IREDES International Rock Excavation Data Exchange Standard

IREDES Initiative

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IREDES Tracking
Profile Documentation

Version 1.0

2012-05-08

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1 General Information

1.1 Introduction

As modern mining machinery today is controlled electronically and even operates autonomously, a smooth and cost efficient flow of data in the mining process will be crucial for cost efficient future mine operations. Therefore, the international Rock Excavation Data Exchange Standard (IREDES) was launched by major players in the industry. The task of this initiative is to define a common electric language for easy and standardized data exchange between mining machines and central computer systems.

This standard is expected to have significant impact on the use of automated mining equipment. Multi vendor installations will be controlled much easier than today as IREDES offers a standardized interface to all machines. Cost can be reduced as no vendor specific import/export filters have to be developed.

By using IREDES, the mining equipment will become on active part of a mining companies IT-infrastructure. All data produced by IREDES compliant machines can be stored in databases. This will lead to a continuous productivity control and helps improving production planning. The XML technology used in IREDES is widely supported and open for the future.

1.2 Preconditions and Usage

This document is and additional textual documentation to provide documentation which cannot be integrated into the schema definitions.

In case of ambiguities, the standard's XML schema is the standard's normative basis. It supersedes all other information given in text documents, presentations, etc.

As the XML definitions only can contain the formal aspects of the standardization, this document adds all content definitions which base on mutual agreement. Therefore it is an important document for the correct interpretation of the standard and for crossover compatibility. An fully IREDES compliant implementation has to fulfill all demands stated in the IREDES XML schemes as well as in this accompanying documentation.

Errors in this documentation as well as in the XML schemes have to be reported to the IREDES office. Thank you for your help!

2 Document History

Date	Version number	Details
2012-05-08	V1.0	Initial preparation of document

3 Referenced Standards

ISO 8859-1: 1987, Part 1: Latin Alphabet No 1

XML Schema Part 0: Primer: http://www.w3.org/TR/xmlschema-0/

XML Schema Part 1: Structures: http://www.w3.org/TR/xmlschema-1/

XML Schema Part 2: Datatypes: http://www.w3.org/TR/xmlschema-2/

XML Base: http://www.w3.org/TR/xmlbase/

Extensible Markup Language (XML) 1.0: http://www.w3.org/TR/2000/REC-xml-20001006

XML Namespaces: http://www.w3.org/TR/REC-xml-names

RFC1321: http://www.faqs.org/rfcs/rfc1321.html

Please note: The IREDES office is not responsible for the content provided by the above sources. Please let us know if a link is not longer working or if content has changed so it does not relate to the intended purpose any longer.

4 Related Documents

This document is a part of a set of documents describing the different parts of the IREDES standard:

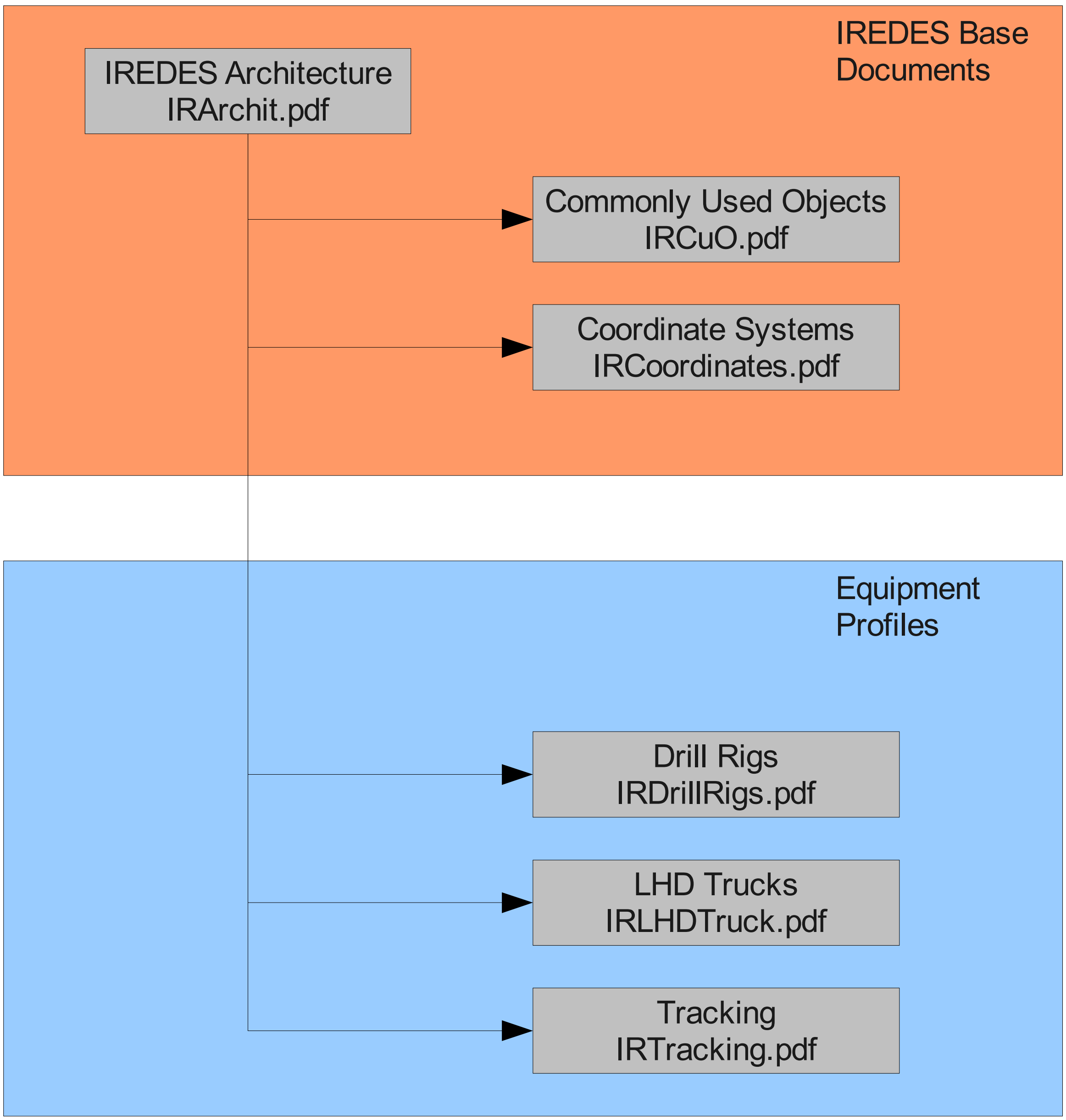

Figure 1: IREDES documentations

The uppermost document is the IREDES Architecture description explaining the general setup and collaboration of the different parts of the standard. The "IREDES Architecture" document will be the best choice to start with as it gives an overview and basic information needed to understand the structure of IREDES.

Detail information about single parts of the IREDES standard are available from separate documents. Readers of these documents should be familiar with XML, XML schemes and implementation relevant issues.

Standard definitions used in common throughout multiple equipment profiles are covered by the corresponding documentation of the "General Objects" (Application Profiles, General Data Types, etc.) and "Commonly used Objects" (CuO).

All standard information concerning a particular equipment type (Drill Rigs, LHDs, etc.) is contained in a separate document related to the equipment profile.

Beside the textual descriptions, the entire standard is available as XML schemes as they contain the formal description of the standard. In case of ambiguities, the definitions in the XML schema override all definitions made in accompanying textual documentation. Textual description available for different IREDES profiles is additional information mainly containing parts of the standards not definable in XML schemes. Implementations should take care of these documents as they may contain important information which must be defined basing on "mutual agreement" to make the standard work.

5 General Handling of the Tracking Profile

5.1 Purpose of the Tracking Profile

The IREDES Tracking profile is designed for monitoring and storing of assets location during mining and construction process. It could be used on mining equipments, machineries, personnel, and/or any asset with an active or passive reporting ability of its location. The Tracking profile standardizes the data schematic such that all software systems working with the tracking data have a common understanding of the information.

5.2 Usage of the Tracking Profile

Unlike the machinery profiles introduced earlier by IREDES, the tracking profile is designed to be used in real-time. That is, the gathered data is closely bonded with its collection time – it is meaningless otherwise.

The Tracking profile could either be used as online or offline profile. When used as offline profile, asset location data is compiled in the defined format and stored on board (timestamp information is included within the profile schema). The stored data will be passed to a server using a storage media (flash drive, cd, etc.).

Online usage of Tracking profile comparing to the offline usage is more efficient. Location data of a device is formated and sent to server directly via Wireless LAN when it is collected. The IREDES standard recommends using Web services for data transmission. However, the data transmission method could be freely chosen according to application.

6 Assets Tracking

This section covers the explanation of each field in the Tracking schema – design purpose and detailed usage.

6.1 Extension Base

The Tracking profile is designed to be a real-time usage schema. It is extended from ***IRRealTimeGenType*** which includes general information needed for real-time information. The IRRealTimeGenType is defined in IrappBaseClasses.xsd.

6.2 Identification

Identification is important when tracking asset's location. A 64 character long identification number is used to uniquely define a device in the mine scope. Each location report has to include this identification.

6.3 Grouping

Device tracked may be assigned to zero or multiple groups using the ***AssetGroup*** element.

6.4 “Location” vs. “RelativeLocation”

IREDES tracking standard provides two options to locate a device: find its absolute position or find its relative location to other locations. With one of the two defined correctly, the location of a device could be identified.

6.5 Location

The ***Location*** element is used when the device could tell its position. A location element is of type ***LocationType*** defined in TrackingBaseClasses.xsd.

Device's accurate location could be defined using one or more of the following:

- LocationID: predefined identification of a certain area in the operation field.
- LocationName: predefined and commonly agreed name of a certain area in the operation field
- Position: a 3-dimensional coordinate defining the accurate position along with a predefined coordinate system

When location is defined correctly, RelativeLocation does not need to be defined to locate the device

6.6 RelativeLocation

A device's (rough) location could be found out with several distances to known locations. Figure 2 shows an example of usage of relative location. Note: A, B, C are known accurate positions. D is a calculated region.

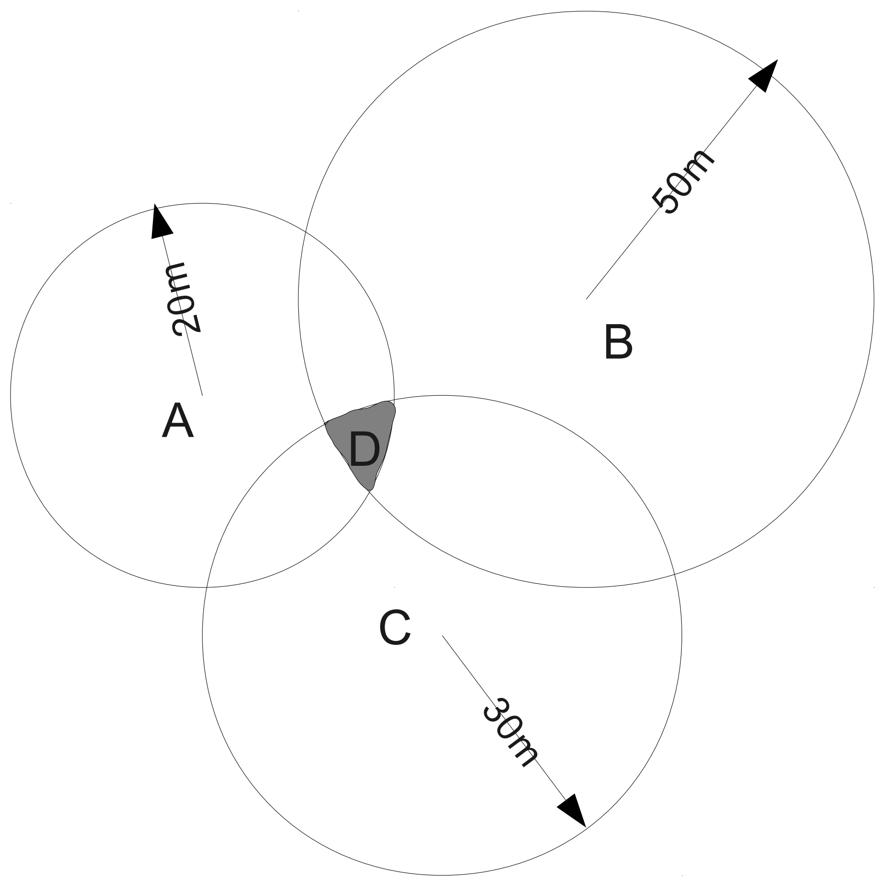

Figure 2: RelativeLocation Example

In the above figure, it shows a device which is:

- 20 meters away from location A
- 50 meters away from location B
- 30 meters away from location C

Given these conditions and given that location A, B and C are all known locations, device could be assumed located in region D.

Tracking schema allows up to 5 locations to be referred to. In RelativeLocation element, the schema also allows user to define direction to the relative location to further narrow down the result region.