AASIG –Workshop #2

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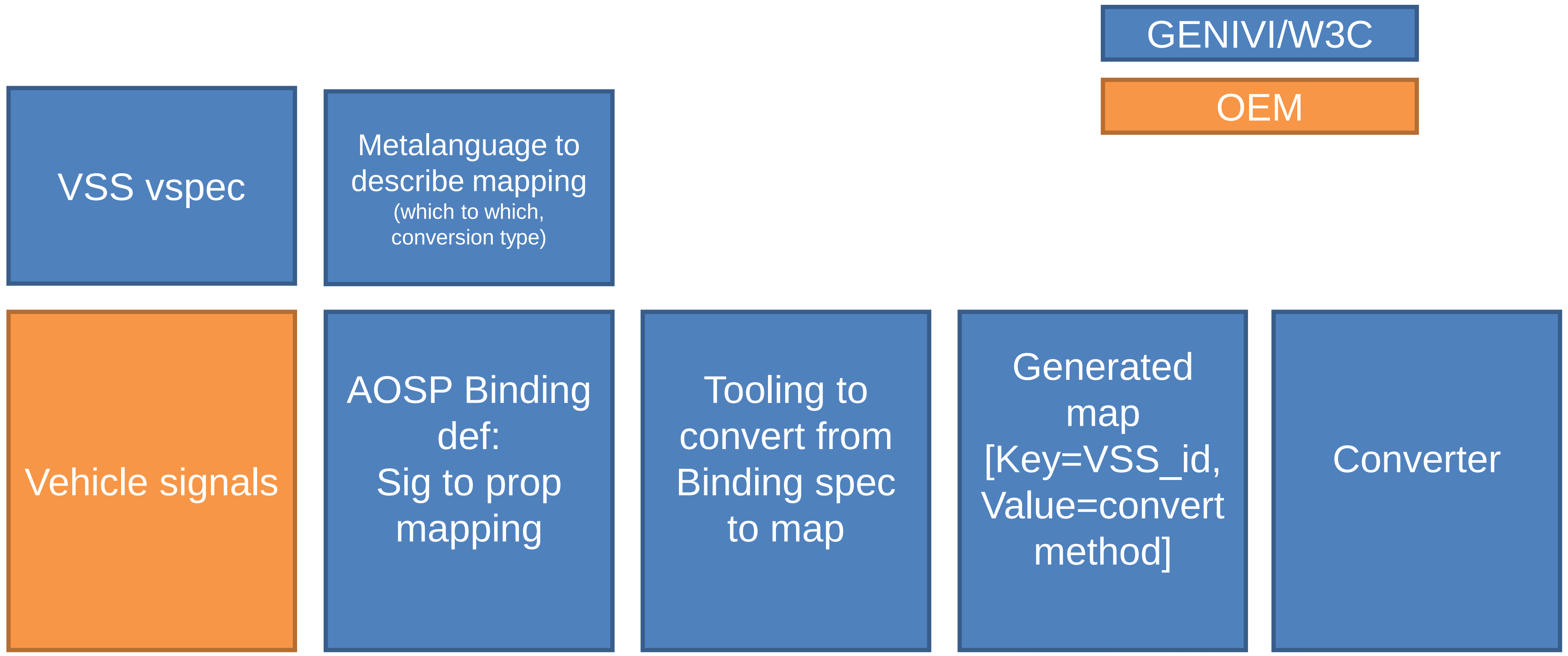
GENIVI All Member Meeting | May 2021

Workshop Agenda

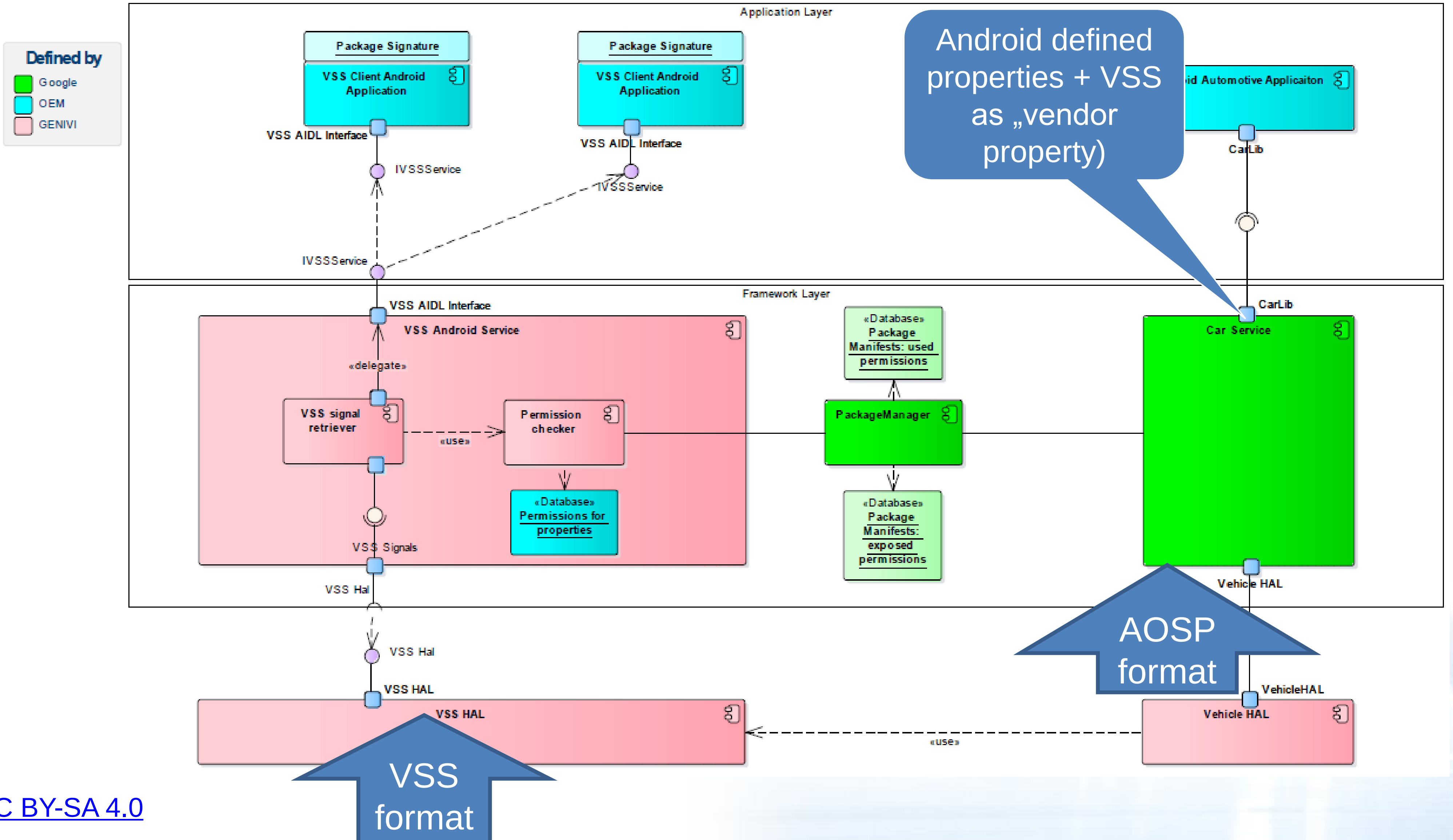
- Level of standardization (how deep GENIVI should standardize the access to Vehicle API: spec level? Tooling level? Implementation level?
- Do we need an alternative API to Android SDK for accessing data? (discussion about the real usecases of accessing data for applications)
- Brainstorm on the metalanguage for describing the conversion between 2 specifications (VSS and Android)
- Virtualization => how can we minimize changes to Android (virtio, trout)
- Simulation => how can we simulate HW acceleration in a seemless environment together an Emulated Android
- Multiple microphones usage in Android
- Multiple devices collaboration : device centric vs car system centric.

Level of standarization



GENIVI/W3C
OEM
VSS vspec
Metalanguage to describe mapping (which to which, conversion type)
Vehicle signals
AOSP Binding def: Sig to prop mapping
Tooling to convert from Binding spec to map
Generated map [Key=VSS_id, Value=convert method]
Converter

Do we need 2nd API? PROS/CONS

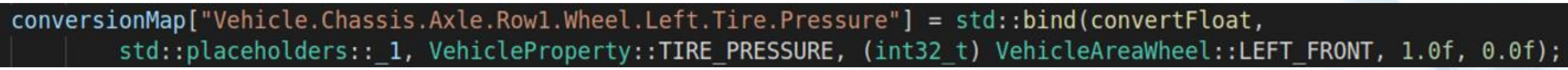


Replace xlxs to reduce human input

```
#
# Tire
#
- Tire:
  type: branch
  description: Tire signals for wheel

- Tire.Pressure:
  datatype: uint8
  type: sensor
  unit: kpa
  description: Tire pressure in kilo-Pascal
```

```
/**
  * Tire pressure
  *
  * min/max value indicates tire pressure sensor range.  Each tire will have a separate min/max
  * value denoted by its areaConfig.areaId.
  *
  * @change_mode VehiclePropertyChangeMode:CONTINUOUS
  * @access VehiclePropertyAccess:READ
  * @unit VehicleUnit:KILOPASCAL
  */
 TIRE_PRESSURE = (
     0x0309
     | VehiclePropertyGroup:SYSTEM
     | VehiclePropertyType:FLOAT
     | VehicleArea:WHEEL),
```

Bind Tire.Pressure to TIRE_PRESSURE – vss layer?
Bind actual „entity” (Row1.Wheel.Left.Tire.Pressure) to VehicleArea – vss layer?
Describe translation between units that are sometimes „tricky” – vss layer with „mathematical language”?

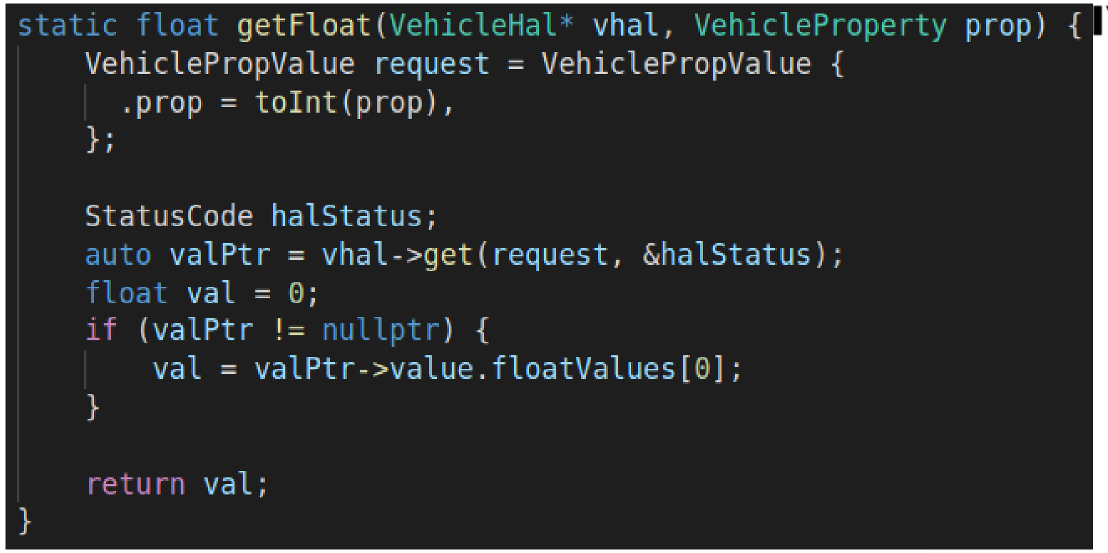


```
conversionMap["Vehicle.Chassis.Axle.Row1.Wheel.Left.Tire.Pressure"] = std::bind(convertFloat,
        std::placeholders::_1, VehicleProperty::TIRE_PRESSURE, (int32_t) VehicleAreaWheel::LEFT_FRONT, 1.0f, 0.0f);
```

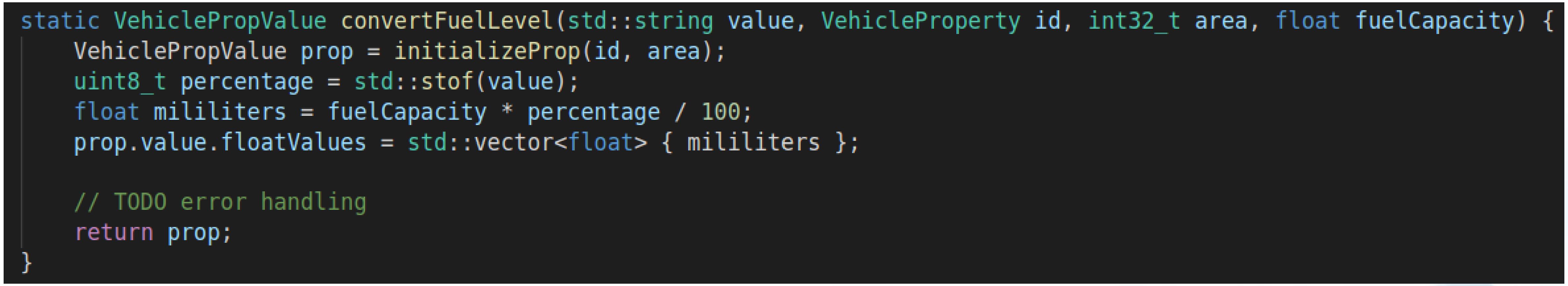
Challenge

```
- Vehicle.Powertrain.FuelSystem.Level
          aospId: VehicleProperty::FUEL_LEVEL
          aospArea: VehicleArea::Global
          translation:
                      -complex: „$INFO_FUEL_CAPACITY * _VAL_ / 100"
```

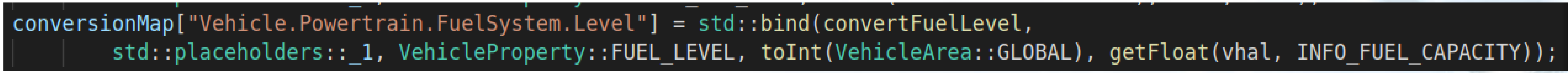
Vehicle.Powertrain.FuelSystem.Level
To VehicleProperty::FUEL_LEVEL
Conversion from % to mililiters – conversion dependent on other signal!



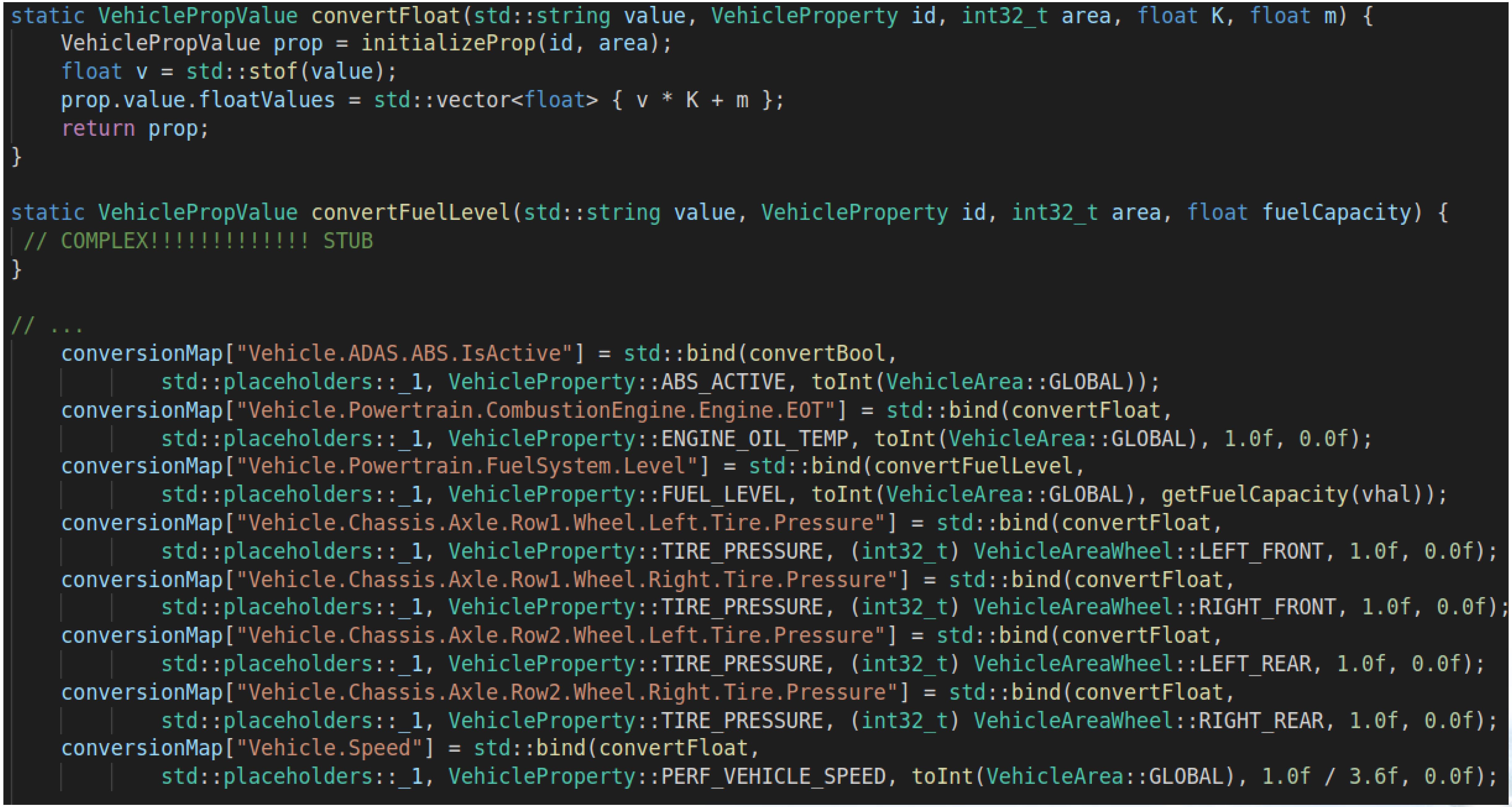
```
static float getFloat(VehicleHal* vhal, VehicleProperty prop) {
    VehiclePropValue request = VehiclePropValue {
      .prop = toInt(prop),
    };

    StatusCode halStatus;
    auto valPtr = vhal->get(request, &halStatus);
    float val = 0;
    if (valPtr != nullptr) {
        val = valPtr->value.floatValues[0];
    }

    return val;
}
```



```
static VehiclePropValue convertFuelLevel(std::string value, VehicleProperty id, int32_t area, float fuelCapacity) {
    VehiclePropValue prop = initializeProp(id, area);
    uint8_t percentage = std::stof(value);
    float mililiters = fuelCapacity * percentage / 100;
    prop.value.floatValues = std::vector<float> { mililiters };

    // TODO error handling
    return prop;
}
```



```
conversionMap["Vehicle.Powertrain.FuelSystem.Level"] = std::bind(convertFuelLevel,
        std::placeholders::_1, VehicleProperty::FUEL_LEVEL, toInt(VehicleArea::GLOBAL), getFloat(vhal, INFO_FUEL_CAPACITY));
```

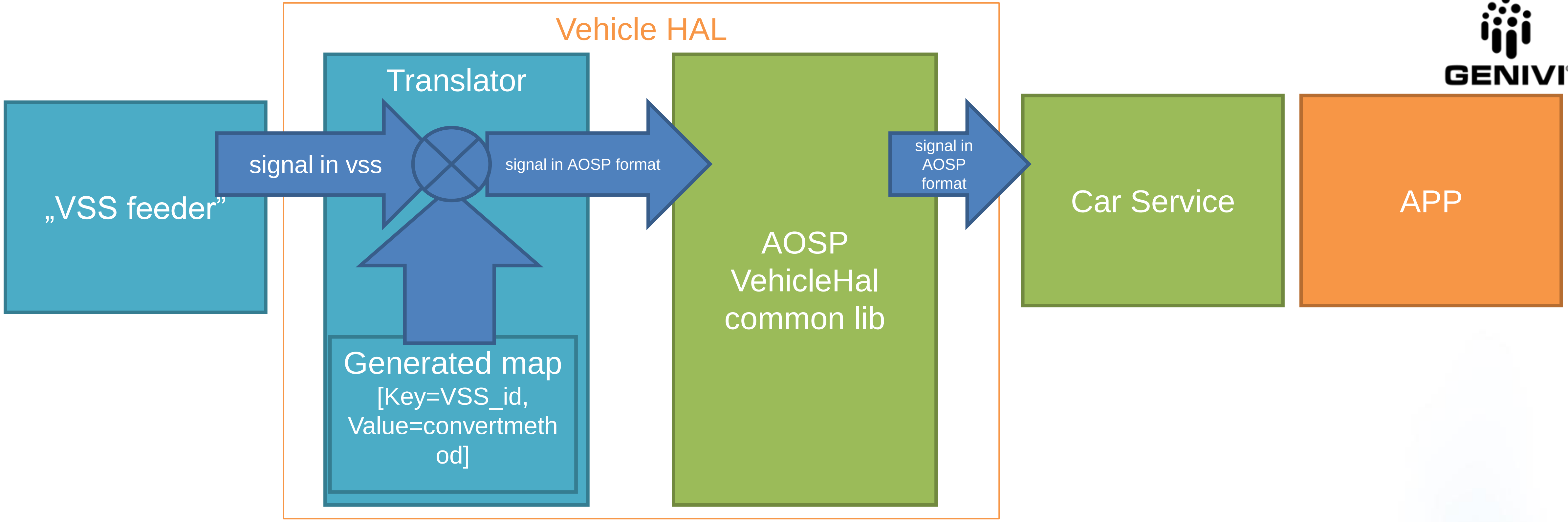


```cpp
static VehiclePropValue convertFloat(std::string value, VehicleProperty id, int32_t area, float K, float m) {
    VehiclePropValue prop = initializeProp(id, area);
    float v = std::stof(value);
    prop.value.floatValues = std::vector<float> { v * K + m };
    return prop;
}

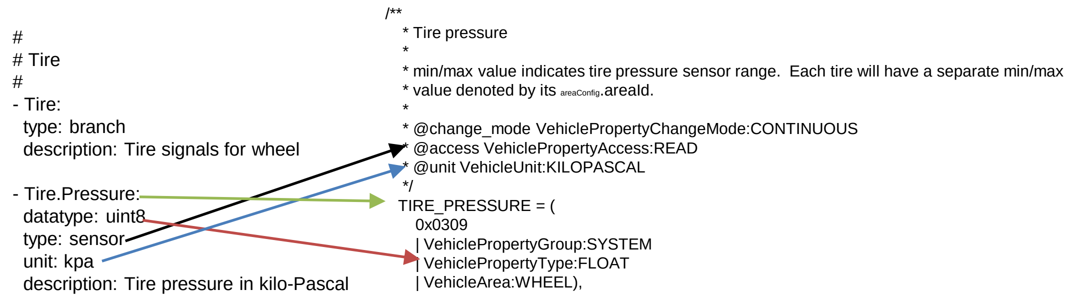
static VehiclePropValue convertFuelLevel(std::string value, VehicleProperty id, int32_t area, float fuelCapacity) {
 // COMPLEX!!!!!!!!!!!!! STUB
}

// ...
    conversionMap["Vehicle.ADAS.ABS.IsActive"] = std::bind(convertBool,
            std::placeholders::_1, VehicleProperty::ABS_ACTIVE, toInt(VehicleArea::GLOBAL));
    conversionMap["Vehicle.Powertrain.CombustionEngine.Engine.EOT"] = std::bind(convertFloat,
            std::placeholders::_1, VehicleProperty::ENGINE_OIL_TEMP, toInt(VehicleArea::GLOBAL), 1.0f, 0.0f);
    conversionMap["Vehicle.Powertrain.FuelSystem.Level"] = std::bind(convertFuelLevel,
            std::placeholders::_1, VehicleProperty::FUEL_LEVEL, toInt(VehicleArea::GLOBAL), getFuelCapacity(vhal));
    conversionMap["Vehicle.Chassis.Axle.Row1.Wheel.Left.Tire.Pressure"] = std::bind(convertFloat,
            std::placeholders::_1, VehicleProperty::TIRE_PRESSURE, (int32_t) VehicleAreaWheel::LEFT_FRONT, 1.0f, 0.0f);
    conversionMap["Vehicle.Chassis.Axle.Row1.Wheel.Right.Tire.Pressure"] = std::bind(convertFloat,
            std::placeholders::_1, VehicleProperty::TIRE_PRESSURE, (int32_t) VehicleAreaWheel::RIGHT_FRONT, 1.0f, 0.0f);
    conversionMap["Vehicle.Chassis.Axle.Row2.Wheel.Left.Tire.Pressure"] = std::bind(convertFloat,
            std::placeholders::_1, VehicleProperty::TIRE_PRESSURE, (int32_t) VehicleAreaWheel::LEFT_REAR, 1.0f, 0.0f);
    conversionMap["Vehicle.Chassis.Axle.Row2.Wheel.Right.Tire.Pressure"] = std::bind(convertFloat,
            std::placeholders::_1, VehicleProperty::TIRE_PRESSURE, (int32_t) VehicleAreaWheel::RIGHT_REAR, 1.0f, 0.0f);
    conversionMap["Vehicle.Speed"] = std::bind(convertFloat,
            std::placeholders::_1, VehicleProperty::PERF_VEHICLE_SPEED, toInt(VehicleArea::GLOBAL), 1.0f / 3.6f, 0.0f);
```

BACKUP Slides


Vehicle HAL
„VSS feeder”
Translator
signal in vss
signal in AOSP format
Generated map [Key=VSS_id, Value=convertmethod]
AOSP VehicleHal common lib
signal in AOSP format
Car Service
APP

AOSP-VSS-Mapping.xlsx



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   * value denoted by its areaConfig.areaId.
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  TIRE_PRESSURE = (
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     | VehiclePropertyGroup:SYSTEM
     | VehiclePropertyType:FLOAT
     | VehicleArea:WHEEL),
```

From vspec   From types.hal

"ID" from VehicleProperty	Proposed equivalent VSS	Datatype, V	Unit, VSS	Datatype, Android	Unit, Android	Transformation type	K	m	Variations	Comments
ABS_ACTIVE	**Vehicle.ADAS.ABS.IsActive**	**BOOLEAN**	**N/A**	**BOOLEAN**	**N/A**	**EQUAL**	1	0		
ENGINE_OIL_TEMP	**Vehicle.Powertrain.CombustionEngine.Engine.EOT**	**UINT8**	**Celsius**	**FLOAT**	**Celsius**	**INT_TO_FLOAT**	1	0	Vehicle.OBD.OilTemperature	VSS: Combustion version missing in VehicleSignalSpecification.id. Android @unit VehicleUnit:CELSIUS, VSS: Celsius
TIRE_PRESSURE	**Vehicle.Chassis.Axle.Row1.Wheel.Left.Tire.Pressure**	**UINT8**	**kPa**	**FLOAT**	**kPa**	**INT_TO_FLOAT**	1	0	Vehicle.Chassis.Axle.Row1.Wheel.Right.Tire.Pressure	Android unit: kPa, VSS unit: kPa
PERF_VEHICLE_SPEED	**Vehicle.Speed**	**INT32**	**km/h**	**FLOAT**	**m/s**	**INT_TO_FLOAT**	1/3,	0	Vehicle.Powertrain.Transmission.Speed, Vehicle.Speed	Android unit: m/s VSS unit: km/h
FUEL_LEVEL	**Vehicle.Powertrain.FuelSystem.Level**	**UINT8**	**percent**	**FLOAT**	**milliliters**	**COMPLEX**			Vehicle.OBD.FuelLevel, Vehicle.Powertrain.FuelSystem.Level	Percent in VSS and milliliters in in Android