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 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
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.
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
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

- 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.
Tutorial Survey

• Please give your feedback on this tutorial session:
  https://www.surveymonkey.com/r/96ieee