[RFC] VDA (Vehicle Data Agent)

07/22/2017
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What is current problems

On differences from actual products related to Vehicle data (include kaizen)

- Apps side
  - Apps is depend vehicle HW IF
  - Apps is depend CAN data format
  - Apps is depend destination requirement
    - Shall be all vehicle data change to AGL public data provide to Apps

- MW side
  - MW need to very high cycle vehicle data received
  - MW need to support OEM private confidential data
  - MW need to protect OEM private confidential data
  - MW need to support many vehicle HW IF
  - MW need to vehicle data cache
  - MW need to easy removable vehicle HW IF

- Data Center side
  - Data Center need to real time vehicle data.
  - Data Center need to sync vehicle data when vehicle change offline to online.
Proposal VDA (Vehicle Data Agent)

All vehicle data change to AGL public data and OEM private data provide to Apps

<table>
<thead>
<tr>
<th>AGL DATA Center</th>
<th>OEM DATA Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>New apps</td>
<td></td>
</tr>
<tr>
<td>AGL public data(json)</td>
<td></td>
</tr>
<tr>
<td>OEM private data(json)</td>
<td></td>
</tr>
<tr>
<td>AGL public data(json)</td>
<td></td>
</tr>
</tbody>
</table>

AGL Vehicle Data Software stack

<table>
<thead>
<tr>
<th>Dashboard apps</th>
<th>HVAC apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGL public data(json)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

LVDA (Low level Vehicle Data Agent) [afb-daemon]

Vehicle data cache

<table>
<thead>
<tr>
<th>CAN convert</th>
<th>OEM convert</th>
<th>LIN convert</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN signal</td>
<td>OEM original signal</td>
<td>LIN signal</td>
</tr>
</tbody>
</table>

AGL format

- CAN convert
- OEM convert
- LIN convert

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**Requirement**

- Shall be Support AGL public data
- Shall be Support OEM private data
- Shall be Support over 100 data/sec
- Shall be Support over 1000 data/sec
- Shall be able to exclude OEM confidential data
- Shall be Support read/write IF
- Shall be Support data Filtering/Thinning out
- Shall be Support All Vehicle IF
- Shall be Support data cache
- Shall be able to removable
- Shall be Support MRAA
- Shall be Support AGL public data
- Shall be Support OEM private data
- Shall be Support over 100 data/sec
- Shall be Support over 1000 data/sec
- Shall be Support read/write IF
Example Use Cases 1–1

VDA provide to same event to Apps from different CAN data.

OEM A

Input mng

AGL public data (json) (iDrive event)

Vehicle data cache

AGL format

CAN convert

can0

Renesas R-CAR M3 + KF [1]

Same event

AGL public data (json) (iDrive event)

Vehicle data cache

AGL format

CAN convert

can0

Renesas R-CAR M3 + KF [1]

OEM B

Input mng

Vehicle data cache

AGL format

CAN convert

can0

Vehicle data cache

AGL format

CAN convert

can0

Renesas R-CAR M3 + KF [1]

Input mng

Vehicle data cache

AGL format

CAN convert

can0

Renesas R-CAR M3 + KF [1]

Same event

Shall be able to Exclude OEM confidential data

Different data

Shall be able to Exclude OEM confidential data

Different data

Vehicle data cache

AGL format

CAN convert

can0

Renesas R-CAR M3 + KF [1]
Example Use Cases 1–2

VDA provide to same event to Apps from different hardware IF.

OEM A model 1

Input mng

AGL public data(json) (iDrive event)

LVDA[afb–daemon]

Vehicle data cache

AGL format

CAN convert

json

CAN signal

Renesas R–CAR M3 + KF [1]

OEM A model 2

Input mng

AGL public data(json) (iDrive event)

LVDA[afb–daemon]

Vehicle data cache

AGL format

OEM convert

json

OEM original

Shall be able to removable

Input mng

Vehicle data cache

AGL format

Different data

CAN signal

Renesas R–CAR M3 + KF [1]

can0

OEM original
Examples of Use Cases 2

Apps not depend destination requirement (For example Driver Distraction)

**Destination A**

<table>
<thead>
<tr>
<th>Apps</th>
<th>VehicleData</th>
<th>DriverDistraction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10km/h &lt;= Speed</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>Speed &lt; 10km/h</td>
<td>OFF</td>
</tr>
</tbody>
</table>

- HVDA (High level Vehicle Data Agent)
  - AGL public data (DriverDistraction)
  - AGL public data (VehicleSpeed & ParkingBrake)
- LVDA [afb-daemon]
  - CAN convert
  - json
  - CAN signal
- Renesas R-CAR M3 + KF [1]
  - can0

**Destination B**

<table>
<thead>
<tr>
<th>Apps</th>
<th>VehicleData</th>
<th>VehicleData</th>
<th>DriverDistraction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10km/h &lt;= Speed</td>
<td>ParkingBrake=OFF</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>Speed &lt; 10km/h</td>
<td>ParkingBrake=ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

- HVDA (High level Vehicle Data Agent)
  - AGL public data (DriverDistraction)
  - AGL public data (VehicleSpeed & ParkingBrake)
- LVDA [afb-daemon]
  - CAN convert
  - json
  - CAN signal
- Renesas R-CAR M3 + KF [1]
  - can0

Change destination logic
[RFC] 2018 CES demo plan

AGL DATA Center

New apps

AGL public data (json)

HVDA (High level Vehicle Data Agent)

Input mng

AGL Vehicle Data Software stack

Dashboard apps

HVAC apps

AGL public data (json)

AGL public data (json)

AGL public data (json)

OEM private data (json)

LVDA (Low level Vehicle Data Agent) [afb-daemon]

Vehicle data cache

AGL format

AGL format

AGL format

CAN convert

CAN convert

LIN convert

CAN signal

CAN signal

LIN signal

Renesas R-CAR M3 + KF [1]

can0

can1

sllin0

Servomotor

AGL CAN Simulator

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KF[1]

http://elinux.org/R-Car/Boards/Kingfisher
Define AGL Public Vehicle Data

Collaborate with the Reference Hardware System Architecture Expert Group

Sample

AGL Public Vehicle Data

Reference to
https://rawgit.com/w3c/automotive-bg/master/snapshots/data_spec_snapshot_latest.html

<table>
<thead>
<tr>
<th>No</th>
<th>Data label(Apps side)</th>
<th>value</th>
<th>AGL Reference IF</th>
<th>ID</th>
<th>Length</th>
<th>Data</th>
<th>cycle(ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VehicleSpeed</td>
<td>unsigned short</td>
<td>CAN</td>
<td>0x010</td>
<td>2 <strong>,</strong></td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>GearPosition</td>
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<td>1 **</td>
<td>64</td>
<td>64</td>
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<tr>
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<td>LightStatus</td>
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<td>2 <strong>,</strong></td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Seatbelt;</td>
<td>unsigned short</td>
<td>CAN</td>
<td>0x300</td>
<td>2 <strong>,</strong></td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>5</td>
<td>FuelInterface</td>
<td>unsigned short</td>
<td>CAN</td>
<td>0x400</td>
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<td>1,000</td>
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<tr>
<td>6</td>
<td>EngineSpeed</td>
<td>unsigned long</td>
<td>CAN</td>
<td>0x011</td>
<td>4 <strong>,</strong></td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

Reference to w3c, OpenXC and FMS Vehicle data