Recommendations Towards a European Union Radionavigation Plan (ERNP)

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Contents

➤ **Introduction**

➤ **Definitions**

➤ **Study Logic**

➤ **ERNP System Mix**

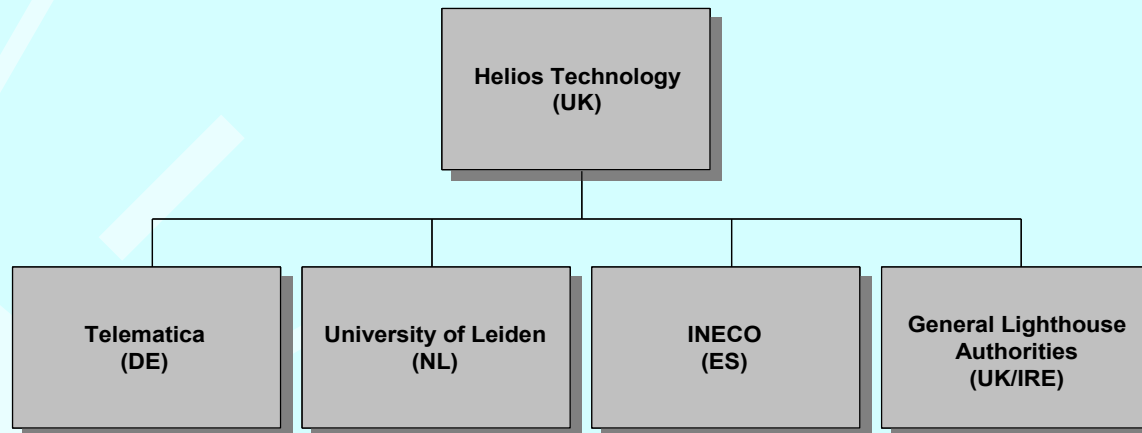➤ **Implementation and Management**

➤ **Conclusions**

Introduction

➤ **Presentation Scope**

➤ **Study Motivation**

➤ **Study Objectives**

This presentation provides a summary of the study carried out by Helios Technology and its partners for the European Commission for the development of the European Union Radionavigation Plan (ERNP)

➢ Contract details

- Contract Number: ETU-B57000A-E4-193-2003 S07.26312-ERNP
- Contract Value: 500kEURO (approx)

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The opinions expressed in this presentation are those of the Author(s) only and do not represent the European Commission's official position

Motivation for the ERNP study

➢ EU Member States have adopted different approaches to radionavigation and not all have developed plans

➢ In Europe, different transport modes have different approaches

- Maritime and aviation define harmonisation and standardisation plans for their own navigation aids
- There are no corresponding plans for terrestrial users
- There are no mechanisms to address multi-modality

➢ New GNSS services (esp. EGNOS and Galileo) provide new reasons for a policy that encourages the use of common systems within the EU

➢ The definition, standardisation and harmonisation of these common, multi-modal, radionavigation aids forms the basis of this ERNP study

ERNP Study Objectives

➢ The overall objective of the study was to contribute to the development of a possible ERNP and to support European Union (EU) Radionavigation policy

➢ In particular, the study aimed to:

- Provide a detailed inventory of radionavigation services and applications, and investigate existing service planning and institutional arrangements
- Determine the role and competency of the EC in regards to radionavigation services and investigate future radionavigation service scenarios and institutional arrangements
- Identify benefits and costs of possible radionavigation service options, and investigate improvements to standardisation and certification for greater interoperability
- Determine the future implementation and management of an ERNP, and propose recommendations to the EC in regards to radionavigation policy

Definitions

➢ **ERNP Coverage Area**

➢ **Radionavigation**

➢ **Services**

➢ **Radionavigation Service Environment**

ERNP *coverage* is the current EU25 Member States and EMCA together with EU neighbour countries relevant to a coherent ERNP

➢ The ERNP is applicable in the European Union (EU) Member States and the European Maritime Core Area (EMCA)

➢ It is the result of a process that has considered neighbouring countries to the EU relevant to a coherent ERNP as well as developments in the United States of America (US) and the Russian Federation (RF)

■ EU States	■ EFTA States
■ EU Candidate States	■ EMCA
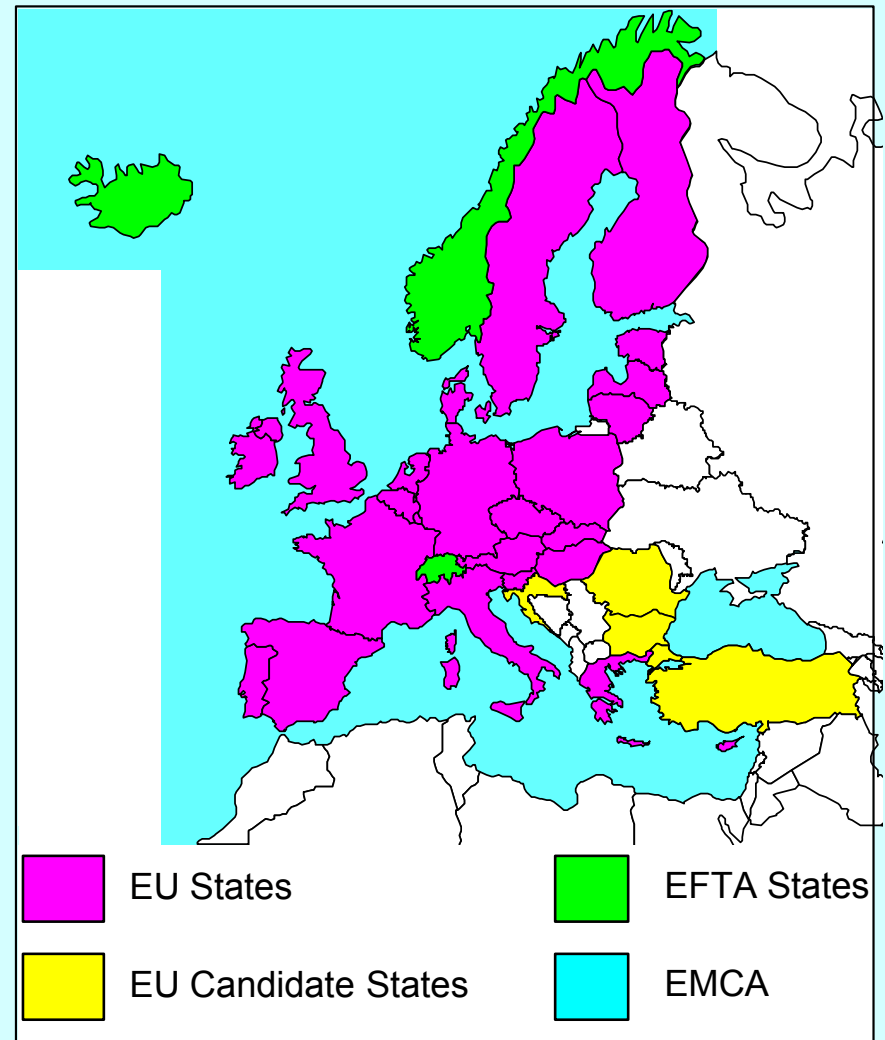
The ERNP study is assuming a very specific definition for radio-navigation

➢ Services provided by radio navigation systems allow users to determine their position, velocity and time from knowledge of the propagation of electromagnetic radio waves. All radio navigation systems are underpinned by precise timing (used to generate the radio waves) and precise co-ordinates

➢ Within the ERNP, systems are classified as stand-alone radio-navigation systems, regional or local augmentations and non-radio-navigation systems

Services are *defined* at three different levels: plan, performance and access
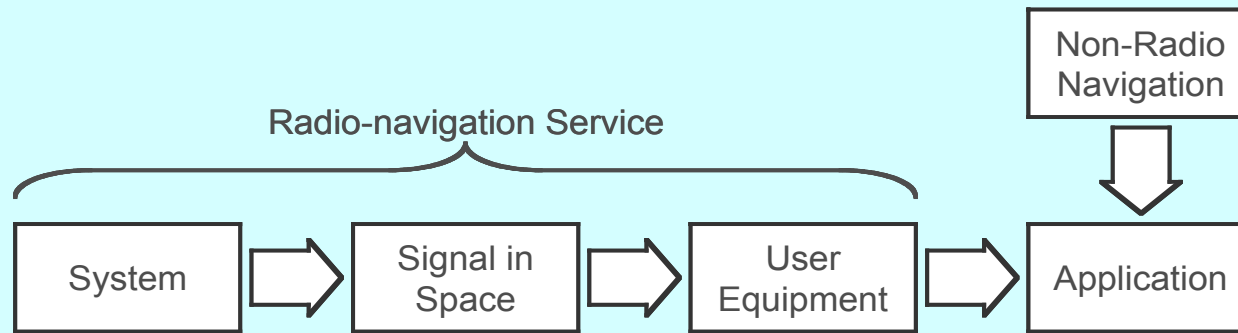
> Plan

- The purpose of the plan is to address policy, consider operational issues, present a service description and identify future developments (including rationalisation). It may include a summary of user requirements

> Performance

- This defines the levels of performance that the system owner commits to providing. It may take the form of a service level agreement

> Access

- A technical signal-in-space interface control document (ICD) that defines the service SIS so that it may be accessed by user equipment
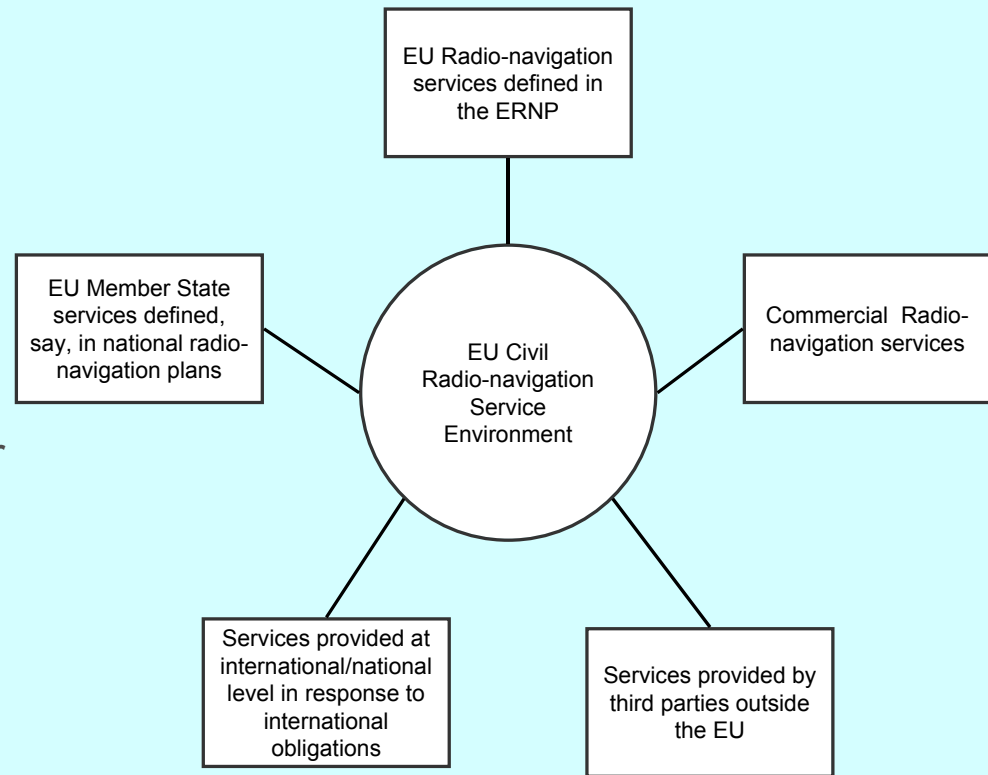
All services for which the EU has a role are ERNP services and a subset of these are "core" ERNP services that are defined and resourced at EU-level

➢ All services for which the EU has a role (definition, standardisation, harmonisation or influence) through the ERNP are ERNP services and included in the ERNP

➢ There is a need to concentrate EU level resources, in terms of investment and maintenance, on those core navigation aids common to multi-modal applications[1]

  • This statement differentiates clearly between those services that are resourced at EU level (described as core) and other services in the ERNP

➢ Only one organisation has the competency to define a service and only the organisation with the competency for service definition can rationalise its services

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1   European Commission. *Tender specifications attached to the invitation to tender*. Invitation to tender No. TREN/ E4/16/2003 concerning Development of the European Radio-Navigation Plan (ERNP)

The SOW envisages a future EU civil radio-navigation service *environment* that comprises a wide range of public and private radio-navigation services
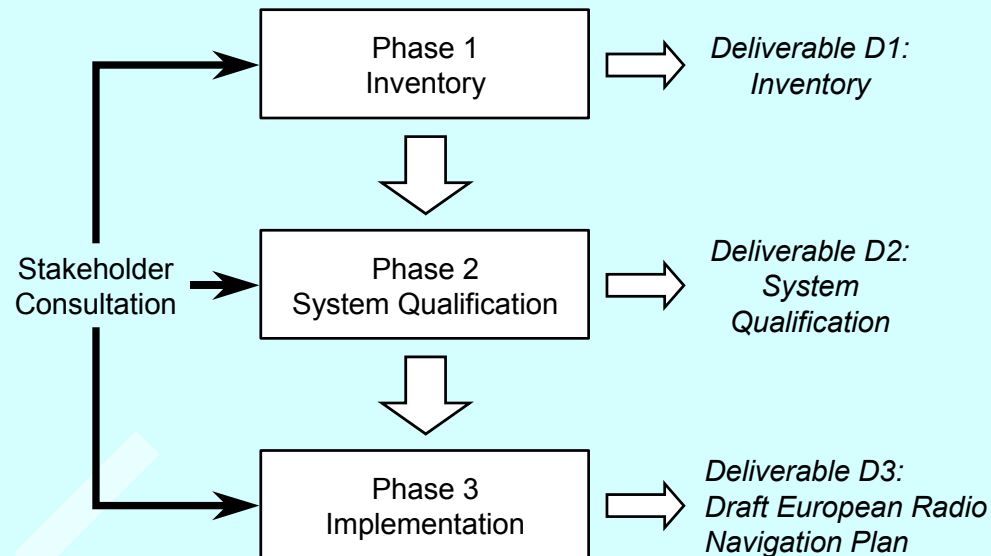
➤ The ERNP radionavigation service environment will comprise a subset of these services and will provide a basic level of service for European users

➤ Users may need to augment this with other radionavigation services and non radionavigation systems or sensors to meet their application requirements

EU Radio-navigation services defined in the ERNP

EU Member State services defined, say, in national radio-navigation plans

EU Civil Radio-navigation Service Environment

Commercial Radio-navigation services

Services provided at international/national level in response to international obligations

Services provided by third parties outside the EU

Study Logic

- ➢ **Overview**

- ➢ **System and Policy Inventory**

- ➢ **System Qualification**

- ➢ **Implementation and Management**

Consultation with stakeholders underpins our sound and achievable approach

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                  │       │    Inventory     │         Inventory
                  │       └─────────────────┘
                  │                │
                  │                ▼
  Stakeholder     │       ┌─────────────────┐
  Consultation ───┼──────▶│     Phase 2      │ ──▶  Deliverable D2:
                  │       │System Qualification│       System
                  │       └─────────────────┘         Qualification
                  │                │
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                  └──────▶│     Phase 3      │ ──▶  Deliverable D3:
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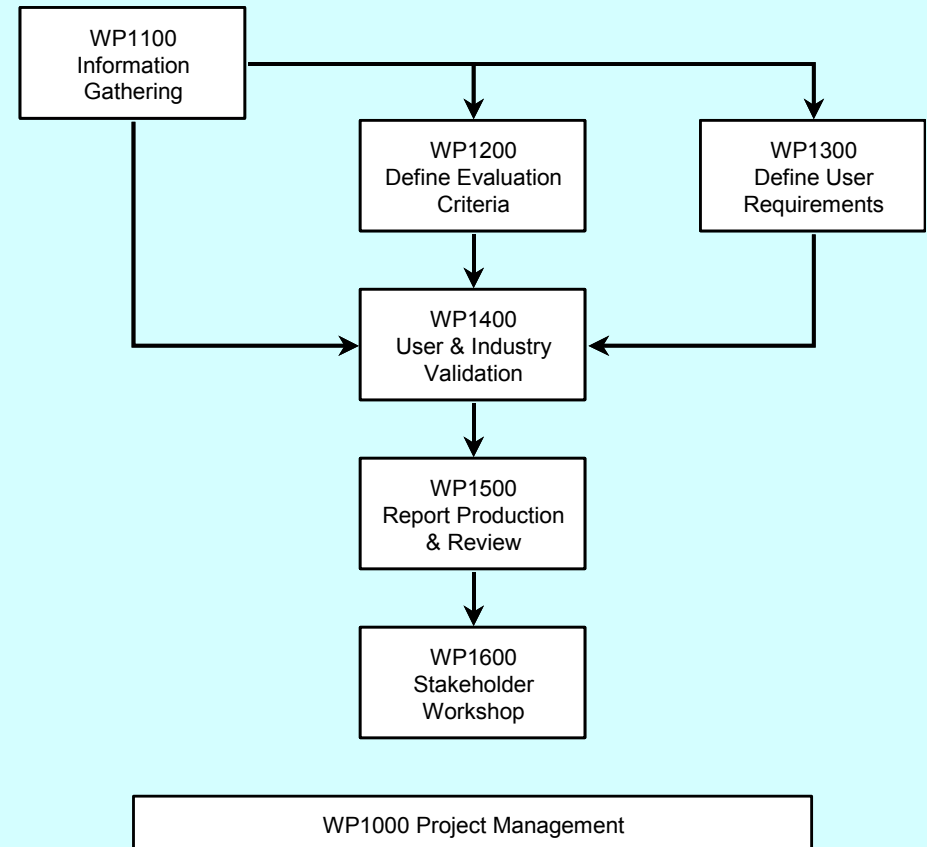
➢ Three Phases
- each three months
- each producing one of the three required output deliverables

➢ Consultation with Stakeholders
- the EC owns key decisions
- there is constant Member State, industry and user validation
- that there is buy-in from key stakeholders along the way (including Eurocontrol)

14

Phase 1 established a system and policy inventory

➢ The inventory of existing RNPs has drawn on source documents from many countries/organisations

➢ The service environment has considered a wide range of stand-alone, augmentation and non-radionavigation services

➢ The application environment has been addressed both at the market sector level and at the application level (9 different sectors with 137 applications)

➢ The European Community would have the competency to regulate radio navigation and the ERNP if needed

WP1100 Information Gathering → WP1200 Define Evaluation Criteria, WP1300 Define User Requirements → WP1400 User & Industry Validation → WP1500 Report Production & Review → WP1600 Stakeholder Workshop

WP1000 Project Management

The second system qualification phase has undertaken a technical assessment …

➢ The technical assessment has examined the EU's role through the ERNP towards each of the Phase 1 services, considered vulnerability and addressed the spectrum environment

- There is currently a strong reliance on GPS and fewer than 40 of the 137 applications analysed would remain operational following the loss of GPS and its augmentations

- The stability and robustness of the current EU radio-navigation service environment would be improved by the availability of Galileo, EGNOS and Loran-C services

- The existing and planned radio-navigation spectrum environment is stable and robust although satellite navigation services are vulnerable to interference

- Critical infrastructure applications (e.g. telecommunications and other utilities) should implement diverse services to mitigate vulnerability and ensure continuity of service
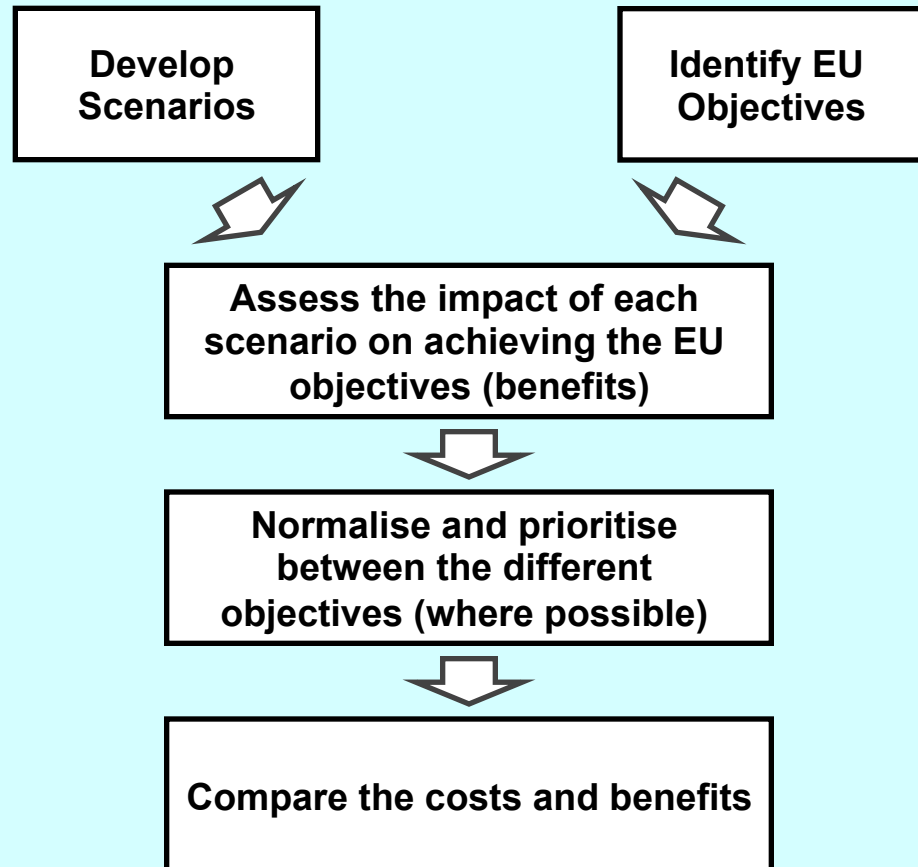
Financial assessment and …

➢ System costs for the period from 2005 to 2020 have been assessed for five radio-navigation services that have the potential to be core ERNP services (defined and resourced at EU level)

- EGNOS, Galileo, Loran-C, EuroFix and Radiobeacon DGNSS

➢ The study has proposed eight principles to guide rationalisation and their impact has been considered across the market sectors at the user level

- There is potential for rationalisation in the EU radionavigation service environment

➢ Cost-recovery is one way for establishing continuity of funding that is linked to long-term service credibility and service take-up

- Charging based on marginal social costs is the preferred approach in the EC White Paper on infrastructure charging
- An initial charging concept for the ERNP based on marginal social costs has been proposed

Institutional and cost-benefit assessment

➢ Establishing an ERNP at EU-level is a logical conclusion

- The EU, together with the Commission, should take the lead role in any ERNP
- Giving the EC the lead policy/planning role for the EU radio-navigation environment is a logical extension of its current involvement in associated areas (telecommunications, satellite communications and Galileo)

➢ High-level benefits and beneficiaries have been considered and long-term operational costs have then been linked to the benefits

➢ These have been augmented further in Phase 3 to include transport policy objectives detailed in the EC's 2001 White Paper and the delivery of wider socio-economic benefits detailed in the Lisbon Strategy

In the third implementation phase the study has addressed service mix determination …

➢ A multi-criteria decision analysis has been used to assess five scenarios based on the existing service mix and the potential core ERNP services

➢ Delivering 78% of the policy benefits provides a compelling justification for selecting EGNOS and Galileo as core ERNP services

➢ The benefit/cost ratio of Loran-C/ EuroFix is compelling but the EU's role is standardisation given the changing institutional environment and EU-level funding may be appropriate to secure policy benefits

Develop Scenarios

Identify EU Objectives

Assess the impact of each scenario on achieving the EU objectives (benefits)

Normalise and prioritise between the different objectives (where possible)

Compare the costs and benefits

The final system mix is presented later

Considered standardisation and certification and proposed a management strategy

➢ Definitions

  • Standardisation is the formulation of a stable set of requirements for a process or equipment

  • Certification is the procedure by which a third party gives written assurance that a product, process or service conforms to specified requirements

➢ The study has proposed possible frameworks for a harmonised EC approach to ERNP standardisation and certification based on the formal approaches adopted by the European Commission for the European Single Sky

➢ The study has covered the critical issues of funding, institutional arrangements, the regulatory process and maintenance

The management strategy is presented later

ERNP Service Mix

EU role through the ERNP for different radio-navigation services

		EU Role Through the ERNP			
		Define	**Standardise**	**Harmonise**	**Influence**
Services	Fully Operational		Loran-C*	NDB	GPS
				VOR/DME	GLONASS
				ILS/MLS	Chayka
				Nat' l DGNSS	
				Radiobeacon DGNSS**	
	Non Fully Operational	Galileo	EuroFix	GBAS	
		EGNOS			

*   For those chains under (predominantly) EU Member ~~state~~ ownership. While Loran-C is fully operational, full European coverage is currently incomplete

**   The standardisation of Radiobeacon DGNSS refers to ~~the~~ ... ~~tal~~ system is already defined and standardised by IALA and the marine aids to navig...

Core ERNP Services

It provides a basic level of service

➢ The ERNP radionavigation service environment comprising these services will provide a basic level of service

  • The services are detailed in a European Union Radionavigation Services (ERNS) document

➢ Users may need to augment these services with other public or private radionavigation services and non radionavigation systems or sensors to meet their application requirements

Implementation and Management

- ➢ **Funding**

- ➢ **Institutional Arrangements**

- ➢ **Regulatory Process**

- ➢ **Maintenance**

The EU should work with other public sector bodies and the private sector to develop, build and operate components of the radio-navigation service environment

➢ Cost-recovery, based on the marginal social cost charging principles outlined in the EC's White Paper on common infrastructure charging [1], should be applied in the radio-navigation service environment

- This should take into account that different market sectors have different levels of maturity and the services have to be cost-beneficial to the user

➢ The EU is responsible for defining and ensuring the continuity of two core ERNP radio-navigation services: EGNOS and GALILEO

- EU funding is needed to cover operational costs in order to secure both the transport and wider socio-economic benefits of its current investment

This study has made a number of recommendations regarding future institutional arrangements, including authorship and ownership

➢ The ERNP should present the EU's policies and plans for a stable and robust radio navigation environment in the EU, comprising seamless, interoperable services to support security, transport (including safety), environment, and economic policy objectives in conformity with existing European Community law

➢ Implementation of the ERNP environment should start by setting out overarching objectives, principles and guidelines based on an EC Communication and associated Council Conclusions

➢ The following is a possible next stage for an ERNP:

- The Commission confirms its interest in the elaboration of an ERNP
- The Commission presents a paper to the Council and the European Parliament based on the results of the study
- Following consultation with the Council and Parliament the EC develops an ERNP in close cooperation with the Member States

Maintenance

➢ The ERNP and ERNS documents should be updated routinely to reflect changes in user requirements, services, policies and new applications

- The ERNS document should be reviewed and updated on a four-year cycle (and on request when required)
- The ERNP document should be reviewed and updated on a four-year cycle
- A formal and ongoing consultation process with stakeholders should be implemented to inform the review process

Conclusions

➢ This study has for the first time produced a comprehensive inventory of all the existing radionavigation services available in Europe today, including the recent GNSS services provided by EGNOS and GALILEO

➢ The study has clearly shown the potential benefits for creating an ERNP for Europe including:

- Improved harmonisation of European radionavigation services
- Rationalisation of radionavigation infrastructure
- Determination of a system mix that increases safety and security and reduces the dependency on GPS
- Promotion of multimodal systems to enable cost efficient solutions
- Increased stability to allow industry to plan future investment

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