

What is **NDS.Live?**

An NDS Association webinar – Feb 25, 2021

NDS.Live webinars

Watch online:

1. The advantages of using NDS.Live for Intelligent Speed Assistance (ISA)

- Recording of the webinar held on February 4, 2021
→ <https://nds-association.org/nds-live-isa-webinar/>

Today:

2. What is NDS.Live?

- Recording on YouTube soon.
Link to video will be posted on LinkedIn and the NDS Association website.

Upcoming webinars

3. ISA: Reduce bandwidth using NDS.Live → Mar 11, 2021 09:00 AM

4. NDS.Live: Deliver data layers the smart way → Mar 25, 2021 09:00 AM

Your hosts and speakers today



Fabian Klebert

Technical Coordinator for the NDS
Association
&
CEO at Klebert Engineering



Philip Hubertus

Senior Product Manager
Automotive Products
HERE Technologies



Agenda

- Navigation Data Standard
 - Where we come from
 - The evolution from NDS.Classic to NDS.Live
- NDS.Live
 - From basics to design principles to Smart Layers
 - Modularity and how it enables scale from basic assistance features, to navigation, to fully automated driving
 - Tools supporting NDS.Live development
- Live Q&A (20 mins) – be ready to be on camera 😊

**NDS is THE worldwide
standard for map data
in automotive eco-systems**

NDS is **THE** worldwide

worldwide coverage and global adoption

standard for map data

one specification with enough flexibility
for a customized user experience

data model (structure & semantics),
storage format, interfaces, protocols

in automotive eco-systems

in-vehicle applications, companion applications, cloud applications, vehicle related services,
supporting navigation, driver assistance and autonomous driving



NDS Association members





The NDS format specification is defined by the members of the NDS association.
This includes world leading OEMs, system vendors, solution providers, and navigation data providers.

Navigation Data Standard



Data Needs: Uses Cases and Data Freshness



		Freshness 		
Use Cases / Shelf-life		Static Data that stays valid for long periods of time, with typically only small fractions changing over time. This is what classical versioned map data is about.	Dynamic Changing data with limited temporal validity (days/hours). Age checks must be used to determine if the dynamic information can be applied.	Live Transient data with momentary validity. For example, such data may be a vehicle's state/e-Horizon, a route, or a search result. Applications either use it right away or discard it.
 Universal Data that is generally relevant for a broad set of use cases or as a general reference for all other data		Roads or display data	Construction sites	Traffic light phase Variable Message Signs
	 Collective Data is relevant to a specific group of use cases. Examples for this are ISA, ADAS, navigation as well as vehicle types (cars vs. trucks), engine types (electric vs. fuel)	POI (OEM brand specific)	EV charging station avail.	Dynamic speed limits, Parking spot availability (automated valet parking)
	 Individual For specific use cases, data could be generated/bundled based on individual requests.	Indoor parking map	POI (sport event)	MPP, routing, search



*“NDS.Live is not a database,
it is a distributed map data system”*

NDS.Live - Design Considerations & Data Consumption

NDS.Live Design Considerations

- **Multiple Data Vendors and Sources**
Where is data stored (cloud, edge, vehicle) and who offers it?
- **Streaming and Dynamic Data**
As an addition to embedded map data, support continuous updates in high frequency (incl. real-time)
- **Embedded & Distributed Applications**
Provide a unified way to access online services that offers basic functionality, like search or routing
- **Modular Design**
Parts of the standard can be developed and used independently
- **Prepared for ADAS & Autonomous Driving**
Provide highly detailed data and keep functional safety in mind

NDS.Live Data Consumption

- **NDS.Live data is either organized as ...**
 - tiles
 - paths
 - objects
- **NDS.Live data services allow for**
 - downloading and storing of data
 - streaming and caching of data
 - requesting tiles, paths, or objects for immediate use
- **NDS.Live data services can be accessed by**
 - OEM or system vendor cloud-based clients (B2B) as a proxy for distribution to vehicles
 - Directly by connected vehicle clients (B2C)

NDS.Live - Design Considerations & Data Consumption

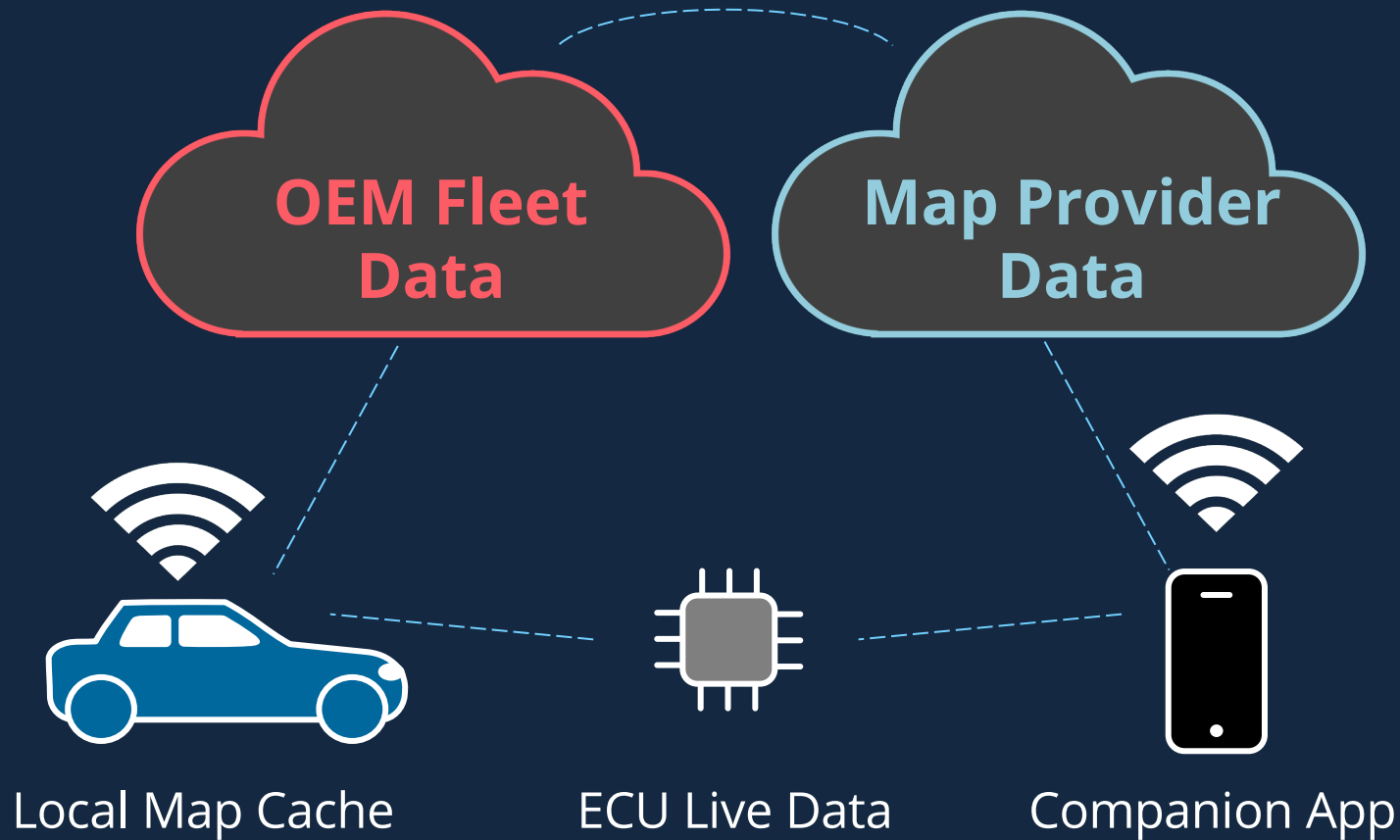
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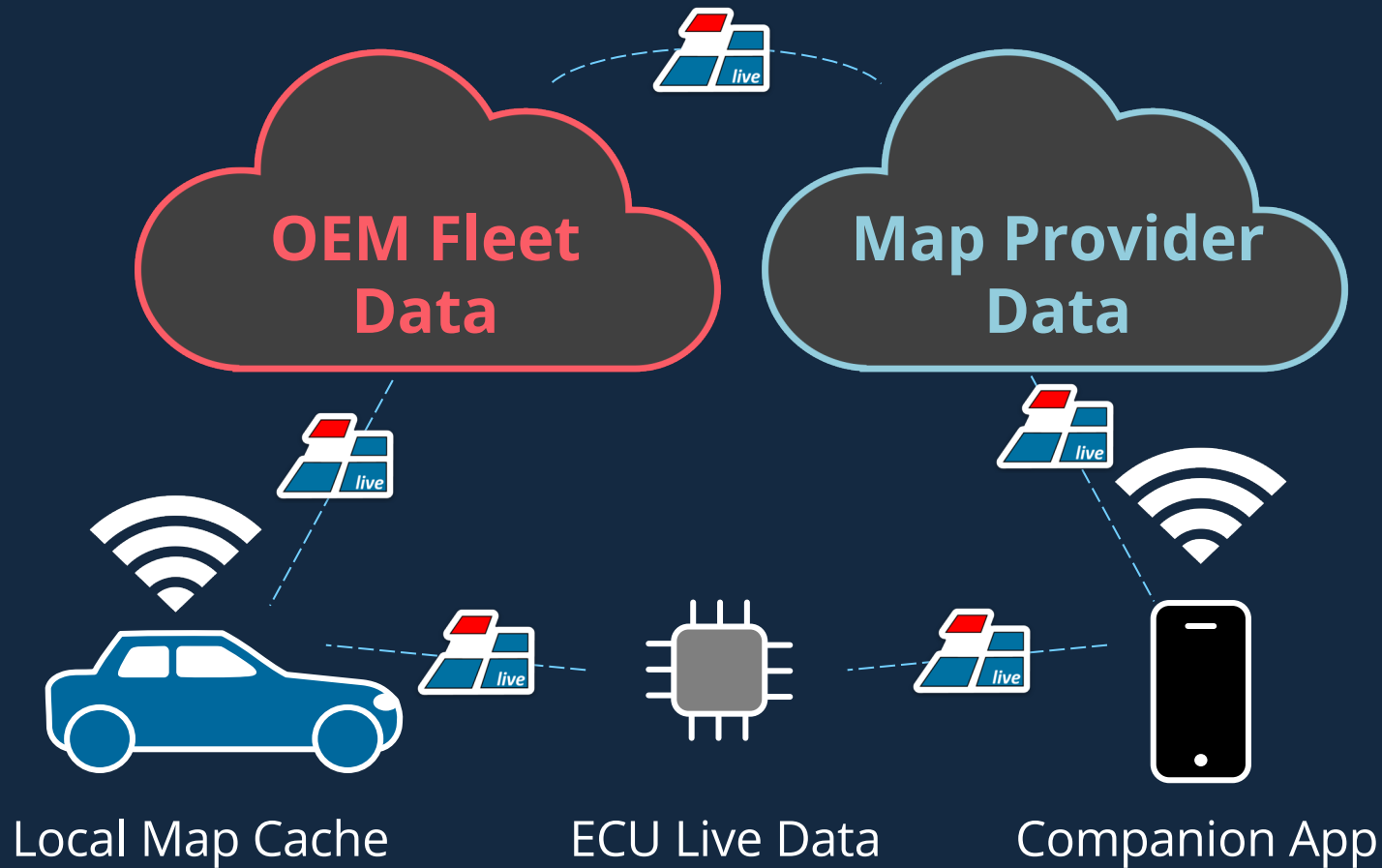
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NDS.Live Design Considerations – Multiple data vendors and sources



NDS.Live Design Considerations – One language for the whole ecosystem



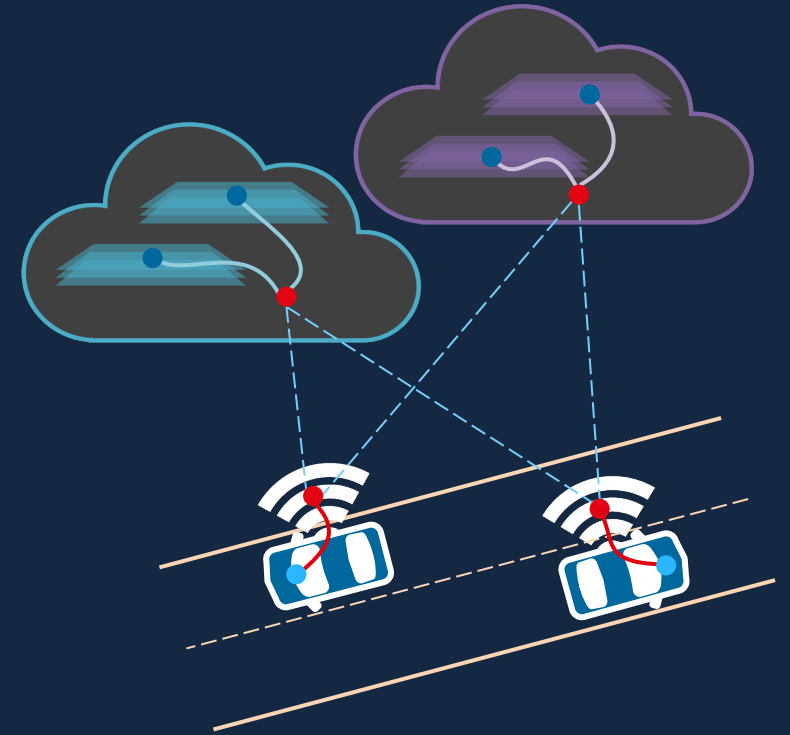
NDS.Live Design Considerations – Services

NDS.Live defines ...

... **service interfaces** to retrieve map data

... from **data layers** in ...

... data **containers**



NDS.Live Design Considerations - Modularity

NDS.Live design is highly modular to ...

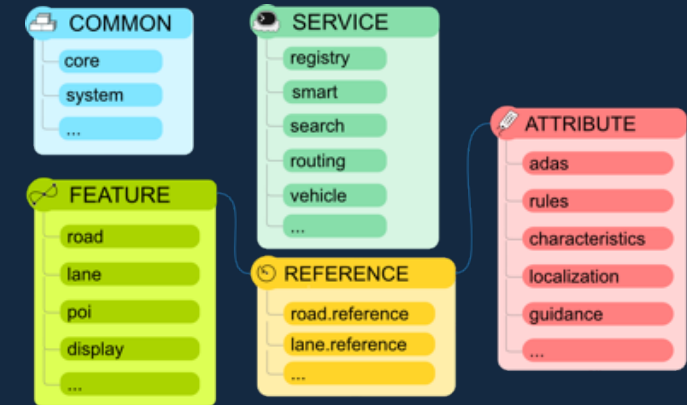
... **reduce migration** efforts between versions

... enable shorter specification update cycles

... enable **higher speed** of development

... allow specialized focus on a minimal data set

... be **future-proof** (update old module with new, keep the rest)



NDS.Live SmartLayer – Key to the mansion on the hill

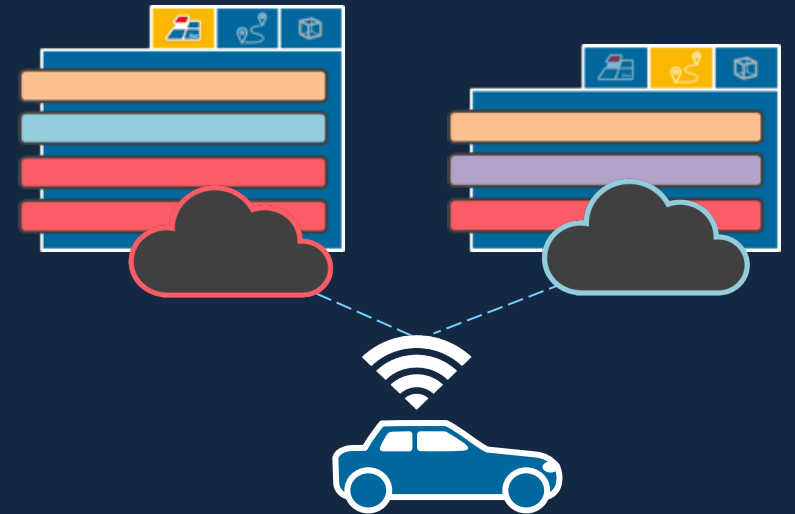
SmartLayer services allow to distribute map layers ...

... in **flexible** configurations

... containing live, dynamic & static data

... over highly **scalable** delivery platforms

... as data tiles, as paths, as objects



NDS.Live SmartLayer - Scalability



ISA only



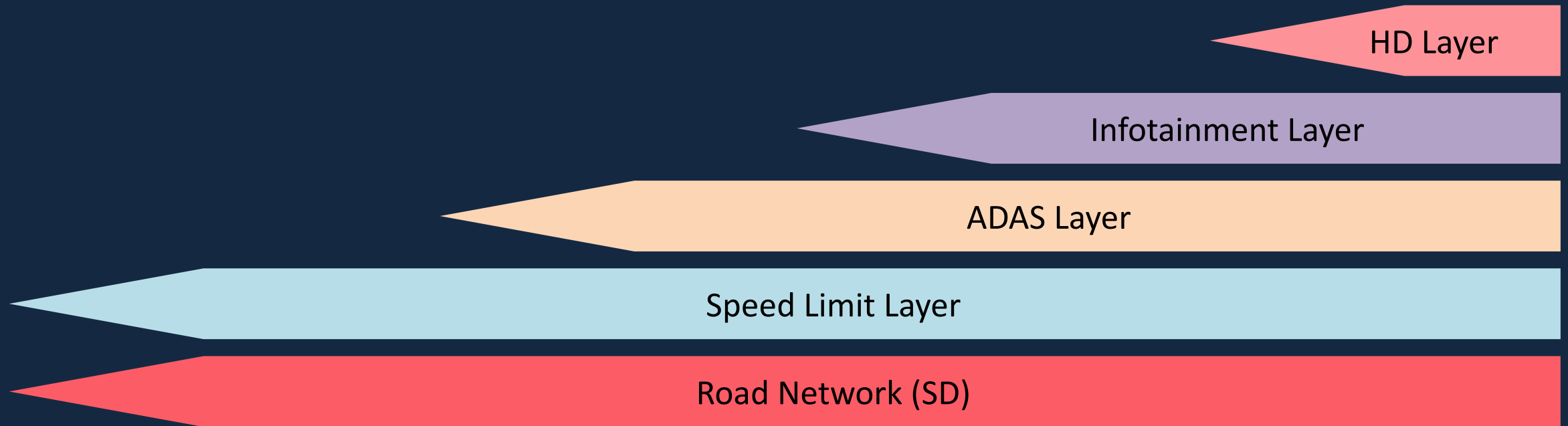
ADAS



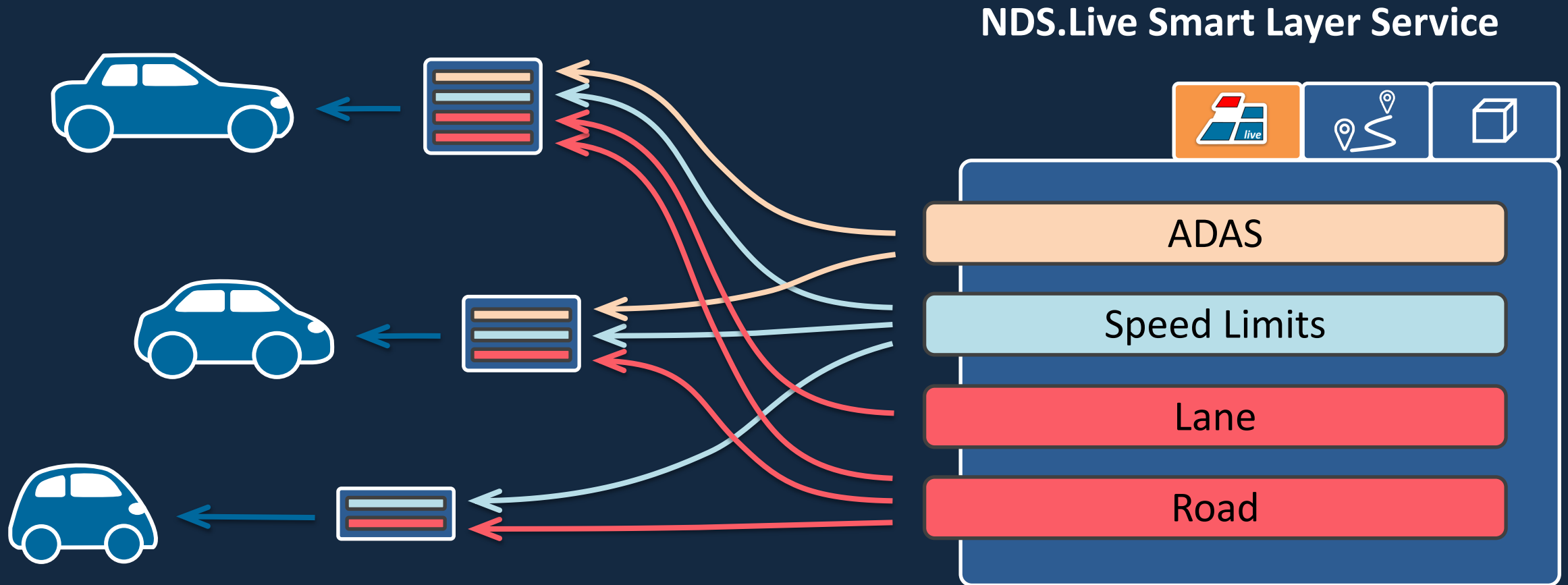
Infotainment



HAD



NDS.Live SmartLayer – Configuration flexibility

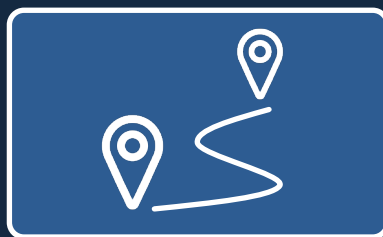


NDS.Live SmartLayer – Data Containers

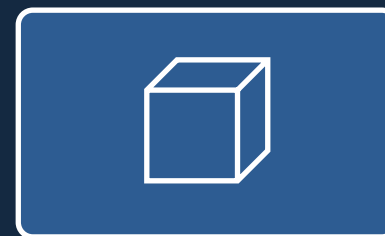
SmartLayer data containers



Tiles



Paths



Objects

Application service specific (e.g. Route, Horizon, Metadata, etc.)

Different Lifetime – same container

Smart Layers are used for

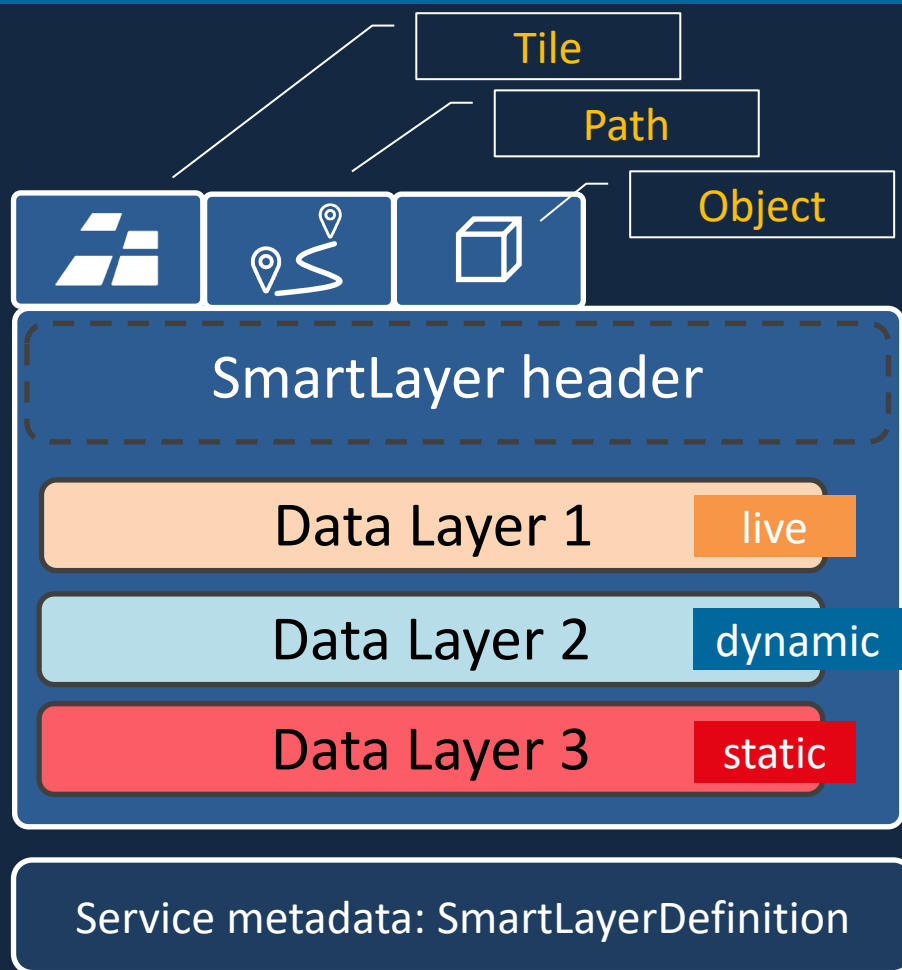
- ... **static** map data

- ... **dynamic** data

- ... **live** data

Depending on the lifetime of data different kind of reference mechanisms may be used

NDS.Live Smart Layer – Summary



SmartLayer container

... all have the **same layout**

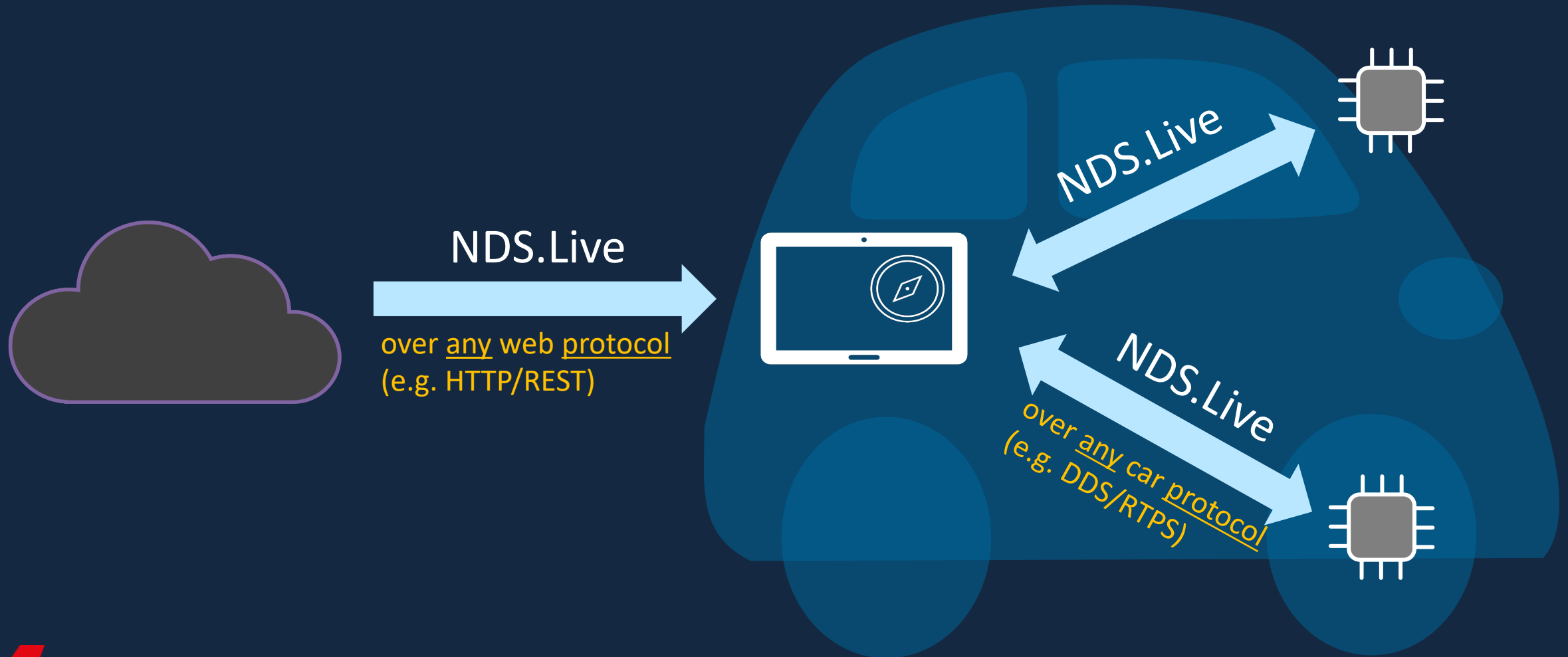
... differ only in **geospatial coverage**

... contain layers from different
specification **modules**

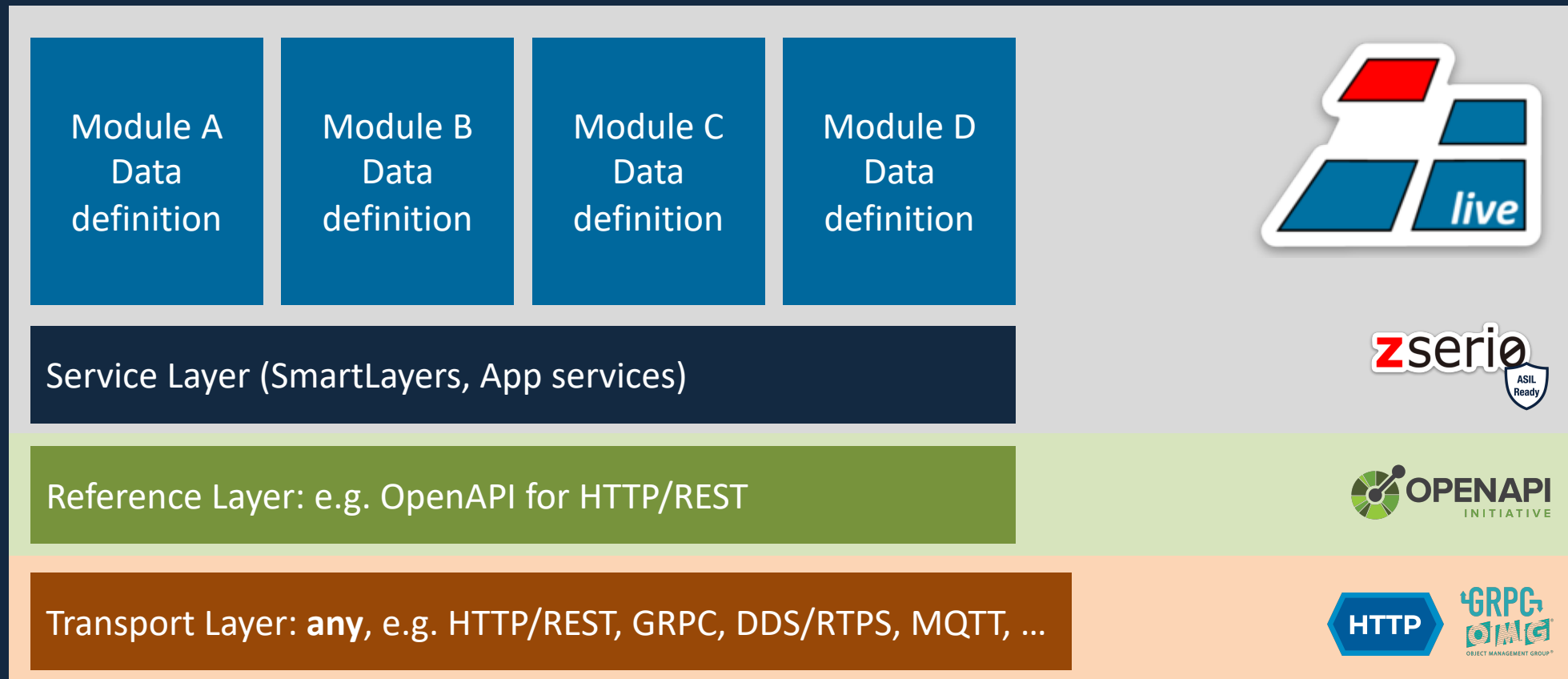
... serve all **data lifetimes**

One configuration per service

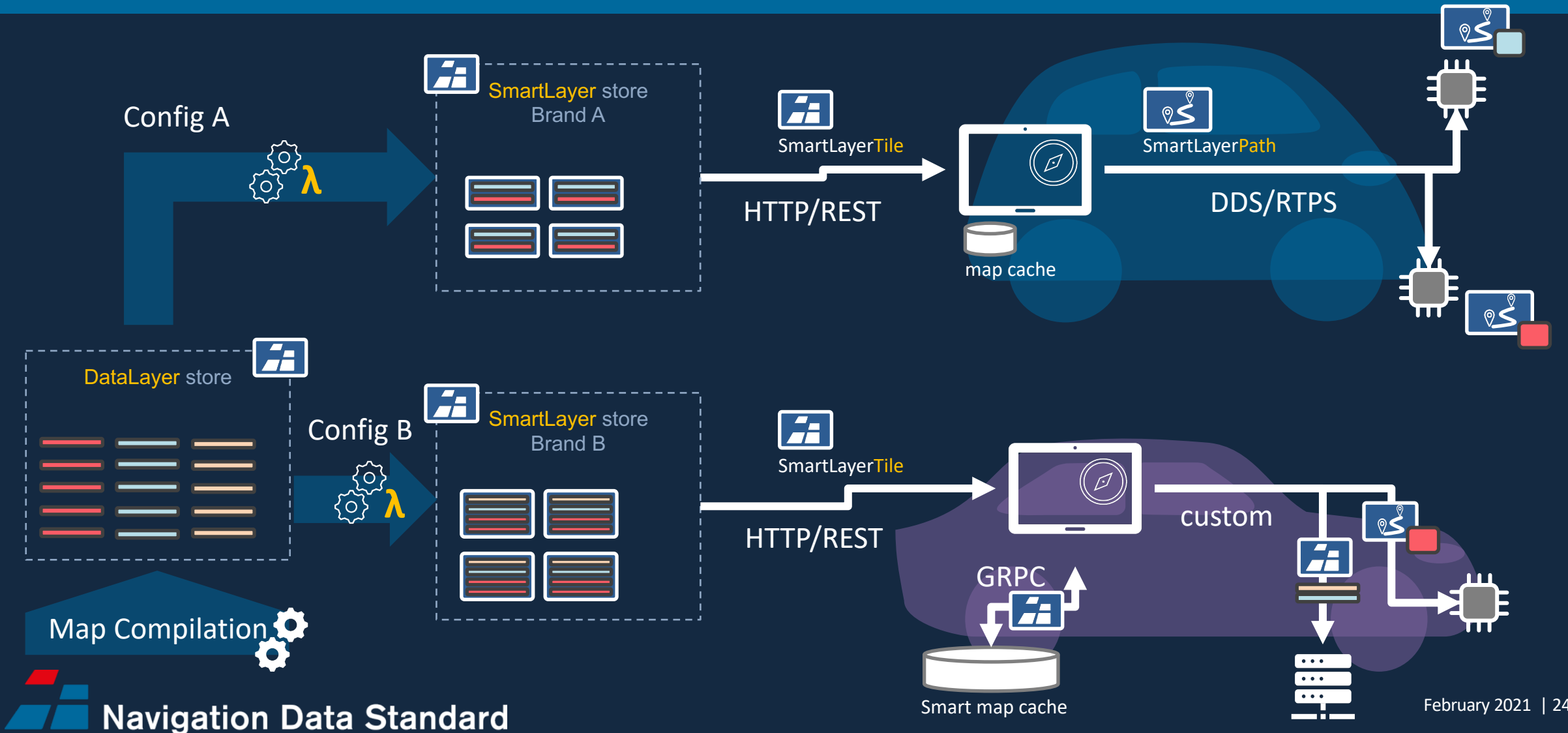
NDS.Live – Not tied to any transport protocol



NDS.Live – Architecture



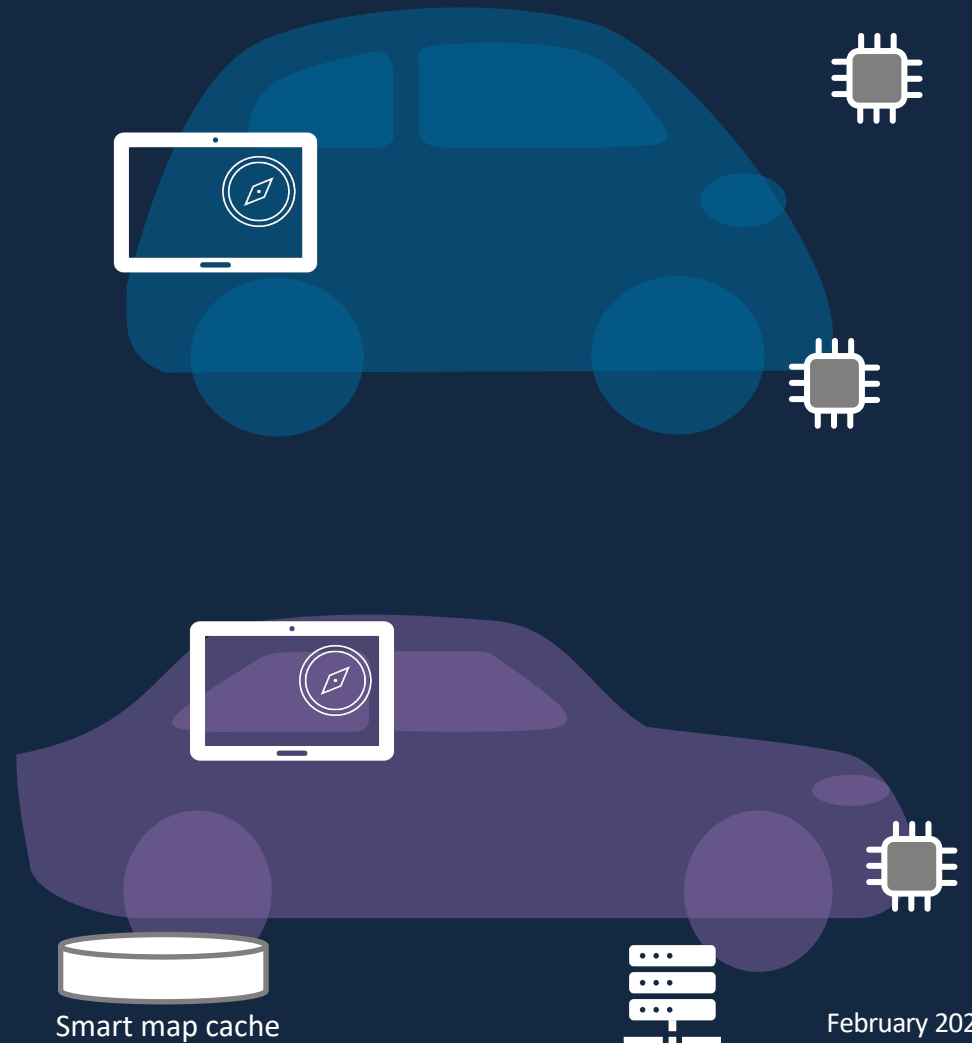
SmartLayer Tiles and Paths: Example scenario



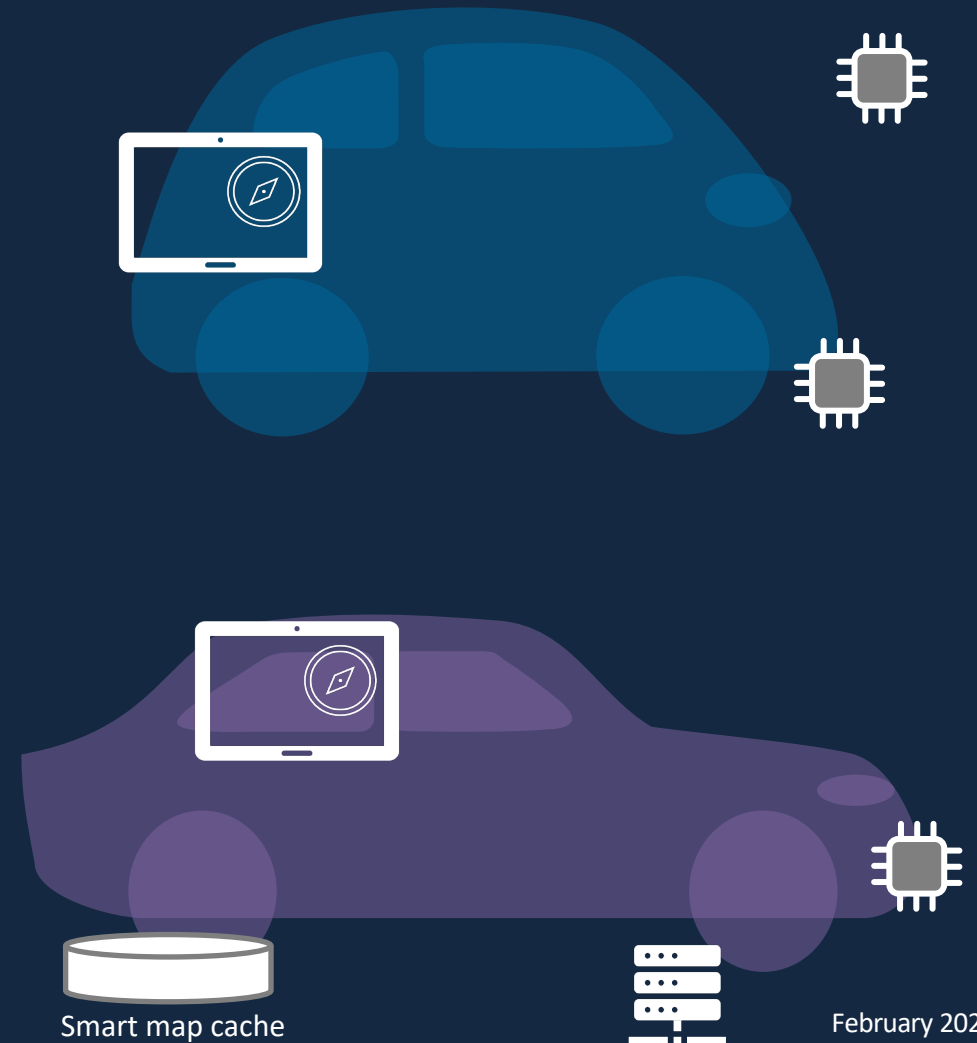
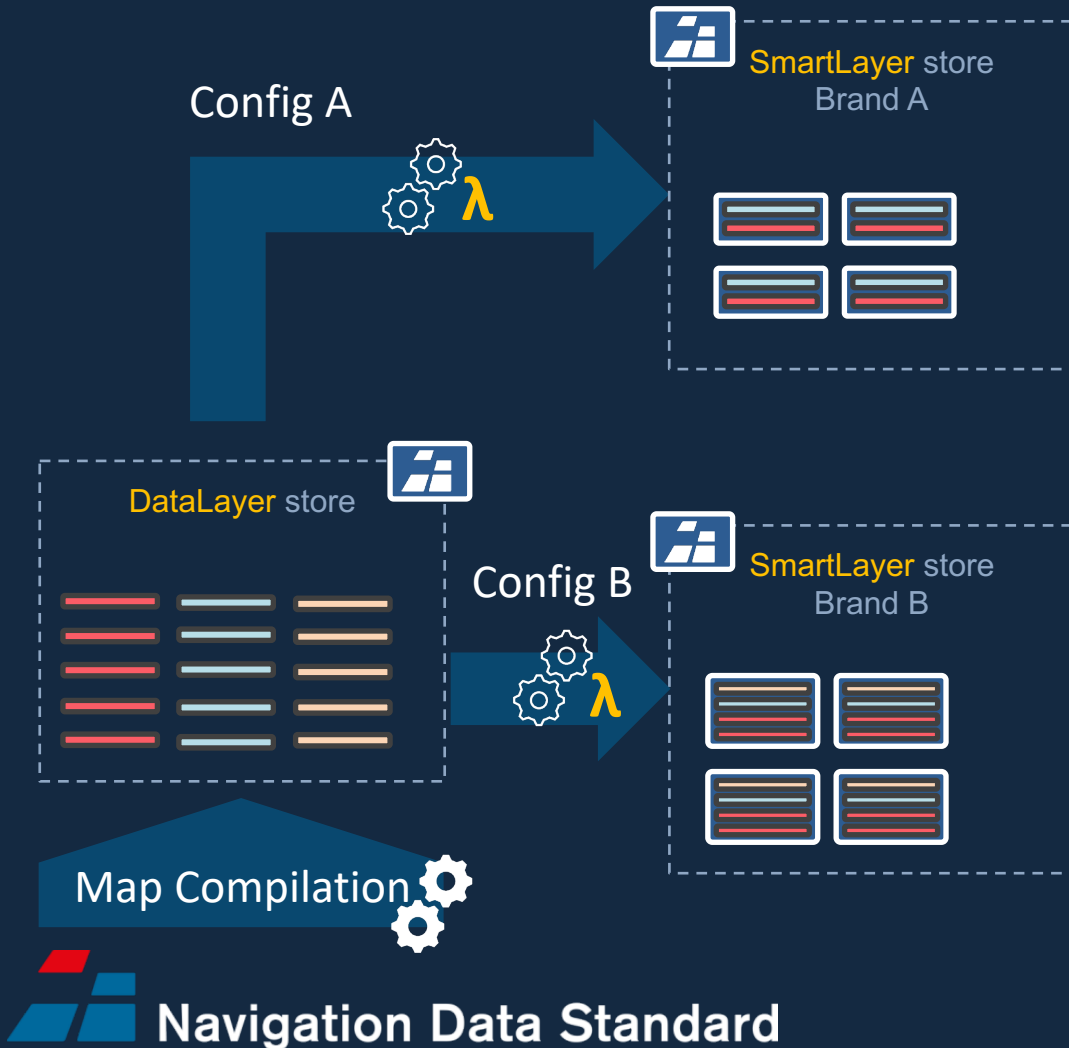
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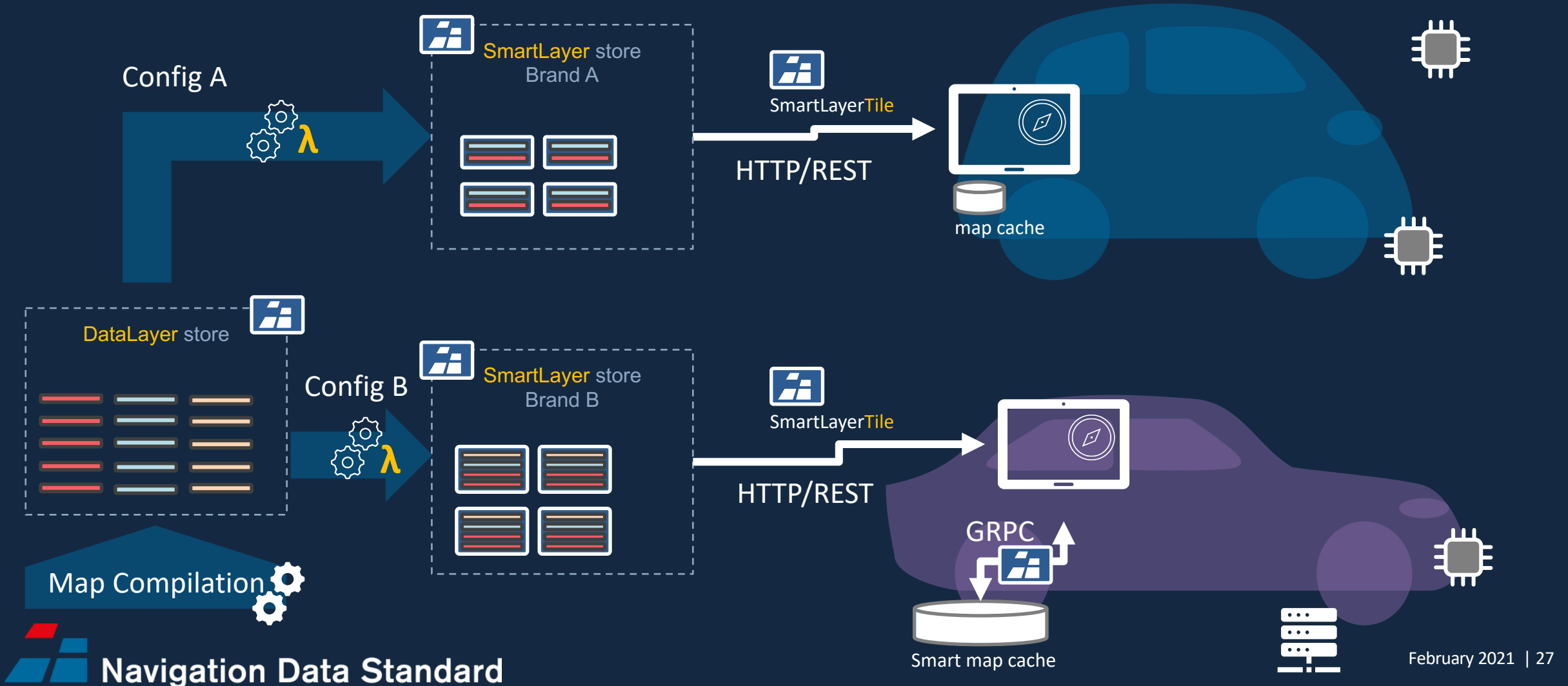
Map Compilation



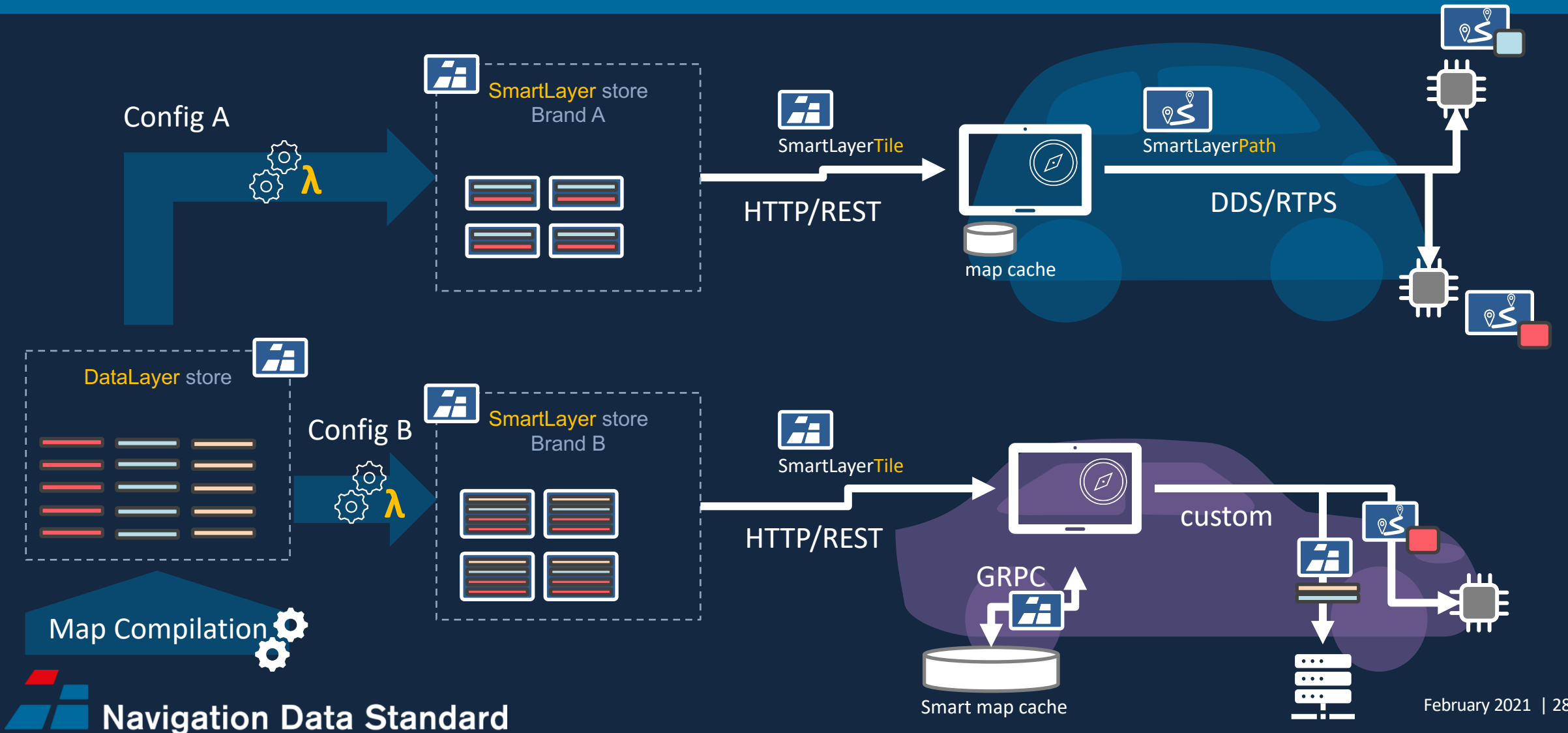
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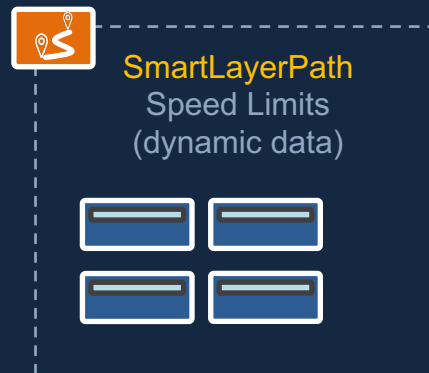
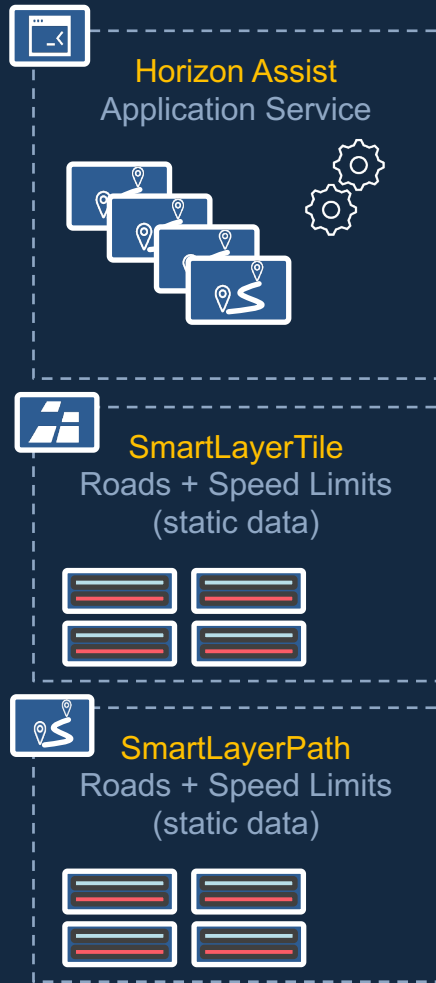
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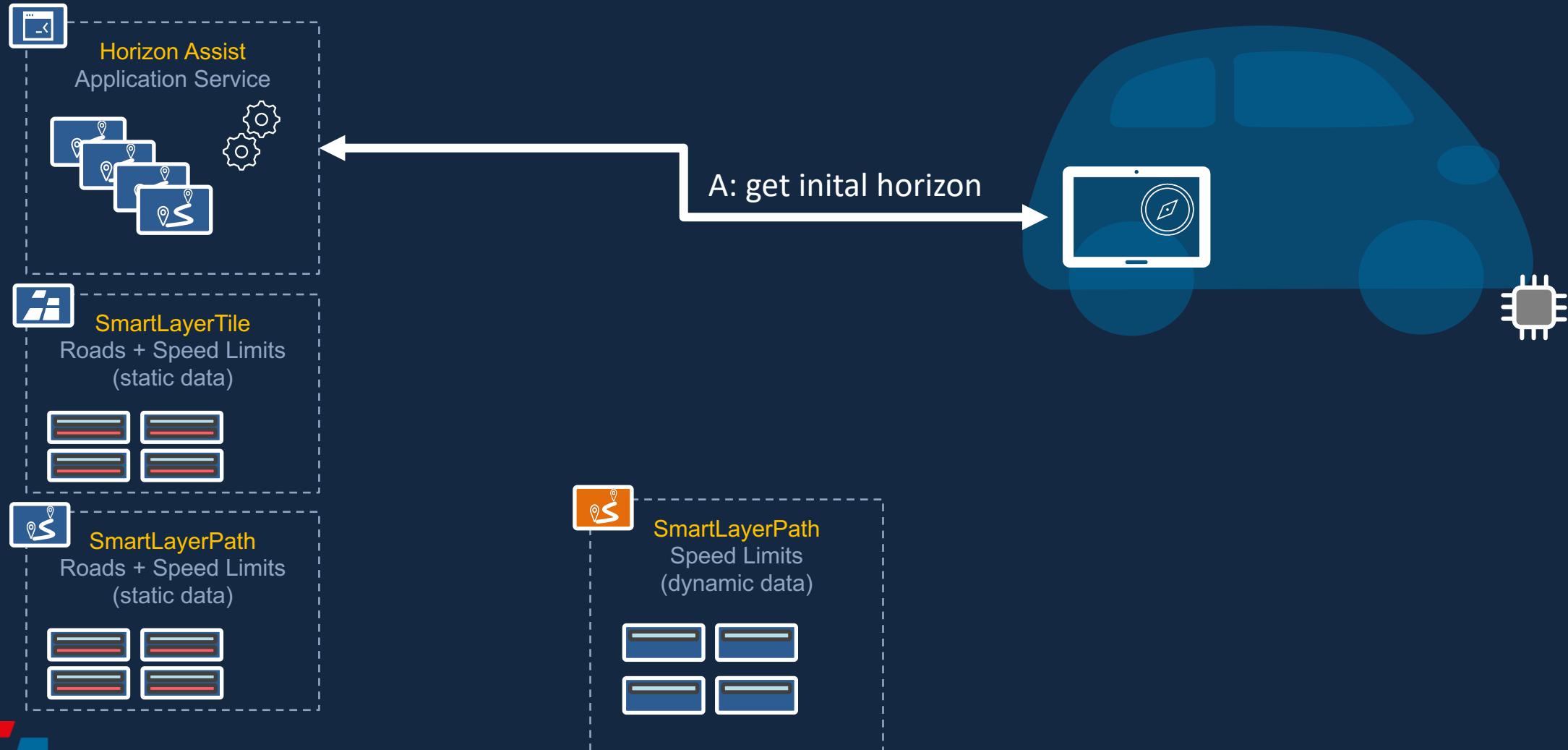
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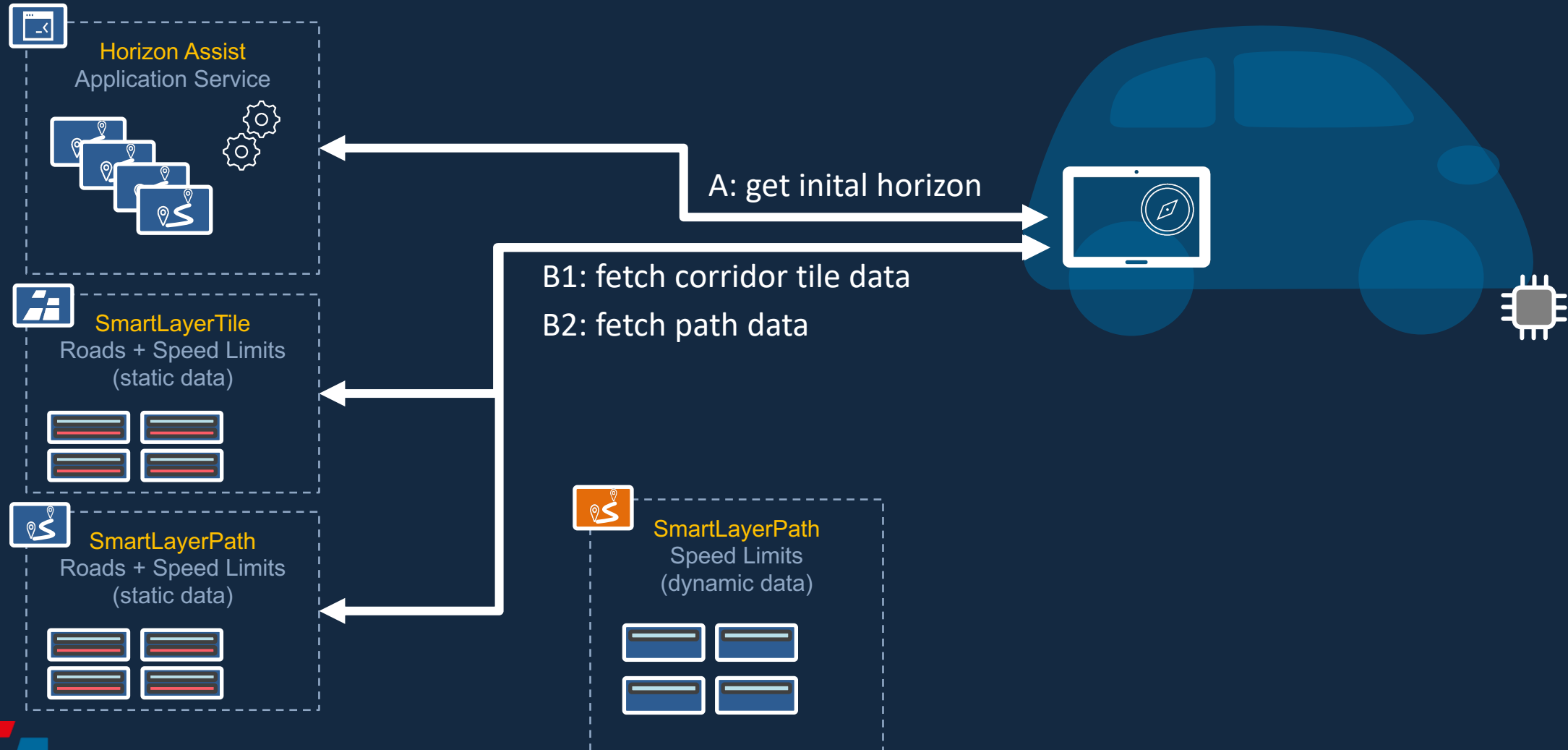
ISA scenario with NDS.Live



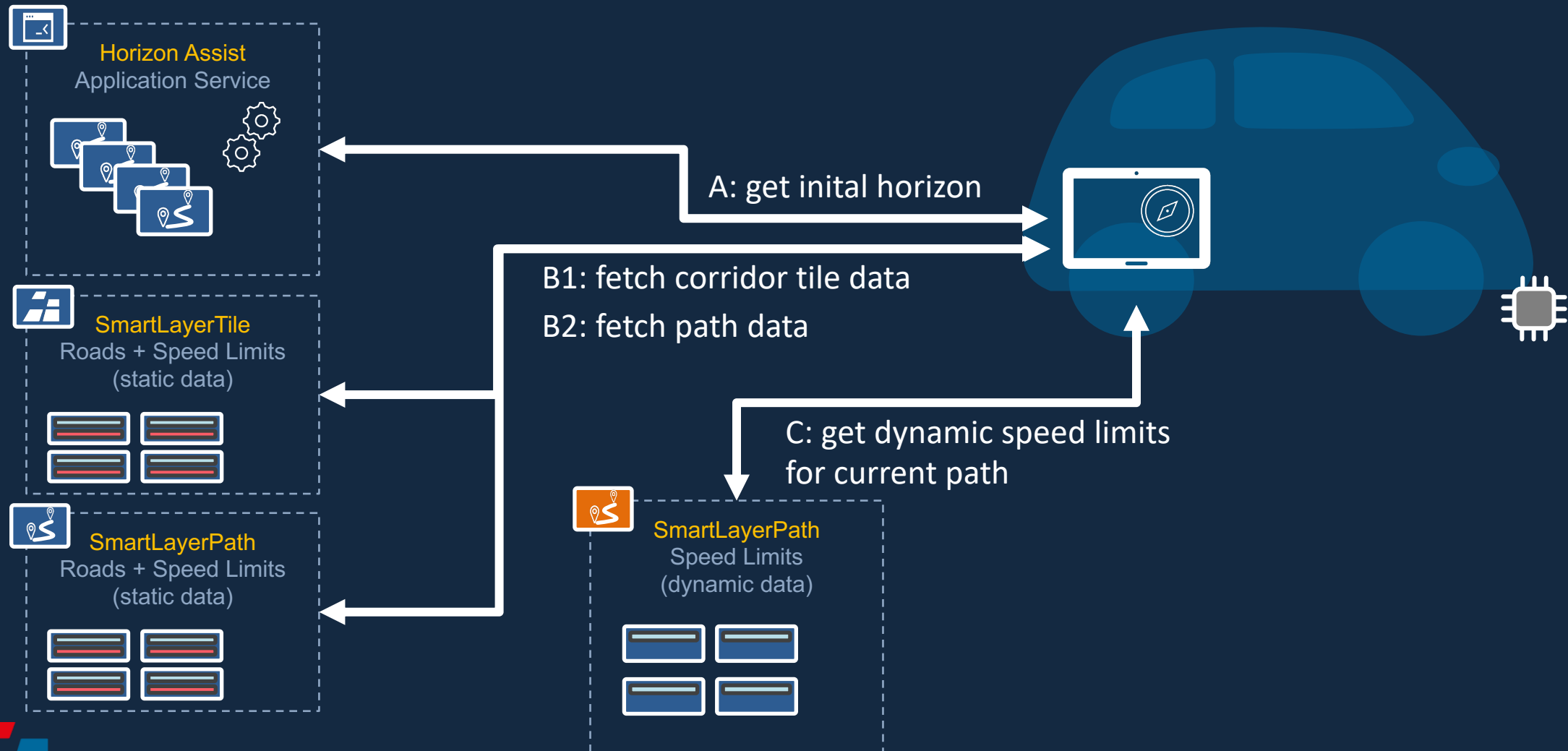
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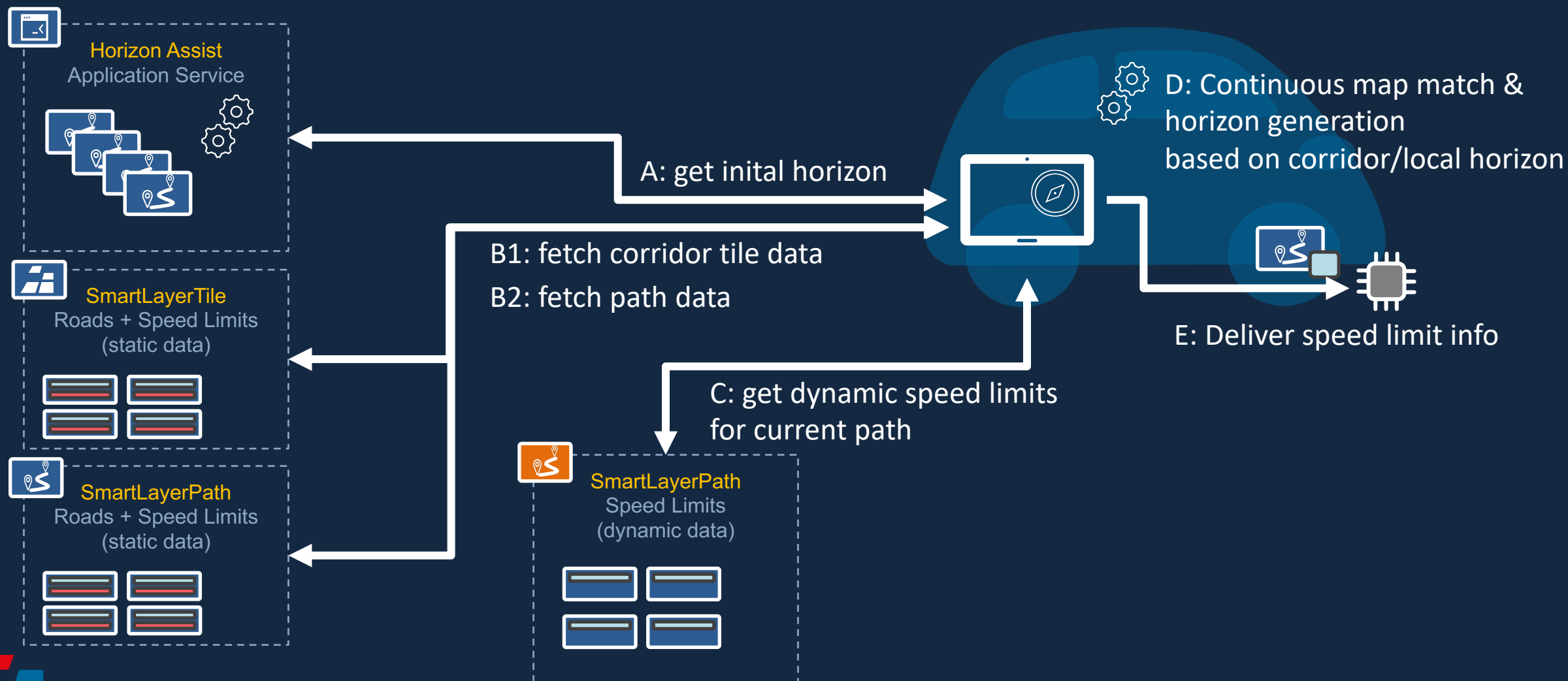
ISA scenario with NDS.Live



ISA scenario with NDS.Live



ISA scenario with NDS.Live



Tools – Supporting NDS.Live development

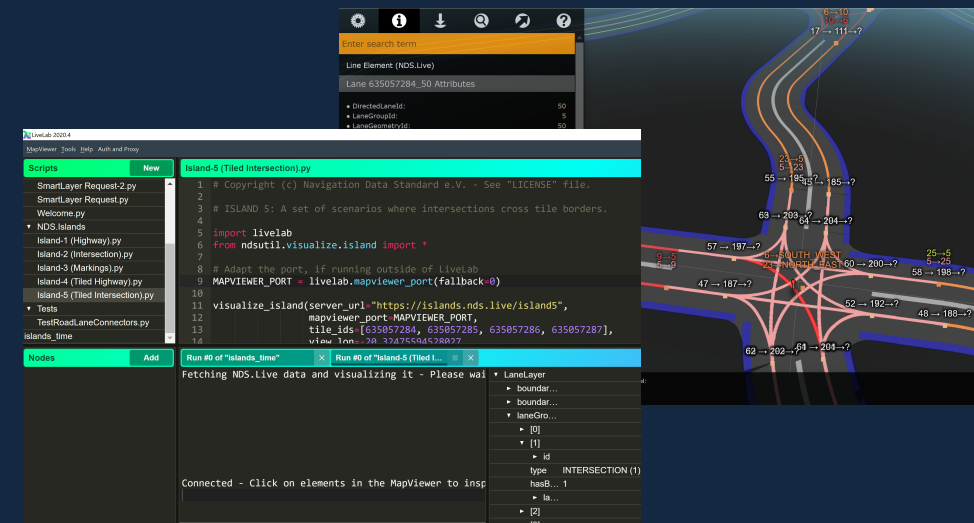
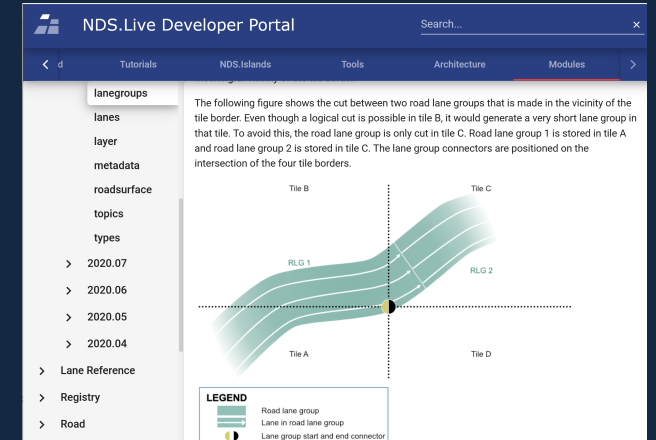
NDS.Live development is supported by

... **LiveLab** (NDS.Live IDE & MapViewer)

... **Developer Portal** (documentation, tutorials)

... Service **reference implementations**

... NDS.Islands **sample maps**



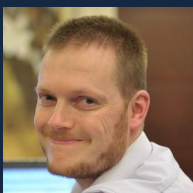
Q&A Panel



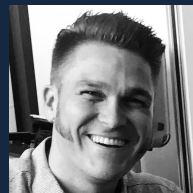
Ottó Nyíró
Product Manager
NNG



Danny Suls
Project Leader
NavInfo (Europe) B.V.



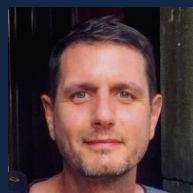
Nico Glorius
Product Manager Data Delivery Services at
NavInfo (Europe) B.V.
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Fabian Klebert
Technical Coordinator
NDS Association



Boris Gumhold
Senior Manager, Engineering
Automotive Publications at HERE Technologies
and Technical Chairman of the NDS Association



Philip Hubertus
Senior Product Manager,
Automotive Products at HERE Technologies

NDS.Live Evaluation

Request an evaluation license for the NDS.Live spec from:

Markus Junker

NDS Association Administration

markus.junker@nds-association.org

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Contact the NDS Association

www.nds-association.org