

EMSA – European Maritime Safety Agency
Unit C.4 – Digitalisation and Application Development

Appendix C.3

International LRIT Data Exchange (LRIT IDE)

Functions and Architecture

Date: 19/07/2016

Version: 1.0

Introduction

This document gives an overview of the International LRIT Data Exchange (LRIT IDE). EMSA hosts and operates the LRIT IDE system since **18-Oct-2011**.

IDE Functions

The Long-Range Identification and Tracking (LRIT) system is a global ship tracking service developed under the co-ordination of the International Maritime Organization (IMO) and available to IMO Contracting Governments.

The LRIT Data Centres (DCs) collect, store, and provide LRIT information (ship position reports) to users worldwide through an Internet based network.

The main function of the LRIT IDE is the routing of messages between DCs and therefore it can be seen as the communication hub of the LRIT network. The LRIT IDE is also responsible for broadcasting messages and monitoring the health of the LRIT network components.

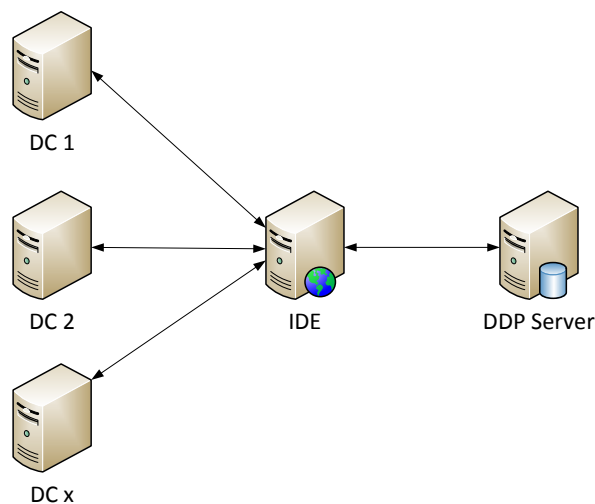


Figure 1 - LRIT Network

The LRIT IDE routes the messages to the proper destination by using address information contained in the Data Distribution Plan (DDP), an XML document maintained by the Contracting Governments and made available by the DDP Server, hosted at IMO.

The LRIT IDE archives the header information of all exchanged messages in a Journal for audit and statistical analysis purposes. The LRIT IDE does not read or store any LRIT information (ex. ship position) contained within the messages.

The LRIT IDE implements industry standard network security procedures to prevent malicious attacks.

The LRIT IDE has a web-based Administrative Interface (AI) accessible to the IDE operators, the LRIT Co-ordinator and DC operators to perform administrative tasks.

More details about LRIT system can be found in the IMO document MSC.1/CIRC.1259-Rev 6.

Software and technologies used

The LRIT IDE uses Transport Control Protocol/Internet Protocol (TCP/IP) for all connections to and from its server. The exchange of messages with other components (DCs and DDP Server) is based on Simple Object Access Protocol (SOAP) and eXtensible Markup Language (XML).

The connection between the LRIT IDE and other components is established and made secure by means of a Private Key Infrastructure (2-way SSL and Digital Certificates).

The LRIT IDE application is deployed on the Apache Tomcat application server.

The system runs on Red Hat Enterprise Linux (RHEL) servers with an Oracle 12c database.

The IDE uses the following software and technologies:

- Red Hat Enterprise Linux (RHEL) OS
- Storage Area Network (SAN)
- Oracle DBMS 12c
- Apache-Tomcat
- Network File System (NFS)
- Java
- Simple Object Access Protocol (SOAP)
- eXtensible Markup Language (XML)
- Public Key Infrastructure (PKI)

The operational monitoring of the LRIT IDE at EMSA is mainly based on NAGIOS and implemented by GMV.

System

Environments

There are four separated environments for the LRIT IDE at EMSA:

- TEST
- Pre-Production (DEVTEST)
- Production Primary (PROD)
- Production Secondary (BCF)

The United States Coast Guard (USCG) operates the disaster recovery (DR) site of the LRIT IDE.

System Architecture

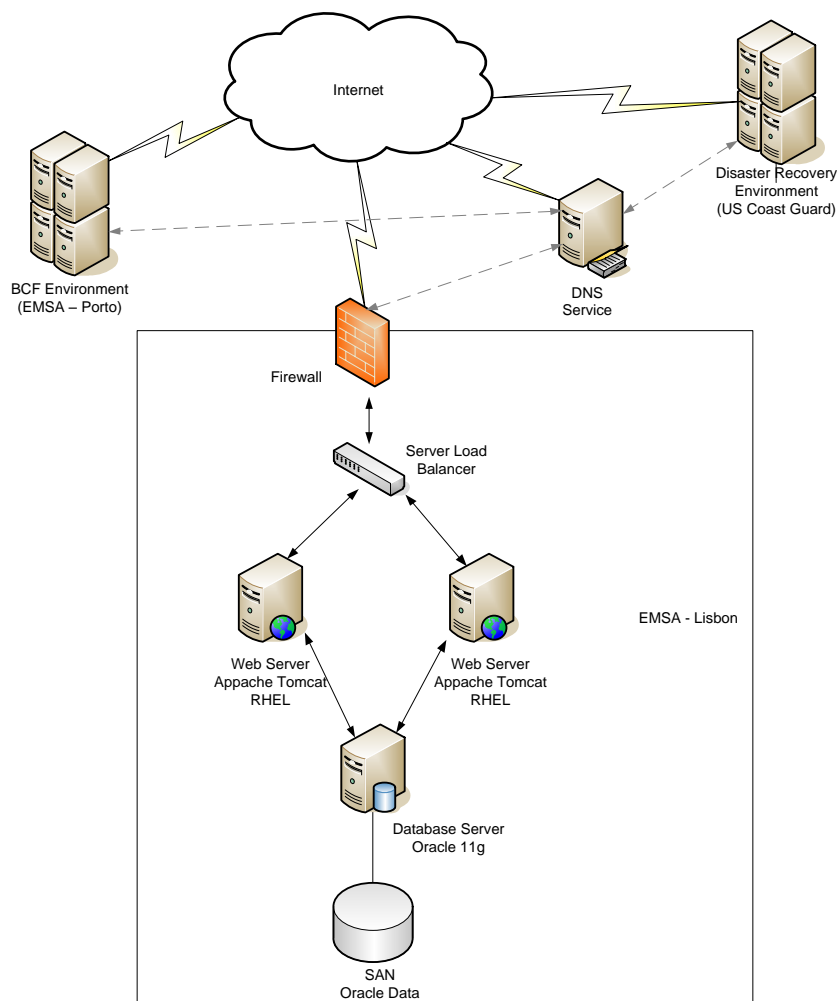


Figure 2. LRIT IDE Architecture

System performance and availability

- The LRIT IDE should process and handle any input within 30 seconds of the receipt of the input and give the appropriate output.
- The LRIT IDE should be capable of receiving and processing at least 100 reports per second.
- The LRIT IDE should operate 24/7 with an availability of:
 - 99.9 % over the year;
 - 95 % over any day.
- The LRIT IDE should have:
 - seamless switch-over to local backup servers;
 - close to seamless switch-over to remote disaster recovery site server in the USA.

Message Size

The average size of an LRIT position report or request messages is of some kilobytes. The size of the DDP message is approximately 2 MB.

LRIT IDE Administrative Interface (AI)

The AI is a password protected web application, developed with Java Server Faces Technology and running on a separate Apache-Tomcat instance.

The AI allows all DC operators to create accounts, change passwords, update profiles, and be authenticated directly through the LRIT IDE Web site. It also provides user management capabilities and gives access to the LRIT Coordinator for auditing purposes.

The AI has three access levels, with access to specific tasks for each level. A non exhaustive list of tasks that can be performed by the AI users is the following:

- DC Operator:
 - Validate polygons
 - Query the Journal for individual LRIT messages
 - Query the LRIT IDE for information pertaining to the LRIT network
 - Query the LRIT IDE for the version of DDP being used
 - Send notifications to all LRIT components
 - Read notifications from all LRIT components.
- IDE Operator:
 - Validate polygons
 - Query the Journal for individual LRIT messages
 - Query the LRIT IDE for a list of all DCs and their URLs or Internet Protocol (IP) addresses connected to the LRIT IDE
 - Query the LRIT IDE for the version of DDP being used
 - Query the LRIT IDE for quality of service information

- Query the LRIT IDE for network statistics on specific or all communication links
- Query the LRIT IDE for a list of errors or anomalies that the LRIT IDE has detected over a given period of time
- Query the LRIT IDE for the results of a diagnostic test
- Query the LRIT IDE for information pertaining to the LRIT application software on the LRIT IDE
- Enable or disable the DDP version number validity checking function for LRIT messages from all DCs
- Configure the time delay feature of the DDP version number checking function.
- LRIT Coordinator:
 - Validate polygons
 - Query the Journal for individual LRIT messages
 - Query the LRIT IDE for information pertaining to the LRIT network
 - Query the LRIT IDE for the version of DDP being used
 - Query the LRIT IDE for quality of service information.

The following figures show some screenshots of the AI.

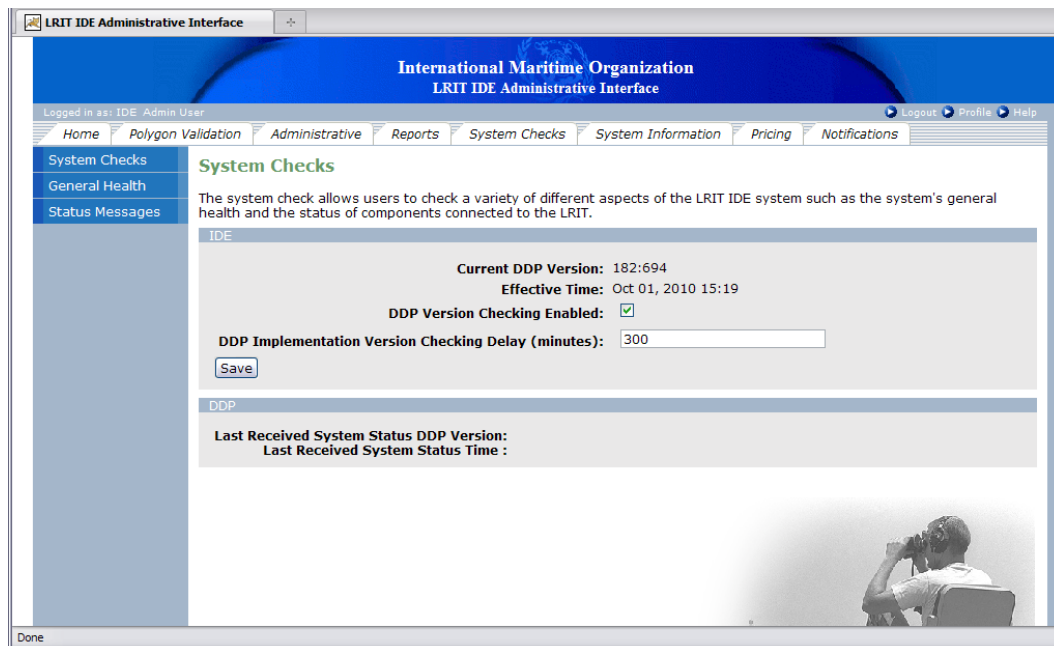
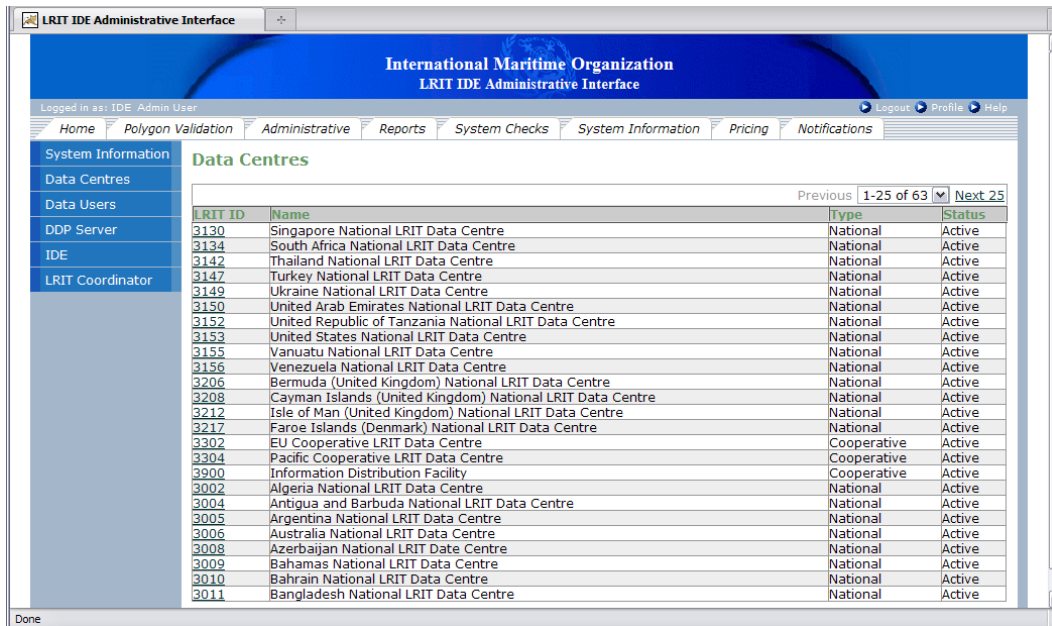


Figure 3. IDE AI System Checks Page



International Maritime Organization
LRIT IDE Administrative Interface

Logged in as: IDE Admin User

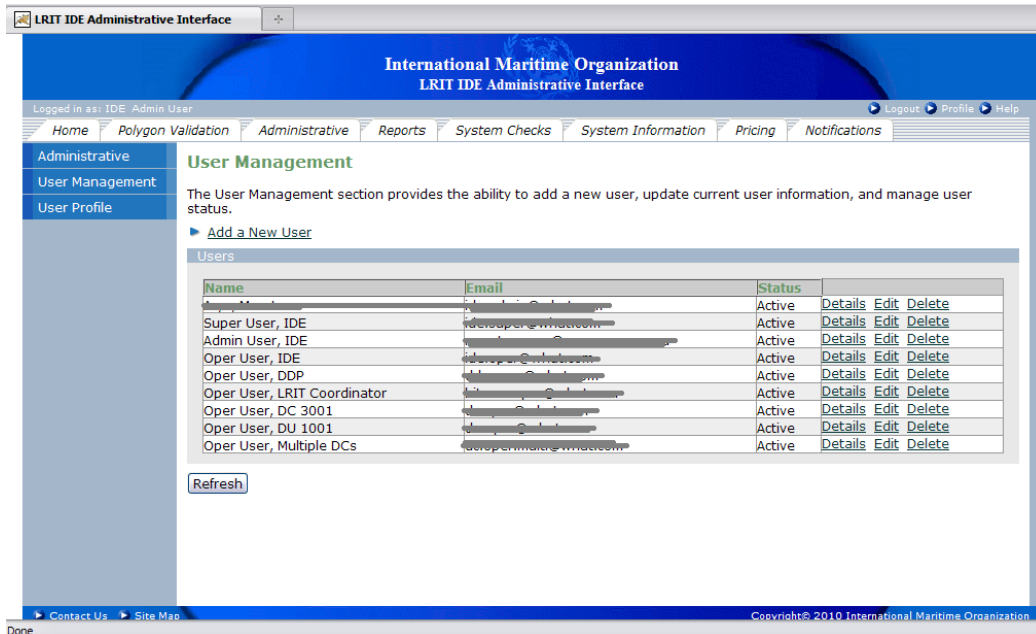
Home Polygon Validation Administrative Reports System Checks System Information Pricing Notifications

Data Centres

Previous 1-25 of 63 Next 25

LRIT ID	Name	Type	Status
3130	Singapore National LRIT Data Centre	National	Active
3134	South Africa National LRIT Data Centre	National	Active
3142	Thailand National LRIT Data Centre	National	Active
3147	Turkey National LRIT Data Centre	National	Active
3149	Ukraine National LRIT Data Centre	National	Active
3150	United Arab Emirates National LRIT Data Centre	National	Active
3152	United Republic of Tanzania National LRIT Data Centre	National	Active
3153	United States National LRIT Data Centre	National	Active
3155	Vanuatu National LRIT Data Centre	National	Active
3156	Venezuela National LRIT Data Centre	National	Active
3206	Bermuda (United Kingdom) National LRIT Data Centre	National	Active
3208	Cayman Islands (United Kingdom) National LRIT Data Centre	National	Active
3212	Isle of Man (United Kingdom) National LRIT Data Centre	National	Active
3217	Faroe Islands (Denmark) National LRIT Data Centre	National	Active
3302	EU Cooperative LRIT Data Centre	Cooperative	Active
3304	Pacific Cooperative LRIT Data Centre	Cooperative	Active
3900	Information Distribution Facility	Cooperative	Active
3002	Algeria National LRIT Data Centre	National	Active
3004	Antigua and Barbuda National LRIT Data Centre	National	Active
3005	Argentina National LRIT Data Centre	National	Active
3006	Australia National LRIT Data Centre	National	Active
3008	Azerbaijan National LRIT Data Centre	National	Active
3009	Bahamas National LRIT Data Centre	National	Active
3010	Bahrain National LRIT Data Centre	National	Active
3011	Bangladesh National LRIT Data Centre	National	Active

Figure 4. IDE AI Data Centres System Information Page



International Maritime Organization
LRIT IDE Administrative Interface

Logged in as: IDE Admin User

Home Polygon Validation Administrative Reports System Checks System Information Pricing Notifications

User Management

The User Management section provides the ability to add a new user, update current user information, and manage user status.

► Add a New User

Users

Name	Email	Status	Details	Edit	Delete
Super User, IDE	ide@open.marine.gov.uk	Active	Details	Edit	Delete
Admin User, IDE	ide@open.marine.gov.uk	Active	Details	Edit	Delete
Oper User, IDE	ide@open.marine.gov.uk	Active	Details	Edit	Delete
Oper User, DDP	ide@open.marine.gov.uk	Active	Details	Edit	Delete
Oper User, LRIT Coordinator	ide@open.marine.gov.uk	Active	Details	Edit	Delete
Oper User, DC 3001	ide@open.marine.gov.uk	Active	Details	Edit	Delete
Oper User, DU 1001	ide@open.marine.gov.uk	Active	Details	Edit	Delete
Oper User, Multiple DCs	ide@open.marine.gov.uk	Active	Details	Edit	Delete

Refresh

Contact Us Site Map Copyright © 2010 International Maritime Organization

Figure 5. LRIT AI User Management

▼ Filter

Filter By Message ID

Message ID

Other Filtering

Start Time
Oct 07, 2010 14:41

End Time
Oct 08, 2010 14:41

Message Type

- Period Position Report
- Polled Position Report
- SAR Position Report
- Position Request
- SAR Position Request
- SAR SURPIC
- Receipt
- DDP Notification

Message Must Be To/From

Enable Filtering By DataCentre
☐

Available

- 0001 - LRIT DDP Server
- 0002 - LRIT IDE
- 3002 - Algeria
- 3004 - Antigua and Barbuda
- 3005 - Argentina
- 3006 - Australia
- 3008 - Azerbaijan National LRIT Date Centre
- 3009 - Bahamas
- 3010 - Bahrain
- 3011 - Bangladesh

Selected

Move

Move All

Remove

Remove All

Enable Filtering By DataUser
☐

Available

- 1002 - Algeria
- 1004 - Antigua and Barbuda
- 1005 - Argentina
- 1006 - Australia
- 1008 - Azerbaijan
- 1009 - Bahamas
- 1010 - Bahrain
- 1011 - Bangladesh
- 1012 - Barbados
- 1014 - Belgium

Selected

Move

Move All

Remove

Remove All

Reset
Search

Previous
1-25 of 80
Next 25

Message ID	DC Originator	DC Destination	Message Type	IDE Receive Time
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Figure 6. Filter Options on the Journal Query Page