IEEE Registration Authority

Virtualization & OUI Tiers

Glenn Parsons, RAC Chair

July 2012

RAC Members

- Glenn Parsons, Chair

- Geoff Thompson, (LMSC prime) IEEE 802

- Clint Chaplin, (LMSC alternate) IEEE 802

- Bob Davis, (MSC prime)

- Leonard Tsai, (MSC alternate)

- Tom Kurihara, (VTS / ITS prime) IEEE 1609

- Geoffrey Garner , (I&M prime) IEEE 1588

- George Riley, ex-officio (CS SAB)

Staff
- Angela Thomas, RAC Secretary
- Karen Lambert, Registrar

RAC Mission

- The IEEE Registration Authority Committee (IEEE RAC) is the oversight committee for the IEEE Registration Authority.
  - OUI, OUI-36, IAB, Ethertype, 802.16 BID
  - LLC, IEEE OID, 1451.4 Mfg ID, 1609.12 PSID

- The IEEE RAC is international in scope, assisting standard developing organizations in their establishment of unambiguous, sustainable registration authorities.

- The IEEE RAC considers the long-term interests of the ultimate users of these standards, while pragmatically addressing the needs of the affected organizations, industries, and the IEEE.

Current RAC Policy on virtualization

- A "prime directive" of the RAC is to not run out of global EUI-48 (aka MAC-48) addresses for 100 years
  - OUIs sold – in 2011:   *1386*   all time: *16390*
  - If linear – more than 99% left, <u>4000</u> year supply
  - If growth trend from last few years continues, it is not linear, <u>26</u> years left
  - What is causing and/or could cause the growth?

- Only one (or at most a few) global EUI-48 addresses can be assigned to a single hardware device
  - This is apparently being violated by existing VM vendors
  - ~260 billion EUI-48 (of ~70 trillion possible) addresses have been assigned – but are they all used?

- One OUI (16M EUI-48 addresses) will be issued per customer for VM use until a further VM policy is decided

What virtualization policy would reduce consumption of EUI-48 addresses?

Is virtualization the problem?

Ask these questions to ourselves and to vendors in the VM space to understand the <u>requirements</u>:

1. Should an EUI-48 be the network identifier for VM, equivalent to an EUI-48 on a physical machine?

2. If so, should the EUI-48 be from the local or global address space?

3. Should the address be globally unique forever or reusable?

4. Should the RAC enforce this?

IEEE

Some responses

1. Should an EUI-48 be the network identifier for VM, equivalent to an EUI-48 on a physical machine?
   - Yes, in the short term
   - Maybe not in the long term (beyond 5 years)

2. If so, should the EUI-48 be from the local or global address space?
   - Local space to be consistent
   - Global space to ensure non-overlap of multi-vendor

3. Should the address be globally unique forever or reusable?
   - Reusable, as most are doing this already despite collisions

4. Should the RAC enforce this?
   - Recommend only
   - Perhaps the data center should buy address instead of VM vendor

Suggested Solutions?

- Allow assignment of EUI-48 address to VMs
  - Concern that address space will exhaust faster

- Lease, instead of sell, an OUI-based address block
  - Or sell to data center (at various granularities) instead of VM vendor?

- Assign OUI address blocks for VM applications (for either or both of the local and global address space) and allow them to be reusable
  - If in the global space, concern that this will dilute the value of EUI-48

- Create a DHCP-like mechanism to allow dynamic assignment of EUI-48 addresses
  - Force deprecation of random EUI-48 assignment

- Create a new "EUI-128" identifier for VMs
  - Virtualization is software so a new address may be feasible in the long term

New Proposed OUI-based Registries

- OUI   *existing*
- OUI-36   *existing*
- CompanyID-24
- CompanyID-36
- Addresses-A (48 bit)
- Addresses-B (36 bit)
- Addresses-C (28 bit)
- Addresses-D (24 bit)

Registry	EUI48	EUI64
Addresses-A	1	65536
Addresses-B OUI36	4096	268435456 ~270 million
Addresses-C	1048576 ~1 million	68719476736 ~69 billion
Addresses-D OUI	16777216 ~16 million	1099511627776 ~1 trillion

IEEE

OUI-based registries reorganization

- **Key Identifiers**
  1. 24 bit Company ID
  2. 36 bit Company ID
  3. 48 bit EUI-48 address
  4. 64 bit EUI-64 address

- **Existing Registries**
  - OUI : 1, 3, 4
  - OUI-36: 2, 3, 4

- **New Registries:**
  - Addresses Size A: 3, 4
  - Addresses Size B: 3, 4
  - Addresses Size C: 3, 4
  - Addresses Size D: 3, 4
  - Company ID 24 bit: 1
  - Company ID 36 bit: 2

- **Addresses registries**
  - Do not include company ID assignment, they are reserved

- **Company ID registries**
  - Do not include address assignments

- **Pro**
  - Retains current registries
  - Adds granularity to reduce potential "lost" addresses
  - Adds Company ID separation
  - Simplifies naming of registries

- **Con**
  - Separate Company ID registry (that cannot be used to create addresses) may be confusing
  - A lot of granularity

◈IEEE

Your input is requested