

Advanced Exchange Services

New Methods for Telemetry and Command Definition and Exchange

CCT is conducting NASA sponsored research to provide an advanced data description exchange approach for space/spaceport systems that will provide a generic platform independent software capability for exchange of semantic control and monitoring information. This new strategy will reduce development, operations, and support costs for legacy and future systems that are part of ground and space based distributed control systems. It will also establish a space systems information exchange model that can support future highly interoperable and mobile software systems. The concept leverages the emerging Object Management Group XML Telemetry and Telecommand Data Specification, called XTCE, to provide a generic solution that will ease the adoption of a common data definition and exchange standard for legacy and future systems by minimizing or eliminating the need for custom semantic description software in new and legacy ground systems. This concept is described in detail in the CCT white paper Advanced Data Description Exchange Services For Heterogeneous Systems.

The Object Management Group and a number of major US and international industry and government aerospace organizations have collaborated to produce the XML Telemetry and Telecommand Data (XTCE) Specification. The XTCE specification is intended as a way to describe telemetry and command “databases” as used in space and ground telemetry systems, packet, and TDM based systems. The XTCE is only a specification, not a service. The intent is to allow the easy interchange of these databases between systems and organizations.

OMG’s vision for the XTCE is that it will one day be the “native” format for ground systems. Until that time, companies and organizations can use converters to go from one system to another, or can convert an existing database into this format for exchange with other parties. Currently in 2nd draft release, the XTCE standard is projected for approval in 2004. The scope of the specification includes:

Telemetry data definition including support for CCSDS packets as well as TDM frames

Data manipulation algorithms to support packaging and unpacking of individual data items

Commanding data definition including command identification, argument specification, and validation criteria

Data representation definitions

Data properties including such things as it default value, validity criteria, and data dependencies

The definition of extensible formats such that blocks of information can be portrayed in this architecture

The XTCE uses XML Schema to describe TM/TC information. The XTCE schema is organized in to seven separate schemas: 1) Space System, 2) Parameter, 3) Common Types, 4) Packaging, 5) Algorithm, 6) Stream Definition, and 7) Command Definition.

The XTCE schema is a hierarchical structure, mimicking the organization of space systems, which are typically systems within systems. The hierarchical approach is useful for minimizing name space collisions, more manageable organization, and implicit inheritance of features from higher levels to lower levels. It consists of a collection of space systems including space assets, ground assets, multi-satellite systems and subsystems.