Transmission of IPv6 Packets over IEEE 802.11 OCB Networks

draft-ernst-its-ipv6-over-80211ocb-00.txt
draft-lee-its-ipv6-over-80211ocb-00.txt

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Contents of a “IPv6-over-80211 OCB” document at IETF

• The Title

• Maximum Transmission Unit:
  – What is the size of the MTU on 802.11-OCB?
  – How to communicate the MTU between 802.11-OCB nodes?
  – IP or MAC fragmentation?

• Frame format:
  – What is the value of the Ethertype on 802.11-OCB?
  – What is the frame format on 802.11-OCB?

• Interface ID: how to build the Interface ID?

• Address mappings: how to map certain unicast and multicast addresses between 802.11 and IP layers?
Title

• Transmission of IPv6 Packets over IEEE 802.11 Networks Outside the Context of a Basic Service Set

• Transmission of IPv6 Packets over the IEEE 802.11p OCB Mode

• Transmission of IPv6 Packets over IEEE 802.11-OCB Networks
Maximum Transmission Unit size

• Currently MTU for 802.11-OCB == 1500 bytes as wired Ethernet

• ETSI CAM specifications are not TLV but ASN.1 “containers”/“matrioska” – no size limit

• 802.11-OCB can transmit >1500byte MTU
• 802.11-OCB MTU is 2308 bytes [RR] » Should we use this MTU?

• Size of common packets captured on 802.11-OCB:
  – WSMP (non IPv6):
    • Unsigned BSM 171 bytes
    • Signed BSM 335 bytes
    • SPAT 350 bytes
    • MAP 663 bytes
  – CAM (non IPv6):
    • At ITS Congress demo: 108 and 524 bytes
    • At GCDC 2016 demo: 102 bytes
  – IPv6:
    • CAM 'heresy' as UDP/IPv6 payload: 76 bytes
    • RA: 125 bytes

• MTU bigger than 1500bytes may be useful for:
  – List of Points of Interest (POI) advertised by Road-Side Units
  – Multiple authentication signatures added to large messages

• Determine the real MTU:
  – PMTUD open source?
  – Algorithm: send an increasing UDP packet until flag “802.11 More Fragments” flips.
Fragmentation

• Not a typical topic in IPv6-over-foo, but seems favorable to include.

• To respect the MTU of 802.11-OCB:
  – IP layer fragments, _and_ MAC layer fragments
  – IP layer does not fragment, MAC layer fragments
  – IP layer fragments, MAC layer does not fragment
  – which one to use and write?
IPv6 packets can be transmitted as "IEEE 802.11 Data" or alternatively as "IEEE 802.11 QoS Data":

- **IEEE 802.11 Data**
  - Logical-Link Control
  - IPv6 Header

- **IEEE 802.11 QoS Data**
  - Logical-Link Control
  - WSMP Header - if replaced by IPv6 header

**Details**

- **IEEE 802.11 QoS Data**: Flags: 0x0000
  - 0x00 = Version: 0
  - 0x10 = Type: Data frame (2)
  - 0x00 = Subtype: 8
  - Flags: 0x00
  - .00 = DS status: Not leaving DS or network is operating in AD-HOC mode (To DS: 0 From DS: 0) (0x00)
  - .00 = More Fragments: This is the last fragment
  - .00 = Retry: Frame is not being retransmitted
  - .00 = PMR MSG: STA will stay up
  - ..0 = More Data: No data buffered
  - ..0 = Protected flag: Data is not protected
  - .00 = Order Flag: Not strictly ordered
  - .00 = Duration: 0 microseconds
  - Receiver address: Broadcast (ff:ff:ff:ff:ff:ff)
  - Destination address: Broadcast (ff:ff:ff:ff:ff:ff)
  - Transmitter address: 00:cf:8f:00:82:6a (00:cf:8f:00:82:6a)
  - Source address: 00:cf:8f:00:82:6a (00:cf:8f:00:82:6a)
  - SSID: Broadcast (ff:ff:ff:ff:ff:ff)
  - Frame check sequence: Oxbeb2f5933 [correct]
  - [Good: True]
  - [Bad: False]
Frame Format

• Reasons to use 802.11 Data Headers
  – Most prototypes do
  – Small and fast

• Reasons to use 802.11 QoS Data Headers
  – Map flows of IP data on separate DSRC/ITS-G5 channels

  – IP differServ may apply

  – draft-ietf-tsvwg-ieee-802-11 proposes mappings of Differentiated Services Code Points (DSCP) to 802.11 User Priorities (UP) for Telephony, Multimedia Conferencing, Low-Latency Data — why not DSRC Control Channel?

• Which frame format to use and to write?
Interface ID

• See the 6man Interface ID
• See the privacy MAC addresses
Address Mapping – unicast

• Work under Way.
Address Mapping – multicast

- ff02::1 ➔ 33-33-0-0-0-1
- ff02::XXXX:XXXX ➔ 33-33-XX-XX-XX-XX
- Destination alternatives:
  - 33-33-0-0-0-1
  - ff-ff-ff-ff-ff-ff “broadcast” for IPv4
  - 01-80-C2-00-00-1D reserved by IEEE for ISO/IEC JTC1/SC6
  - ISO/IEC 9542 as “All Multicast Capable Intermediate Systems Address”
  - 01-00-5E- reserved by IEEE for multicast addresses under IANA OUI (they are not Local).
  - ➔ Which one to use?
Address Mapping – multicast

For Link scoped IPv6 multicast addresses:

A Group ID TBD of length 112bits may be requested from IANA; this Group ID signifies "All 80211OCB Interfaces Address". Only the least 32 significant bits of this "All 80211OCB Interfaces Address" will be mapped to and from a MAC multicast address.

For other than link- and interface- scoped IPv6 multicast addresses:

Application-specific multicast addresses may be requested later for use in vehicular communications use-cases (i.e. “all Uber cars in the street”).