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How to Build a Highly Accurate Digital Twin – Intelligent Infrastructure in the Corridor for New Mobility

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Fabian Thomsen, Armin Erraji,
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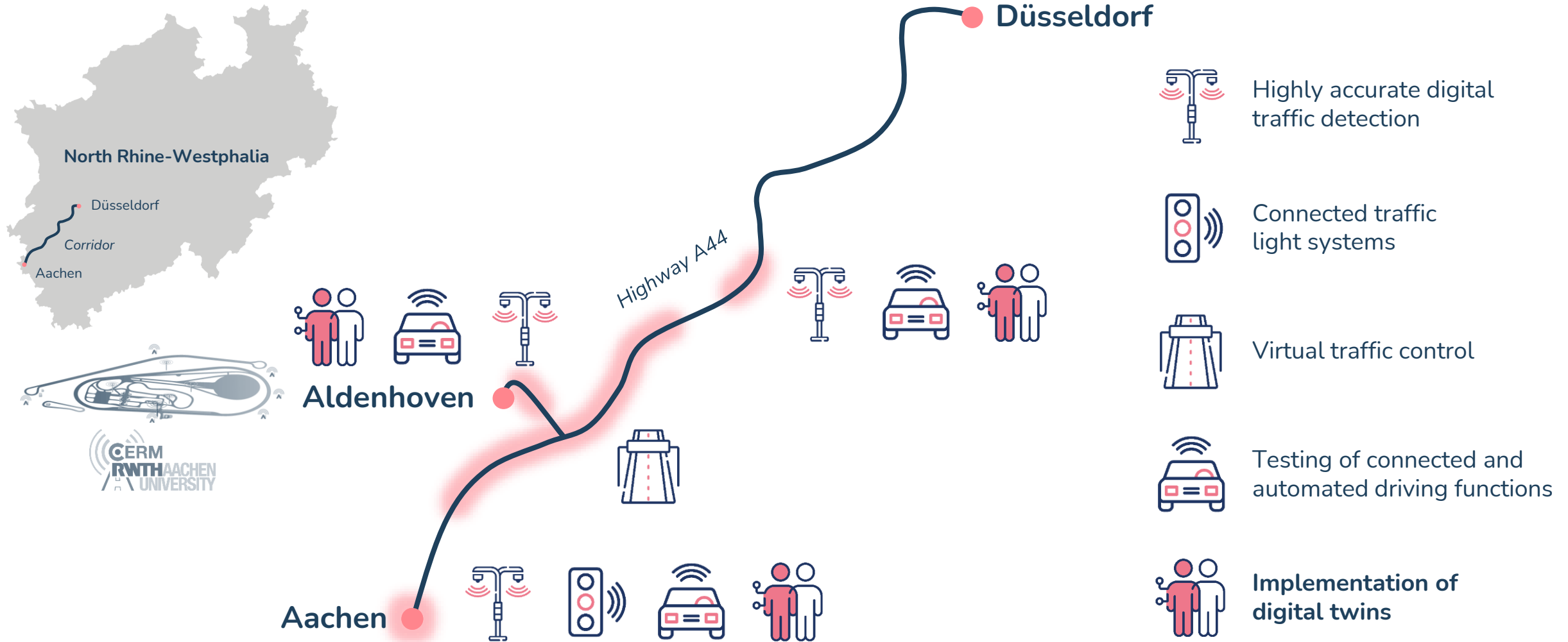
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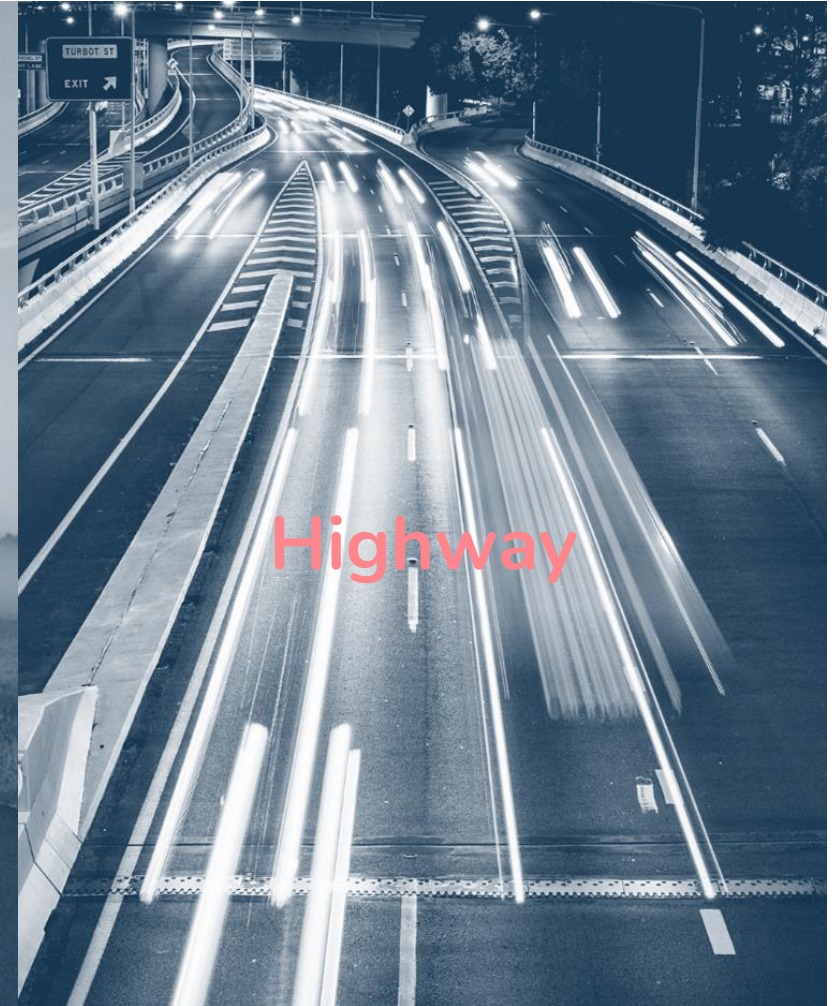
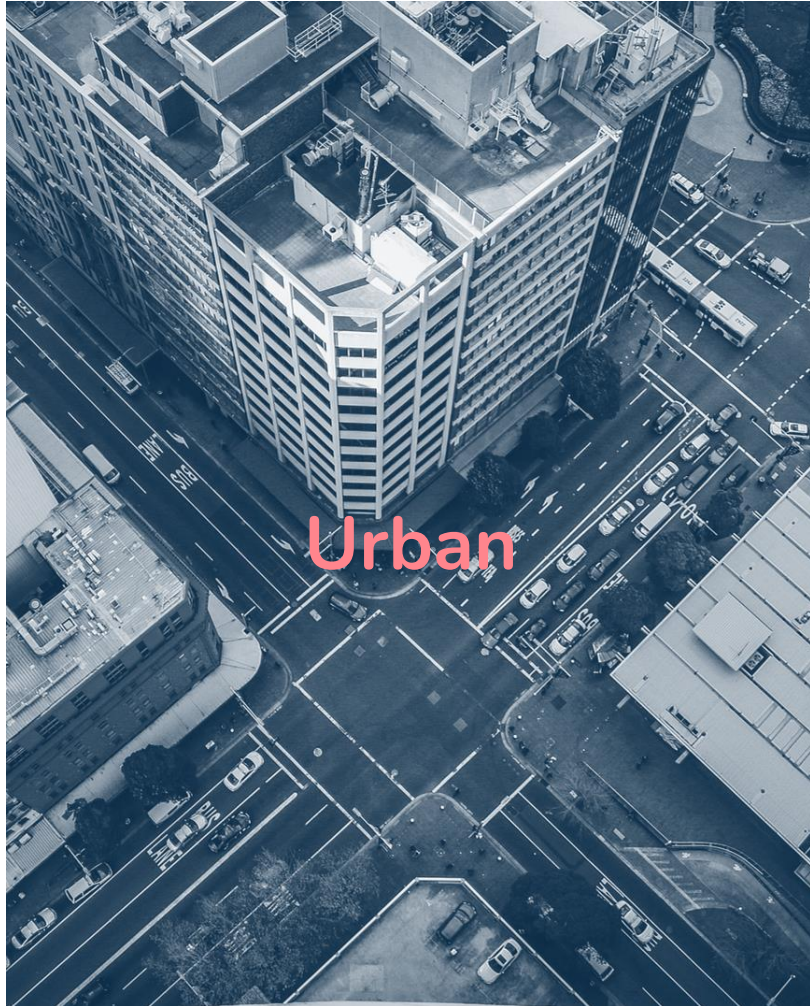
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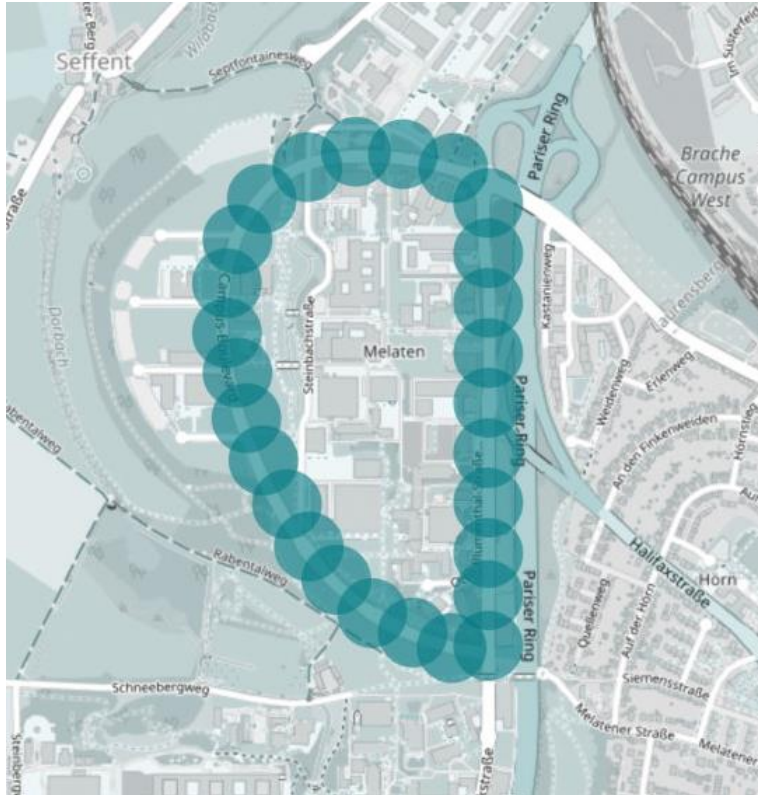
Overall Objective of the Project



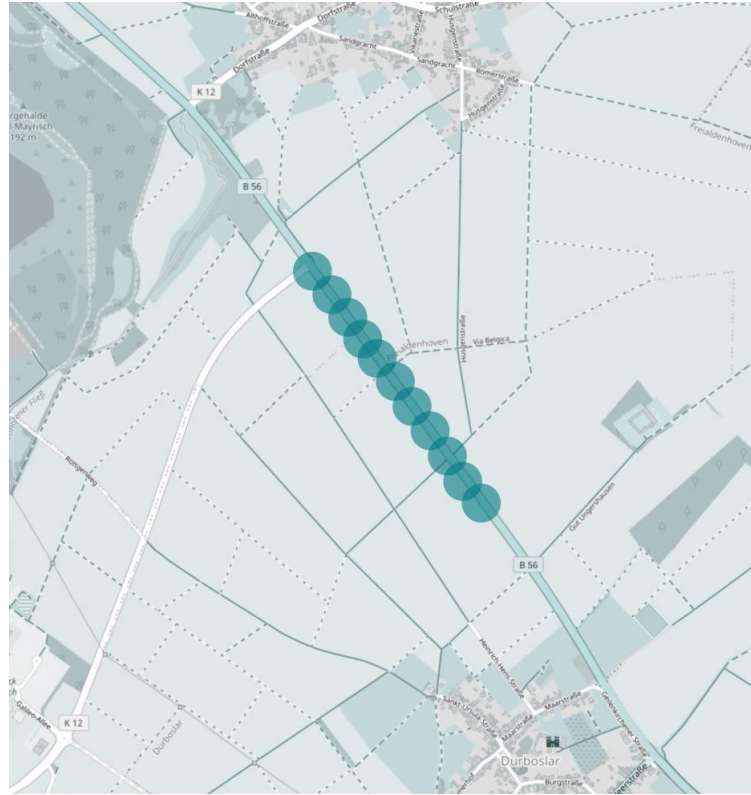
Test Fields for Automated and Connected Mobility



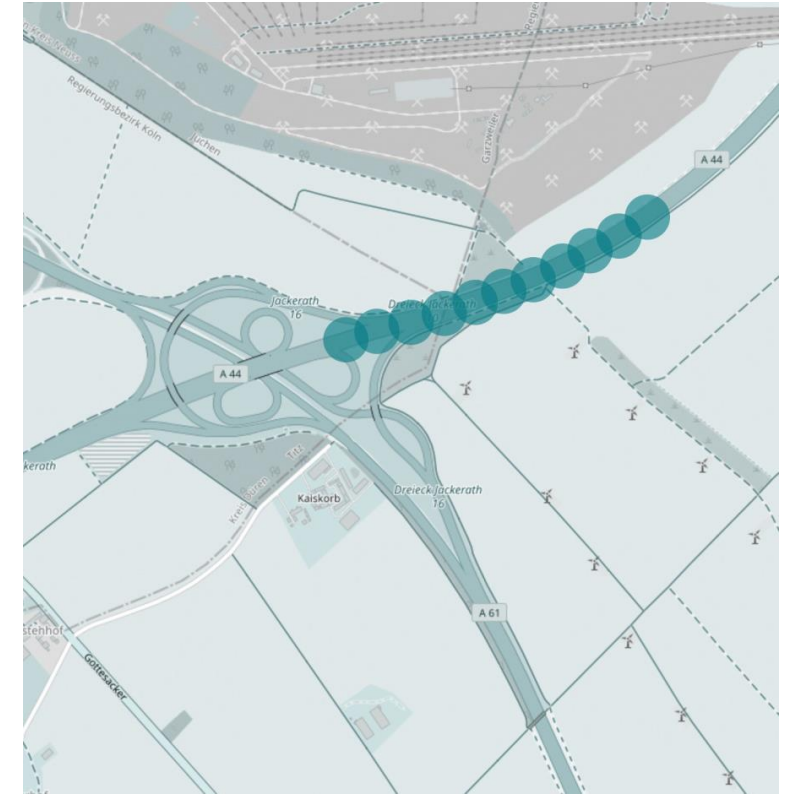
Test Fields for Automated and Connected Mobility



Urban
Campus Melaten, Aachen
2.4 km, 46 Road Side Units

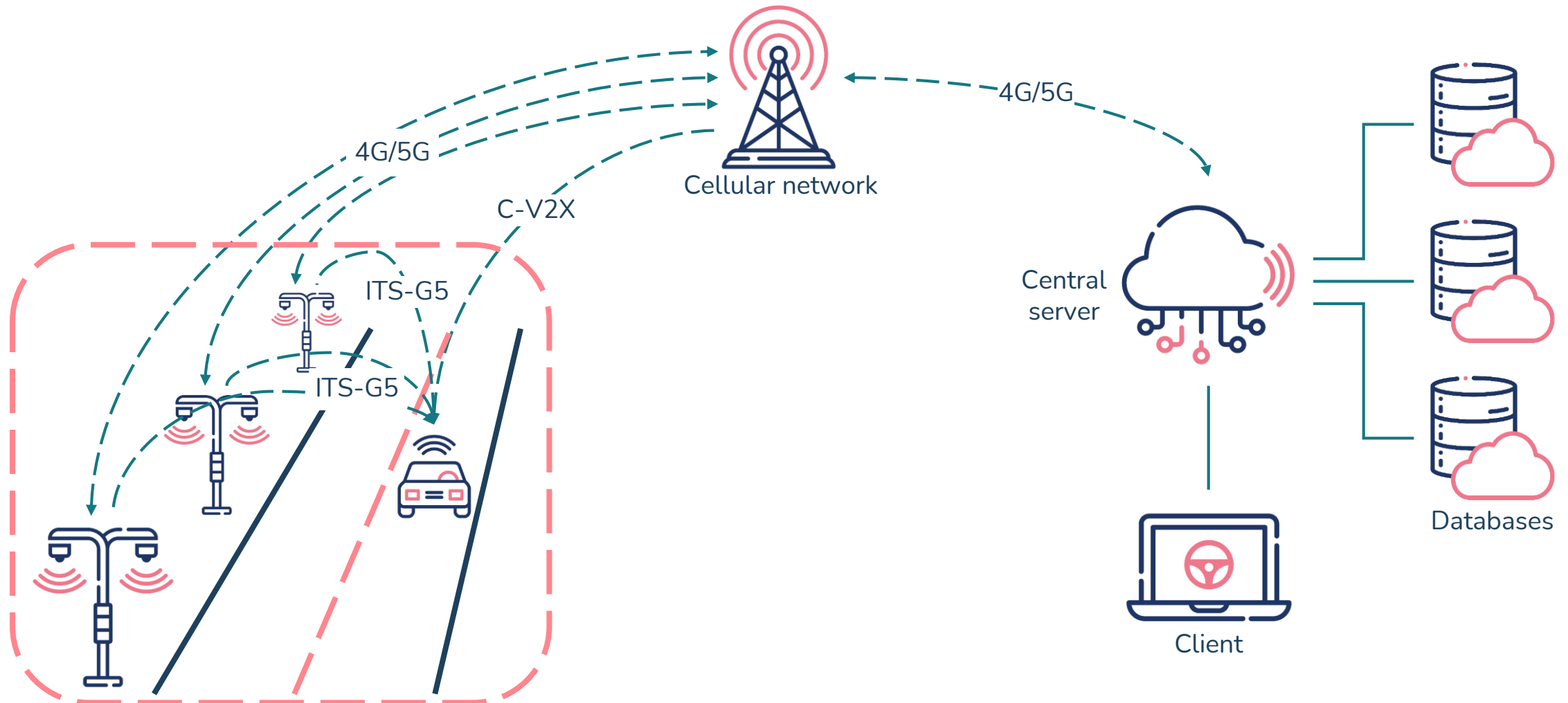


Rural
B 56, Aldenhoven
1 km, 11 Road Side Units

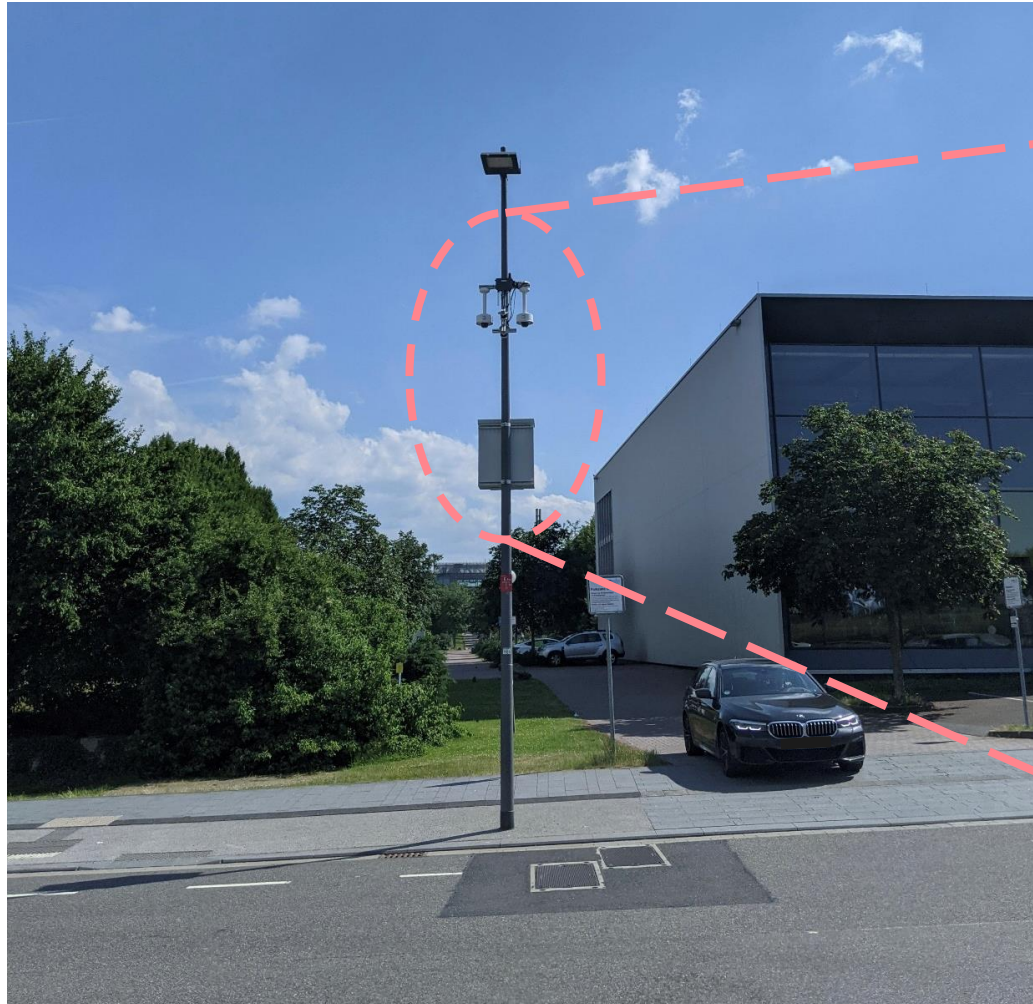


Highway
A 44, Jackerath
1 km, 11 Road Side Units

Traffic Detection Concept



Stationary Smart Roadside Infrastructure Sensors



V2X road side unit
(ITS-G5/802.11p)



2 LiDAR sensors
(128 vertical layers)



2 Camera sensors
(4K resolution)



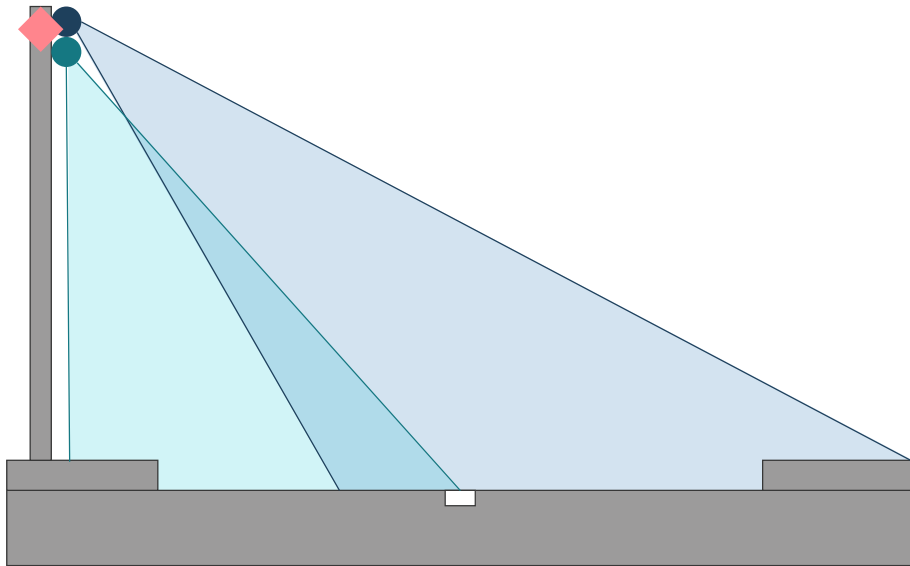
Sensor data processing unit



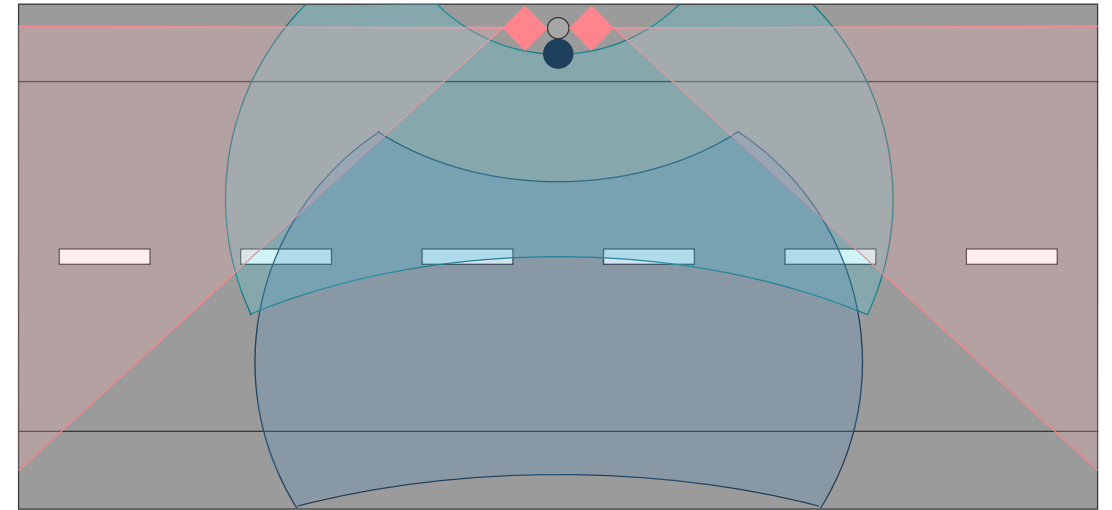
Multiband antenna
(GNSS/Wi-Fi/4G/5G)

Sensors' Fields of View for Each RSU

Side view



Top view*



● LiDAR 1

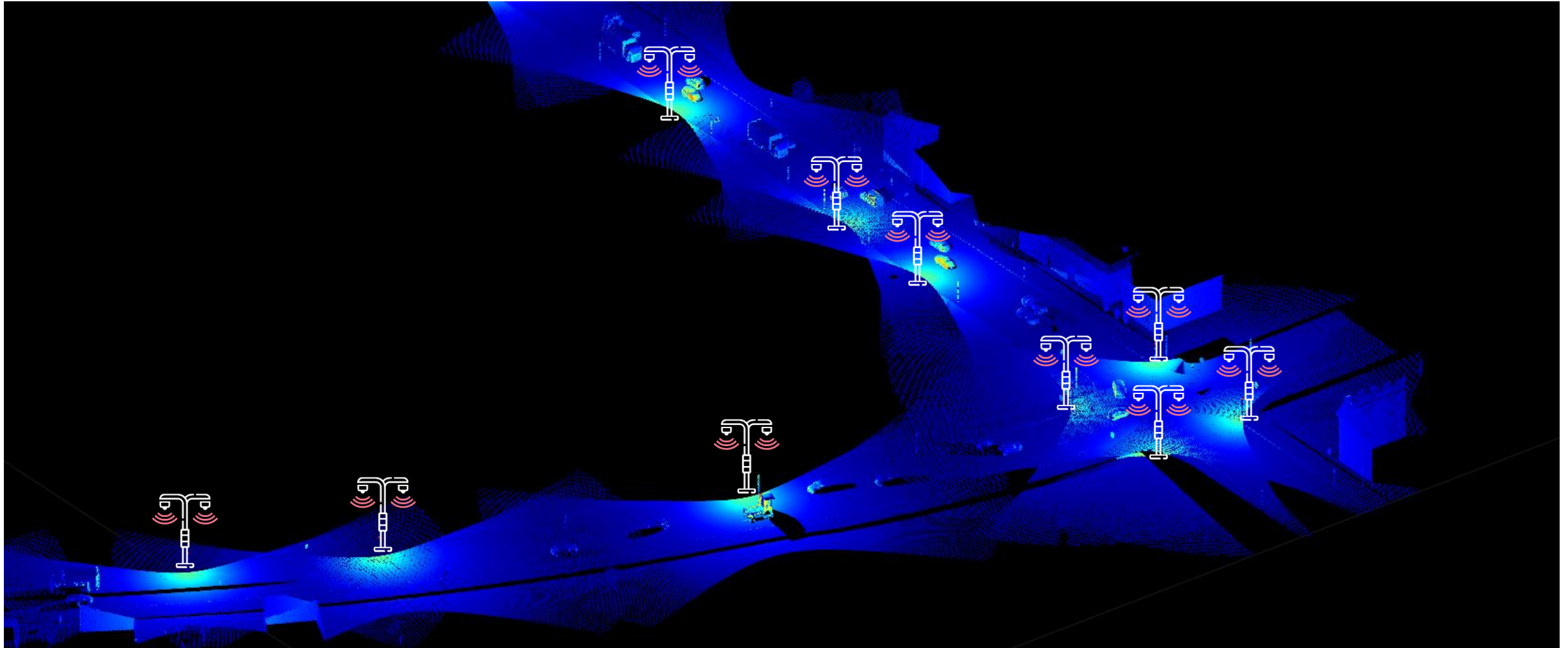
● LiDAR 2

◆ Camera 1

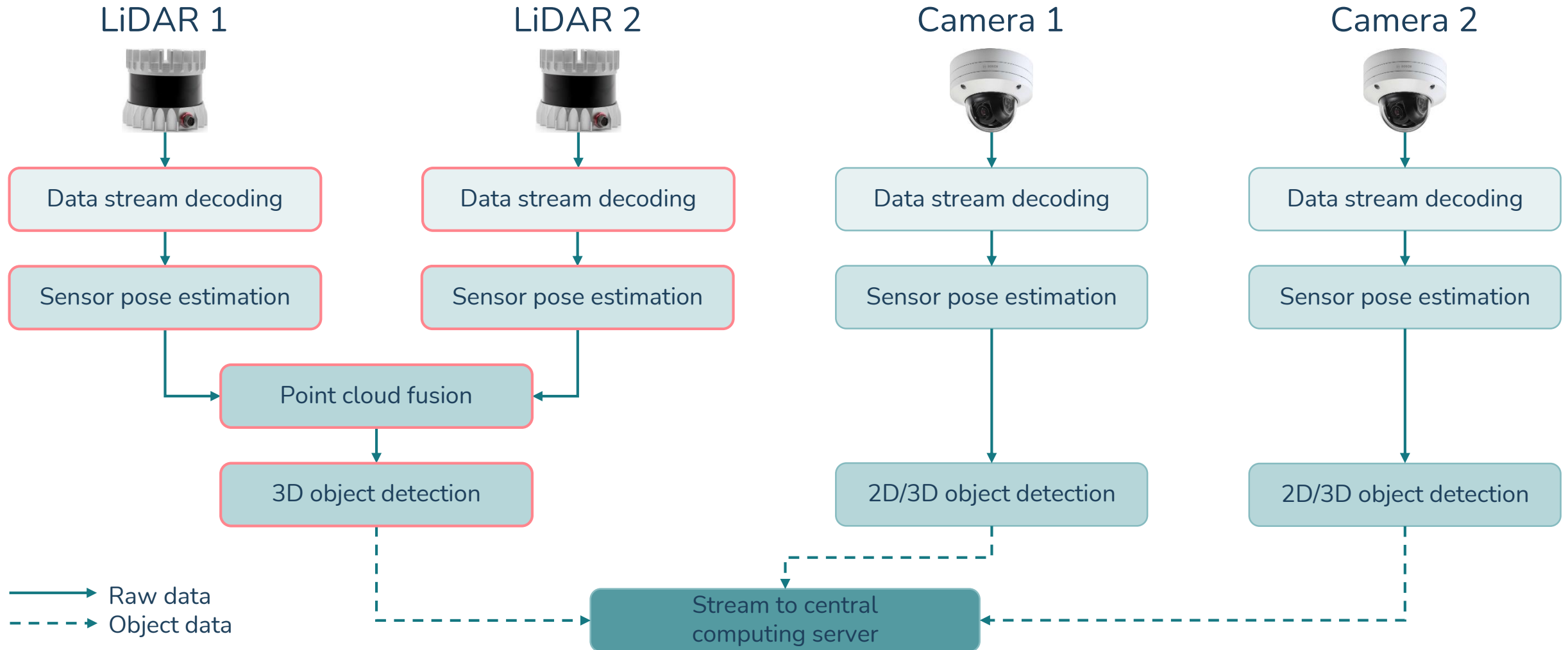
◆ Camera 2

***Scales shown are not true to reality!**

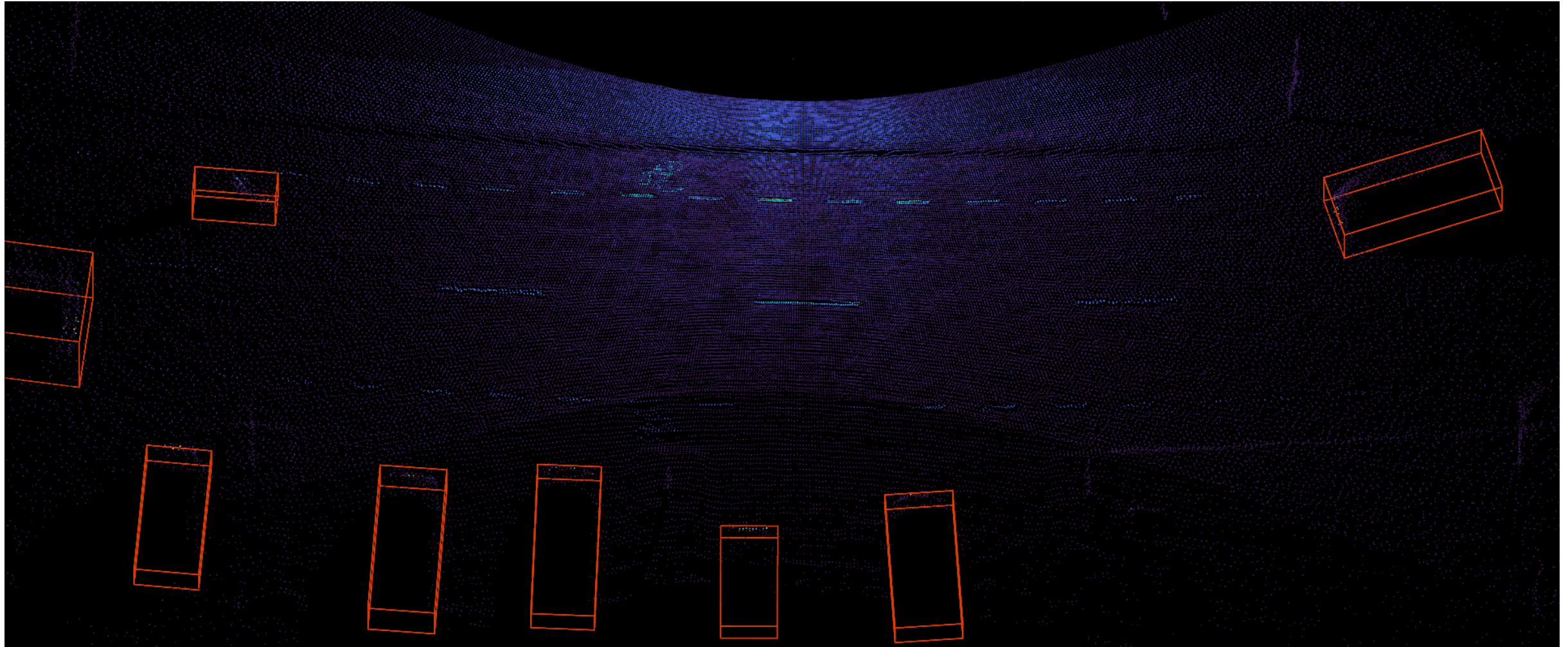
Global Fused LiDARs' Fields of View



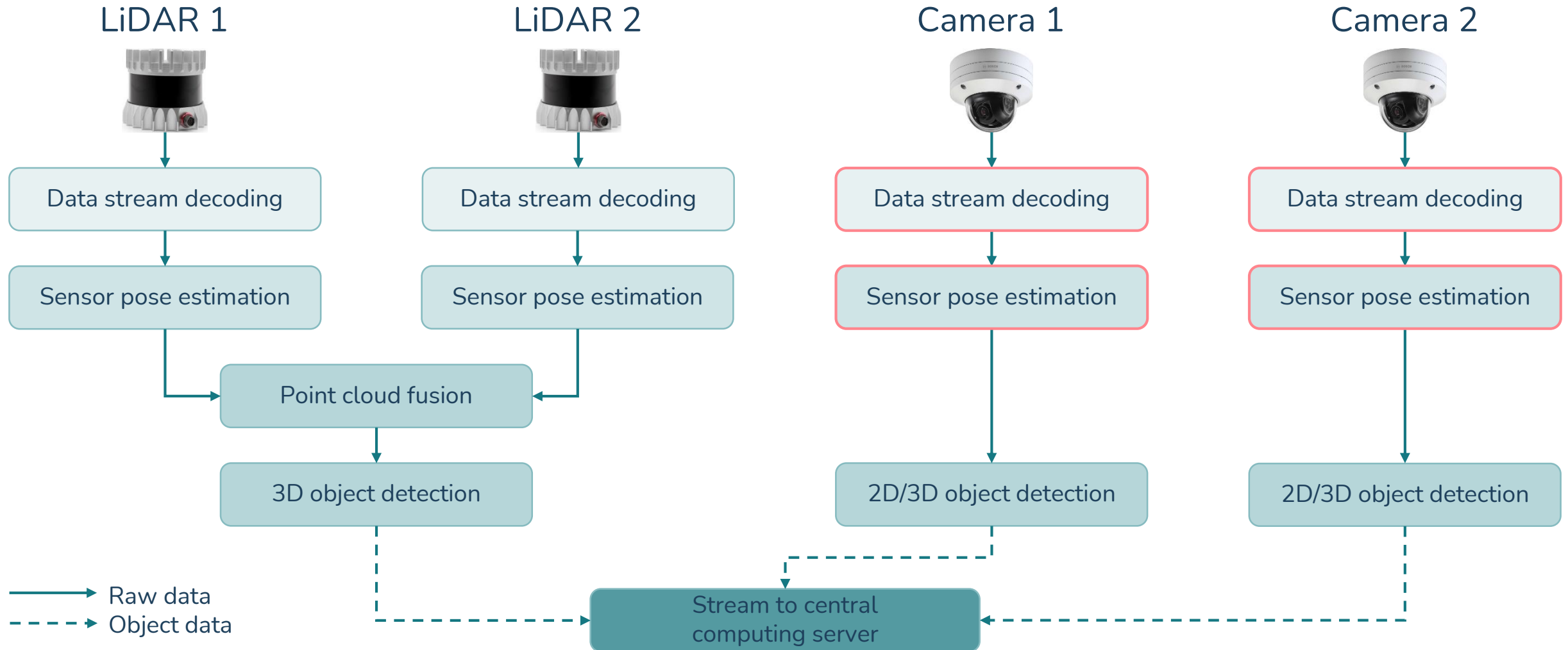
Data Processing Pipeline for Each Road Side Unit

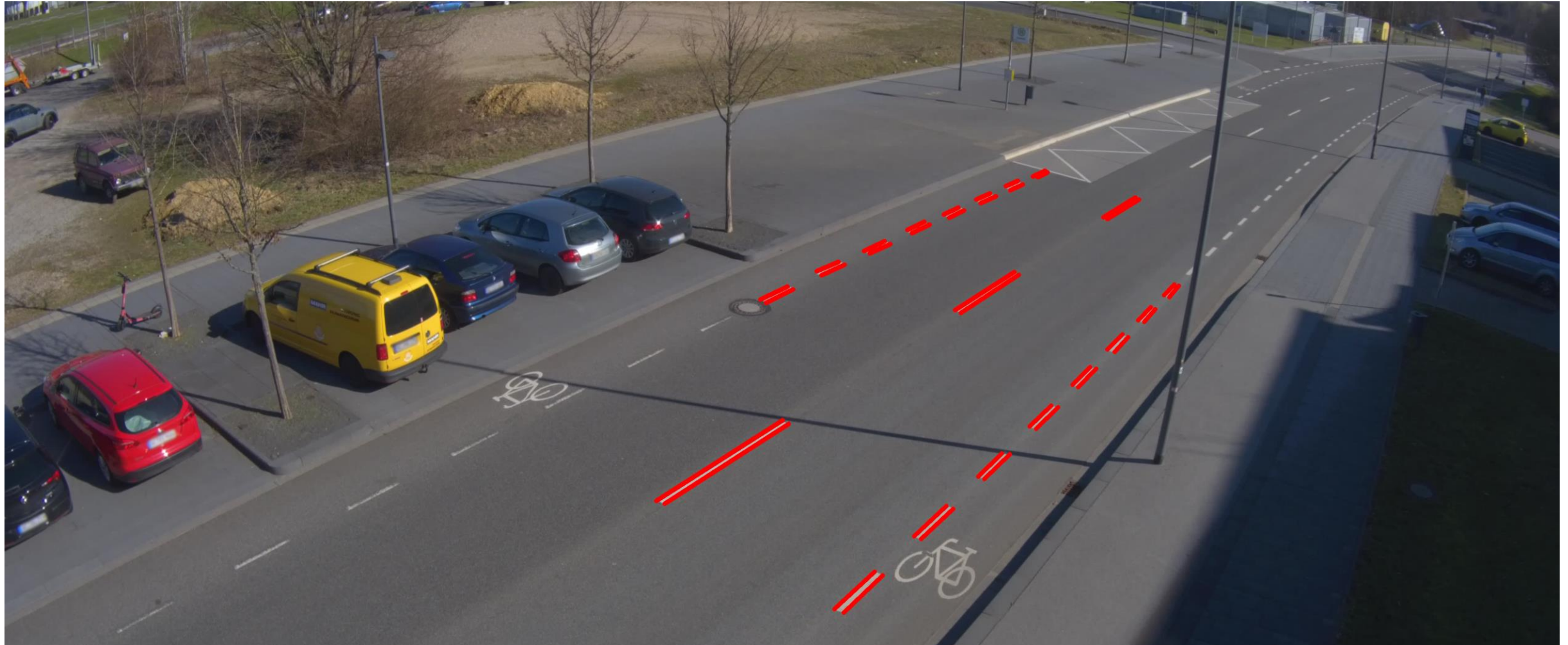


LiDAR Point Cloud Fusion for Each Road Side Unit

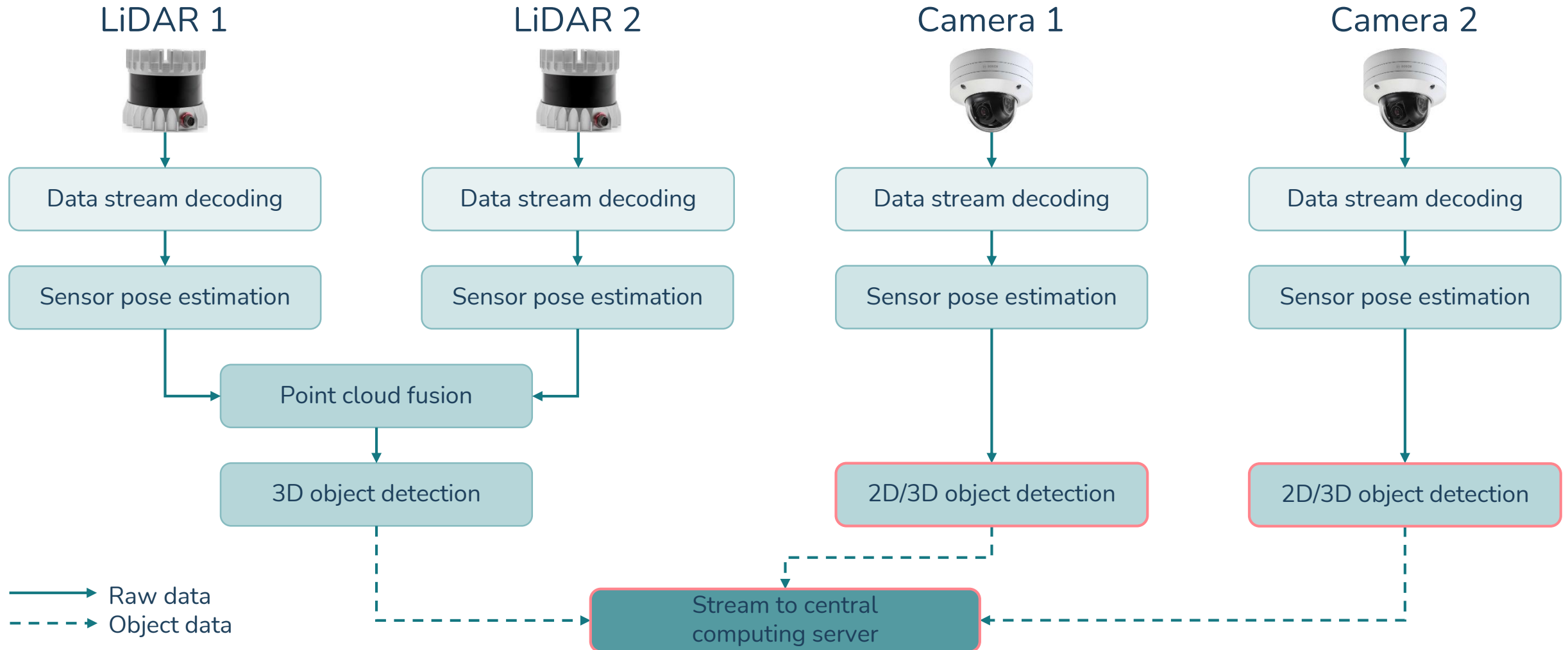


Data Processing Pipeline for Each Road Side Unit

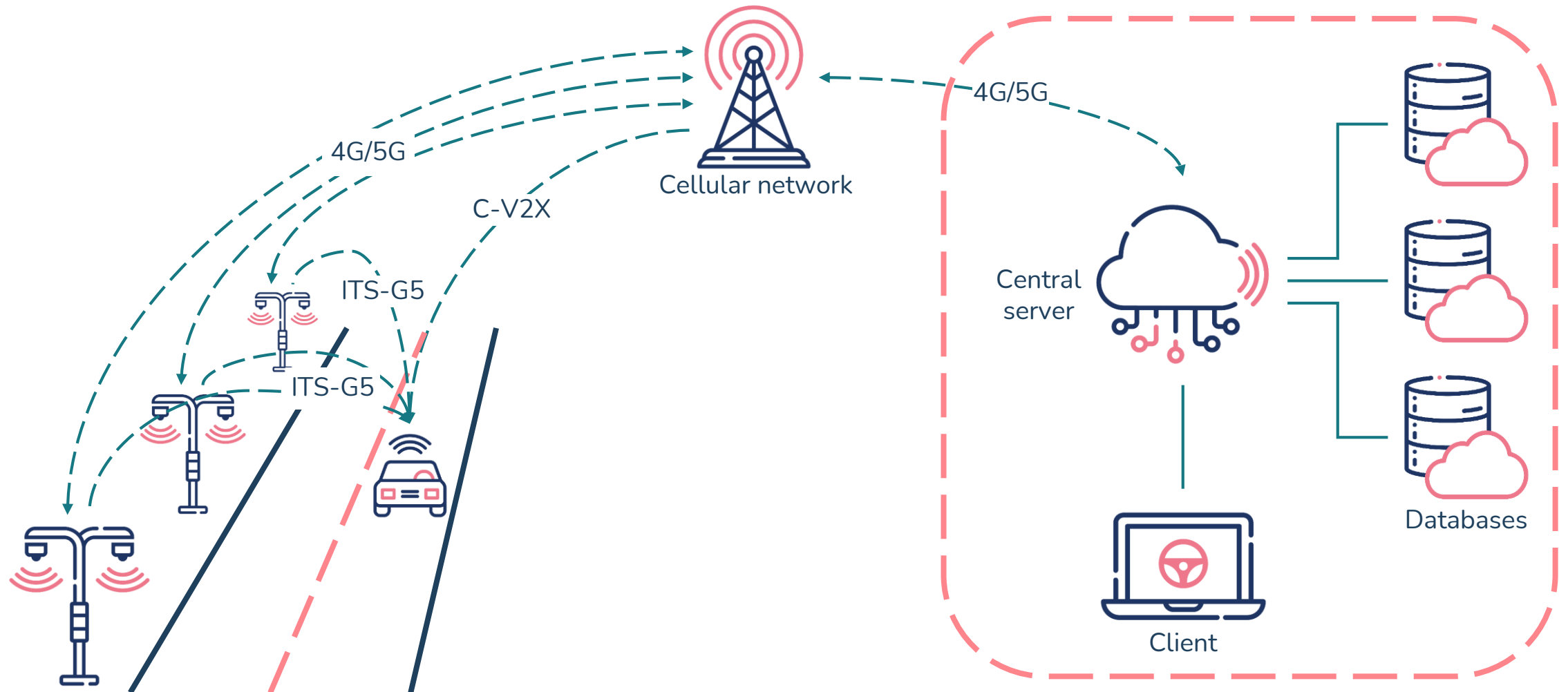




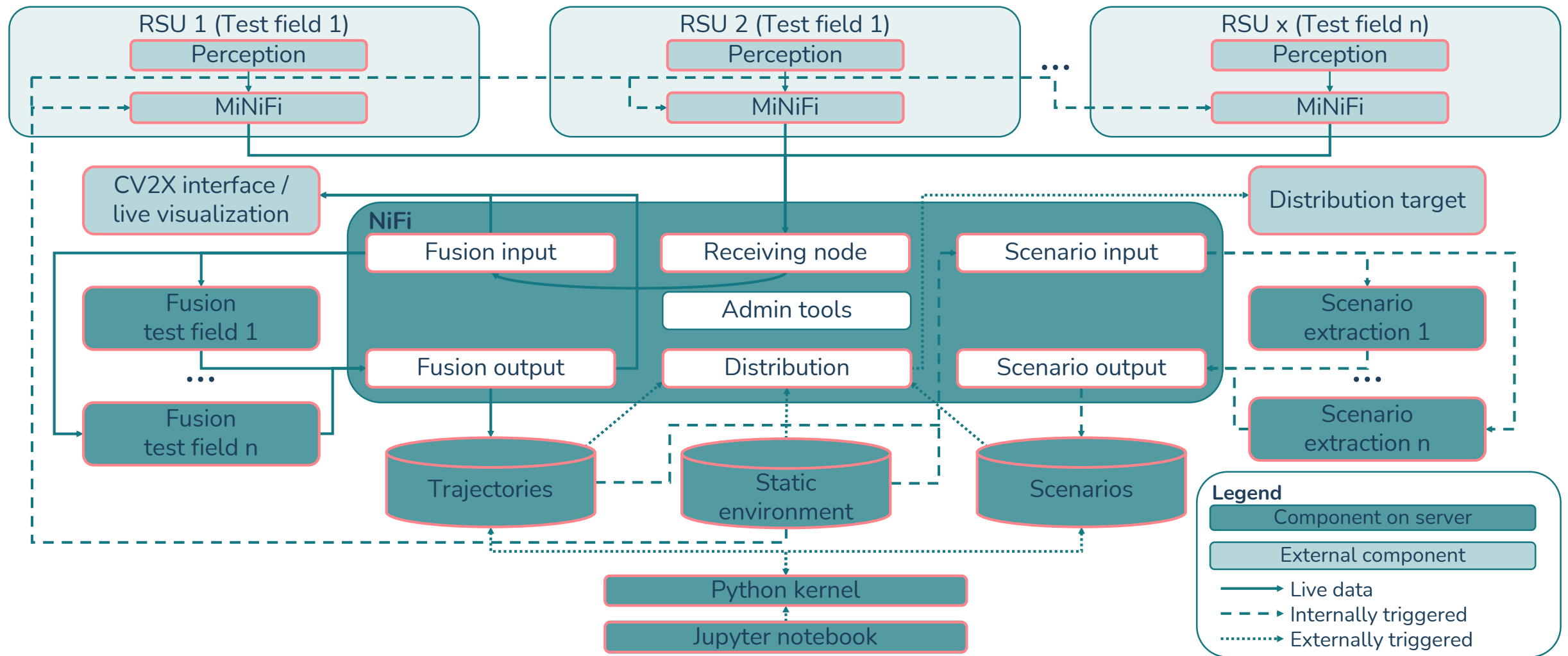
Data Processing Pipeline for Each Road Side Unit



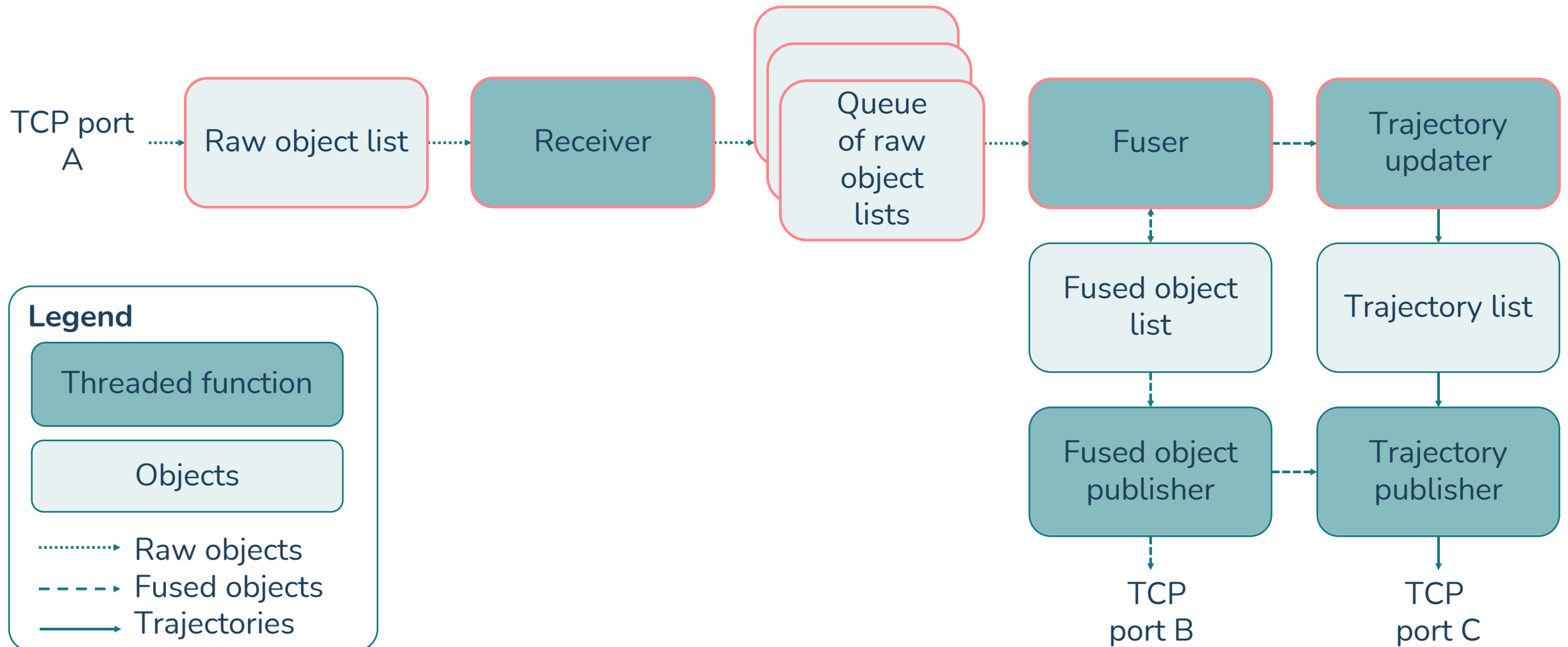
Traffic Detection Concept



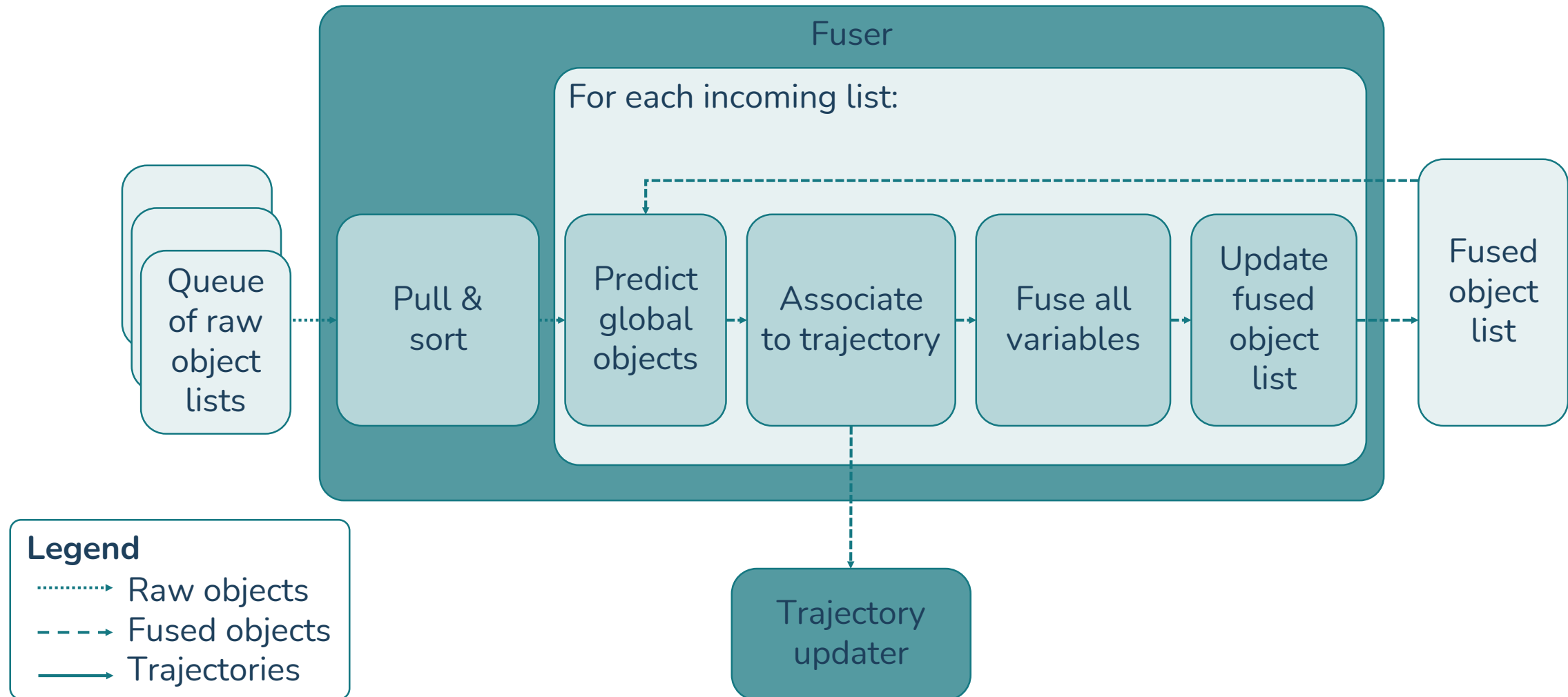
Data Management Concept



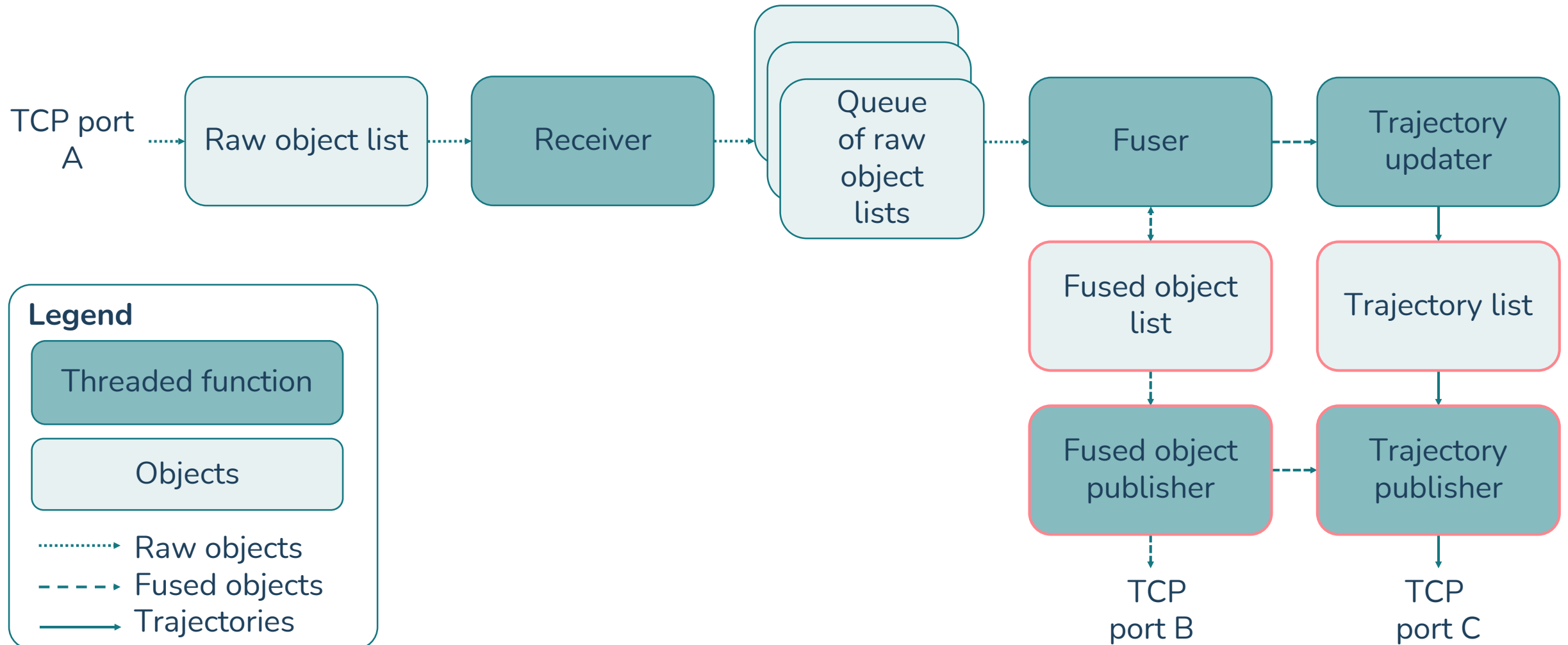
Data Processing Pipeline of Fusion Function



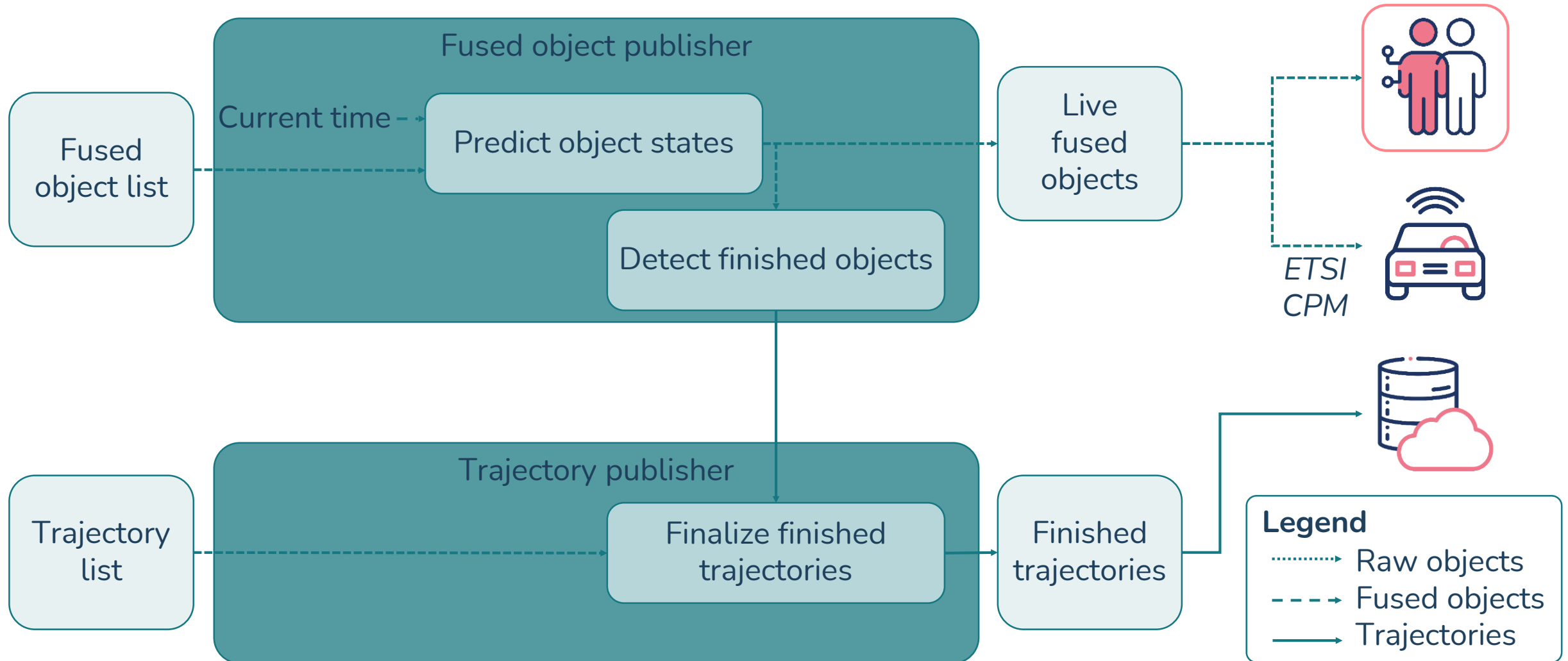
Data Processing Pipeline of Fusion Function

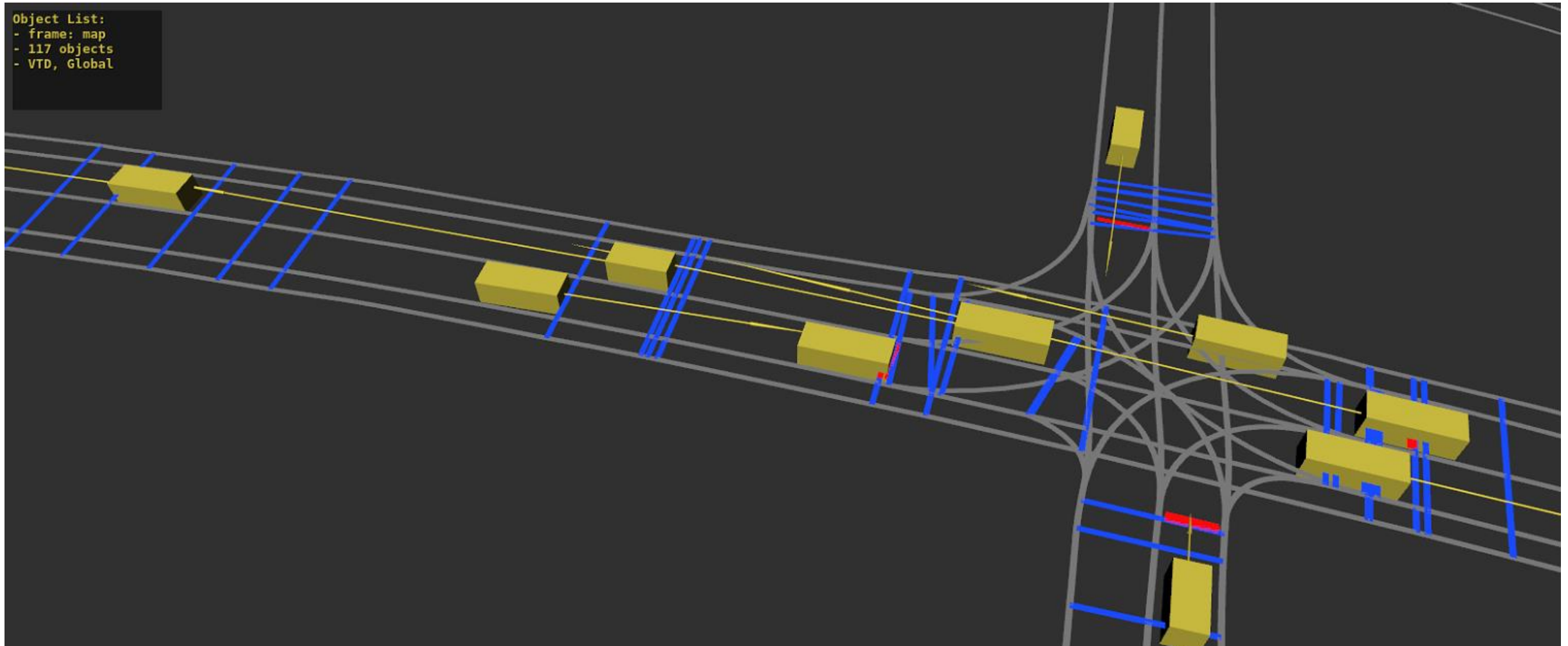


Data Processing Pipeline of Fusion Function

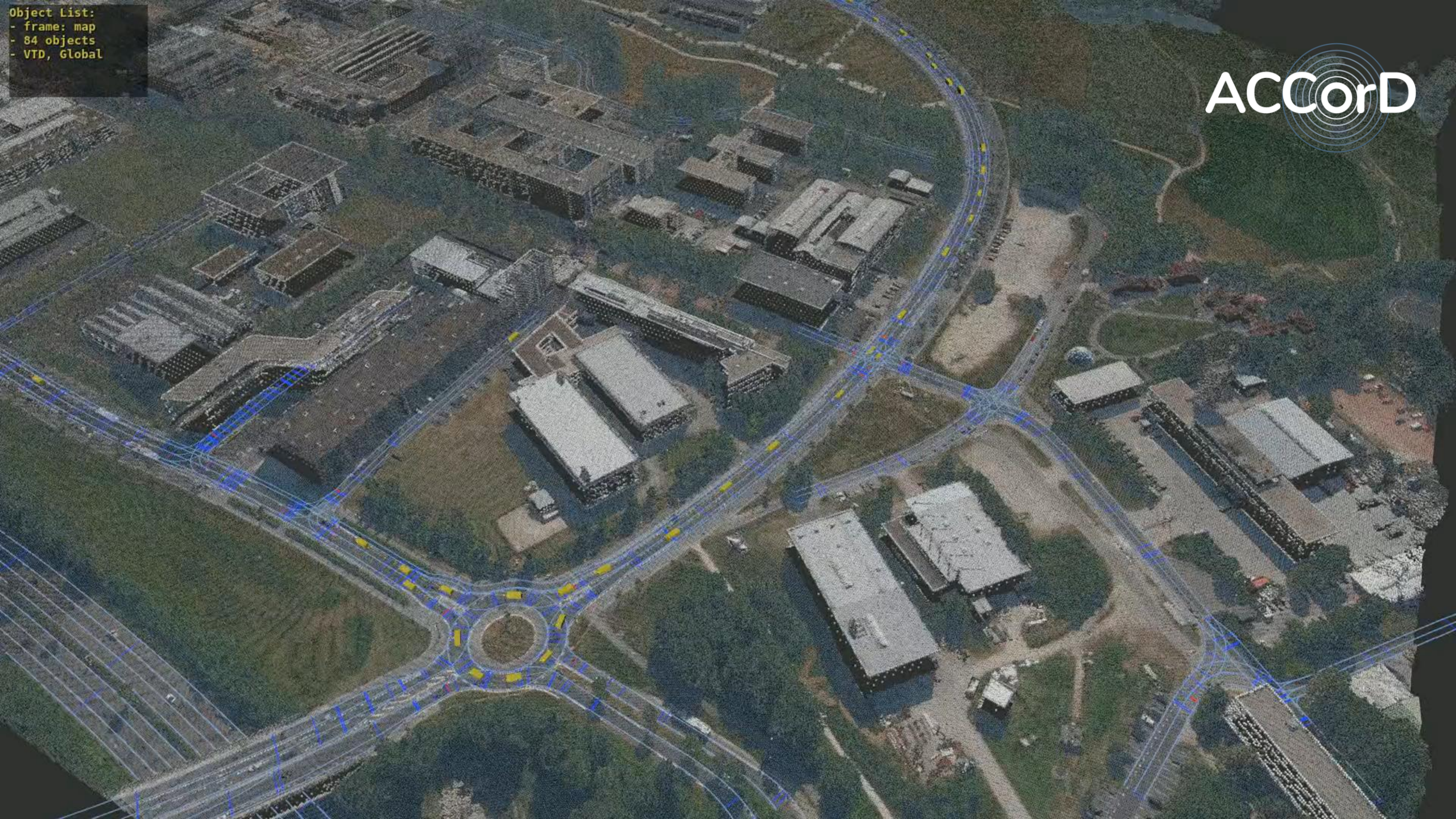


Data Processing Pipeline of Fusion Function





Object List:
- frame: map
- 84 objects
- VTD, Global





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