

DINPAS

Digital Infrastructure Enabling Accurate Positioning for Autonomous Systems

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Project Information

The focus is on an **enhanced digital infrastructure** to support **accurate positioning of mobile GNSS clients** with a specific evaluation focus on the requirements relevant for an **autonomous airport** with a combination of ground vehicles and airborne objects such as UAVs.

Funding agency: **VINNOVA**
Sweden's Innovation Agency

Project timing: 2021-10-01 – 2023-09-30

Project Partners:

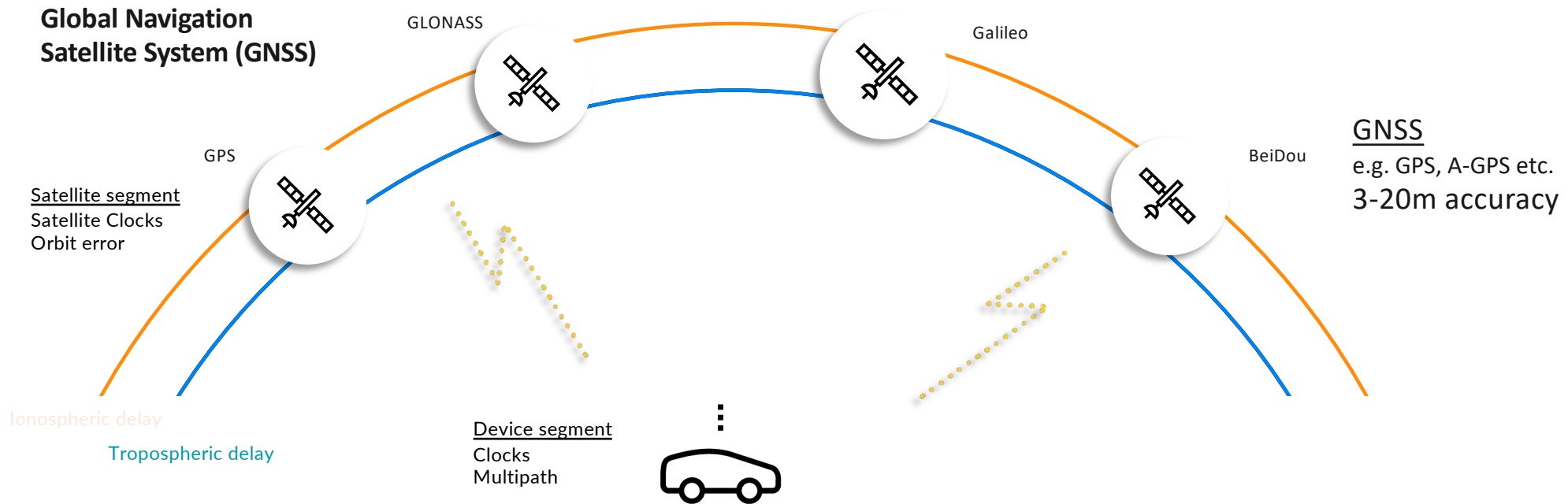


VINNOVA
Sweden's Innovation Agency

RISE

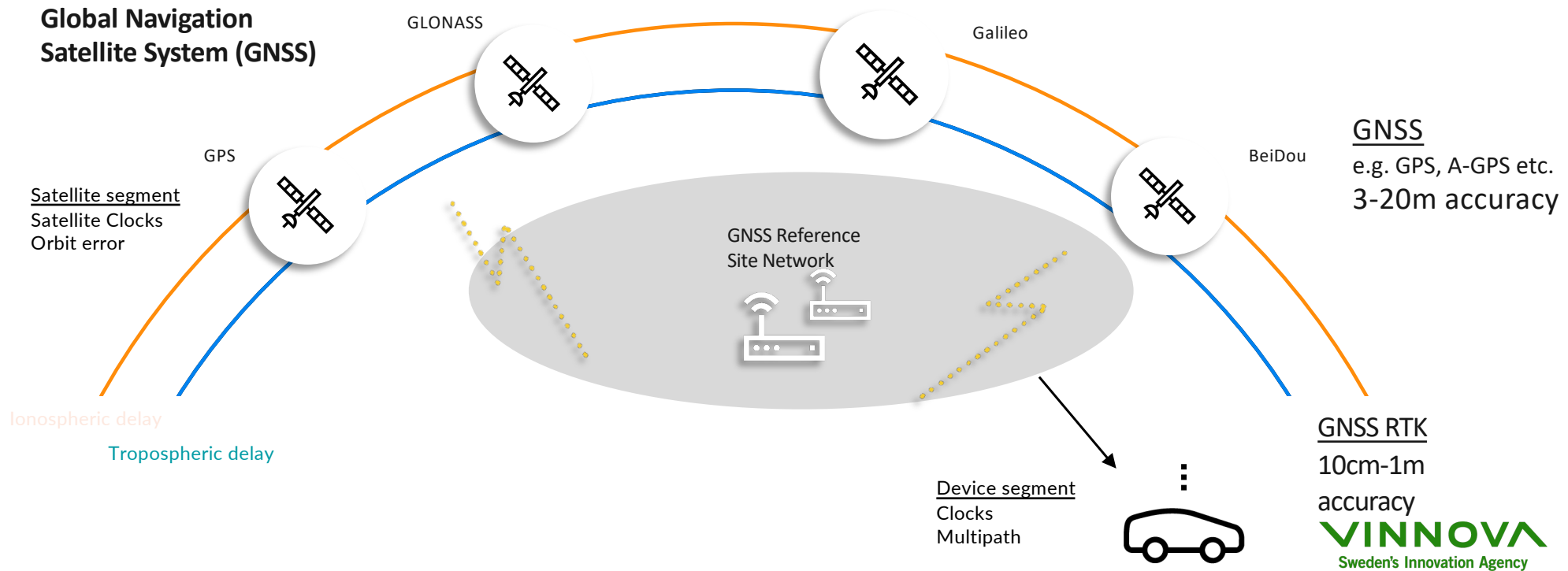
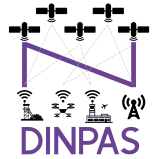
The challenge

Global navigation satellite systems are subject to errors



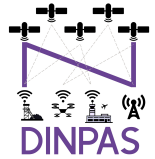
The technology

Global navigation satellite systems errors can be compensated for based on data from a reference network

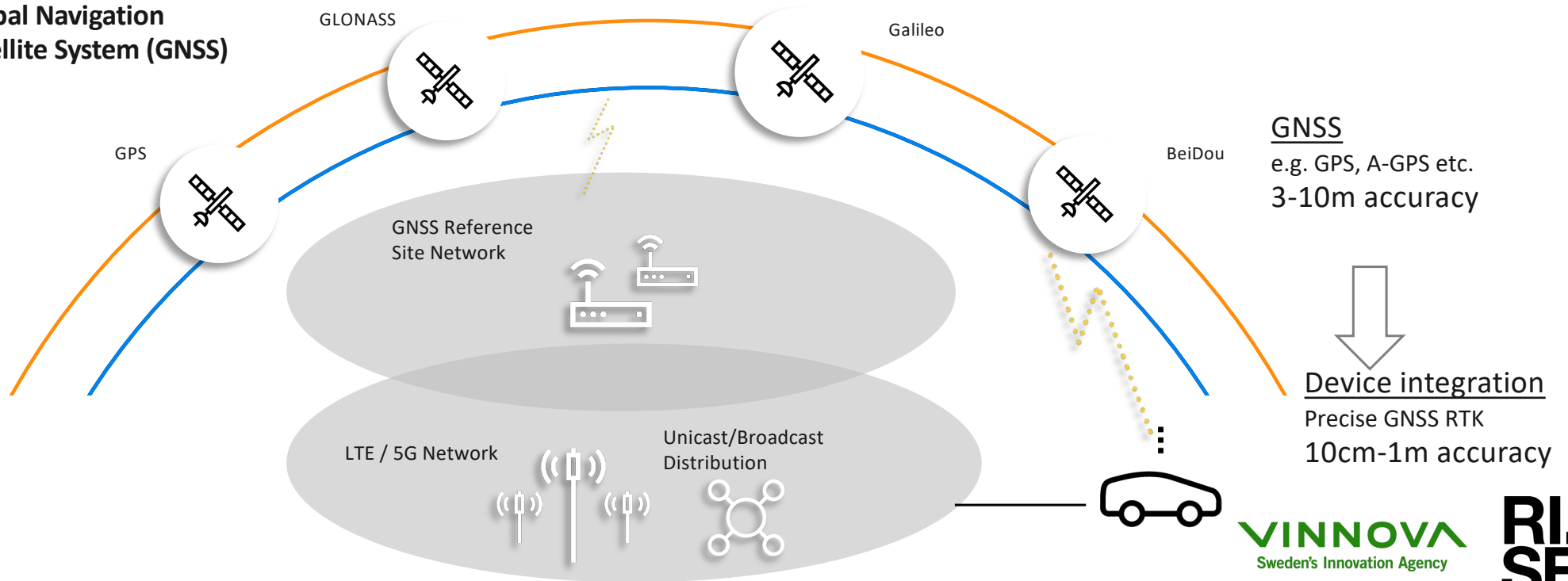


The distribution

Affordable sub-meter localization accuracy for vehicles, IoT devices and next gen smartphones

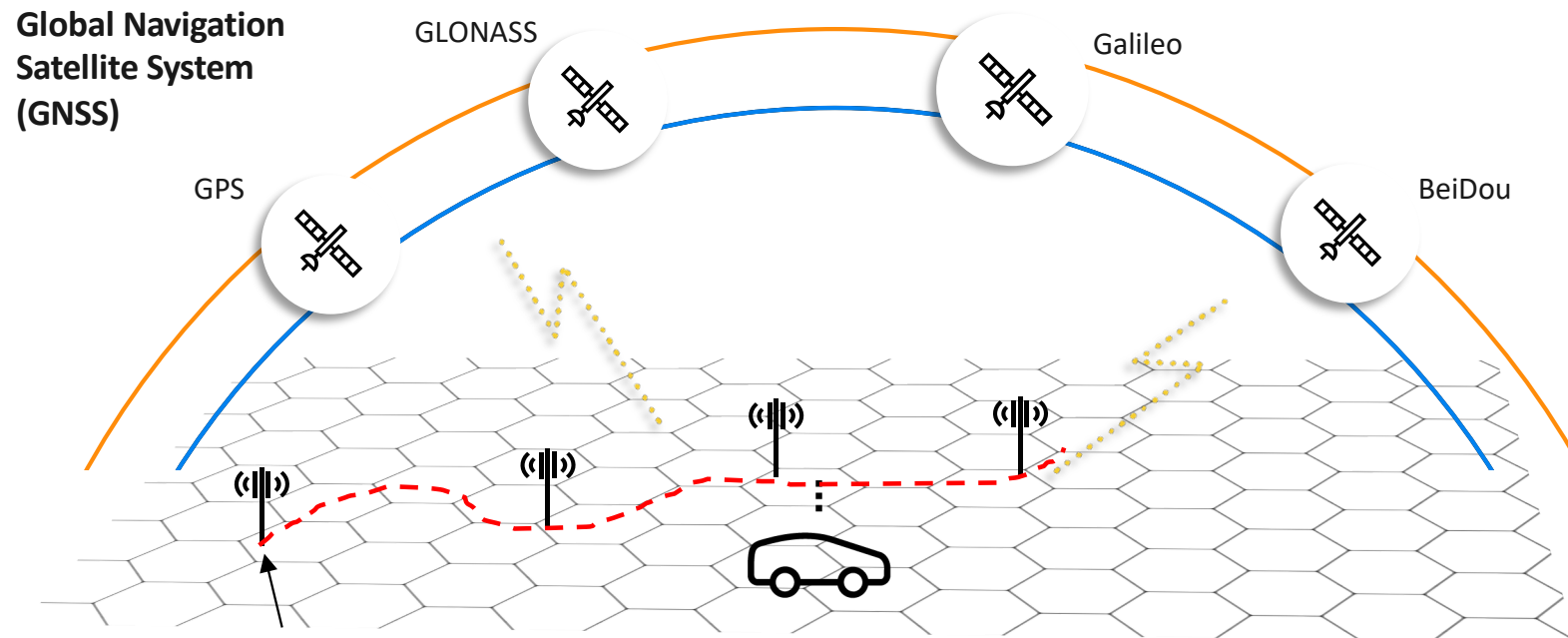


Global Navigation Satellite System (GNSS)



Observation Space Representation

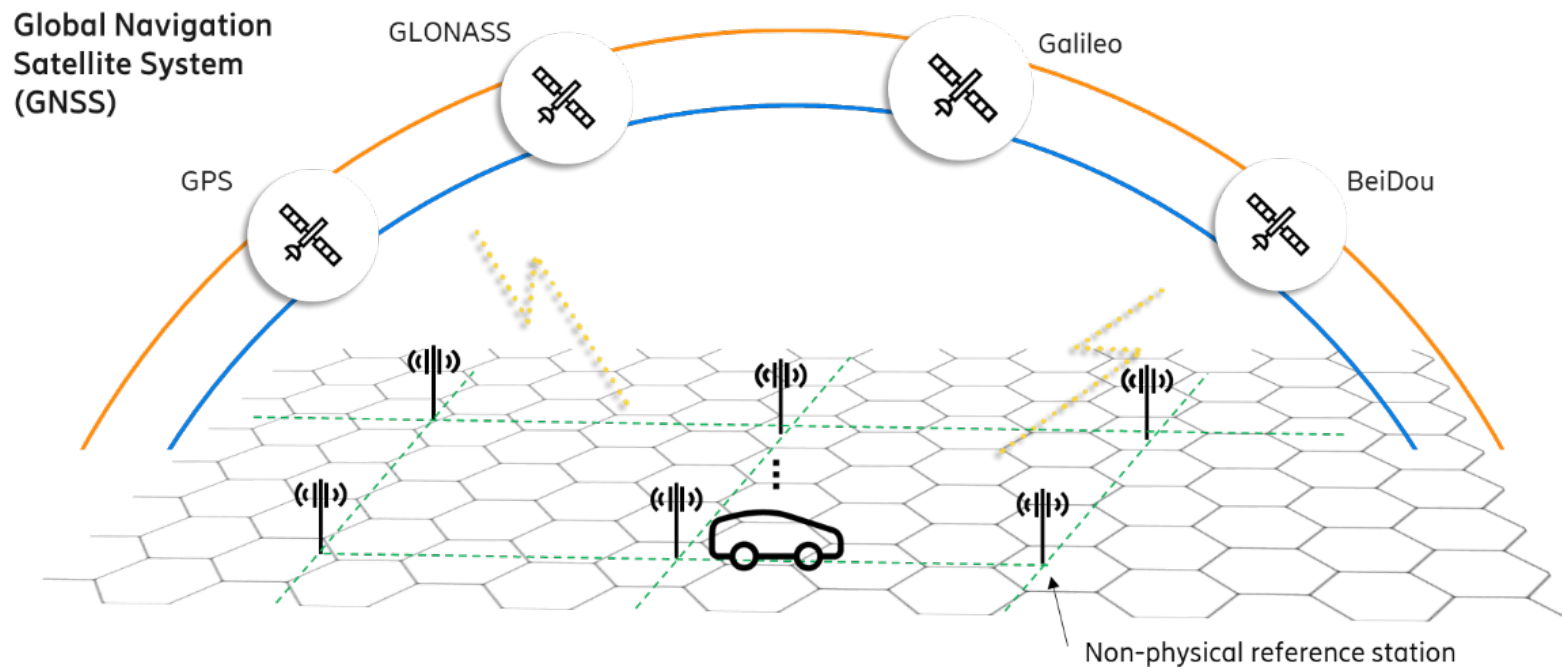
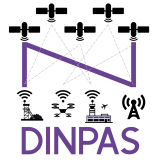
Legacy e2e NTRIP/RTCM



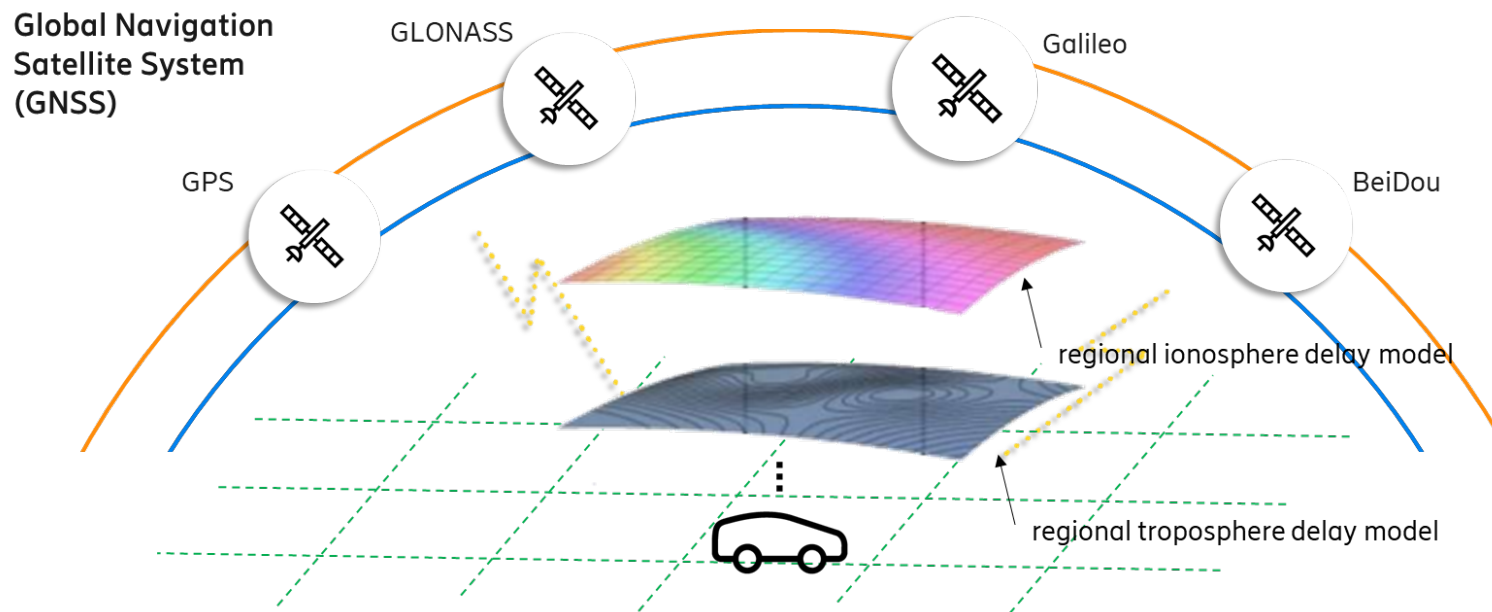
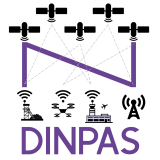
Non-physical reference station, assigned along the way, based on frequent feedback of precise positions from devices

Observation Space Representation

Gridded OSR

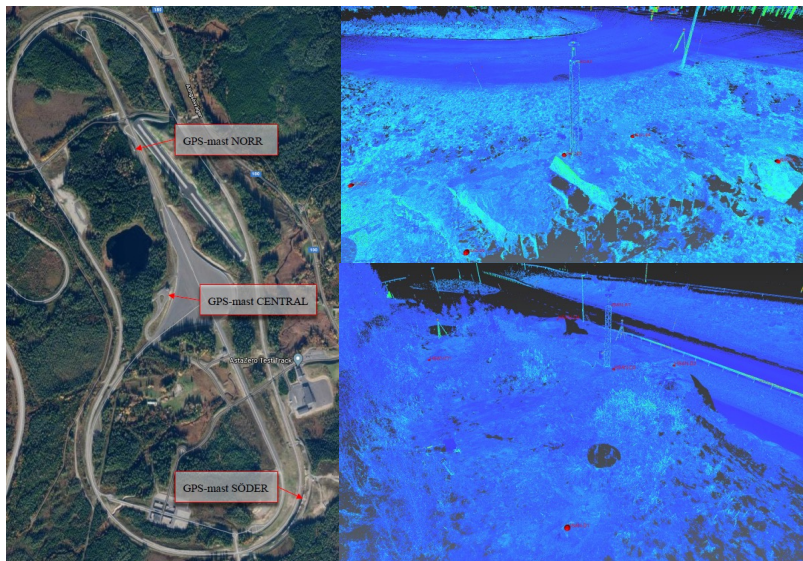


State Space Representation



AOREF system

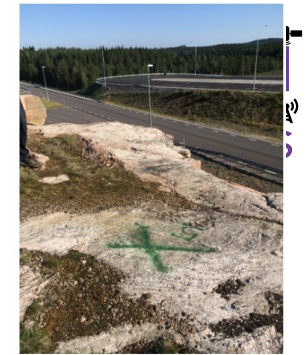
- 3 GNSS reference stations installed in cooperation between RISE Measurement Science and Technology, AstaZero and Lantmäteriet.
- One of the stations is included in the SWEPOS N-RTK real time service.



Figur 12 Punkt 1 markerad



Figur 10 Punkt 3 markerad. (en 3:a mälades dit efter att fotot tagits)

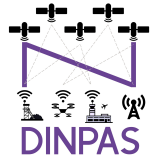


Figur 11 Punkt 5 markerad.

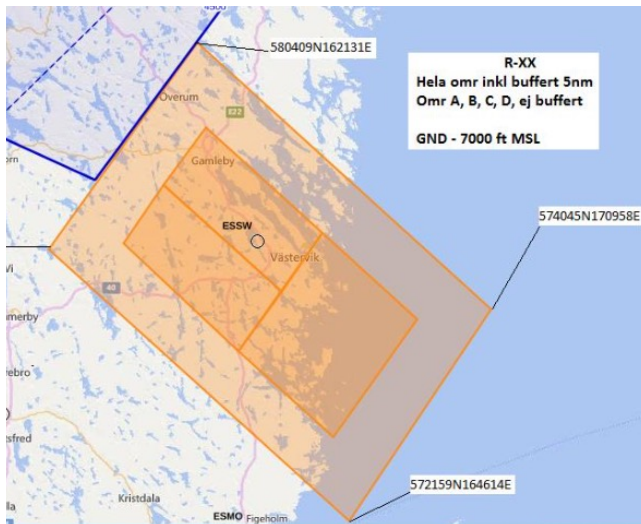


The system will enable validation of absolute position.

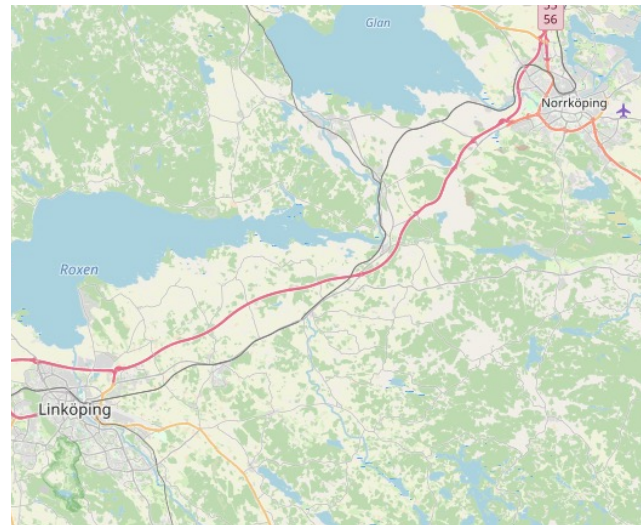
Other test environments



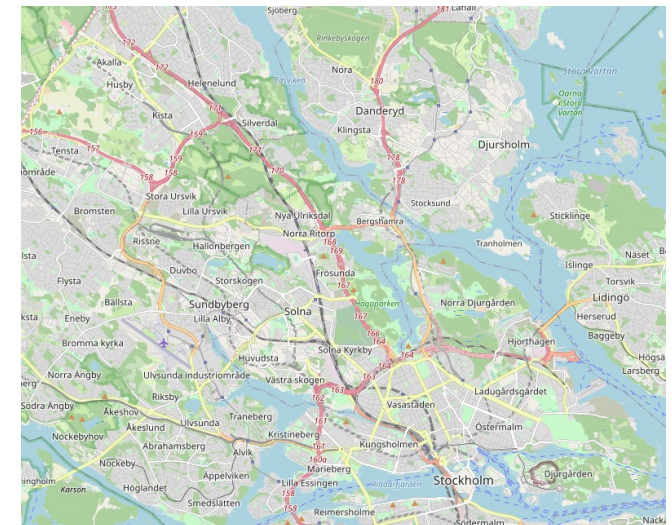
Drone Center Sweden, Västervik

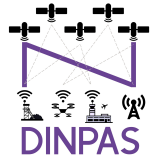


Linköping-Norrköping



Kista - Stockholm





Why did DINPAS got funded?

Motiv för beslut

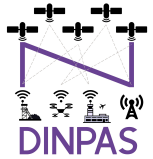
Inom utlysningen "Avancerad och innovativ digitalisering - våren 2021" inkom det totalt 19 ansökningar som sammanlagt sökte ca 87,5 miljoner kronor i bidrag. Ansökningarna har utvärderats av en panel bestående av totalt 13 förordnade bedömare. Bedömningen har skett gentemot bedömningskriterierna Potential, Aktörer och Genomförbarhet enligt utlysningstexten avsnitt 7.1. Bedömarnas rekommendation har legat till grund för Vinnovas beslut. Er ansökan har bedömts med följande omdöme:

Ansökan adresserar ett angeläget och relevant område med potential för Sverige, och beskriver ett ambitiöst projekt med stora möjligheter till synergier med andra nationella och internationella initiativ kring den autonoma flygplatsen. Planen för resultatspridningen är väl genomtänkt och får tyngd av det omfattande aktörskonsortiet samt den tänkta referensgrupperingen, och projektet bedöms kunna få stort industriellt genomslag.

Project Goals – What?

The **DINPAS** project will:

- **deploy software** for generating 3GPP SSR with data from a set of reference stations at Lantmäteriet/SWEPOS..
- **deploy GNSS SSR distribution** by converting SSR correction data to 3GPP SSR
- **deploy GNSS SSR client reception** with u-blox ,Saab Combitech, RISE and Katla
- **develop a reference framework** based on A0REF already established at AstaZero.



Project Goals (continued)

The **DINPAS** project will:

- **evaluate GNSS positioning and timing performance** with assistance data based on 3GPP SSR
- **analyse mobile network coverage in 3D** by radio measurements
- **investigate suitable business models** for future services associated to the digital infrastructure and how that impacts both Lantmäteriet and telecom operators (Telia).



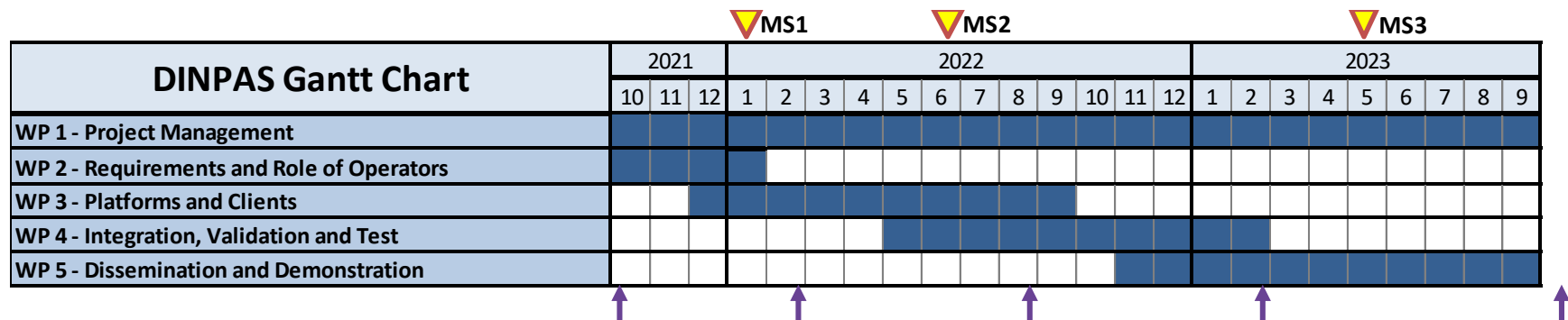
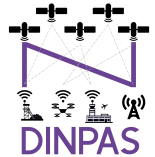
Project Implementation – How?

Work Package Overview (WP Lead)

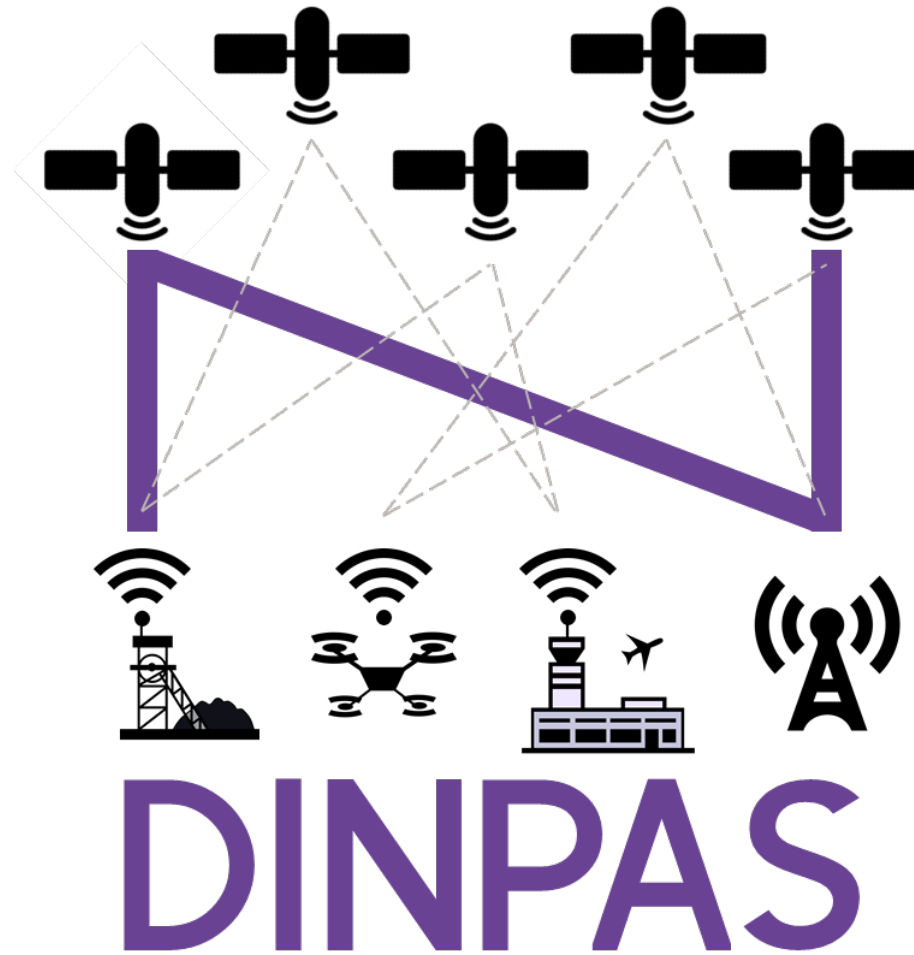
- **WP1** – Project Management (**RISE**)
- **WP2** – Requirements and Role of Operators (**IBG**)
- **WP3** - Platforms and Clients (**Ericsson**)
- **WP4** - Integration, Validation and Test (**Lantmäteriet**)
- **WP5** - Dissemination and Demonstration (**Combitech**)



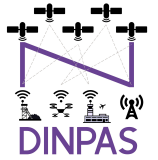
Time plan – When?



Milestone	Description	Date
MS1	Positioning digital infrastructure requirements and architecture defined.	2022-01
MS2	GNSS correction data generation, distribution system and client ready for test and validation.	2022-06
MS3	Final demonstration with test applications relevant for autonomous airports	2023-05



Questions or AoB?





VINNOVA Advanced and innovative digitization

First call Spring 2021

- consortia that in collaboration can contribute to the development of **components and system solutions** for the benefit of the next generation of **industrial digital solutions**, and for new products and services to be developed in Sweden.
- The projects must be relevant within one or some of the call's defined **technical focus areas** and are expected to have an impact on one of the application areas **autonomous mine, autonomous airport or circular industry**.

Project Workpackages

