Finalizing charter text and deliverables

IETF ITS Virtual BoF Session

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by webex teleconference,

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Charter Body (1 of 2)

Automobiles and vehicles of all types are increasingly connected to the Internet. Comfort-enhancing entertainment applications, road safety applications using bidirectional data flows, and connected automated driving are but a few new features expected in automobiles to hit the roads from now to year 2020.

Today, there are several deployed Vehicle-to-Internet technologies (V2Internet) that make use of embedded Internet modules, or through driver's cellular smartphone: mirrorlink, carplay, android auto. However, Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I, not to be mistaken with V2Internet) communications are still being developed.

In the future, some vehicle communications may not use IP for exchanging safety messages with other vehicles and infrastructure. Other vehicle communications may involve IP-based protocols, especially when multiple applications need to share one data link.

This group will work on V2V and V2I use-cases where IP is well-suited as a networking technology, supporting also applications that involve exchanges of safety-related messages between vehicles and infrastructure if necessary.

This group will develop IP-based protocols to establish direct and secure connectivity between a vehicle, which is often comprised of moving networks, and other vehicles and stationary systems. Some communications will be extremely short lived, but others will last for many hours or days.

Charter Body (2 of 2)

Moving network to nearby moving or fixed network communications may involve various kinds of link layers: 802.11-OCB (Outside the Context of a Basic Service Set), 802.15.4 with 6lowpan, 802.11ad, VLC (Visible Light Communications), IrDA, LTE-D, LP-WAN. One of the most used link layers for vehicular networks is IEEE 802.11-OCB, as a basis for DSRC. However, IPv6 on 802.11-OCB is not yet defined.

The group will only work on IPv6 solutions.

The group will leverage on technologies for Internet of Things (IoT) which are developed in other IETF efforts: 6lo, LP-WAN, T2T. Co-existence with techniques of infrastructure mobility management will be coordinated with the DMM Working Group and with LISP Working Group.

The SDOs interested in this work are: ISO/TC204, ETSI TC ITS, 3GPP, NHTSA and more.

This group will not work on V2V or V2I use-cases where IP is not well-suited. It will not work on Delay-Tolerant Networking nor on Information-Centric Networking.

If the group is successful in accomplishing its first goals, then it can be rechartered to work on other things (examples include but are not limited to: a 1-hop mechanism of IP prefix exchange between moving networks, an n-hop extension, naming for moving networks; generalization for trains, air, unmanned and space use-cases).

Deliverables

1. **Informational RFC "ITS General Problem Area"** covering:
   - What is ITS?
     - Explain V2V, V2I, and related terms
   - Why is IPv6 needed?
     - Explain why some traffic will not use IPv6
     - Explain why other traffic will use IPv6
   - Use-cases, illustrating the expected areas for initial focus
   - Informative references, relationship with other SDOs

2. **Standards Track RFC "IPv6 over 802.11p"**

3. **Informational RFC "Problem Statement"** covering:
   - Problem statement
   - Security considerations
   - Privacy considerations

Timeline

Oct 2016 - submit "ITS General Problem Area" to WG

Dec 2016 - submit "IPv6 over 802.11p" to WG

Jun 2017 - submit "ITS General Problem Area" to IESG

Jun 2017 - submit "IPv6 over 802.11p" to IESG

Sep 2017 - submit "Problem Statement" to WG

May 2018 - submit "Problem Statement" to IESG

Candidate drafts

I-D Title	I-D filename	Target Deliverable
Cooperative Adaptive Cruise Control and Platooning at SDOs and Gap Analysis	draft-petrescu-its-cacc-sdo	1, 3
Problem Statement for Vehicle-to-Infrastructure Networking	draft-jeong-its-v2i-problem-statement	1, 3
Problem Statement for the use of IP in some ITS scenarios	draft-petrescu-its-problem	3
Transmission of IPv6 Packets over IEEE 802.11p Networks	draft-petrescu-ipv6-over-80211p-00.txt	2

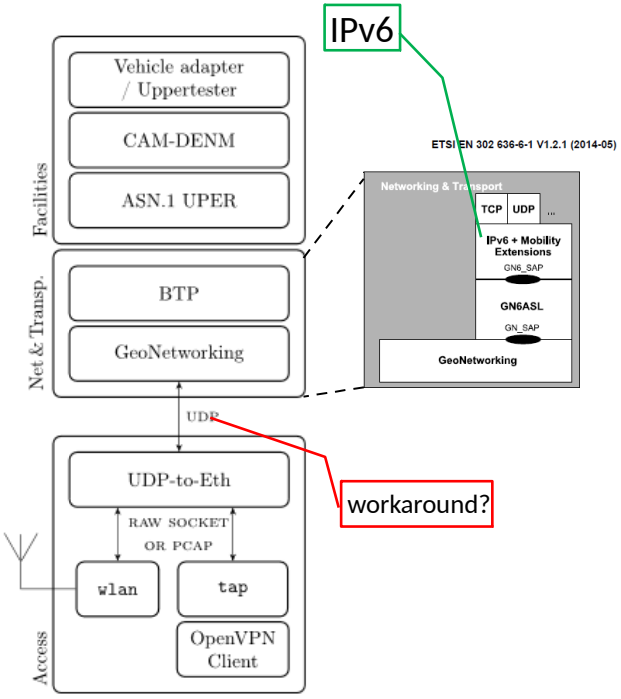
Background for item 2

“IPv6 over foo” RFCs at IETF

- “foo” means a “network” even though it’s a “link”.
- IPv6-over-foo RFCs typically define:
  - Maximum Transmission Unit size
  - frame format and Ethertype
  - formation of the Interface ID, link-local address
  - address mappings between link-layer and network-layer
- Examples of IPv6-over-foo RFCs:
  - "Transmission of IPv6 Packets over Ethernet Networks" RFC 2464
  - "Transmission of IPv6 Packets over IEEE 802.15.4 Networks" RFC 4944
  - "Transmission of IPv6 Packets over ITU-T G.9959 Networks" RFC 7428

“IPv6 over 802.11p” elsewhere

ETSI ITS

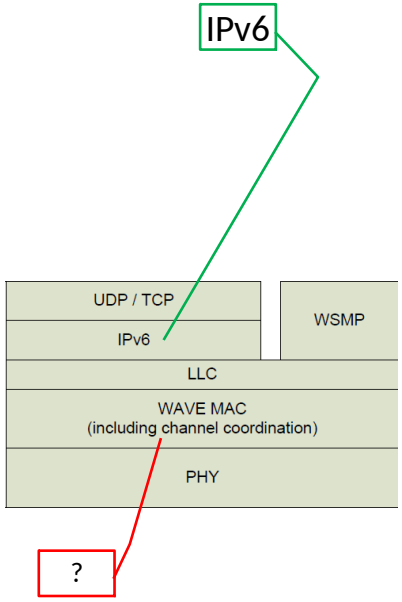


Opensource at github.com/alexvoronov/geonetworking

EN 302 636-6-1 V1.2.1 (2014-05) “IPv6 over GeoNetworking”

(at ETSI “802.11p” means “ITS-G5”)

IEEE WAVE P1609

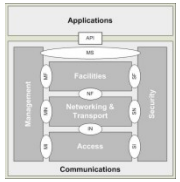


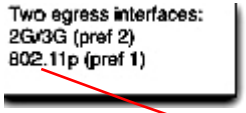
Opensource at itsforge.net

P1609.3v3/D3 July 2015 “Networking Services”

(at IEEE “802.11p” now means “OCBEnabled 802.11-2012”)

ISO TC204



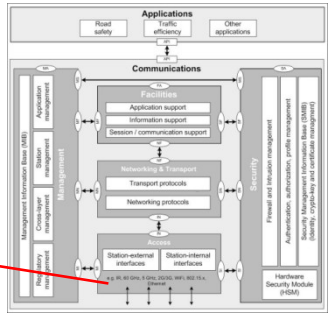


11p among others

IPv6

ISO 21210:2010 “IPv6 Networking”

5GHz among others



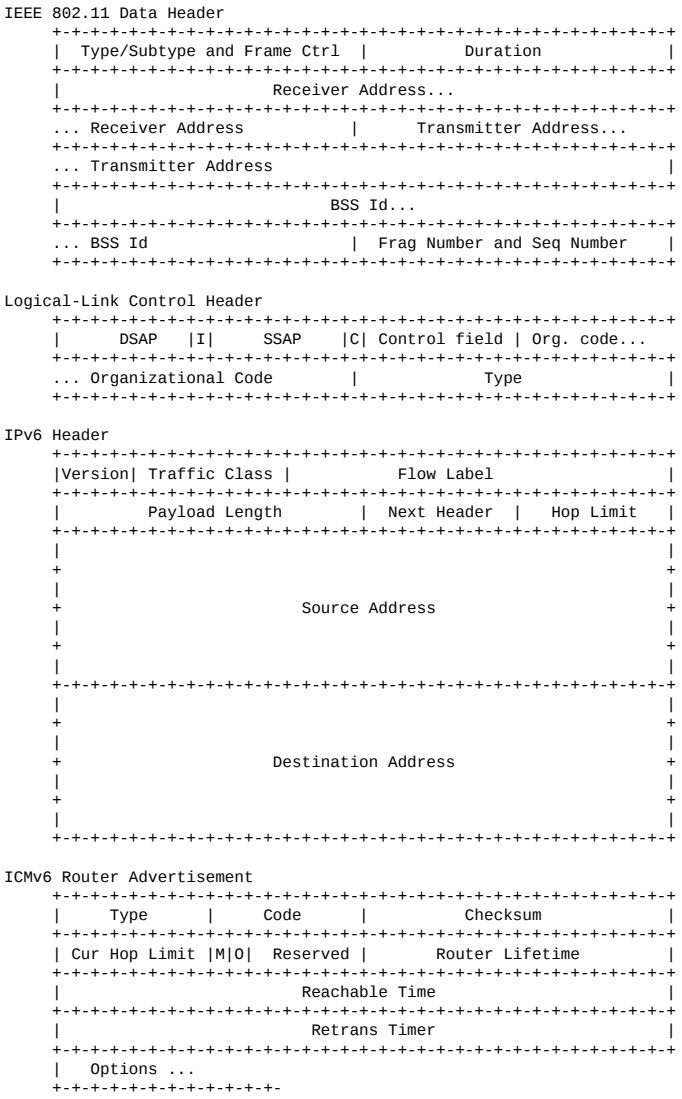
Opensource ---

ISO 21217:2014 “Architecture”

(at ISO “802.11p” means “M5” at “5GHz”)

Captured IPv6-over-80211p

5.9GHz



"Frame Format"

OCB

BSS Id == ff:ff:ff:ff:ff:ff

Type == 0x86DD Internet Protocol version 6 (IPv6)

IPv6

A regular IPv6 packet

For other non-IPv6 and IPv6 packets transmitted over 802.11p see captures at http://www.itsforge.net/index.php/forum/cv-dsrc-message-parser/44-test-files

Other potential IPv6-over-80211p relationship

```
802.11 radio information
IEEE 802.11 QoS Data, Flags: ........C
    Type/Subtype: QoS Data (0x0028)
    Frame Control Field: 0x8800
        .... ..00 = Version: 0
        .... 10.. = Type: Data frame (2)
        1000 .... = 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)
            .... .0.. = More Fragments: This is the last fragment
            .... 0... = Retry: Frame is not being retransmitted
            ...0 .... = PWR MGT: STA will stay up
            ..0. .... = More Data: No data buffered
            .0.. .... = Protected flag: Data is not protected
            0... .... = Order flag: Not strictly ordered
    .000 0000 0000 0000 = Duration: 0 microseconds
    Receiver address: Broadcast (ff:ff:ff:ff:ff:ff)
    Destination address: Broadcast (ff:ff:ff:ff:ff:ff)
    Transmitter address: 00:f4:07:47:c9:07 (00:f4:07:47:c9:07)
    Source address: 00:f4:07:47:c9:07 (00:f4:07:47:c9:07)
    BSS Id: Broadcast (ff:ff:ff:ff:ff:ff)
    .... .... .... 0000 = Fragment number: 0
    1111 0111 1010 .... = Sequence number: 3962
    Frame check sequence: 0x52e5e94e [correct]
    Qos Control: 0x0022
        .... .... .... 0010 = TID: 2
        [.... .... .... .010 = Priority: Spare (Background) (2)]
        .... .... ...0 .... = EOSP: Service period
        .... .... .01. .... = Ack Policy: No Ack (0x0001)
        .... .... 0... .... = Payload Type: MSDU
        0000 0000 .... .... = TXOP Duration Requested: 0 (no TXOP requested)
Logical-Link Control
Wave Short Message Protocol(IEEE P1609.3)
```

Non-IPv6 WSMP capture courtesy CV-DSRC Message Parser at itsforge.net

IPv6 Header RFC2460

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|Version| Traffic Class |           Flow Label                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         Payload Length        |  Next Header  |   Hop Limit   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
+                                                               +
|                                                               |
+                         Source Address                        +
|                                                               |
+                                                               +
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
+                                                               +
|                                                               |
+                      Destination Address                      +
|                                                               |
+                                                               +
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Contents of a potential "IPv6-over-80211p" document at IETF

- MTU: 1280bytes
- Frame format:
  - Ethertype 0x86DD;
  - 802.11 Data Header, LLC Header.
- Interface ID: as RFC2464 but privacy too RFC7217
- Address mappings: as RFC2464 but maybe also a multicast group for "cars nearby"(?)

Other parameters specific to “IPv6-over-80211p” but not pertinent to be defined by an IPv6-over-foo document at IETF

- PHY:
  - frequencies: 5.875GHz or 60GHz
  - power level: 33dBm or 44 dBm
  - distance: 500m
  - modulation: OFDM, half-rate
- MAC:
  - OCB mode, ad-hoc mode, infrastructure mode, ESSID
  - QoS feature mapping
  - Time Stamp Advertisement vs. IPv6 Router Advertisement
- Application:
  - transmission of a WSMP message over IPv6 over 802.11p
- Policy:
  - regional legislation:
    - mandating the use of safety applications on safety channel
    - use of IPv6 on a particular 5.9GHz channel