EMERGING IEEE 802 WORK ON MAC ADDRESSING

Local Address Structure and Address Distribution

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Presentation Objective

- Give an overview of MAC Addresses
- Cover emerging work on MAC Addresses.

IEEE 802 ADDRESSING

IEEE 802 Addresses

- IEEE 802 defines Universal Addresses and Local Addresses
  - 48-bit and 64-bit addresses are defined.
  - Most usage up to now has been universal addresses
- Universal addresses
  - Have U/L bit set to 0
  - Called an Extended Unique Identifier (EUI-48 or EUI-64)
  - IEEE 802.16 uses EUI-64, other IEEE 802 standards use EUI-48
- Local addresses
  - Have the U/L bit set to set to 1
  - No other defined structure

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Universal address structure

- Blocks are assigned by the IEEE Registration Authority
- 3 sizes of blocks
  - Number of IEEE assigned bits is 24, 28 or 36 (providing 2^{24}, 2^{20}, 2^{12} EUI-48s, respectively)
  - The IEEE assigned bits include the Universal/Local bit which is always 0 and the Individual/Group bit
- Objective is to have the address space last at least 100 years.

THE NEED FOR LOCAL ADDRESS USE

MAC address consumption ramps up

- When MAC addresses were created (~1980) network ports were used only on computers and large printers in enterprises.

- Approaching the 2nd decade (2000), MAC address usage was still on a pace to last centuries.
  - A typical user might have 3-5 devices with MAC addresses

- Now, it isn't unusual to have a dozen or more addresses per person
  - Cell phones, TVs, Blu-ray players, tablets, printers, network devices, laptops, media computer – and many of these have multiple addresses for multiple ports.

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And now things go on networks

- Sensors and actuators – e.g. light switches and thermostats
- LED lights which get power and control over Ethernet
- Potentially dozens of ports per home, car or machine
- **Some may be disposable or short lived**, e.g. medical sensors
- **Some may be virtual** – virtual machines use MAC addresses too.

Enabling Local Addresses

- **How do we enable using local addresses for these things?**
- User configuration of addresses isn't feasible.
- We need to enable Local address use without configuration

Local address space

- The Local Address space is has been:
  - A huge flat space: 2^{46} addresses
  - But lacking in organization to enable using it for anything but by a local administrator
- It is rarely used
- Work needed to enable its use without an administrator configuring the address for each device.

IEEE 802c

Local Address Usage

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IEEE P802c Local Address Usage

- Provide an for an optional structured use of the local address space to allow for coexistence of address assignment protocols with each other and with administered addresses.
  - Structured Local Address Plan (SLAP)
- The project is currently at first Working Group ballot
  - Details may change

Structured Local Address Plan

Divides the address space into quadrants for:

- Standards Assigned Identifier – a space for IEEE 802 address assignment protocols
- Extended Local Identifier – a space for protocols that assign addresses from a Company ID block
  - Includes some blocks for local administrator assignment
- Administratively Assigned identifier – can be used for random address assignment
- Reserved Quadrant

IEEE 802CQ

Multicast and Local Address Assignment Protocol

IEEE 802.1CQ

- Specify protocols and procedures for assignment of locally unique addresses.
- Applies to assignment of individual addresses and multicast (group) addresses
- Provide for both
  - Address servers providing address
  - Peer-to-peer address claiming

- Protocol proposals are being solicited

SUMMARY

Summary

- Not every device should need a global MAC address
- We need to enable use of local MAC addresses
- Projects are underway to do this.
- Don't assume that every individual MAC address is an EUI or that every device has an EUI.

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Tutorial Survey

- Please give your feedback on this tutorial session:

  https://www.surveymonkey.com/r/96ieee