Simplifying ground segment reconfiguration

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"Make accessing satellites as easy as accessing Google."
Why it should be as easy as Google?

• It's a just-in-time world!

• Reduction of barriers between payload and users

• Support to Time critical initiatives
  - The International Charter on Space and Major Disasters
Google analogy: Remote data access

Scisat-1 LEOP support

- Effort of 60 days to ensure compatibility
- Skilled and trained professionals required
Google analogy: Remote data access

Access to NASDA web page

• Little effort, takes less than 2 seconds
• Only basic computer training required
Google analogy: Remote data access

Similarities:

• Goal: Access to data from remote location
• Environment: Geographically dispersed systems
• Ownership: Owned & operated by various organizations

Differences:

• Space industry lacks business model for open access
• Cost of assets
Challenges

• Software crisis
  • Lack of software standards
  • Segmentation / integration problem
  • Now a systems level problem
Vision

- Lead up time should be eliminated
- Achieve quick & simple reconfiguration
- Develop business model for open access

"Google" access to satellites
- Reuse existing infrastructure
- Increase interoperability
- Simple & quick reconfiguration
- Middleware is a suitable standard
Networking & middleware

Without middleware

Main Software
- net cfg
OS
Hardware

With middleware

Main Software
OS
Hardware
Server
 CSA research activity

Objective:
• Create configuration entities
• Autonomously reconfigure entire ground segment
System Overview

Driving requirements
- Manage connections
- Manage and create configurations

Main components
- XTCommunicator, from Xiphos Technologies
- Parent server
- Distributed clients

Java

mysql
Components / Technology

Wrapper Server

XTC
Server
mysql

XML
DOM4J API

Main Software
OS
Hardware

Main Software
OS
Hardware

JDBC™ API
Connector/J driver

SSL (TCP/IP)
Implementation: Space Servicing and Assembly

- Operations planning
- Contact dynamics analysis
- Real-time robotic controls
- Onboard automation
- Spacecraft simulation
- Ground control software
Lessons learned

The Good

• XML based interface
• JUnit : Automated regression testing

The Bad

• Data base interface: designing object data model

Solution

Will experiment with Evolution tool from Sygenics

www.sygenics.com
Conclusion

Solve the software crisis first

How?

• Continue R&D in ground segment field
• Support / contribute standards organization
• Demand interoperability from COTS vendors