MAC Address Format Summary and Suggestion

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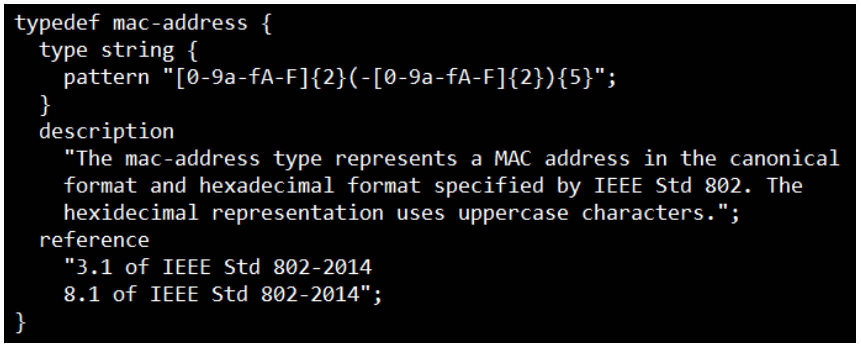
MAC Address Format

- IETF and IEEE 802 have different patterns for mac-address
  - IETF Format: pattern '[0-9a-fA-F]{2}(:[0-9a-fA-F]{2}){5}’;
    - uses ‘:’ as separator
  - IEEE 802 Format: pattern "[0-9a-fA-F]{2}(-[0-9a-fA-F]{2}){5}";
    - uses ‘-’ as separator
    - Also ‘:’ has a different interpretation in IEEE 802 specs than ‘-’ does. The ‘:’ indicates bit-reversal of each hex digit.
      - However the bit-reversal usage is historic
        - » An amendment to IEEE Std 802-2014 is needed

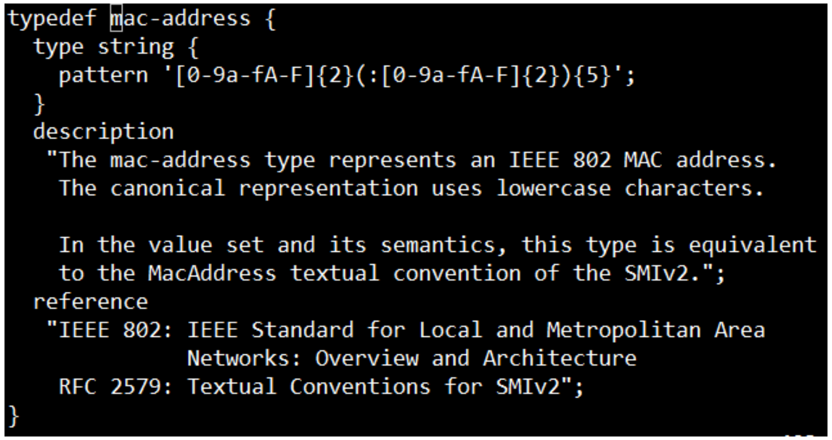
Not just a ‘-’ or ‘:’ problem

- IEEE definition
- [ieee802-types.yang]()
- “-”
- Pattern allows upper and lower case characters but description says uppercase is used.



```
typedef mac-address {
  type string {
    pattern "[0-9a-fA-F]{2}(-[0-9a-fA-F]{2}){5}";
  }
  description
    "The mac-address type represents a MAC address in the canonical
    format and hexadecimal format specified by IEEE Std 802. The
    hexidecimal representation uses uppercase characters.";
  reference
    "3.1 of IEEE Std 802-2014
    8.1 of IEEE Std 802-2014";
}
```

- IETF definition
- [ietf-yang-types.yang]()
- “:”
- Pattern allows upper and lower case but notes that lower case is canonical.



```
typedef mac-address {
  type string {
    pattern '[0-9a-fA-F]{2}(:[0-9a-fA-F]{2}){5}';
  }
  description
   "The mac-address type represents an IEEE 802 MAC address.
    The canonical representation uses lowercase characters.

    In the value set and its semantics, this type is equivalent
    to the MacAddress textual convention of the SMIv2.";
  reference
   "IEEE 802: IEEE Standard for Local and Metropolitan Area
              Networks: Overview and Architecture
    RFC 2579: Textual Conventions for SMIv2";
}
```

Issue with strings

- mac-address typedef is a string in YANG
- That means when mac-address is used as a key, the input format used must match not only the separator (‘:’ or ‘-’) but the case of the characters representing the hexadecimal number
- If a mac-address is used as a key, or if two mac-addresses need to be compared, a normalized format would be useful.

Some Example Trouble Spots

- ietf-l2vpn-svc uses mac-address as a key
- ietf-i2rs-rib.yang has a mac-address leaf that the description says is “used for matching”
- ieee802-dot1q-lldp.yang uses mac-address as a key
- ieee802-dot1q-tsn-types.yang defines a mac-address without using the datatype, but uses the same pattern as the ieee mac-address datatype

Why SNMP is different

- In SNMP a MacAddress is an OCTET STRING of size 6 with a display hint.
- On the wire the MacAddress is treated as a string of octets that are not affected by the display hint or the separator used.
- So AE-12-FF would be the same as ae:12:ff

What to do

- Common wisdom says it is too late to change either the IEEE or IETF definition to use a 6 byte binary array
  - This would fix the “on-the-wire” and key comparison issue
  - Whatever is done should be done for any OUI types also
  - Another concern is that the current patterns only support 48-bit MAC addresses, but IEEE Std 802-2014 also mentions “extended address” or 64-bit MAC addresses.
- Identify potential conflicts
  - Modules that use both yang:mac-address and ieee:mac-address and try to compare them or present two different input formats because of the pattern differences.
  - Even if only one definition is used, some hints or guidelines should be created because the format of the string (upper/lower case) matters for comparison

- A Suggestion is provided on the next slide
- Followed by a summary of various options on how to proceed

Suggestion

- Leave the IETF and IEEE definitions alone
- Create a new datatype in ieee802-types.yang
  - Implementations could use the normalized format when mac-address is used as a key or there is a concern over the string matching

```
typedef mac-address-normalized {
   type string {
      pattern "[0-9A-F]{2}([0-9A-F]{2}){5}";
   }
   description
      "The mac-address type represents a
      normalized MAC address format. There is no ambiguity
      in the format so string comparison is possible.";
   reference
      "3.1 of IEEE Std 802-2014
      8.1 of IEEE Std 802-2014
      IETF RFC 6991";   }
```

The pattern has no separator and allows only upper case, this avoids any ambiguity

Do we need to fix the size? Should this be {7}?

Summary

- Do Nothing
- Normalized mac-address format typedef
  - Suggestion from Previous Slide
- Other thoughts?
  - YANG support for display-hint like functionality
  - String equivalence pattern to provide flexibility for string (and key) comparisons
  - Other input and/or display capabilities