GLA Radio Navigation Plan

General Lighthouse Authorities
The United Kingdom and
Republic of Ireland

Delivering 2020 The Vision

Executive Summary

The General Lighthouse Authorities of the United Kingdom and Ireland have a shared mission statement: **"To deliver a reliable, efficient and cost effective Aids to Navigation service for the benefit and safety of all mariners".**

The GLAs' Radio Navigation Plan (GRNP) is a core component in delivering their Marine Aids to Navigation Strategy – known as "2020 The Vision". It has been produced by the GLAs Radio Navigation Committee and is under ongoing management and maintenance by the GLAs' Research and Radio Navigation Directorate. It focuses specifically upon radio navigation (RNAV) systems and their role within the overall Aids to Navigation (AtoN) service provision mix. This document therefore presents the GLAs' plan in respect of GPS, Galileo, DGNSS, AIS, eLoran and racons.

This plan reflects the level of service the GLA's will provide to all users, taking advantage of technological and operational improvements that we forecast in radio navigation AtoN service provision. However, there are other developments in the external environment, many of which will be discussed in this document that could affect our level of service in the future.

As outlined in 2020 The Vision, we believe our overall strategy, and therefore our plan, will be modified if significant progress is made at International and National Level in any or all of a number of critical areas.

If the plan, as described in this document, is not implemented, the GLAs will be unable to maintain their level of service provision, build upon their track record of success and deliver their shared mission statement. This plan describes how we will adapt in the face of a rapidly changing environment, and thereby optimise our service provision in terms of cost, risk and service level.

The developments described in this document, if realised, will individually and collectively influence the provision of all AtoN and the level of service we provide.

Glossary of Terms

AIS	Automatic Identification System
AtoN(s)	Aid(s) to Navigation
CIL	Commissioners of Irish Lights
COSPAS	Space System for Search of Distress Vessels (Russian Federation)
DfT	Department for Transport (UK)
DGNSS	Differential Global Navigation Satellite System
DGPS	Differential Global Positioning System
DoT	Department of Transport (Ireland)
EC	European Commission
ECDIS	Electronic Chart Display Information System
EGNOS	European Geostationary Navigation Overlay System
eLoran	Enhanced Loran
EMSA	European Maritime Safety Agency
ERNP	European Radio Navigation Plan
EU	European Union
GALILEO	European GNSS (not an acronym)
GLA	General Lighthouse Authority
GLF	General Lighthouse Fund
GLONASS	Global Navigation Satellite System (Russian Federation)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System (US)
GRNP	GLA Radio Navigation Plan
GSA	GNSS Supervisory Authority
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IBS	Integrated Bridge Systems
IEC	International Electrotechnical Commission
IHO	International Hydrographic Organisation
IMO	International Maritime Organisation
IRCG	Irish Coast Guard
ITU	International Telecommunication Union
LORAN	Long Range Navigation system
MCA	UK Maritime and Coastguard Agency
MEHRA	Marine Environmental High Risk Area
NELS	North-west European Loran System
NLB	Northern Lighthouse Board
PSSA	Particularly Sensitive Sea Area
RACON	RAdar BeaCON
RNAV	Radio Navigation
RTE	Radar Target Enhancer
SARSAT	Search and Rescue Satellite-Aided Tracking
SOLAS	Safety of Life at Sea (IMO Convention)
TH	Trinity House
UK	United Kingdom
US	United States of America
WWRNS	World Wide Radionavigation System

The General Lighthouse Authorities

- The Corporation of Trinity House, known as Trinity House - England, Wales, Channel Islands and Gibraltar
- The Commissioners of Northern Lighthouses, known as the Northern Lighthouse Board - Scotland and the Isle of Man
- The Commissioners of Irish Lights, known as Irish Lights - all of Ireland

The costs of the GLAs' services are met from the General Lighthouse Fund (GLF), which derives its income mainly from light dues that are charged on commercial shipping calling at United Kingdom and Republic of Ireland ports. Charges are in direct proportion to the costs of the services provided. This is regulated by the UK Secretary of State for Transport who has a duty to ensure the effective management of the GLF and enable the GLAs to provide adequate aids to navigation at the optimum cost. An advisory body, known as the Lights Advisory Committee, which is made up of shipping and ports' representatives, is consulted by the UK Department for Transport on certain financial matters relating to the GLF.

The GLAs share three principles that underpin Aids to Navigation (AtoN) service provision:

- the GLAs must provide such aids to navigation as deemed practicable, necessary and justified by the volume of traffic and the degree of risk;
- to obtain the greatest possible uniformity in AtoN, each GLA shall take into account appropriate international directives, requirements, recommendations and guidelines, including those of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA); and
- the GLAs co-operate closely to minimise overlap in the provision of AtoN and to ensure consistent

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COMMISSIONERS OF NORTHERN LIGHTHOUSES 1786 IN SALUTEM OMNIUM

IRISH LIGHTHOUSE SERVICE IN SALUTEM OMNIUM

GLA Radio Navigation Plan

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1. Introduction

1.1 GENERAL

The three General Lighthouse Authorities (GLAs) - Trinity House (TH), the Northern Lighthouse Board (NLB) and Commissioners of Irish Lights (CIL), provide marine Aids to Navigation (AtoN) to the mariner in the interest of general navigation, and have a duty of superintendence and management over all other aids to navigation.

The GLAs have a shared mission statement:

"To deliver a reliable, efficient and cost effective AtoN service for the benefit and safety of all mariners."

The growth in marine leisure activities, the proliferation of high-speed and larger craft and changes in traffic patterns each place new demands on AtoN service providers.

It is recognised that the widespread reliance on Global Navigation Satellite Systems (GNSS) as the primary means of position fixing has encouraged some mariners to navigate in areas where, and under conditions in which, they had not previously ventured - for example, close inshore, at night and in reduced visibility. More generally, the recognised vulnerabilities of GNSS to interference must be taken into consideration when determining future AtoN provision.

Any future strategy also needs to take into account the evolving shipboard practices and training requirements of seafarers. Traditional navigational skills sometimes appear to be superseded by over-reliance on new technological advances (for example, the Electronic Chart Display Information System (ECDIS) and Integrated Bridge Systems (IBS)). AtoN service providers must re-examine continuously the level of requirements and delivery to take account of these changes.

However, it is clear from in-depth consultation with users, both in the commercial and leisure sectors, that lighthouses, buoys and beacons will continue to play a vital role in the balanced AtoN mix. Additionally, the role of AtoNs is often understated when considering the protection of the marine environment, marine coastal industries and the general public.

Given the rapid changes in maritime practice, it is important that the GLAs look ahead to determine an overall strategy for future AtoN provision. In 2004, the three GLAs published their shared strategy entitled **2020 The Vision** (1). This provides users with a balanced view of requirements over the next 15 years, so that our waters continue to be amongst the safest to navigate in the world.

This GLA Radio Navigation Plan (GRNP) sets out how the GLAs are going to deliver the radio navigation aspects of 2020 The Vision. It will be subject to periodic review.

(1) "2020 The Vision: Marine Aids to Navigation Strategy", General Lighthouse Authorities of the United Kingdom and Republic of Ireland, October 2004

1.2 SCOPE AND OBJECTIVES

This document focuses solely upon radio navigation (RNAV) services and their role within the GLAs' overall AtoN service provision mix. It presents the GLAs' plan for GPS, Galileo, DGNSS, AIS, eLoran and Racons.

This GRNP is aimed at the GLAs' users, stakeholders and partners. These include the UK and Irish Departments for/of Transport (DfT/DoT), the Maritime and Coastguard Agency (MCA), the Irish Coast Guard (IRCG) and our international partners in the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA).

This GRNP enables the GLAs together with their users, stakeholders and partners to move forward with confidence in the delivery of our vision and means that we are able to manage and steer a course through what promises to be a varied and challenging environment.

1.3 BUILDING ON A TRACK RECORD OF SUCCESS

The GLAs are proud of their track record of success and wish to build upon this as we move towards 2020. The GLAs have been providing and optimising radio navigation services to the mariner for more than sixty years including radiobeacons for direction finding, DECCA, racons and radar target enhancers.

Over the last decade, the GLAs have collectively:

- introduced IALA marine radiobeacon DGPS;
- deployed a Loran station at Rugby on a trial basis; and
- reduced the overall cost of service provision by 50% in real terms.

We will continue to provide radio AtoNs for the safety of all mariners and the plan outlined in this document will directly influence the mix of AtoN services provided by the GLAs.

2. The Changing Service Provision Environment

2.1 GENERAL

The GLAs' AtoN service provision mix is coming under increasing pressure. User requirements are becoming more demanding, whilst at the same time the GLAs endeavour to deliver maximum value for money. This is in the context of growth in shipping traffic and an increasingly litigious legal environment. Radio navigation itself is also adding new levels of complexity to our service provision environment and significant change is anticipated over the next two decades.

Through co-operation amongst the GLAs and with other international partners, the GLAs are able to greatly influence the service provision environment. However, at the same time, there are a number of external matters over which the GLAs have little or no influence.

2.2 INSTITUTIONAL

Significant changes have occurred in the European institutional environment during the last five years:

- the European Maritime Safety Agency (EMSA) was established in 2002 following the Erika disaster to reduce the risk of maritime accidents, marine pollution from ships and the loss of human lives at sea;
- the European GNSS Supervisory Authority (GSA) was established by European Council Regulation in 2004 to manage European satellite navigation programmes, be the licensing authority for the Galileo public-private partnership and own the European GNSS infrastructure; and
- the North-west European Loran System (NELS) agreement for operating Loran in Europe ended in December 2005.

In the future, there is a need for ever-closer co-operation between the International Maritime Organisation (IMO), the International Hydrographic Organisation (IHO) and the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) in pursuit of the emerging e-Navigation concept.

2.3 REGULATORY

Globally, there are growing signs that more and more States are ready to support further legislation to ensure maritime safety, environmental protection and security:

- the IMO mandated AIS carriage for SOLAS vessels over 300 gross tonnes from 31st December 2004;
- at IMO NAV 52 in July 2006, IMO agreed to proceed with mandatory carriage of ECDIS for SOLAS vessels; and
- development of Marine Electronic Highways and Motorways of the Sea in high risk areas.

This is likely to result in greater commonality in service provision between different States. It may lead to a strengthening of IMO's role as regulatory requirements are implemented in a more stringent manner.

In Europe, there is the prospect of a European Radio Navigation Plan (ERNP) *to 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* (2).

In the UK, the Government is currently consulting on Spectrum Pricing that is likely to impact on the GLAs' service provision.

2.4 COMMERCIAL

There are key trends in the global shipping industry that are already having, and will continue to have, a large effect on the service we deliver:

- the continued importance of the maritime sector to support global economic growth particularly on the Asia routes - in 2004 the world seaborne trade reached a record high of 6.76 billion tonnes and the world fleet expanded by 4.5% (3);

(2) "Recommendations towards the development of a European Union Radio-Navigation Plan (ERNP)", Helios Technology Ltd, 25th October 2004.
(3) "Review of Maritime Transport, 2005". United Nations Conference on Trade and Development (UNCTAD) Secretariat, United Nations, New York and Geneva, 2005.

- ships are becoming larger and faster – on 1st September 2006, Maersk took delivery of the *Emma Maersk*. This is 397 metres long, 56 metres wide, can carry 11000 twenty-foot containers and is capable of more than 25 knots; and

- the age profile of the world fleet – over the last decade, the average age of container ships and tankers has decreased markedly although more than 30% of the remainder of the world fleet is more than 20 years old.

The pressures on the GLAs' service provision will increase as a result of these trends. The size, age and abilities of the international fleet is becoming more varied and this has a significant effect upon our plans for introducing new AtoN services equipment.

Essentially we must meet the demands of modern, state-of-the-art ships with fully integrated bridge systems as well as 30 year-old cargo ships with basic bridge and navigation equipment.

2.5 OPERATIONAL

There are a multitude of changes afoot in the operational environment that present new challenges including:

- IMO's and IALA's support of e-Navigation – e-Navigation is currently best defined by IALA as *the collection, integration and display of maritime information onboard and ashore by electronic means, to enhance berth-to-berth navigation and related services, for safety and security at sea, and protection of the marine environment* (4);

- the widespread and growing reliance upon GNSS and its role underpinning navigation, situational awareness and communications for e-Navigation;

- Growing deployment of local and specific Traffic Management Schemes to meet ever more stringent requirements at higher capacity levels; and

- the balance between traditional navigation skills and the role of new technological advances such as ECDIS and IBS.

GPS will remain the primary radio navigation means of position fixing from berth-to-berth for at least another ten years. The introduction of GPS has encouraged mariners to navigate in areas where, and under conditions in which, they had not previously ventured and the introduction of e-Navigation will further change the way that ships operate. As part of its introduction, we all need to understand what happens when key e-Navigation components (e.g. GNSS) fail or are denied. Getting the human factors part of this right is also critical: before we follow the technology to the ultimate end, we must consider safety, liability, onboard training and duty of care.

(4) IALA Strategy Group Meeting, February 2006

2.6 TECHNICAL

Significant changes to underpinning services and systems are expected over the next two decades:

- the introduction of Galileo and modernised GPS services;
- the deployment of AIS as an AtoN;
- new technology radar that may not trigger existing racons; and
- the prospect of the European-wide provision of eLoran.

These new systems and services provide us with an ever-increasing array of options through which to optimise our service level, and reduce risk and cost. At the same time, the need for co-ordination with our partners in IALA and key stakeholders such as IMO and the MCA/IRCG has never been more important as we endeavour to ensure consistent levels of service provision on an international basis.

2.7 OFFSHORE RENEWABLE ENERGY

The GLAs' statutory responsibility for superintendence and management encompasses all Local Aids to Navigation as well as the marking of offshore structures, renewable energy developments and aquaculture sites. The GLAs conduct inspections and audits of all AtoNs under the responsibilities of Local Lighthouse Authorities and others on an annual basis and report the results to Government.

Governments are dedicating ever-increasing levels of effort and resources into developing a sustainable power portfolio. The UK has increased its Renewables Obligation target to 15.4% by 2015/16 and the Irish government has a target of 13.2% by 2010. The marine environment is a target for wind, wave and tidal energy generation, and projects of this kind are likely to increase significantly during the period of this plan.

3. The GLAs' Radio Navigation Plan

3.1 OVERVIEW

The mix of AtoN provided within the system must meet user needs in differing weather and other environmental conditions, taking into account the type and density of traffic as well as technological developments in surface navigation. In order to meet the varied user requirements, the provision of radionavigation AtoN services must be considered in the context of the overall mix of AtoNs in any particular area.

An optimised service provision mix is one that is flexible in the way that it can be deployed to meet the needs of different groups of users.

It is accepted that the need for visual AtoNs to provide position fixing has decreased in recent years due to widespread use of Global Navigation Satellite Systems (GNSS). Conversely, the need for AtoNs to provide hazard marking and warning has increased in order to assist the mariner in spatial and situational awareness.

A comprehensive system must therefore take these factors into consideration.

More than any time before, there is now a great and ever-increasing disparity between equipment fit and competence amongst users. Recognising and reacting to this disparity presents significant challenges. The mariner navigating only by compass and paper chart will have totally different needs to those of a watchkeeper on the bridge of a modern, state of the art cruise ship. Importantly, the variety of navigation equipment and skills in non-SOLAS vessels requires the GLAs to ensure that the risk control measures provided by AtoNs are comprehensive.

This plan is based upon the GLAs supporting the full range of radio-navigation systems available to deliver a flexible service that meets the needs of all users. This approach is the only way that we can maintain service levels in the context of a rapidly changing and unpredictable service provision environment. These systems will be deployed in particular areas in a way that balances cost, risk and service levels in that particular environment.

The GLAs' radio navigation AtoN service in 2015 will be characterised by the following:

- operationally – risk-based planning with an AtoN monitoring strategy in place and the marking of offshore energy structures.
- technologically – the radio navigation services available will include modernised GPS, Galileo, 2nd generation DGNSS, eLoran, various AtoN AIS services and new technology S-band racons; and
- supported user operations – coastal navigation and some port approach.

This will provide firm foundations for the take-up of e-Navigation by SOLAS and non SOLAS vessels as well as the provision of more innovative e-Navigation services in the longer term.

3.2 GLOBAL POSITIONING SYSTEM

GPS is a dual-use radio navigation system that is operated for the Government of the United States by the U.S. Air Force and managed by the National Space-Based Positioning, Navigation and Timing Executive Committee. The US already has advanced plans in place to modernise the GPS system and introduce new GNSS services. These will be provided using new civil signals and potentially offer the maritime user improved levels of service.

At present, GPS is the principal means of radio navigation position fixing used by all classes of mariner and underpinning navigation, situational awareness and communications. This will remain the case for most of the next decade.
The GLAs will:

- encourage the EU to work with US GPS authorities to ensure the continued availability of GPS services in Europe;
- continue to assess new GPS services to ensure that the services provided meet the needs of the mariner; and
- encourage and support the IMO's acceptance of new GPS services into the World Wide Radionavigation System (WWRNS).

3.3 GALILEO

Galileo is the European civil GNSS currently under development, and due to commence its commercial operations phase at the end of 2010 (5). Galileo will be funded by a public-private partnership: the public sector will own the Galileo infrastructure and will be represented by the European GNSS Supervisory Authority; the private sector comprises a consortium of European companies with exclusive rights to the infrastructure for 20 years. Galileo will offer five new GNSS services:

- Open Service - free at the point of use and interoperable with GPS;
- Safety of Life – providing real-time integrity;
- Commercial Service – providing specific data services on a commercial basis to users with more stringent requirements;

(5) "Taking Stock of the Galileo Programme", Communication from the Commission to the European Parliament and the Council, Brussels, 7 June 2006, COM(2006) 272 Final.
Photo credits: (GPS) Lockheed Martin Corporation - GPSIIR (artist's impression)
(Galileo) ESA - GSTB-V2/A in orbit (artist's impression)

- Public Regulated Service – aimed at government users with more stringent security requirements; and
- Search and Rescue service - compatible with today's COSPAS/SARSAT services.

The GLAs will:

- assess new Galileo services in order to ensure that the services provided meet the needs of the mariner;
- encourage and support the IMO's acceptance of the Galileo Open Service (and potentially other services as appropriate) into the World Wide Radionavigation System (WWRNS); and
- continue our involvement in the development of GPS/Galileo standards through IMO, IEC and ITU.

3.4 IALA RADIOBEACON DGNSS

IALA radiobeacon DGNSS remains the internationally accepted means of providing DGNSS (DGPS at present) corrections and integrity information to maritime users. It is defined nationally with global standards, albeit with some regional harmonisation of frequencies through IALA and ITU.

The GLAs will continue to provide the radiobeacon differential GNSS service. This service will be developed in line with GPS and Galileo to provide not only comprehensive but cost effective augmentation in terms of accuracy; but also to monitor the performance of GPS and Galileo and to provide timely integrity warnings of service degradation.

The GLAs will:

- continue to provide the IALA radiobeacon DGNSS service meeting the needs of current users;
- recapitalise the existing DGNSS infrastructure in 2008;
- review their service provision to take account of GPS modernisation and Galileo;

- continue to encourage and support the IMO's acceptance of IALA radiobeacon DGNSS into the World Wide Radionavigation System (WWRNS); and

- investigate the standardisation and delivery of high precision DGNSS to support aids to navigation management, harbour approach and docking.

3.5 AUTOMATIC IDENTIFICATION SYSTEM

On 12th July 2006, the UK Parliament approved a Statutory Instrument for AIS. Following this, all references to a beacon in Part VIII of the Merchant Shipping Act 1995 shall be construed as including equipment provided for broadcasts in the frequency range 156.025 - 162.025 MHz where such equipment forms part of a system for providing information (a) to ships about the type, position and functioning of aids to navigation of ships, or (b) to assist the General Lighthouse Authorities in the efficient provision of aids in the navigation of ships. The transmission of AIS AtoN messages is also permitted under the Merchant Shipping (Commissioners of Irish Lights) Act, 1997.

The GLAs' AIS services will significantly enhance and complement existing Aids to Navigation and are a key enabler for e-Navigation. The GLAs will use AIS:

- to provide AtoN identity and AtoN status confirmation to the mariner;

- to facilitate traffic analysis by AtoN providers to assist in the provision of the appropriate level of service and mix of AtoN;

- to broadcast meteorological and hydrological data to the mariner;

- to broadcast AtoN monitoring for the service provider;

- to broadcast synthetic AIS; and

- to provide virtual AtoNs, for example for use in wreck marking prior to deploying buoys, mitigating further the risk to mariners.

As AIS develops, the GLAs will exploit all these benefits to enhance their service to the mariner by applying AIS technology to selected AtoNs. The use of AIS as an AtoN will have a direct and positive impact on our service provision. Under certain circumstances, AIS may provide an appropriate alternative to permanent or temporary physical AtoNs.

In order to maximise the opportunities presented by AIS, the GLAs will:

- encourage recognition of the value of AIS as an approved AtoN, via IMO;
- investigate the provision of virtual AtoNs and, in doing so, review the local and general provision of physical AtoNs;
- continue our involvement in the development of relevant standards through IALA, IEC and ITU; and
- acquire and process AIS traffic data to develop an improved picture of ship movements to inform AtoN provision.

3.6 ENHANCED LORAN

2020 The Vision expressed concerns about the vulnerability of GNSS in view of the total reliance on the system for electronic position fixing and timing input to many applications including navigation, vessel traffic monitoring and casualty analysis. Consequently, the provision of a complementary, terrestrial radio navigation service is essential to support e-Navigation, particularly in areas of high traffic density, restricted waters, Particularly Sensitive Sea Areas (PSSAs) and Marine Environmental High Risk Areas (MEHRAs). There is only one candidate: Enhanced Loran (eLoran).

The deployment of a complementary, internationally standardised terrestrial radio navigation system provides the only way of maintaining our service levels until 2020 without undue increases in cost and/or risk.

In Europe, eLoran is currently being run on an *ad hoc* basis following the demise of the North-west European Loran System.

The recent study towards the development of an ERNP, published by the European Commission, recommends that the EU should work with Member and associated States and appropriate international organisations:

- to investigate the European-wide provision of eLoran services in order to secure both transport and wider socio-economic policy benefits derived by eLoran;
- to harmonise eLoran standards; and
- to support the development of multi-modal receivers to ensure service take-up.

Since the publication of 2020 The Vision, the GLAs have undertaken further investigation and analysis to determine the degree to which the system can provide an adequate backup to GNSS; in particular relating to performance, coverage, cost effectiveness and user acceptance.

In support of this plan, the GLAs will:

- work with our international partners to ensure that eLoran remains operational within Europe and the US in the short term.
- work to identify appropriate long-term institutional arrangements for eLoran in Europe;
- be involved in development of eLoran standards;
- work to secure long-term funding for eLoran services;
- extend the Loran trials at Rugby to March 2010 in concert with our other European partners;
- encourage the development of eLoran user equipment;
- continue our ongoing programme of work and publish the results of our Loran trials to our users, stakeholders and international partners;
- encourage and support the realisation of the ERNP through an EC communication and the implementation of recommendations pertaining to Loran, as currently published by the EC;
- work with IALA and IMO to ensure that the ERNP is harmonised with IMO resolutions and standards and IALA's recommendations and guidelines; and
- continue to seek wider support from other user segments and public sector domains in order to share future costs on an equitable basis.

3.7 RACONS

Maritime users continue to place a high importance on racons (Radar Beacons) as an integral part of the AtoN mix particularly at night, in reduced visibility and adverse weather conditions. In response, the GLAs recognise the importance of racons in the overall service provision mix and their role in satisfying the needs of specific users.

IMO has recognised the value of new radar technology to improve the detection of small craft under poor conditions and, from 2008 onwards, has removed the obligation for S-band radars to trigger racons.

The GLAs will:

- continue to monitor developments in radar technology and support specific studies or trials as required;
- together with international partners investigate and determine the implications of IMO removing the need for S-band radars to trigger racons; and
- continue to liaise with appropriate national and international bodies and racon manufacturers, as required, to ensure that the mariners' requirements are met.

4.1 IMPLEMENTATION

This plan will be implemented by:

- Co-operation between the three GLAs – at all stages of the system/service lifecycle (covering requirements, design, development, test, verification, operation and decommission) to ensure the provision of the required level of service;
- Continuous Aids to Navigation Review - to ensure that the Aids to Navigation system effectively supports user and stakeholder needs, taking into account all potential changes in the service provision environment. This includes trends, types, volume and mix of traffic, local hazards, areas of traffic convergence/separation, environmental considerations and changes to other risk mitigation measures;
- Consultation with User Groups - to ensure the level of service continues to meet their requirements, taking into account the complementary balance between radio navigation services, other AtoNs, onboard systems and the "view from the bridge";
- Strategic Participation in IALA - to ensure continuous representation of national interests whilst working alongside our international partners;
- Influence in European Projects - including those of the European Commission, the European Space Agency, and the European Maritime Radionavigation Forum. In particular, we will work to bring about the implementation of the European Radio Navigation Plan (ERNP) as currently recommended;
- Continuing Contribution to Developments in Marine Technology – to ensure future and current radio navigation service provision remains relevant and supported by international standards where appropriate;
- Application of the Risk Assessment principles - as laid down in the IALA Guidelines;
- Continued and closer co-operation with the MCA and IRCG - to establish national AIS networks around the British and Irish coasts;
- Securing revised Merchant Shipping Acts – to ensure that our strategic vision and associated plans are well aligned with our regulatory responsibilities; and
- Promotion and communication of this plan – to ensure that our users, national stakeholders and international partners are fully aware of how we intend to continue providing our service up until 2020 and beyond.

4.2 PLANNING FOR CHANGE

This GRNP sets out the GLAs' plan for taking advantage of technological and operational improvements that we forecast in radio navigation AtoN service provision. However, there are other developments in the external service provision environment that could affect our level of service in the future.

As outlined in 2020 The Vision, we believe our overall strategy and therefore our plan will be modified if significant progress is made during the period of the Plan at International and National Level in any or all of the following areas:

- eLoran is adopted as the terrestrial back up to GNSS in Europe and integrated receivers (GPS/Galileo/LORAN/DGNSS) are mandated for carriage by all SOLAS Convention vessels;
- Automatic Identification System (AIS) data is displayed on all SOLAS ships over 300 gross tons in a manner that facilitates the use of AIS on AtoNs and virtual AtoNs;
- a network of AIS stations around our coast facilitates stakeholders, such as the GLAs, having the ability to implement AIS as an AtoN and as an emergency wreck marking system; as well as providing the all-important traffic data to inform the risk management process that determines the deployment of AtoNs;
- measures are considered that direct traffic in high density and high risk areas, leading to a measure of sea-traffic control and changes in the provision of AtoN and Vessel Traffic Services accordingly;
- the carriage of integrated navigation receivers by non-SOLAS Vessels, to ensure that all mariners have an electronic position-fixing capability without the need for radar or physical AtoNs.

The publication and implementation of a European Radio Navigation Plan taking into account all recommendations from the 2004 study (6) will contribute significantly to safety in the marine environment.

(6) "Recommendations towards the development of a European Union Radio-Navigation Plan (ERNP)", Helios Technology Ltd, 25th October 2004.

The GLAs will continue to provide AtoN for the safety of all mariners and in doing so, seek to:

- regulate standards in the provision of AtoN in general and local areas;
- avoid proliferation of, and interference amongst marine radio navigation systems;
- exercise their wreck powers to ensure the safety of navigation, in a way which is consistent with preservation of the environment;
- promote proper standards of training and competence in the use of existing and new AtoN;
- actively participate in all relevant aspects of national and international developments in navigation and safety of the mariner.

If the plan, as described in this document, is not implemented, the GLAs will be unable to take advantage of new technologies to improve service to the mariner and reduce costs, build upon their track record of success and deliver their shared mission statement. This plan describes how we will adapt in the face of a rapidly changing environment, and thereby optimise our service provision in terms of cost, risk and service level.

When the plan described in this document is realised, it will individually and collectively influence the provision of all AtoN and the level of service we provide:

"To deliver a reliable, efficient and cost effective Aids to Navigation Service for the benefit and safety of all mariners".

TH..... **NLB**..... **CIL** .....

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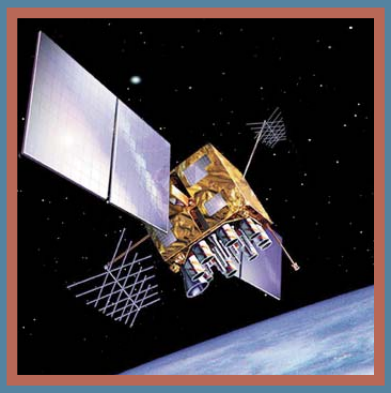

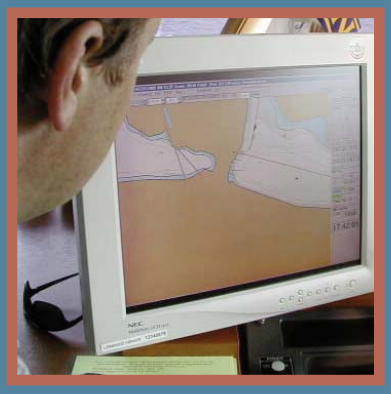

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