Internet Protocol Based Standards for Spacecraft Onboard Interfaces

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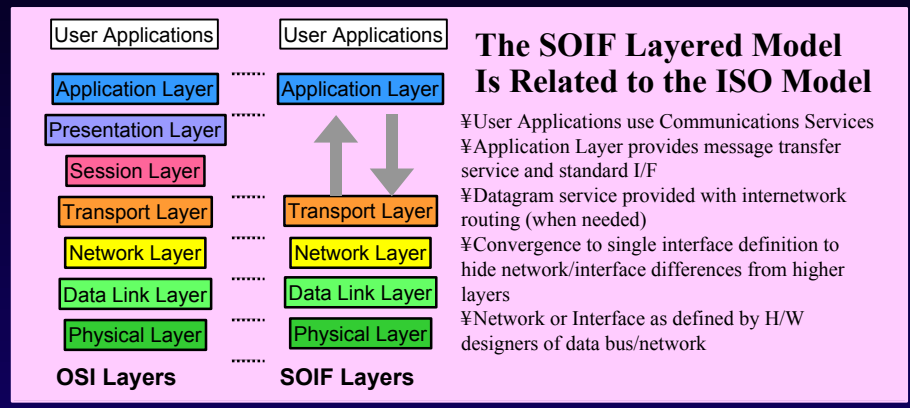
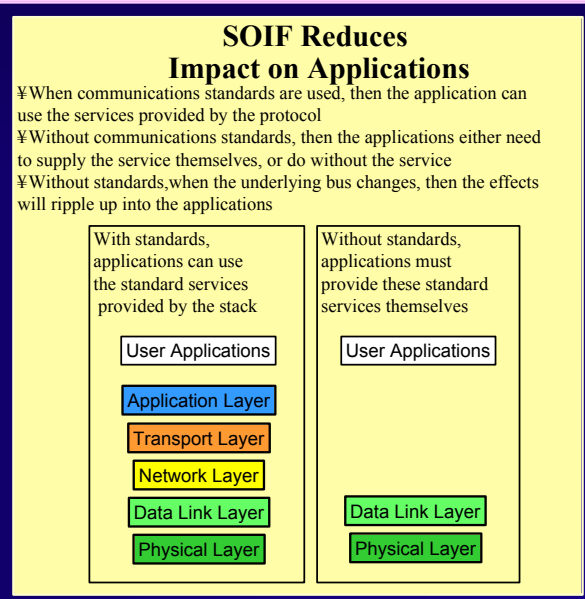
AGENDA

- Introduction to SOIF
- SOIF Objectives and Significance
- Three Views of SOIF
- User Services View of SOIF
- Interoperability View of SOIF
- Protocol View of SOIF
- Conclusions and Acknowledgments

Introduction to SOIF

- Standardized spacecraft interfaces should lead to:
  - Plug and play components, devices, and sensors
  - Reduced development costs and risks
  - Shorter development times
  - Shorter spacecraft integration time
  - Shared design and test documentation
  - Increased reuse of flight equipment, including instruments
  - Increased reuse of test equipment
  - Increased quality of flight and test equipment
  - Development of standard components
  - Second-sourcing of flight and test equipment
  - Potential for secondary or "quick ride" payload opportunities
  - Easier adoption of new and evolving technologies
    - Hardware and Software upgrades
    - Autonomy
    - Vehicle Health Management
- SOIF could impact all areas of spacecraft avionics development, including the hardware, software, and the test environment





Objective and Significance

Overall Objective

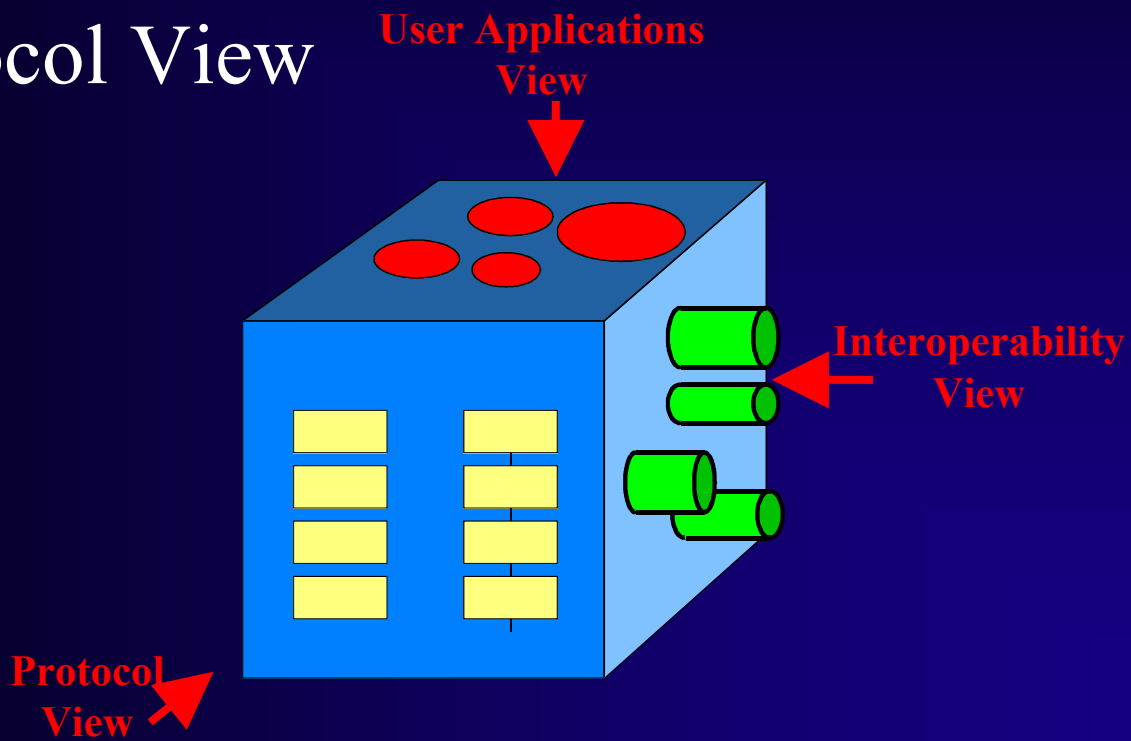
This Spacecraft Onboard Interface (SOIF) task will develop standards for onboard hardware and software interfaces, that will enable greater hardware and software reuse, reduce schedule, cost, and risk, and should reduce spacecraft wiring (harness) mass

Goals	Significance
• To develop communications services in the Space Applications and Messaging Layers	• Gives the Space Applications (Users) standard interfaces for all (inter and intra processor) communications
• A selection of services and protocols that make sense for spacecraft	• Must not use excessive resources, or have an implementation cost higher than anticipated savings
• Can change the underlying data bus to meet the needs of the application	• Allows subsystems, devices, and science instruments ability to move between different spacecraft

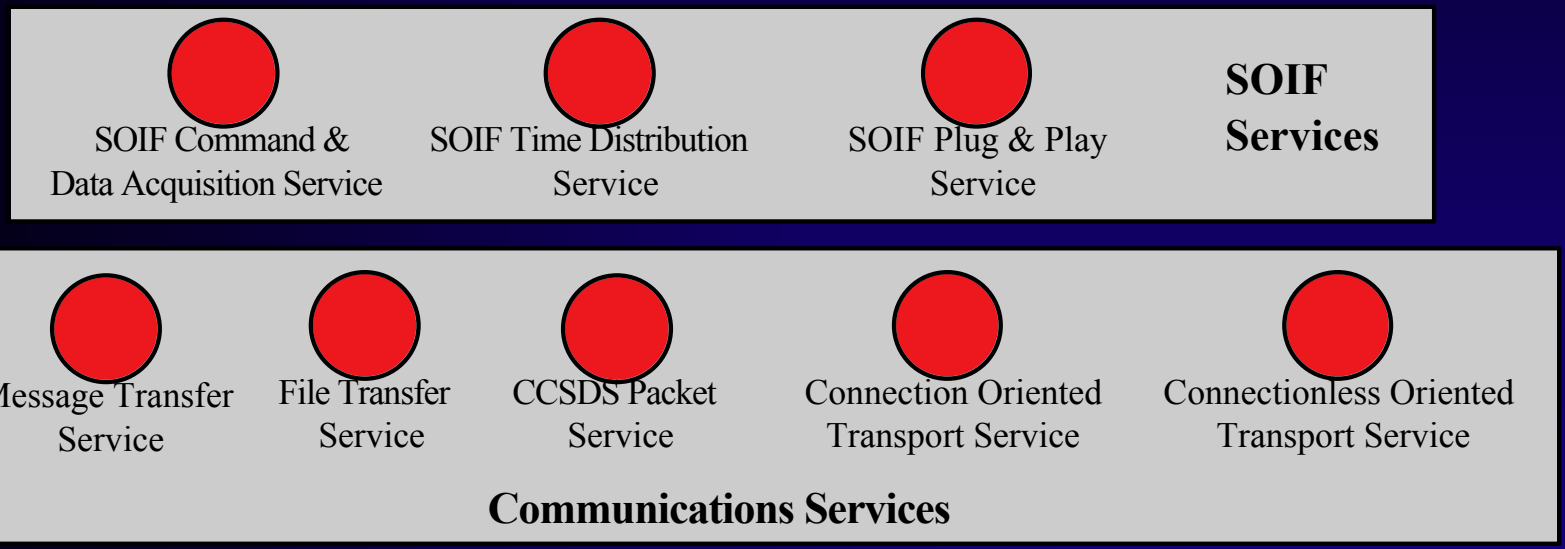
The combined effect of meeting these goals will be to separate the hardware from the implementation of the Space Applications

Three Views of SOIF

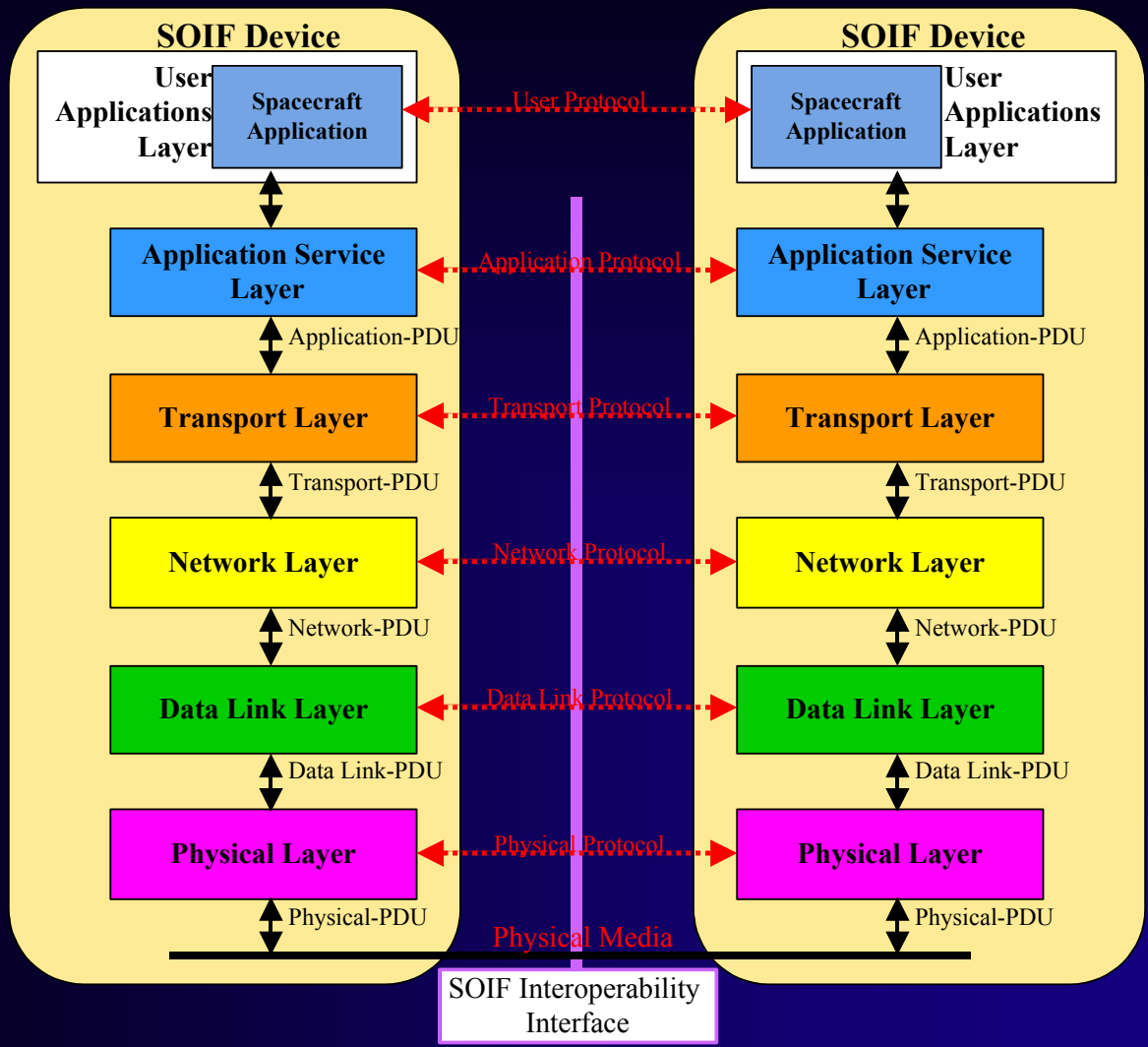
- User Application View
- Interoperability View
- Protocol View



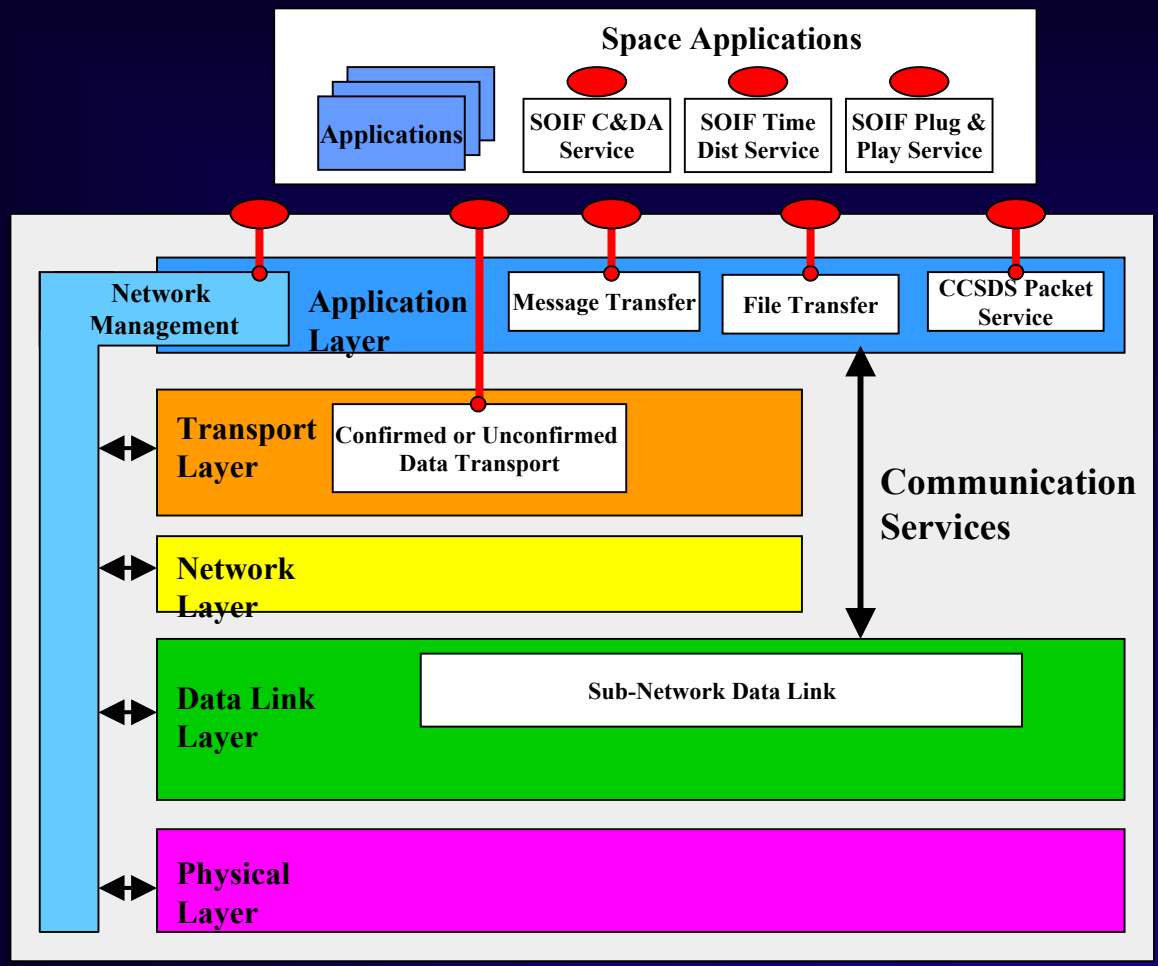
User Services View



SOIF Interoperability View



SOIF Protocol View: Reference Model



Conclusions & Acknowledgement

- SOIF is a collaborative effort between the member agencies of CCSDS
- We all expect that SOIF will be the dominate for of onboard interface once it has been accepted by the community
- SOIF will bring important advantages in cost, schedule, and risk to the using projects

SOIF is a collaborative activity involving many individuals from different countries and organizations throughout the world. We gratefully acknowledge all of the contributions of the SOIF work area members during the twice-yearly face-to-face meetings, and the numerous teleconferences and e-mail exchanges that have brought us so far.

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• NASA DATA SYSTEM STANDARDS PROGRAM •

1. Interplanetary Internet: An Architectural Framework for Space Internetworking: Adrian Hooke
2. User Data Services for Internet Based Spacecraft Applications: Joe Smith
3. CCSDS File Delivery Protocol (CFDP): Tim Ray
4. Internet Protocol Based Standards for Spacecraft Onboard Interfaces: Joe Smith
5. Standard Spacecraft Interfaces and IP Network Architectures: Jane Marquart 
6. Standard Transport and Network Capabilities: Bob Durst
7. Next Generation Space Internet: Standards and Implementation: Keith Scott
8. Secure Space Networking: Howie Weiss
9. Delay Tolerant Networking: Scott Burleigh
10. CCSDS Link Layer Protocol Suite: Greg Kazz