Interfaces

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Outline

• Overview
• Interfaces in SysML
  • Ports
  • Interface hierarchy
  • Connecting ports, conjugation
  • Flow properties
  • Item flows
• SKA Interface stereotype
Overview

• The integrated modelling environment provided by CSM allows interfaces to be precisely defined and communicated in a consistent way

• Interface specifications can be stored in a read only library so both sides use the same definitions

• The model can be used as a tool to check against the ICDs to ensure that all the interfaces have been captured correctly
SysML – Ports

• Ports are used to represent interfaces

• Two types of port:
  – Full - represents physical parts e.g. an electrical connector
  – Proxy – exposes features of its owning block or parts, allows hierarchy to be defined

• Currently in the consortia model, only proxy ports are used
SysML – Interface hierarchy 1

- Proxy ports are typed by interface blocks (specialised blocks with no internal structure)
- This allows a hierarchy of interface layers to be created and developed as the design progresses
- In the model interfaces are defined in the SKAO Library to ensure consistency
SysML – Interface hierarchy 2
SysML – Connecting ports 1

- Ports are joined using connectors
- To avoid creating separate specifications for ports which exchange similar items but in opposite directions, a port can be conjugated. Conjugating a port reverses the direction of flow properties and behavioral features.
SysML – Connecting ports 2
SysML – Flow properties

- Ports can have associated flow properties which specify what can flow through a port and the direction of that flow.
SysML – Item flows 1

• Item flows specify what is actually flowing along a connector between two ports. For a valid connection the item flow must match or be a generalisation of the flow properties associated with the ports.

• In the model Item Flows are defined in the SKAO Library to help ensure consistency
SysML – Item flows 2
SKA Interface Stereotype 1

- The model defines an ‘SKA Interface’ stereotype encapsulating a variety of information associated with interfaces including interface class, leading and following parties, identity number etc and can be extended as needed

- The SKA Interface stereotype is applied to all interface blocks defined in the SKA Library
Questions?
Points for discussion

- How should the model be used in conjunction with existing ICDs?
  - Creation of N-squared diagrams
  - Using association blocks
  - Adding constraints to support engineering analysis e.g. network capacity and power
Tip: Multi-valued enumerations

- Multi-valued enumeration properties can be created by setting the property multiplicity to \([0..*]\). This saves adding ‘MULTIPLE’ to the enumeration type.