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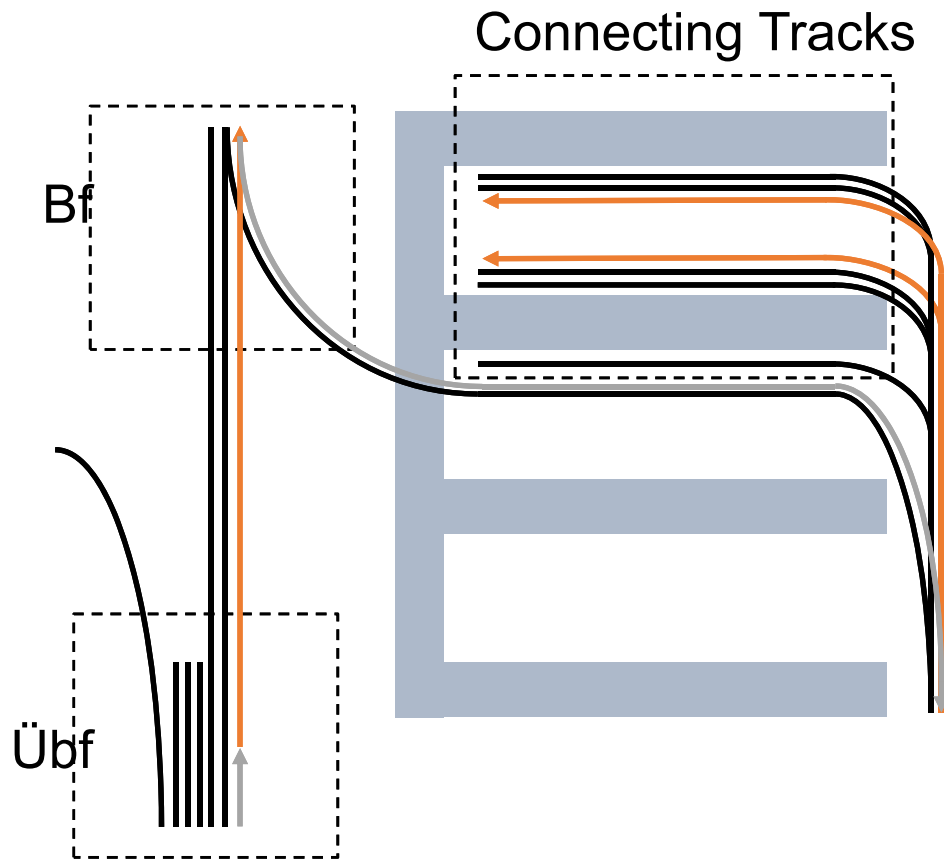
EUROPÄISCHE UNION
Investition in unsere Zukunft
Europäischer Fonds
für regionale Entwicklung



EFRE.NRW
Investitionen in Wachstum
und Beschäftigung

SAMIRA-Projekt is being funded under EFRE-0801689

Typical Operation in Harbour Area



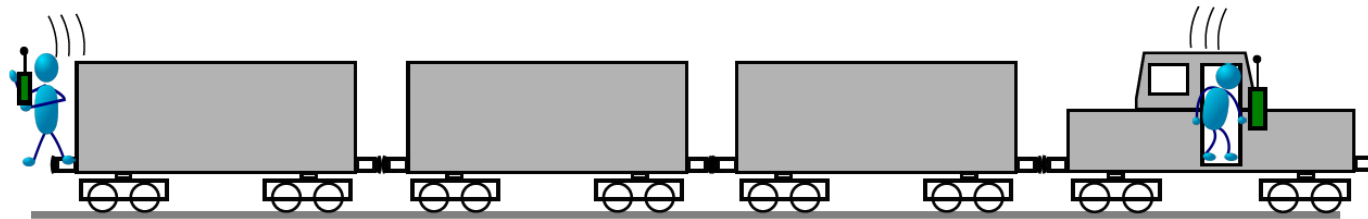
pulled shunting drive
pushed shunting drive

**Multiple
Change of the
Directions
required**

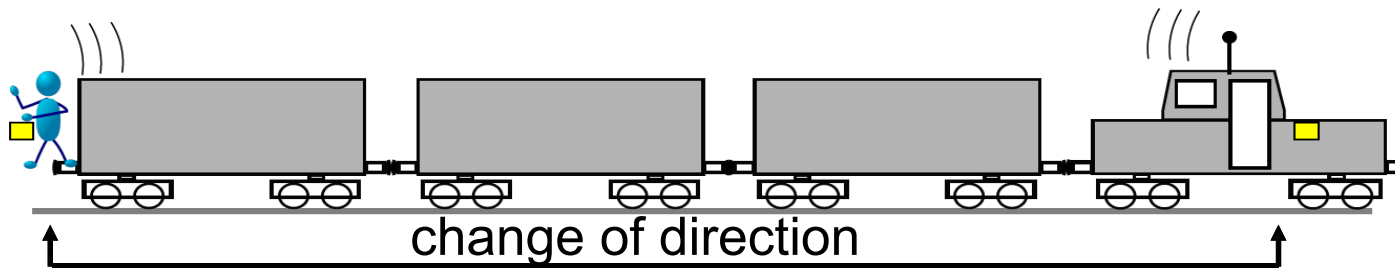


The Problem of Today's Shunting

Either operated by two people



..... or by remote control



Problem / Initial Situation

- The cost of last mile services at terminals and junctions is too high compared with other transport modes
- For long trains the use of an additional shunting attendant is necessary, as the range of an existing radio remote control is not sufficient,
- In the upcoming digitalisation, freight wagons will also be equipped with the corresponding technology, whereby the wagon rental companies will record the corresponding data on vehicle conditions,
- Demographic change, shortage of skilled workers and cost pressure therefore require new, - i.e. digital - solutions to increase efficiency.

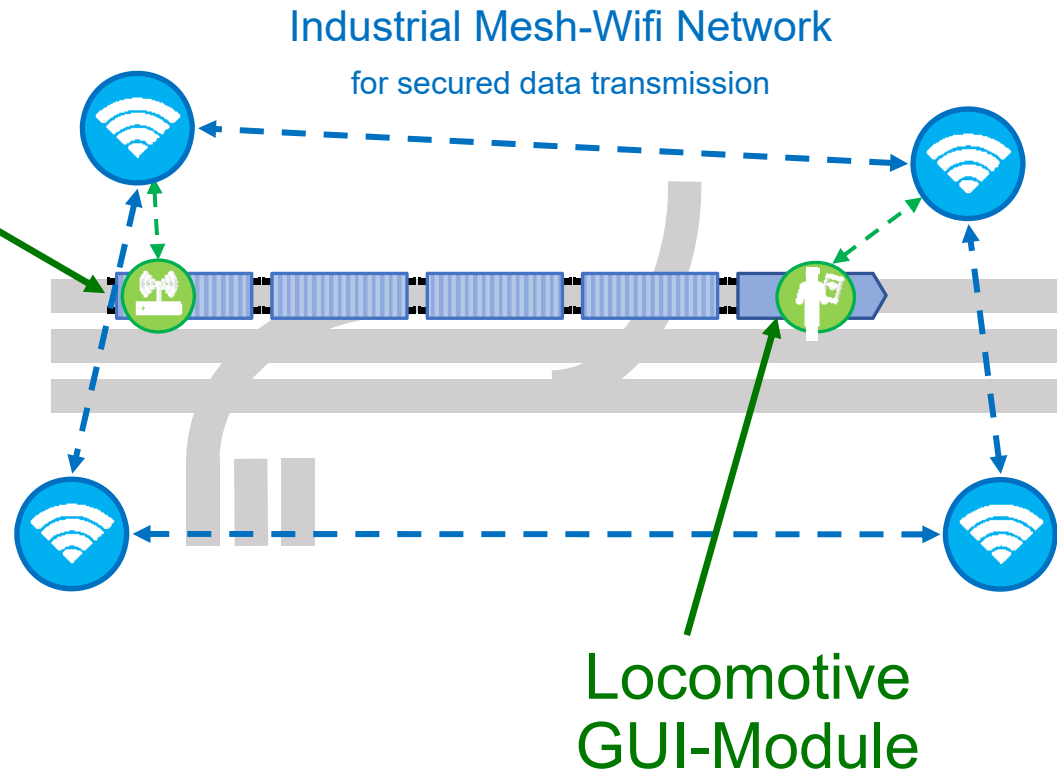
Technological Solution

- As an alternative for having a shunting attendant or a locomotive driver at the end of the train, an electronic system is used to collect and remotely transmit the necessary information directly to the driver at the locomotive.
- An appropriate interface must be developed and installed on the locomotive to receive all data, process them accordingly and provide it reliably to the locomotive driver.
- The aim of the SAMIRA project is to create the technical and organisational conditions for the production and practical use of such a system.

Solution: Shunting Assistant

Portable Sensor Module

- Camera
- Radar / LIDAR
- Track-selected position
- Transmission via mesh-wifi to locomotive



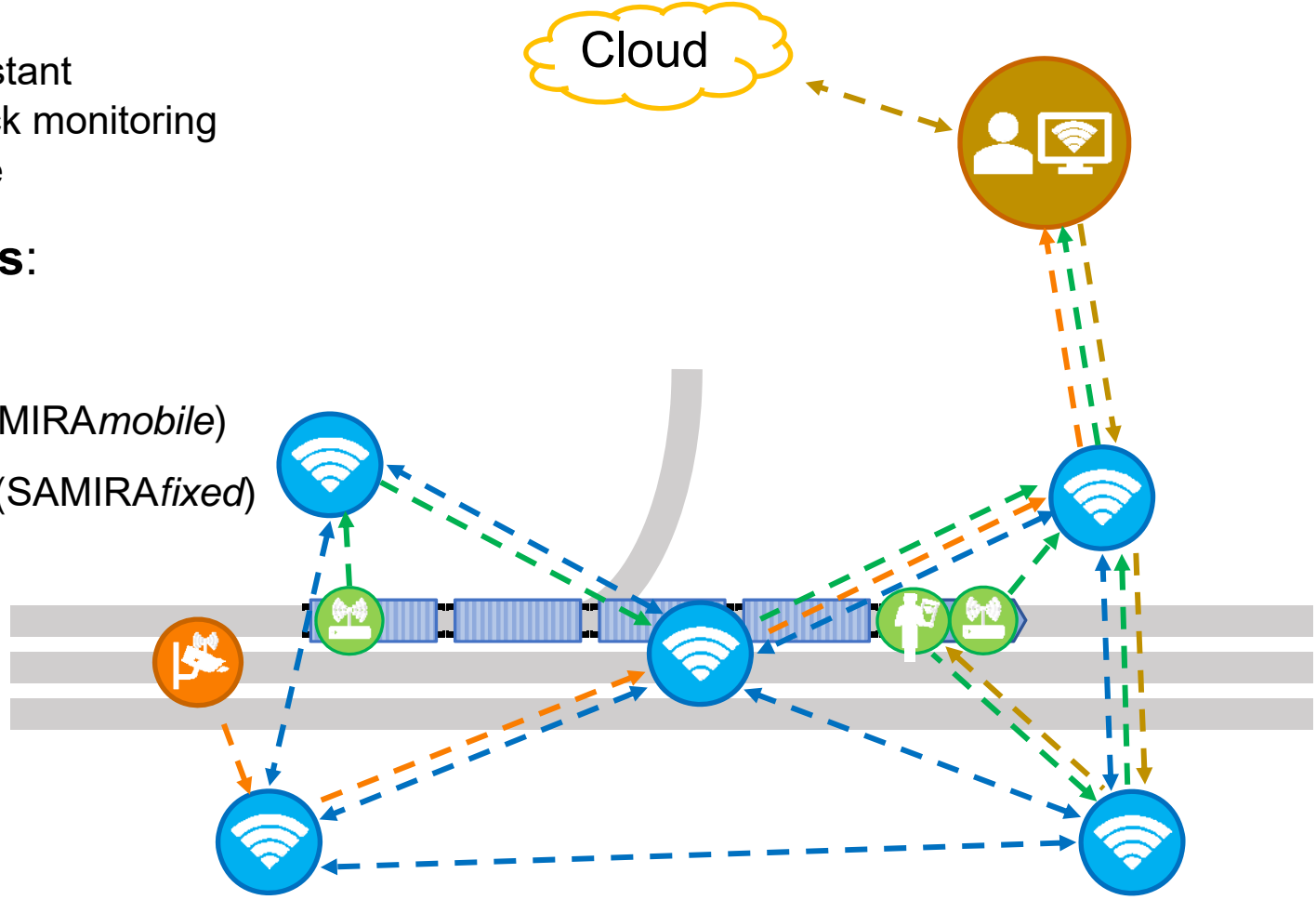
Extended Concept SAMIRA

Dataflow:

- Shunting Assistant
- Stationary track monitoring
- Control Centre

Components:

- Mesh nodes
- Mobile Unit (SAMIRAmobile)
- Stationary Unit (SAMIRAfired)
- Edge Server
- GUI



Display with Augmented Reality



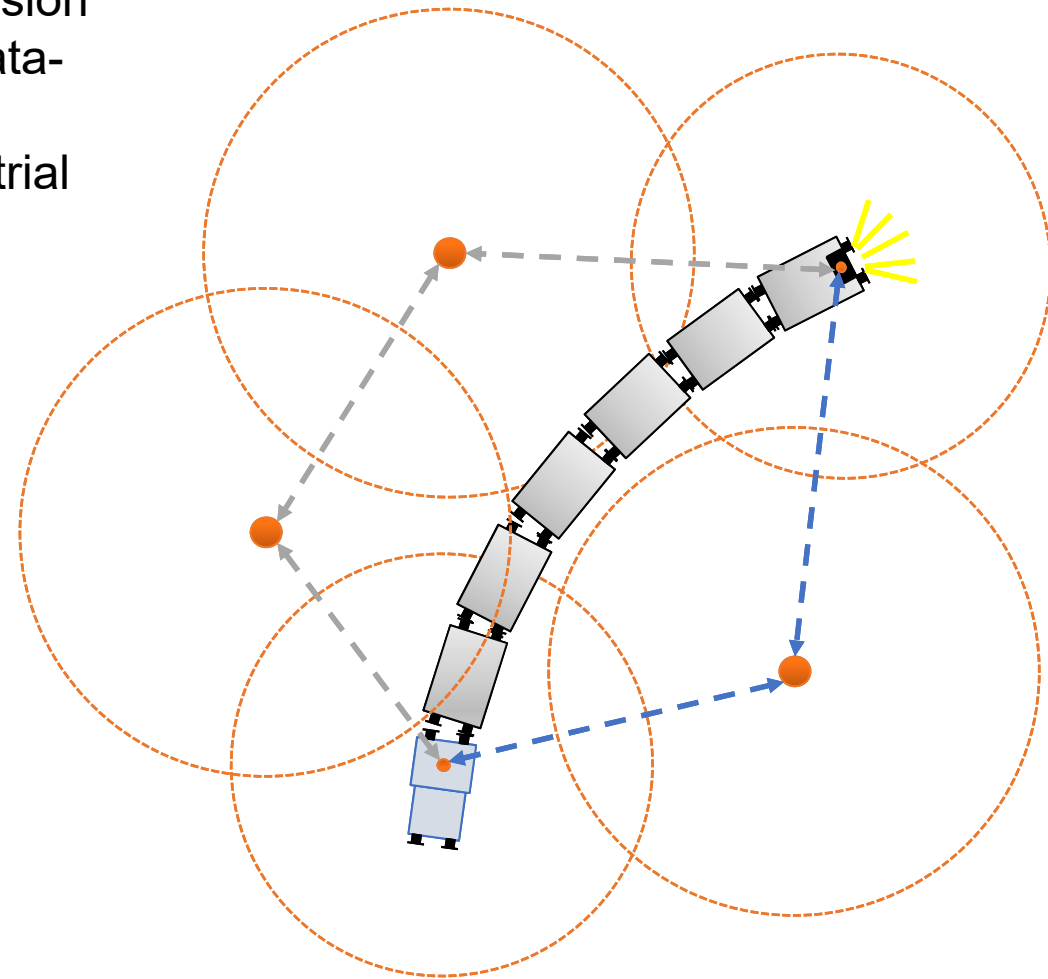
Technical Requirements

- Loco driver is always in a safe and comfortable environment
- Infrastructure components are remotely controlled or operation must be organized accordingly.
- Real time data transmission must be guaranteed.
- Precise, track-selective positioning must be guaranteed while driving.
- A clear assignment between SAMIRAmobile device and receiver in loco's driver cab is required.
- Automatic change of camera image when changing direction
- Train length and position information must be recorded and communicated
- Locating is necessary as a preventive measure against loss of any mobile device

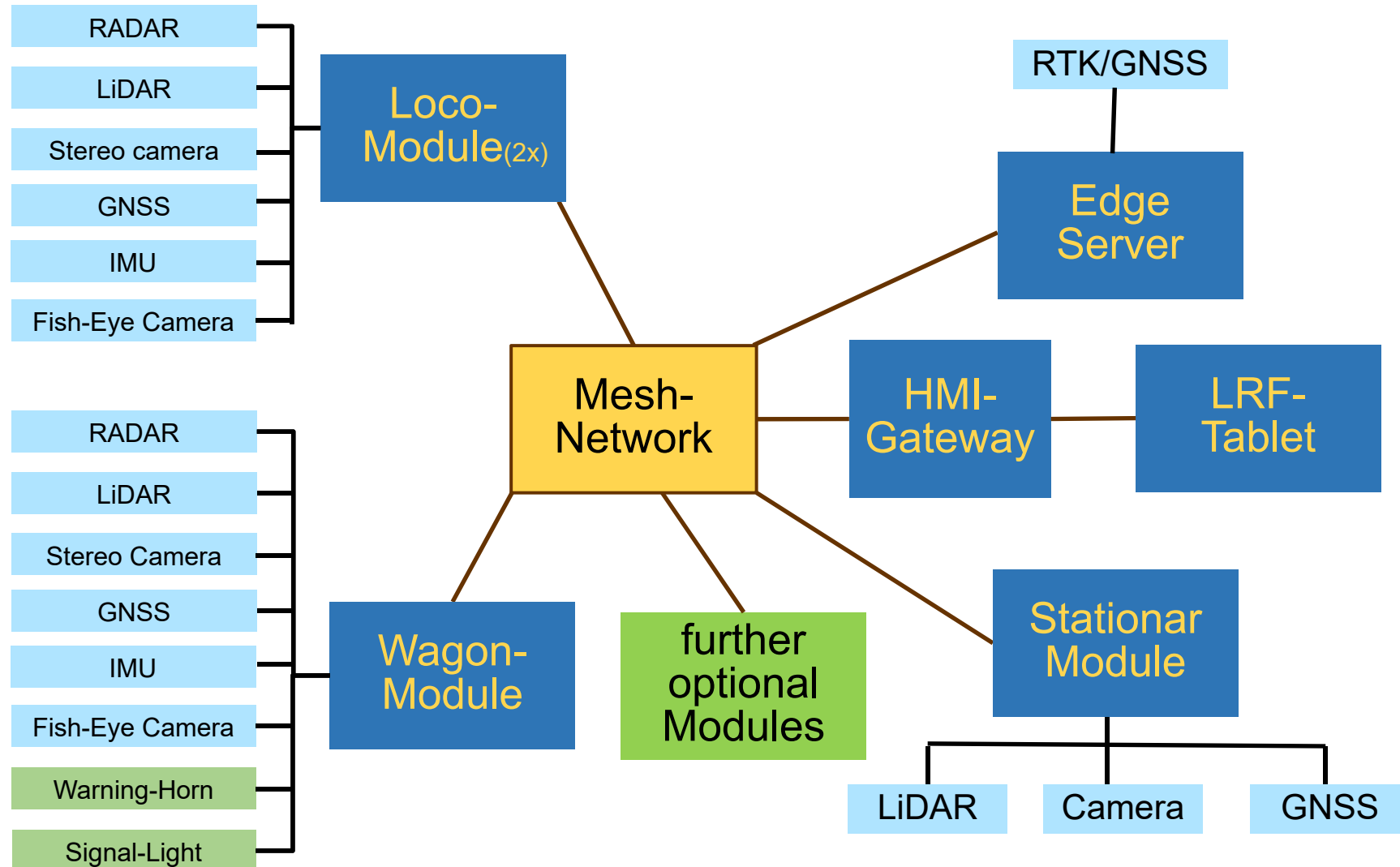
Data Transmission via Wireless Mesh Network (WMN)

To ensure seamless data transmission a radio network with a sufficient data-transmission rate required.
A first approach is a secure, industrial wireless mesh network

- Fixed transmission nodes
- Mobile transmission nodes
- Internet connection possible
- Redundancy
- Dynamic Routing

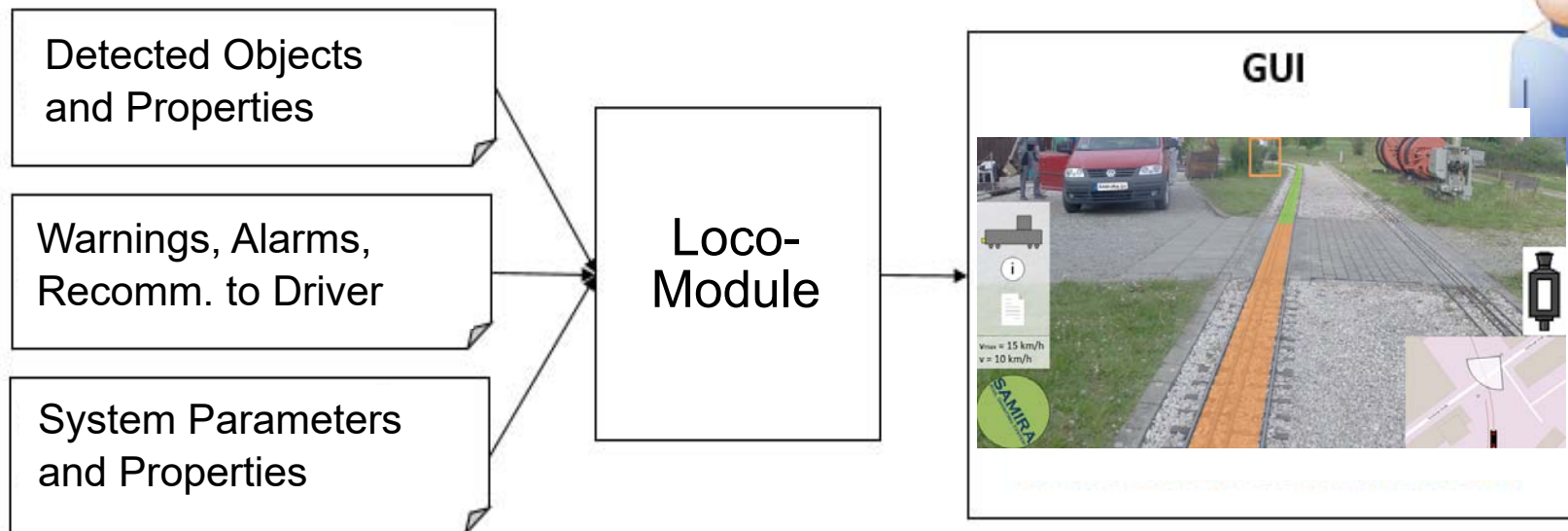


SAMIRA System Architecture

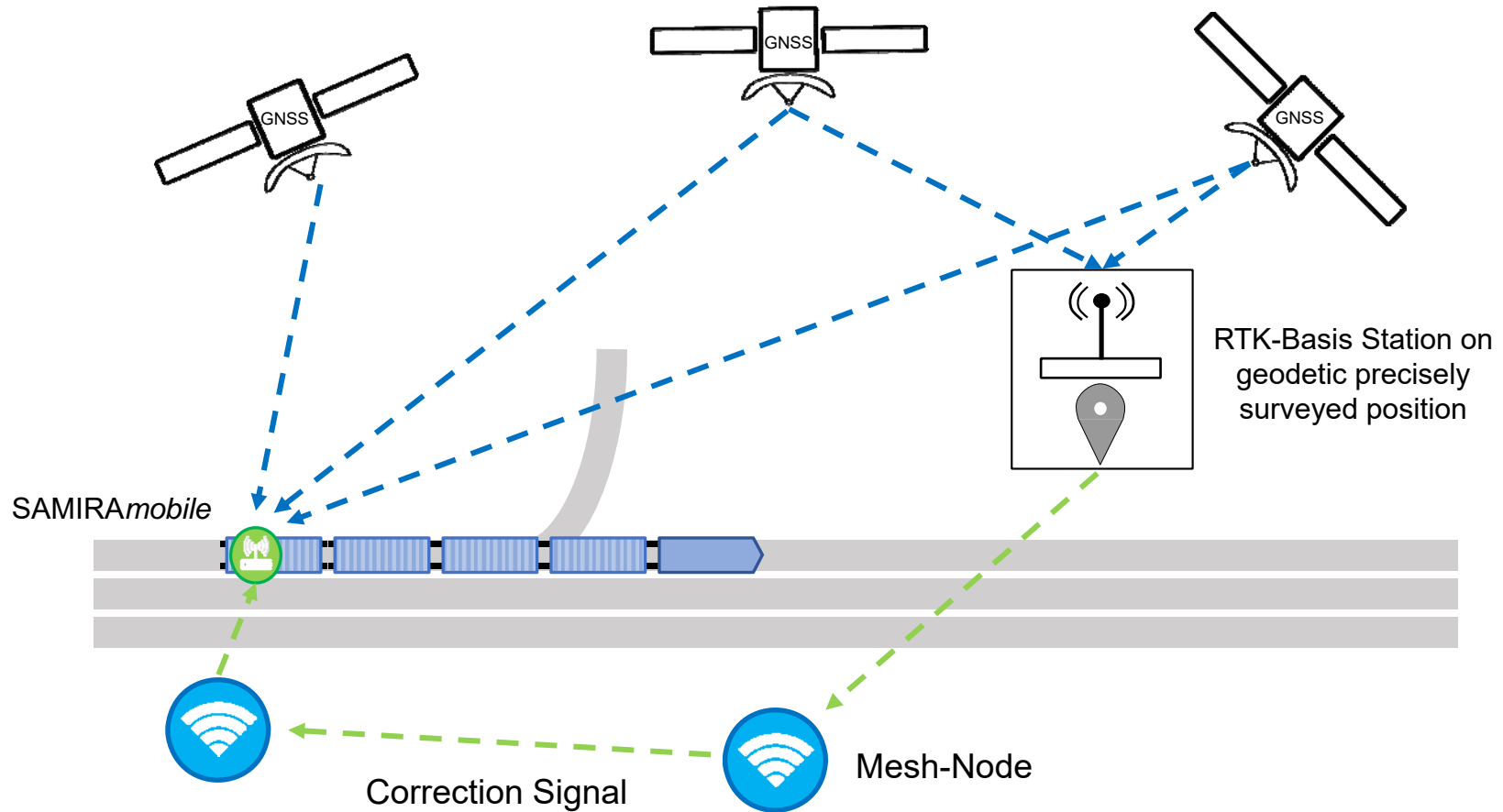


Generation of Display Information

Information from Mesh-Network




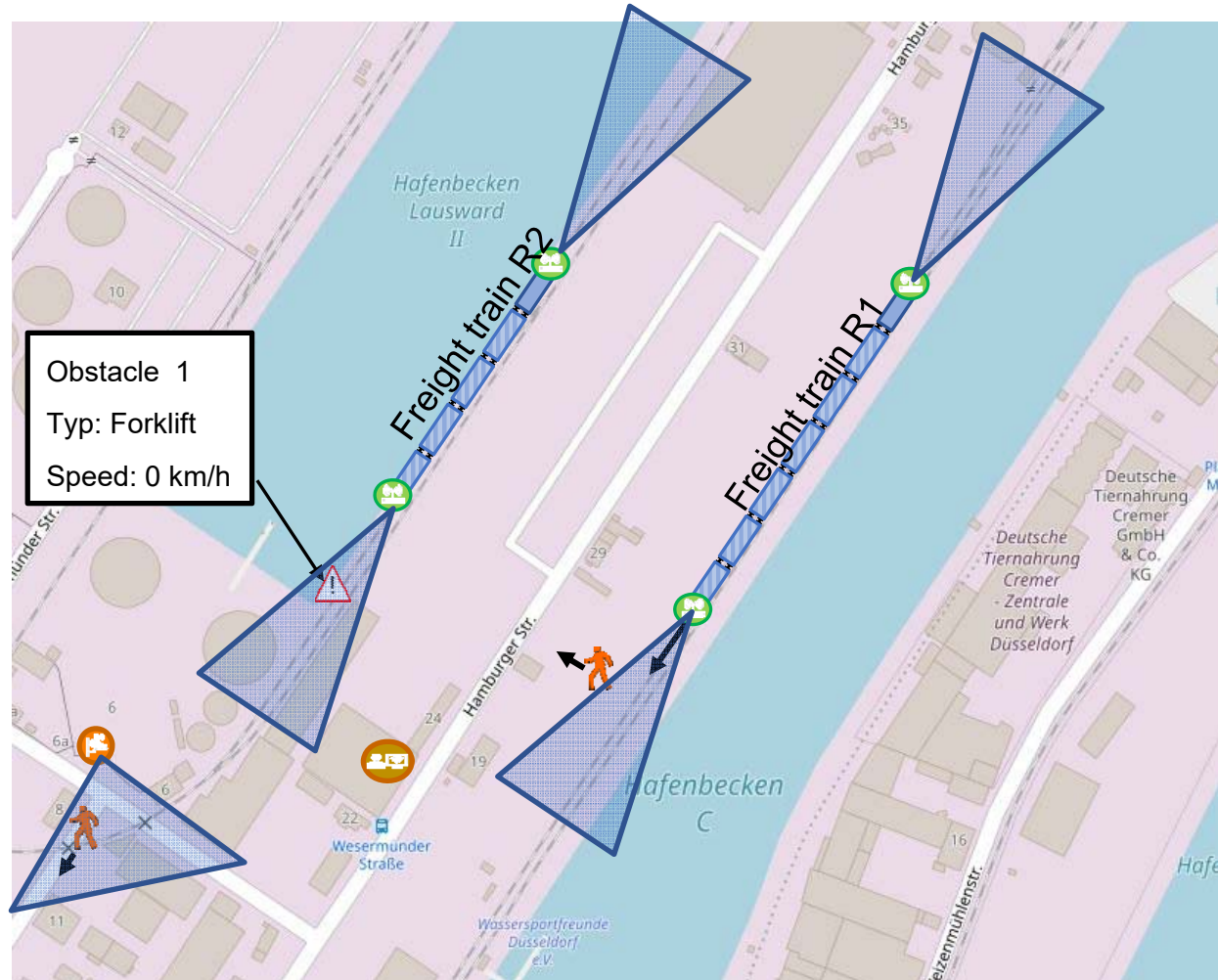
Concept RTK



RTK = Real Time Kinematic

Digital Map

-  Mobile Device
-  Stationary Device
-  Edge Server
-  Pedestrians
-  Obstacle
-  Freight train
-  Velocity vector
-  Detection area



SAMIRA provides manifold advantages:

- The shunting attendant is no longer required and can now be better used as an additional shunting driver on the locomotive
- SAMIRA increases safety in railway operations, especially at night, in fog, snowfall or heavy rain
- SAMIRA supports to reduce (rear-end) accidents and so reduction of downtimes, repair costs and insurance premiums
- The captured data and (augmented) live images including position information can be displayed with all (mobile) components integrated into the mesh network, e.g. control centre, signal box, terminals, etc.
- SAMIRA is already creating the basic structure for further digitization in the railway sector (i.e. Logistics 4.0, IoT).

SAMIRA: a Modular System



SAMIRA can be configured modularly and adapted to your requirements:

a) SAMIRA basic system

- Sensors mobile module on freight wagon and display in driver's cab
- Basic system RTUS - shunting with technically supported tip

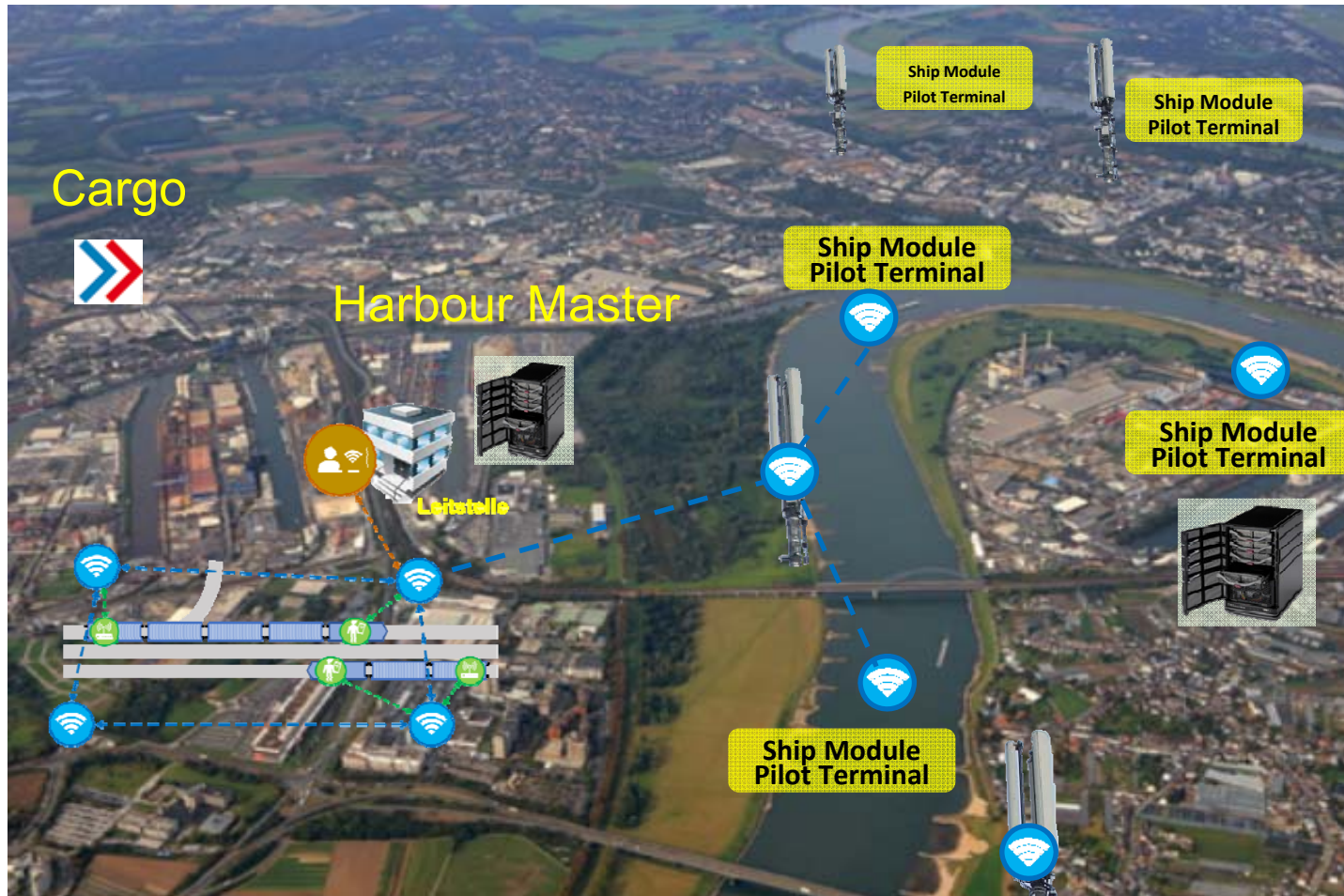
b) SAMIRA train system

- Additional sensors permanently installed in the locomotive on one side
- for locomotives with one or two cabs

c) SAMIRA fully equipped

- Additional sensors permanently installed in locomotive on both sides
- for locomotives with one or two cabs

SAMIRA in the intermodal logistic strategy



Luftaufnahme 2017 von <http://www.nd-haefen.de/>



Thank you!

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Das Europäische Galileo System

Grafik: esa