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Connectivity Standards Engineer  
General Motors



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App Store  
BMW Group



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Innovation & Partnerships Sr. Manager  
Faurecia

# AOSP App Framework Standardization Expert Group Status

# AUTOMOTIVE AOSP APP FRAMEWORK STANDARDIZATION

EXPERT GROUP

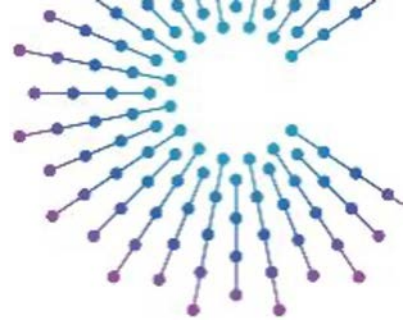
OCTOBER 11<sup>TH</sup>, 2023



## COVESA

Accelerating the future of connected vehicles

# Antitrust Note Well



Before we begin, we would like to make clear that COVESA is committed to compliance with the antitrust laws in all of its activities, and that it expects all participants to similarly comply with the antitrust laws. We will not engage in--and members must refrain from--any discussion of, or understandings regarding competitively sensitive topics. If you have any doubts regarding whether a matter is appropriate for discussion, please consult with your antitrust counsel.



# Agenda

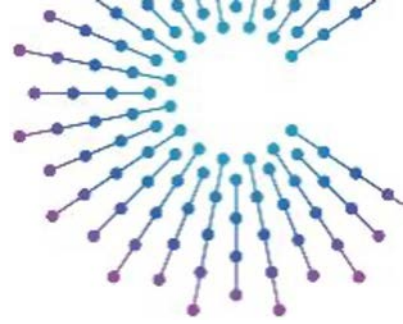
OCTOBER 11<sup>TH</sup>, 2023  
9:00AM – 9:45AM EST



# COVESA

Accelerating the future of connected vehicles

# Agenda

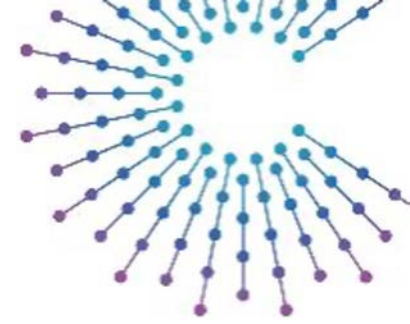


- Why is there the need for an AOSP App Framework Standardization Expert Group?
- What already happened on the topic at COVESA
- Status update on ongoing work streams
- What's Next
- Questions

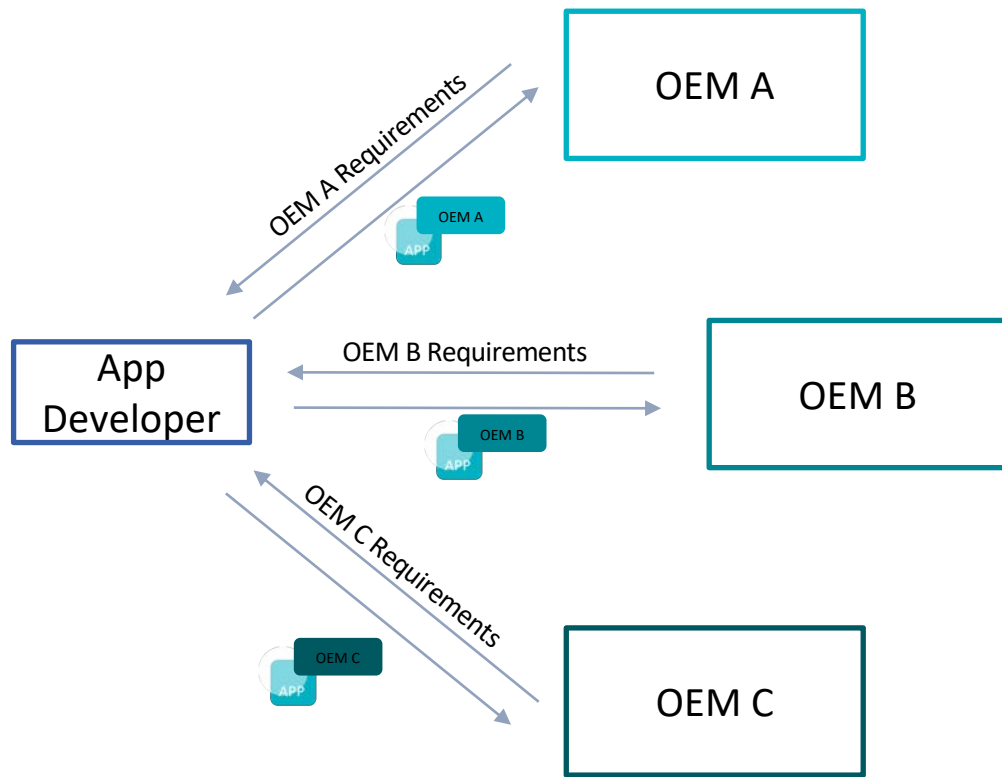
A decorative graphic at the top of the slide consists of a network of interconnected nodes and lines. The nodes are represented by small circles in various shades of blue and purple, connected by thin lines. The overall pattern is a complex, web-like structure that spans the width of the slide.

## **Why is there the need for an AOSP App Framework Standardization Expert Group?**

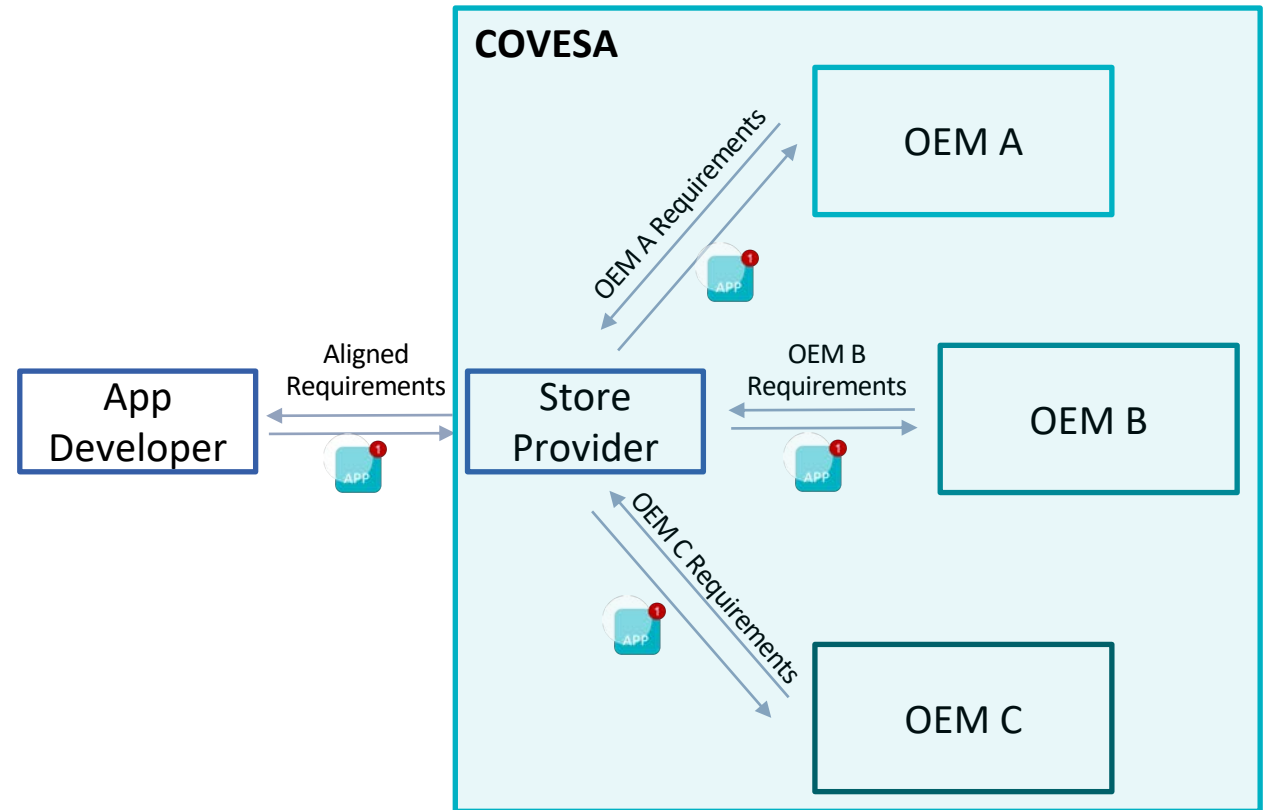
# Traditional Approach vs. Platform Ecosystem Approach.



- # Develop app once, deploy to many OEMs via an App Store.
- # No need for OEM specific development work.



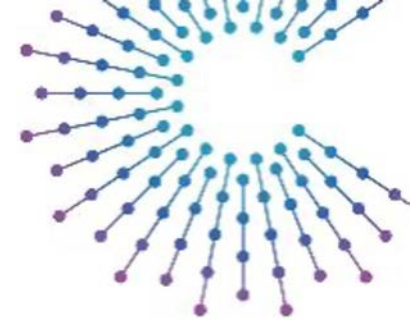
Traditional Approach



Platform Ecosystem Approach



# With an AOSP-based App Store, OEMs support a relevant 3rd Party Ecosystem to emerge.

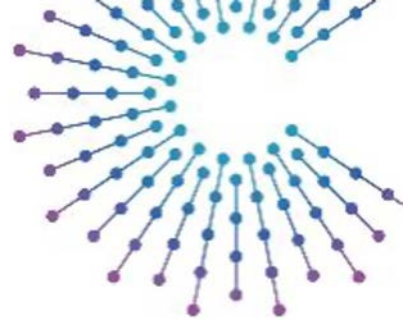


Platform ecosystems **need to attract and coordinate two different target groups** – app developers and OEM customers.

In order to **grow the portfolio** of the AOSP based App Store we need to focus on the **App Providers as an important customer group**.



# Goals Automotive AOSP App Framework Standardization.



**1 Enabling innovation and rich experiences.**

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**2 Frictionless onboarding and testing for app developers.**

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**3 Building a Cross-OEM App Ecosystem.**

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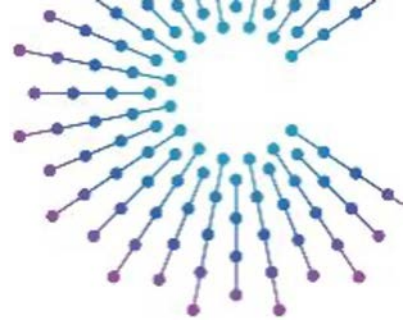
**3 Avoid fragmentation.**

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## **What already happened on the topic at COVESA**

# April 2023: AMM in Portugal

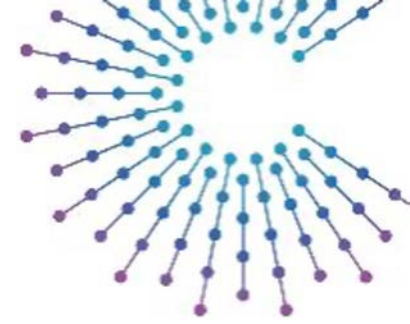


- Presentation of the initiative related to Automotive AOSP App Framework Standardization Expert Group to COVESA members
- Attendance of several OEMs, App Store Providers, Tier 1s and app developers
- Interest expressed by the attendees
- Jointly identified TOP3 topics:
  - Non-GAS Emulator (independent of OEM)
  - Push Notifications
  - Camera API



Presentation from  
April 2023 AMM

# F2F Meeting June 2023: Munich



## ACHIEVEMENTS



**FORVIA**  
faurecia

- Election of Chairs
  - BMW (Melina Mascolo)
  - General Motors (Richard Fernandes)
  - Forvia / Faurecia Aptoide Automotive (Camille Ghibaudo)
- Definition of main work streams
  - Camera API
  - Push Notifications
  - Cross-OEM emulator
- Presentation of potential reference implementation for In-Vehicle Camera Access

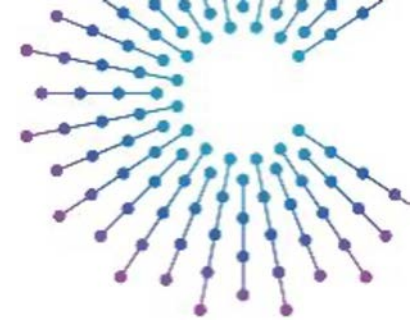




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## Status update on ongoing work streams

# In-Vehicle Camera Access: Deliverable & Status



## DELIVERABLE

1. Defining **default in-vehicle camera** for Developers to access
2. Transparency for Developers **which in-vehicle cameras can be accessed** (+ its location)
3. Definition **reference implementation along existing Google standard** (across OS versions)
4. **Ensurance** for developers that this reference implementation **works across multiple OEMs**
5. Future: Enabling 3rd Party Developers to test camera integration with Cross-OEM emulator

Feedback on  
reference implementation

Demo of POC / solution

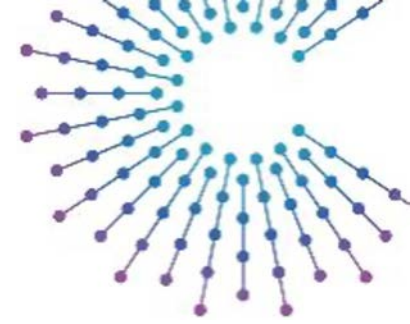
Clarification timeline  
OEM Platform Support

Publishment reference  
implementation

Positive feedback already provided by:



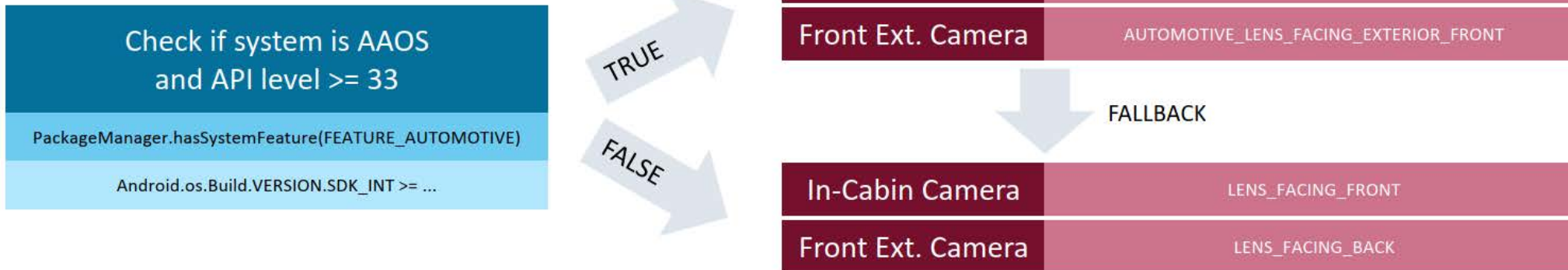
# In-Vehicle Camera Access: Reference Implementation Deep Dive



## Guidelines

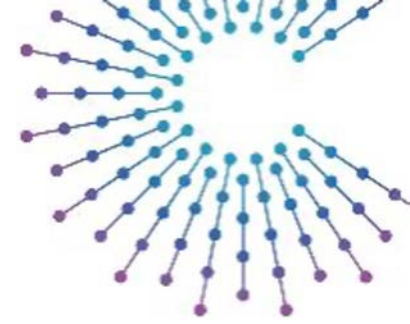
- AUTOMOTIVE\_LENS\_FACING only exists in Camera2, not CameraX
- App targetSdk should be 33 where AUTOMOTIVE\_LENS\_FACING was introduced (Android 13)
- App minSdk should be 24 because PackageManager hasSystemFeature API is required

## Implementation logic



*Obs: these are only for the default lens facing apps can expect in automotive, but they can still use Camera2 APIs to enumerate the different cameras and characteristics/metadata.*

# Push Notifications: Deliverable & Status



## DELIVERABLE

Agreeing upon a common service/protocol of how 3<sup>rd</sup> Parties can provide push notifications.

## INTERIM STEPS

1. Deciding who is building and financing the reference implementation
2. Deciding who is hosting and financing the necessary backend service
  - COVESA vs. every OEM individually
  - If OEM specific implementation: Test suite to ensure compatibility for 3<sup>rd</sup> Party Developer

Definition  
possible solutions



Android Automotive VHAL

First POC

Working POC on basis of Unified Push

mavi.io



OEM &  
app feedback

Currently app feedback  
is being gathered

zoom



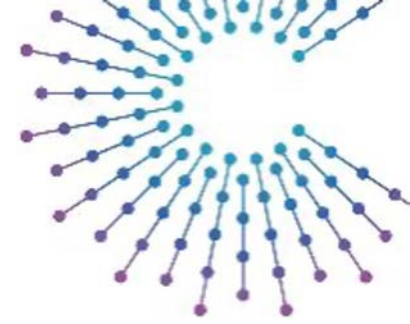
Decision  
implementation logic

Implementation &  
publishment solution



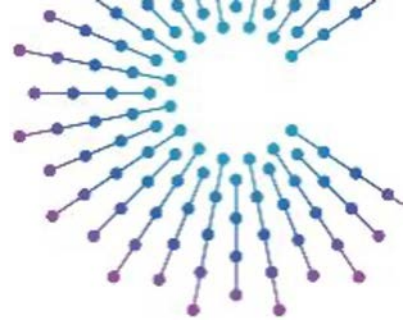
# Status update: Push Notifications

- Push Notification POC from Maximilian Galanis (BMW)



# Status update: Emulator

- Two possible directions for Cross-OEM availability:
  - Snapp:
    - Agreed to provide a generic emulator
  - Harman
    - Have a more customizable emulator and currently working to define next steps.

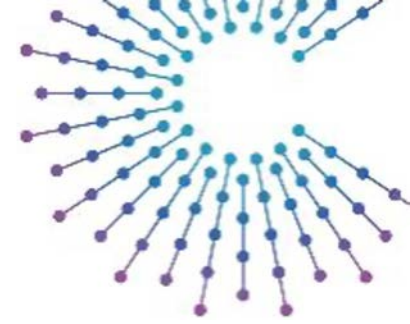


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**What's next?**

# What's Next

- At COVESA AMM
  - Brainstorming session
  - Working session on push notifications
  - Round table
- Opportunity for an event in the frame of CES 2024 on January, 9th
  - Joint podium discussion
  - Vehicle demonstration



CES 2024: 2 OPTIONS @ COVESA NETWORKING RECEPTION  
& DEMONSTRATION SHOWCASE, JANUARY 9<sup>TH</sup>



#### Joint podium discussion

5pm - 6pm

#### Attendees

- Invite-only
- OEMs, App Stores, App Developers

#### Costs

- 5500\$ per OEM/ App Store Provider
- Not applicable if combined with vehicle demonstration

#### Vehicle demonstration

6pm - 9pm

#### Attendees

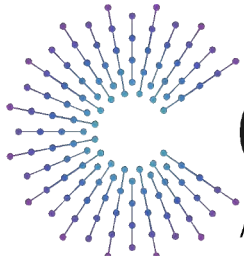
- Open for all registered participants
- COVESA invites big parts of automotive industry

#### Costs

- ~7500\$ per vehicle
- 400\$ fire marshall inspection





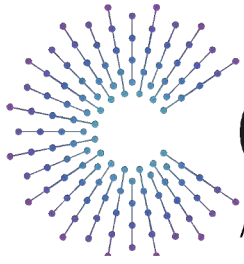


# COVESA

Accelerating the future of connected vehicles

## Questions



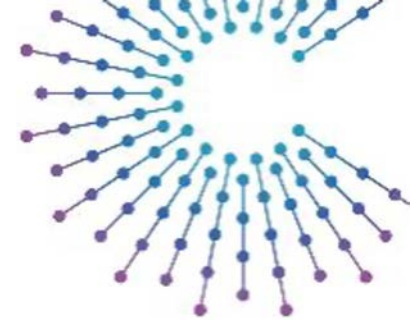


# COVESA

Accelerating the future of connected vehicles

## Thank You For your Time



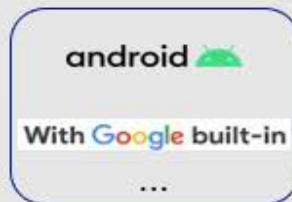


# Back Up Slides



# Ecosystem: AAOS Apps framework standardization initiative

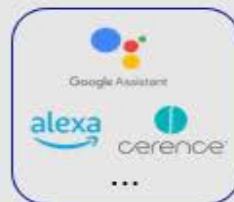
## The concept



Whatever the Android Automotive Flavour



Whatever the distribution channel



Whatever the Voice Assistant



Whatever the Maps Provider



The same version of the Android Automotive apps distributed to several OEMs

## The purpose

- Avoid fragmentation
- Increase attractiveness of automotive market for Android Apps developers

## Integration into COVESA

## Launch of the Expert Group

Jan 2023

16th May 2023

Garching F2F meeting

Work on Push notifications

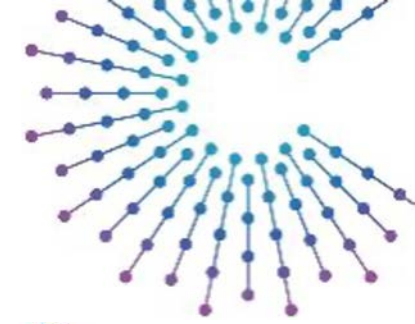
## The involved OEMs and Tier1



## Identified priorities

- AOSP Emulator
- Push notifications
- Vehicle data collection and Sensor interface definition, with initial focus on sensors and properties which are not supported yet by AAOS (e.g. ambient lights)

# Status update: Camera API



Presented  
Work in progress

## CLARIFICATIONS OEMS.

### *In-Vehicle Camera Access.*

Camera libraries and APIs in Android have a set of characteristics, one of them being the **LENS\_FACING**. This property informs 3rd-party developers which camera to select.

- **AAOS (Android 13 or higher):**
  - Introduction of **AUTOMOTIVE\_LENS\_FACING**, allowing to access variety of in-cabin cameras
  - Precondition: **FEATURE\_AUTOMOTIVE** system flag (PackageManager.hasSystemFeature API)
  - Standardization:
    - In-Cabin Camera: **INTERIOR\_SEAT\_ROW\_1\_CENTER**  
→ Should this be the default or rather LEFT / RIGHT?
    - Front-facing exterior Camera: **EXTERIOR\_FRONT**
  - **LENS\_FACING** can be supported in addition to **AUTOMOTIVE\_LENS\_FACING**
- **Android or AAOS (up to Android 12):**
  - Standardization:
    - In-Cabin Camera: **LENS\_FACING\_FRONT**
    - Front-facing exterior Camera: **LENS\_FACING\_BACK**

#### Possible values:

- EXTERIOR\_OTHER
- EXTERIOR\_FRONT
- EXTERIOR\_REAR
- EXTERIOR\_LEFT
- EXTERIOR\_RIGHT
- INTERIOR\_OTHER
- INTERIOR\_SEAT\_ROW\_1\_LEFT
- INTERIOR\_SEAT\_ROW\_1\_CENTER
- INTERIOR\_SEAT\_ROW\_1\_RIGHT
- INTERIOR\_SEAT\_ROW\_2\_LEFT
- INTERIOR\_SEAT\_ROW\_2\_CENTER
- INTERIOR\_SEAT\_ROW\_2\_RIGHT
- INTERIOR\_SEAT\_ROW\_3\_LEFT
- INTERIOR\_SEAT\_ROW\_3\_CENTER
- INTERIOR\_SEAT\_ROW\_3\_RIGHT