LISCA – LASC Interoperability Specifications for Collision Avoidance FAQ Document

ACARP Project C22012

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WHAT IS LISCA?

LISCA is an abbreviation for the LASC Interoperability Specification for Collision Avoidance. This specification has been developed by CSIRO for the underground coal industry, funded by ACARP project C22012.

This open communication specification is designed to allow interoperability between OEMs of plant and OEMs of Collision Avoidance Systems (CAS) or Proximity Detection Systems (PDS). This specification does not propose any technical method for detection, nor specify rules for behaviour to be undertaken if an unwanted interaction is imminent, however it does provide the enabling capability for these systems to be implemented by components that can operate in an integrated fashion.

A generic Collision Avoidance System has been modelled as a process with 3 components

- Detect objects in proximity (PDS)
- Decide whether an unwanted interaction is imminent (CADMS)
- Act to avoid the unwanted interaction (CS)

Some systems may implement more than one of these components.

WHY HAS IT BEEN DEVELOPED?

One of the major problems in getting proximity detection and collision avoidance systems integrated and tested has been the requirement to custom-build every implementation. This specification, when implemented, will remove much of this burden of customised implementation, and has wide support from all sectors of the industry, including Plant manufacturers, Proximity Detection System manufacturers, and mine sites.
This specification outlines the method for Proximity Detection Systems and Plant Equipment to communicate in a standard, pre-defined manner, as well as specifying basic data items that will be accessible for higher-level functionality (such as traffic management).

This does not specify a standard detection technology that must be used by all systems, nor preclude the use of additional proprietary communications between systems or subsystems.

**WHAT IS LISCA LEVEL 1?**

Level 1 is simply an agreed set of 12 connections between any Proximity Detection System, and the Control System of mobile equipment (The CADMS component is not involved in this level). These signals indicate critical data transfer between the subsystems, as well as a level of verification that the devices are in working condition. *It should be noted that the Control System of the plant has the final responsibility for the actions being undertaken by the plant, so the signals generated by the Proximity Detection System are to be interpreted as recommendations, and implemented by the Control System as such.*
WHAT IS LISCA LEVEL 2?

Level 2 defines a soft communications protocol to allow for detailed information to be passed between the subsystems. This will allow more intelligent decision making and ensure extensibility of the system into the future. At this level there can be a deeper role for decision making, taking more complex data and allowing more complex actions, rather than just go/slow/stop. It should be noted that the Control System of the plant has the final responsibility of the actions being undertaken by the plant, so the signals generated by the Proximity Detection System and the CADMS are to be interpreted as recommendations, and implemented by the Control System as such.

The Level 2 specification is based on CIP (called EtherNet/IP over Ethernet hardware or DeviceNet if implemented on CANbus). Each subsystem acts as both a producer and consumer of data, allowing the base set of data to be available to all other components, while also notifying of events.
I MAKE A PROXIMITY DETECTION SYSTEM, WHAT DO I HAVE TO DO?

**Level 1 compliance:**
1) Provide a well-documented physical interface (with connectors/wiring diagram) that implements the PDS interface defined in the document: ‘LISCA Specification Level 1’
2) On receipt of a tender proposal, complete the template ‘LISCA Specification Level 1 Tender Response’

**Level 2 compliance:**
1) Choose physical layer Ethernet or CAN (note that various plant OEMs may define which they prefer or support)
2) Become familiar with CIP:
   [http://www.odva.org/Portals/0/Library/Publications_Numbered/PUB00213R0_EtherNetIP_Developers_Guide.pdf](http://www.odva.org/Portals/0/Library/Publications_Numbered/PUB00213R0_EtherNetIP_Developers_Guide.pdf)
3) Acquire an ODVA vendor ID:
4) Implement the communication interface as specified in ‘LISCA Specification Level 2’
5) On receipt of a tender proposal, complete the template ‘LISCA Specification Level 2 Tender Response’

I MAKE MOBILE PLANT EQUIPMENT, WHAT DO I HAVE TO DO?

**Level 1 compliance:**
1) Provide a well-documented physical interface (connector/wiring diagram) that implements the CS interface defined in the document: ‘LISCA Specification Level 1’
2) On receipt of a tender proposal, complete the template ‘LISCA Specification Level 1 Tender Response’
3) Enable definition of event-action table by mine sites and implement into CS
4) Work with the Mine sites and Vendors to determine the agreed actions to be taken by the CS for each of the LISCA PDS signal conditions.

**Level 2 compliance:**
1) Choose physical layer Ethernet or CAN (note that various plant OEMs may define which they prefer or support)
2) Become familiar with CIP:
   [http://www.odva.org/Portals/0/Library/Publications_Numbered/PUB00213R0_EtherNetIP_Developers_Guide.pdf](http://www.odva.org/Portals/0/Library/Publications_Numbered/PUB00213R0_EtherNetIP_Developers_Guide.pdf)
3) Acquire an ODVA vendor ID:
4) Implement the communication interface as specified in ‘LISCA Specification Level 2’
5) On receipt of a tender proposal, complete the template ‘LISCA Specification Level 2 Tender Response’
6) Define component valid action table (See L2 Section 10)
7) Implement into Resolution Advisory implementation into CS
I AM RESPONSIBLE FOR A MINE SITE, WHAT DO I HAVE TO DO?

1) Use document template ‘LISCA Specification Tender Statement’ as part of the request for tender for equipment
2) Develop risk mitigation strategies by generating a desired event-action table relevant to the mining processes and practices.
3) Work with CS provider and PDS vendor to implement the system, utilising relevant processes in AS61508 and AS62061. Specifically, creation of documentation for the initial phases of the 61508 lifecycle:
   a. Concept
   b. Overall Scope Definition
   c. Hazard and Risk analysis
   d. Overall Safety Requirements

As well as providing information and direction where necessary for further stages: