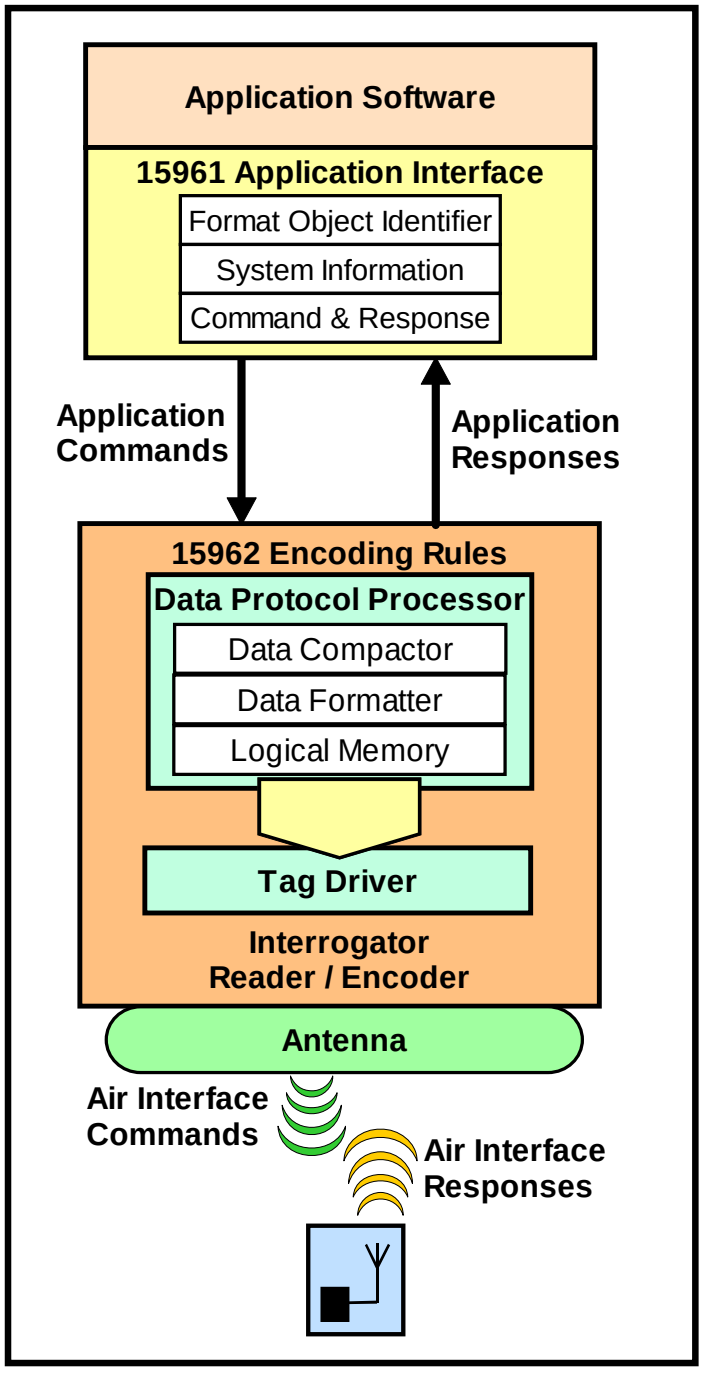
AN OUTLINE OF THE ISO RFID DATA PROTOCOL

Introduction

The ISO RFID Data Protocol, as defined in ISO/IEC 15961 and 15962, is an interface between an application, such as a library management system, and the RFID tag. The figure below illustrates the components.



Let us consider what each component does.

ISO/IEC 15961 Application Interface

The **Application Commands and Responses** allow business level communication between the application and the RFID tag, instead of using the lower level air interface commands.

> EXAMPLE:
> For baggage handling handling, the command "Read the final destination" can be used rather than Read block 9 & 10.

Object Identifiers are used to provide unique codes for the data. This approach offers two significant advantages:

- The same type of standard tag can be used for different applications, bringing economies of scale to many sectors.

- User organisations are able to define a flexible set of data elements that form the data dictionary from which the most relevant can be selected in a particular system. The data dictionary can be extended and modified over time with minimal system changes.

The **system information** deals with features concerned with configuring the tag for access purposes across the air interface and for efficient encoding.

ISO/IEC 15962 Encoding Rules

The encoding rules achieve a combination of flexibility and efficiency for the bytes that are encoded on the RFID tag:

- Data is **compacted** efficiently using the set of compaction techniques that reduce the encoding on the RFID tag and across the air interface.

- The **data formatter** minimises the encoding of the object identifiers on the RFID tag and on the air interface, but still provides complete flexibility for identifying specific data without the recourse to rigid message structures.

The syntactical encoding rules effectively create a *self-defining message structure* for each tag. This allows optional data from the application data dictionary to be selected, for variable length data to be encoded, and for different formats of data (e.g. numeric or alphanumeric) being encoded as efficiently as possible. Through the rules of ISO/IEC 15962, it is possible to correctly interpret the data on the tag without any prior knowledge of what data is encoded on the tag. This is important for supply chain situations and inter-library loans.

The **tag driver** is the interface between the generic data protocol and the specific type of RFID tag used in an application. System information held on the RFID tag is used to configure a **logical memory** structure within the Data Protocol so that the bytes from the tag can be correctly read or bytes created in the logical memory can be correctly transferred to the RFID tag through the tag driver. The tag driver effectively converts the business level commands into a series of air interface commands; it also takes the business level data provided by the commands, processed by the encoding rules of ISO/IEC 15962 into the relevant byte stream to transfer to the RFID tag.

The entire process is reversed for reading information from the tag, where the encoding rules decompact the data, recreate object identifiers, and transfer this back as application responses.

Data Constructs

Since the original publication of ISO/IEC 15961 (in October 2004), it has become clear that there is a need to manage application-related data through a Registration Authority. Four types of information are involved under the general definition of **data constructs**:

- In many systems, one particular piece of data is seen as the prime key for look-up purposes. This is called the unique item identifier (sometimes commonly called a licence plate code). The first data construct to register is the object identifier for the unique item identifier.

- Where additional data is likely to be encoded on the RFID tag, this is usually defined in some form of data dictionary. The second data construct is the object identifier structure for any other data.

  EXAMPLE:
  IATA has specified an additional 16 object identifiers, all with the same common root of 1 0 15961 12.

- The third data construct is the AFI code is used to manage the air interface and define the reading domain to avoid the system clash of reading tags from another system. As such, the AFI achieves reading efficiencies across the air interface.

- The final data construct is the data format, used to reduce the encoding of long object identifier.

Object identifiers are under the control of a responsible body representing the users of the application domain. These are declared to the registration authority, together with a request for an AFI and data format. Once all the details have been agreed, the information is added to a publicly available register. This can be used by solution providers to develop solutions and helps other organisations with their decision-making for RFID systems.

Some of the Benefits of the ISO RFID Data Protocol

- Object identifiers provide a sector-specific way to identify data while using the same RFID tags, readers and other devices used by other sectors.

- The object identifier structure and the encoding rules of ISO/IEC 15962 allow complete flexibility in dynamically creating structured data on the RFID tag. In the library community data can differ by media type, between departments, between libraries, yet be completely readable for inter-library loan systems and extensions over time.

- The rules for registering data constructs enable the user community, i.e. the libraries, to retain the ownership of data. At the same time, it ensures interoperability of data with other systems.

- identifying the object identifier for the unique item identifier enables functions in some tags and/or the Data Protocol commands to access this data more quickly, without reading all the data on the tag.

- Using a standard AFI code ensures long term management of the air interface for library items. Additionally, it protects libraries from other main (as yet unknown) RFID systems interfering with library systems and equally avoids library items clashing with other RFID systems.

- Overall, the Data Protocol increases opportunities for interoperability of RFID tags, devices, and systems. As new tag configurations are introduced for a given air interface, these can be incorporated with the minimum of disruption. Furthermore, the new tag configuration can be intermixed with existing tags because the Data Protocol retains the same functionality through the application command and addresses the differences through the tag driver.