Document Revisions (Title style)

***AISM***Association Internationale de Signalisation Maritime ***IALA***

International Association of Marine Aids to Navigation and Lighthouse Authorities

10, rue des Gaudines

78100 Saint Germain en Laye, France

Telephone: +33 1 34 51 70 01 Fax: +33 1 34 51 82 05

e-mail: [contact@iala-aism.org](mailto:contact@iala-aism.org) Internet: [www.iala-aism.org](http://www.iala-aism.org)

**IALA Guideline No. ####**

**on**

**High accuracy systems and services in ports and harbours**

**Edition 1**

**[Date issued]**

**[Previous Edition; Date issued]**

Revisions to the IALA Document are to be noted in the table prior to the issue of a revised document.

|  |  |  |
| --- | --- | --- |
| **Date** | **Page / Section Revised** | **Requirement for Revision** |
| 03/02/2016 |  | Draft document structure |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Index of Tables

**Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.**

Index of Figures

**Es konnten keine Einträge für ein Abbildungsverzeichnis gefunden werden.**

**CONTENTS**

[1 Introduction 5](#_Toc442708830)

[1.1 Purpose and scope of document 5](#_Toc442708831)

[1.2 Structure of document 5](#_Toc442708832)

[2 Requirements and Definitions 6](#_Toc442708833)

[3 High-Precision Systems and Services 6](#_Toc442708834)

[4 Basic architecture of systems and services 6](#_Toc442708835)

[4.1 Optical Systems 6](#_Toc442708836)

[4.2 GNSS Augmentation Services 6](#_Toc442708837)

[5 Methods and Techniques 6](#_Toc442708838)

[5.1 RTK (Real Time Kinematik) 7](#_Toc442708839)

[5.2 PPP (Precise Point Positioning) 7](#_Toc442708840)

[5.3 Laser Ranging 7](#_Toc442708841)

[6 Interface specifications 7](#_Toc442708842)

[7 System and Service utilization 7](#_Toc442708843)

[7.1 Optical Systems 7](#_Toc442708844)

[7.2 GNSS Augmentation Services 7](#_Toc442708845)

[8 Concepts for management and port stakeholders 7](#_Toc442708846)

[ANNEX A Abbreviations 8](#_Toc442708847)

[ANNEX B Definitions 9](#_Toc442708848)

[ANNEX C References 10](#_Toc442708849)

# Introduction

## Purpose and scope of document

Port and harbours have to be considered as essential hubs for the worldwide trade and shipping. Specific applications or manoeuvres, as for example automatic docking but also the passing of vessels in narrow bands, require very accurate and precise positioning information for their safe and efficient execution.

The purpose of this guideline is the harmonization between service provision and their utilisation at shipside. Therefore the guideline is providing information concerning applicable systems, services and techniques as well as dedicated applications, with an exclusive focus on high-precision applications.

The document also summarizes recommendations of service providers, such as when and how the provided service data should be used. This forces the clarification of responsibilities and dependencies between shore-side and ship-side parts of such systems under consideration of the possible diversity on performance requirements.

This document use references to existing and future recommendations and guidelines from IALA dealing with the development, deployment and operation of PNT-relevant services including technical specification of communication interfaces between services and users.

## Structure of document

Chapter 2 refers the requirements on high accuracy systems including dedicated definitions.

Chapter 3 gives a general overall about systems and services.

In Chapter 4 the basic architecture (concept and hardware) of each system is described.

Chapter 5 informs about the applied methods and techniques implemented by algorithms and software as essential part of the systems.

Chapter 6 deals with interface specifications in relation to communication channels, data protocols, messages, and formats.

In Chapter 7 the utilization of the system and services for the user (on-board) is explained.

Chapter 8 is giving information about utilization policies, data exchange, intelligent access on independent services.

At the end the following annexes are included:

* Annex A: Abbreviations
* Annex B: Definitions
* Annex C: References

# Requirements and Definitions

>> references to IMO resolution A.915(22) ' Revised Maritime Policy and Requirements for a Future Global Navigation Satellite System (GNSS)’ and the contained requirements on automatic docking

>> explain difference between ports and harbours

# High-Precision Systems and Services

>> Gives a short overview about possible systems and services (the following table contains first examples and has to be extended in case of additional systems). May be it make sense to generalize the systems in that section and to give examples in an additional annex (Annex D).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Type | Description | Installations / Testbeds / Examples | Ref |
| Laser distance measurement devices | Device | Reflectorless distance measurement | ASTECH LDM301A | [1] |
| GNSS Ground based augmentation system | System and Service | Position augmentation by phase based GNSS correction data as well as integrity information | Research Port of Rostock | [2] |
| High precision RT services of Land Survey Offices | System and Service | Position augmentation by phase based GNSS correction data | SAPOS HEPS | [3] |
| Commercial High Precise RT services | System and Service | GNSS augmentation by PPP technology | FUGRO Starfix G2/G4  NavCom StarFire | [4]  [5] |
| … |  |  |  |  |
| … |  |  |  |  |

# Basic architecture of systems and services

## Optical Systems

## GNSS Augmentation Services

# Methods and Techniques

>> use/refer to information from IALA Aids to Navigation Manual NAVGUIDE 2014

## RTK (Real Time Kinematik)

## PPP (Precise Point Positioning)

## Laser Ranging

# Interface specifications

>> e.g. output channel, data format, required bandwidth etc.

>> main specification ITU, RTCM, applied for service provision

# System and Service utilization

>> e.g. on-board requirements, dedicated on-board systems (e.g. PPU)

## Optical Systems

## GNSS Augmentation Services

# Concepts for management and port stakeholders

>> e.g. utilization policies, data exchange, intelligent access on independent services

## ANNEX A Abbreviations

|  |  |  |
| --- | --- | --- |
| GNSS | - | Global Navigation Satellite System |
| IALA | - | International Association of Marine Aids to Navigation and Lighthouse Authorities |
| IMO | - | International Maritime Organisation |
| PNT | - | Position, Navigation, and Timing |
| PPU | - | Potable Pilot Unit |
| RT | - | Real Time |

## ANNEX B Definitions

|  |  |
| --- | --- |
| Accuracy |  |
|  | |
| Precision |  |
|  | |
| Integrity |  |
|  | |
|  |  |
|  | |
|  |  |
|  | |

## ANNEX C References

[1] <http://www.astech.de/en/produkt.html?name=LDM301A>

[2] Engler, Evelin und Noack, Thoralf und Beckheinrich, Jamila und Hirrle, Angelika und Schlüter, Stefan und Reimer, Roland und Klähn, Dietmar (2008) GNSS based solutions for maritime “Safety of Life” Application with increased Accuracy Requirements. ISBN 978-3-937655-18-5.

[3] <http://www.zentrale-stelle-sapos.de/heps.html>

[4] <http://www.starfix.com/positioning-systems/>

[5] <http://www.navtechgps.com/navcom_starfire_subscription_service/>