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Session D (08:30 – 12:00):

Standards Development Activities –

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

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- History and rationale
- An overview of the protocol suite
- Next steps

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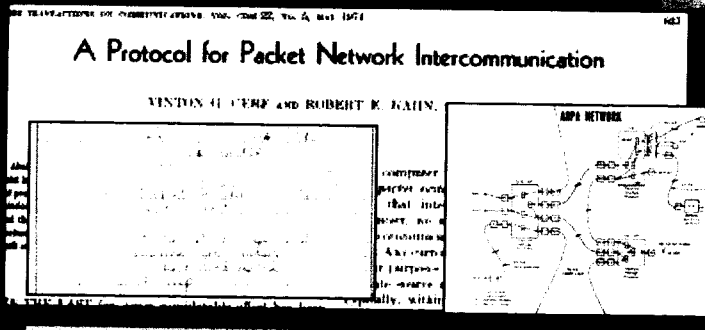
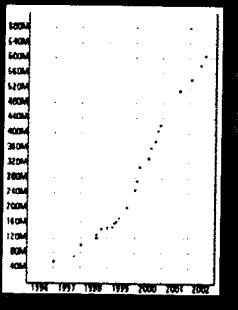
NASA Telemetry Standardization

NASA/ESA Working Group

Consultative Committee for Space Data Systems (CCSDS)

CCSDS Space Link





InterPlaNetary Internet (IPN)

Evolution of the terrestrial Internet

ajh4
04 June 2003

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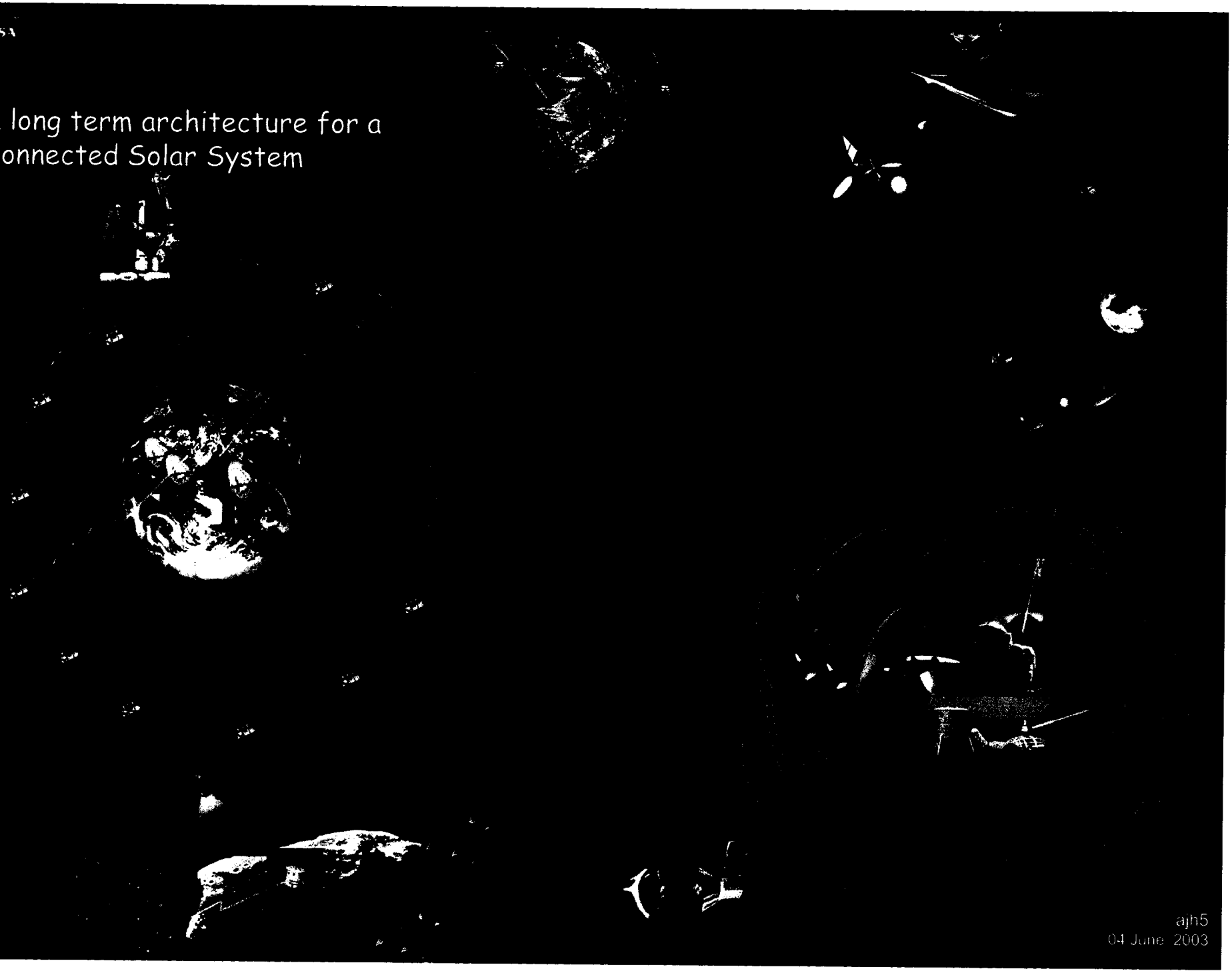
a long term architecture for a connected Solar System



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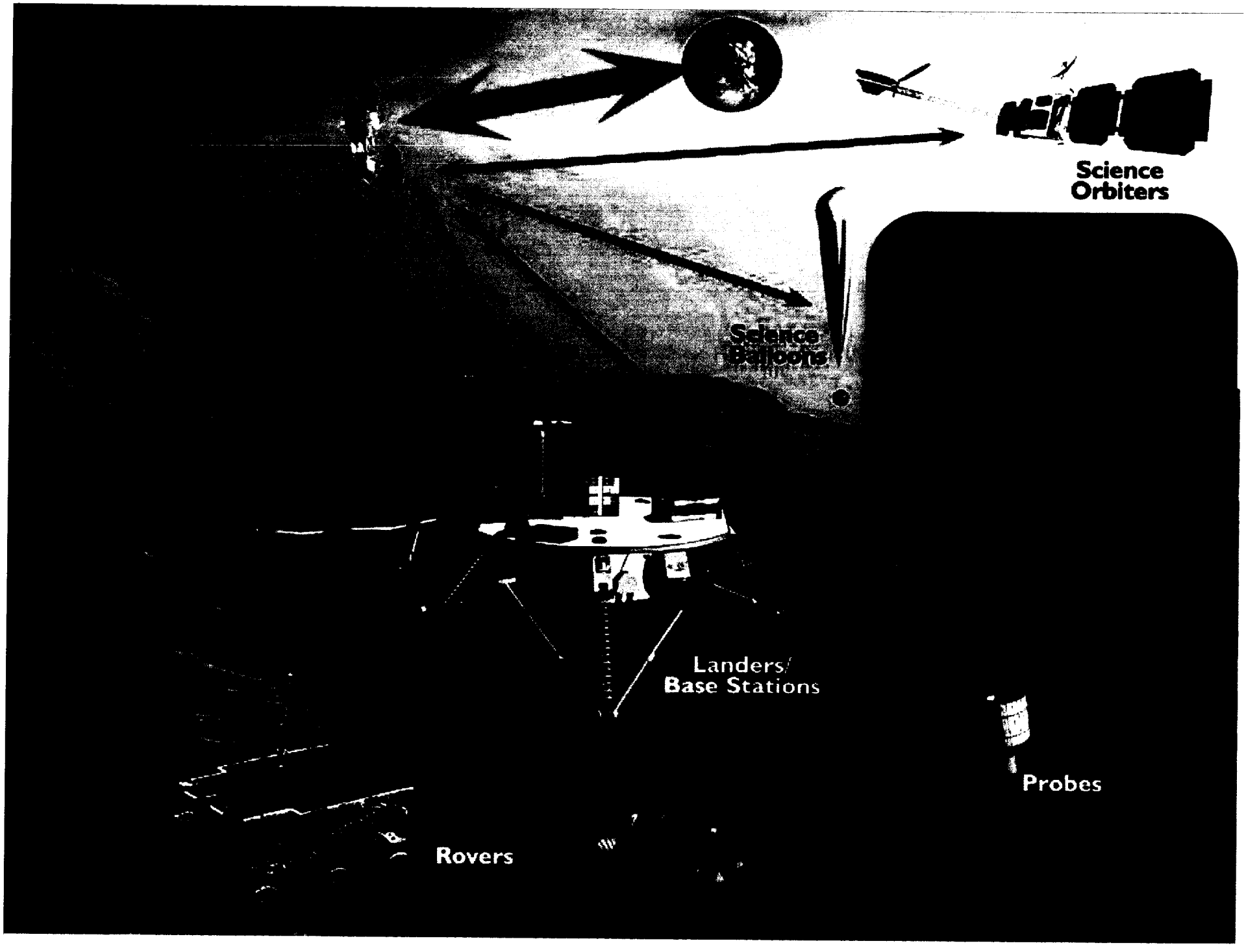
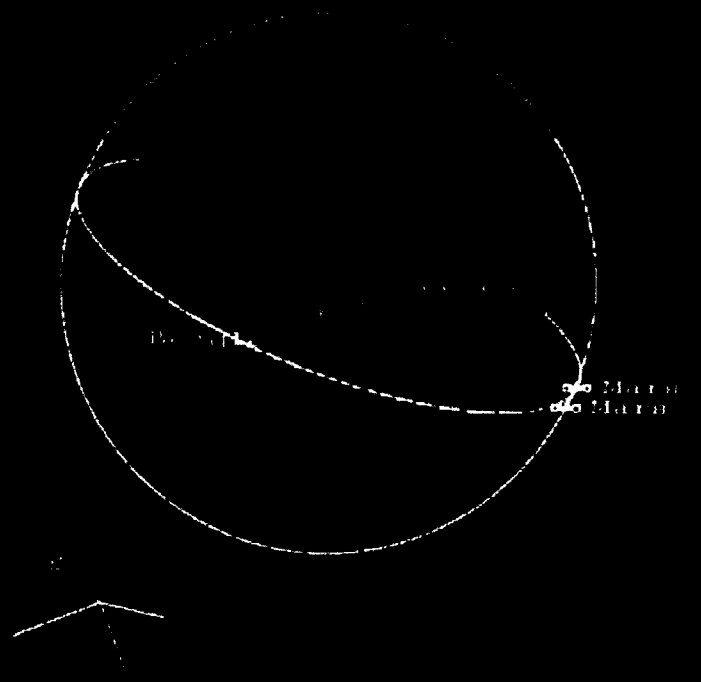
04 June 2003

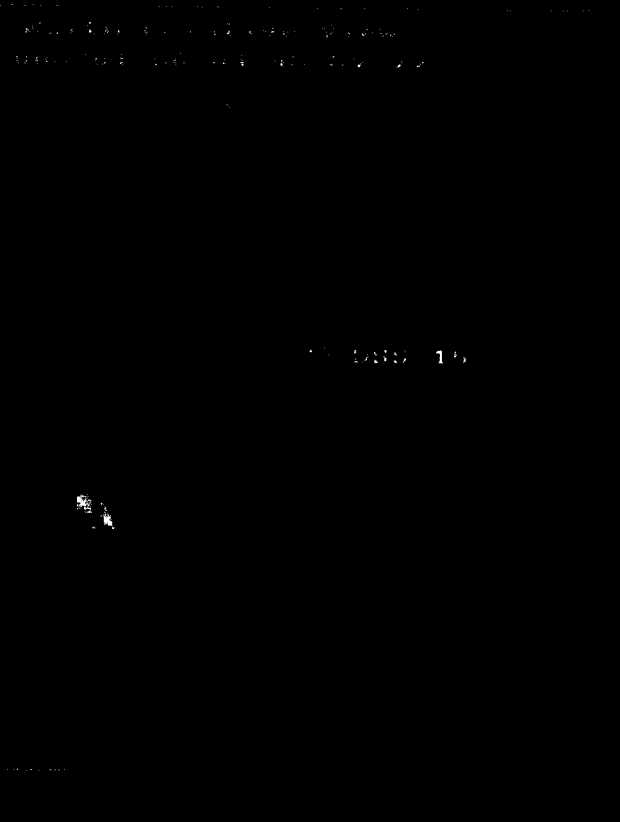

Science Orbiters
Science Balloons
Landers/
Base Stations
Probes
Rovers

NASA

The Internet is a connected, chatty based on a wired backbone with negligible delay and errors (with untethered "edges" emerging)

The InterPlaNetary Internet is a often disconnected, store-and forward based on a wireless backbone with huge delays and error prone links

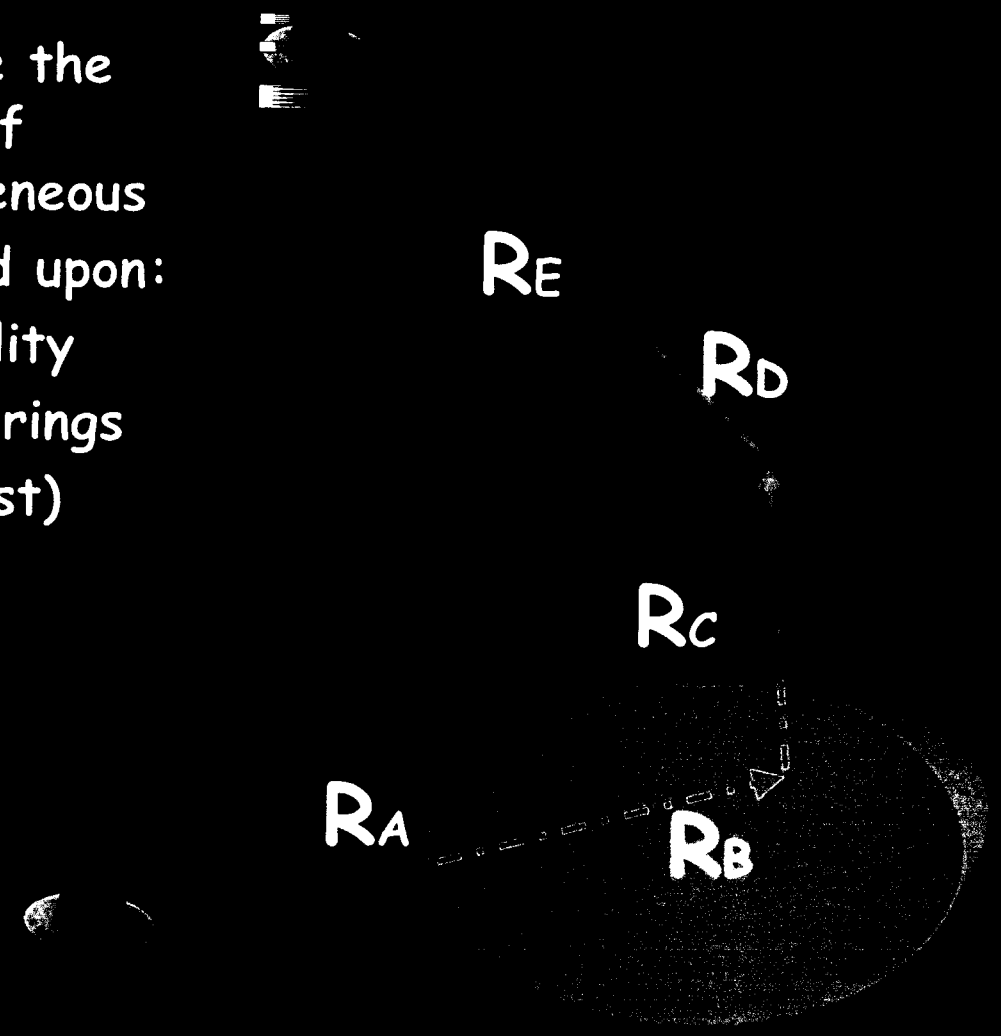




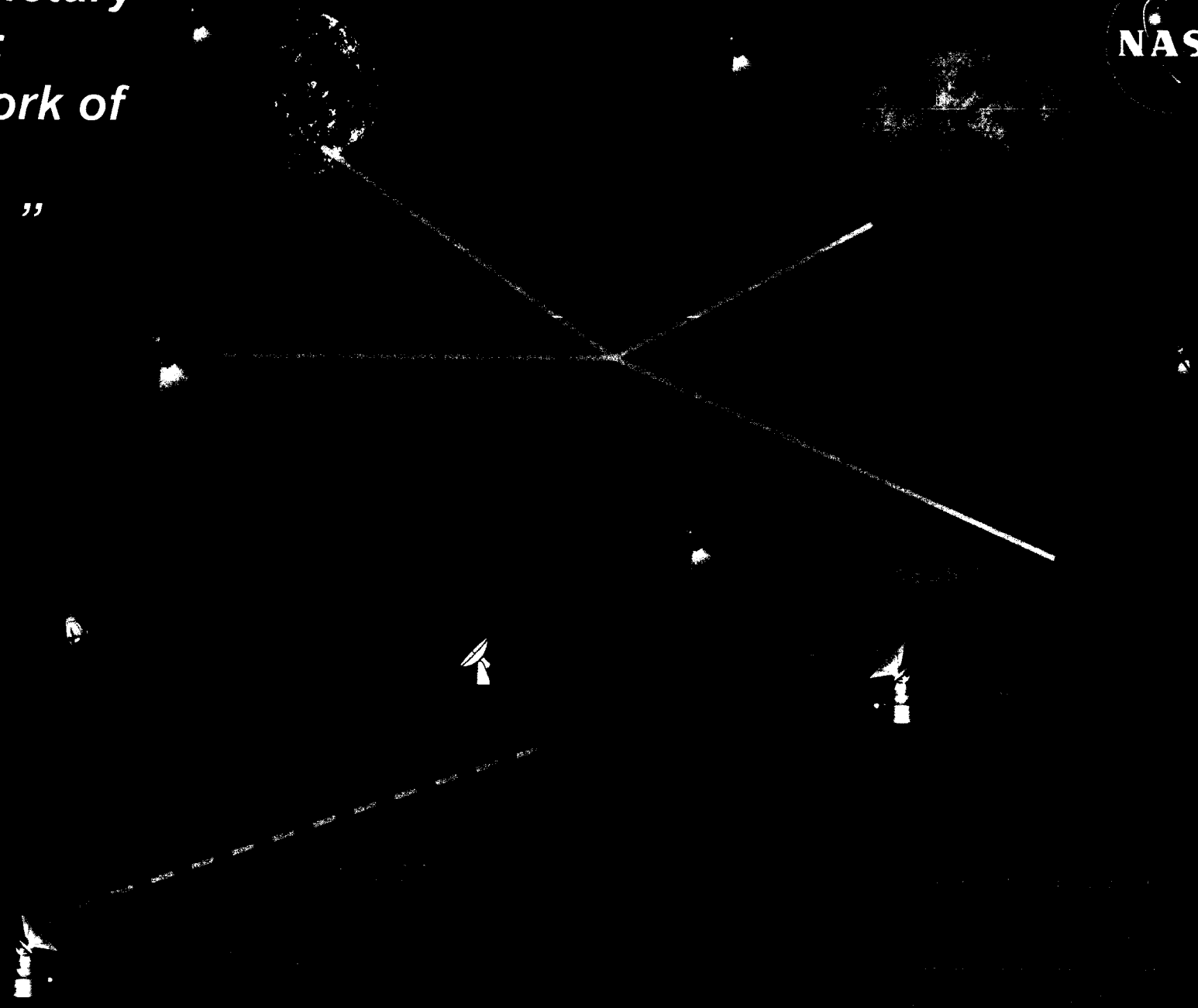
The Interplanetary Internet

an overlay network for interconnection of

- A is an area where the relevant characteristics of communication are homogeneous are defined based upon:
  - Communications capability
  - Quality of Service Peerings
  - Security (levels of trust)
  - Degree of resource management
  - Etc.
- Traversal of two or more will affect the nature of communications



Interplanetary Internet: a "network of "



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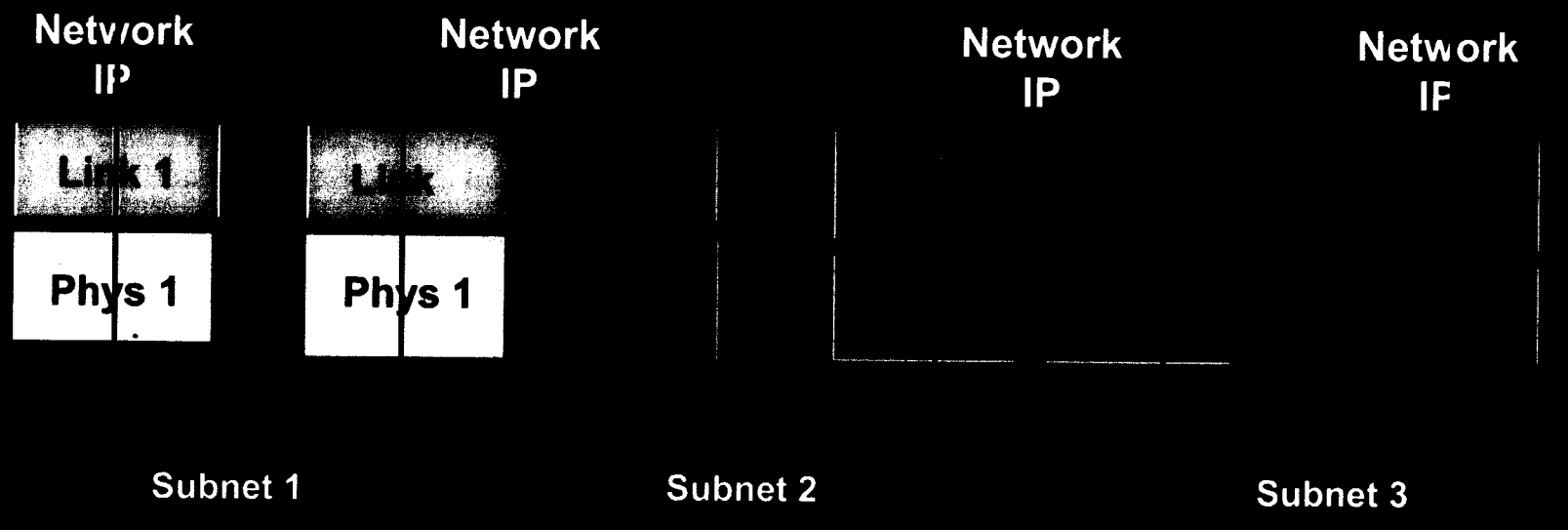
The Internet: a Network of Connected Sub-Networks



Bundles: a Store and Forward Application Overlay

Internet a

Internet b

New protocol development

Transport a

Transport a

Network a

Network a

Network a

Network b

Network b

Link 1

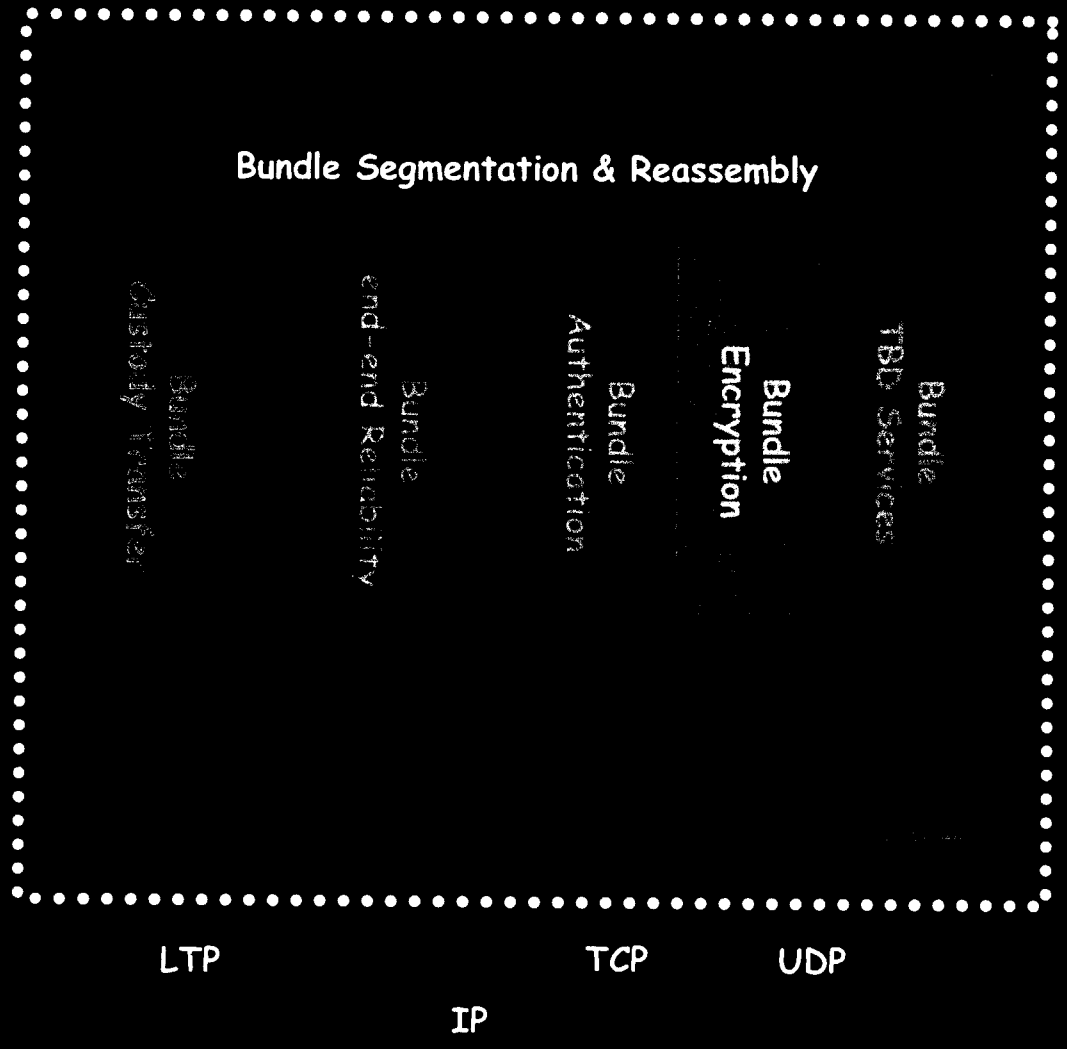
Link 1

Phys 1

Phys 1

NASA

"Bundles"



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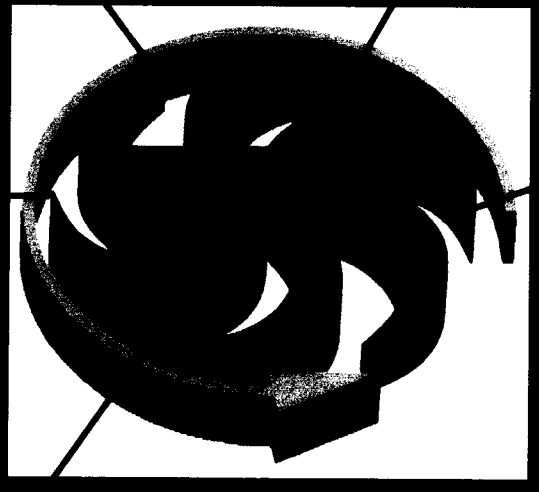
- "Non-chatty" message-oriented communications
- Store-and-forward between nodes
- Routing algorithms cognizant of scheduled connectivity
- Use transport and network technologies appropriate to the environment
- Integral infrastructure protection



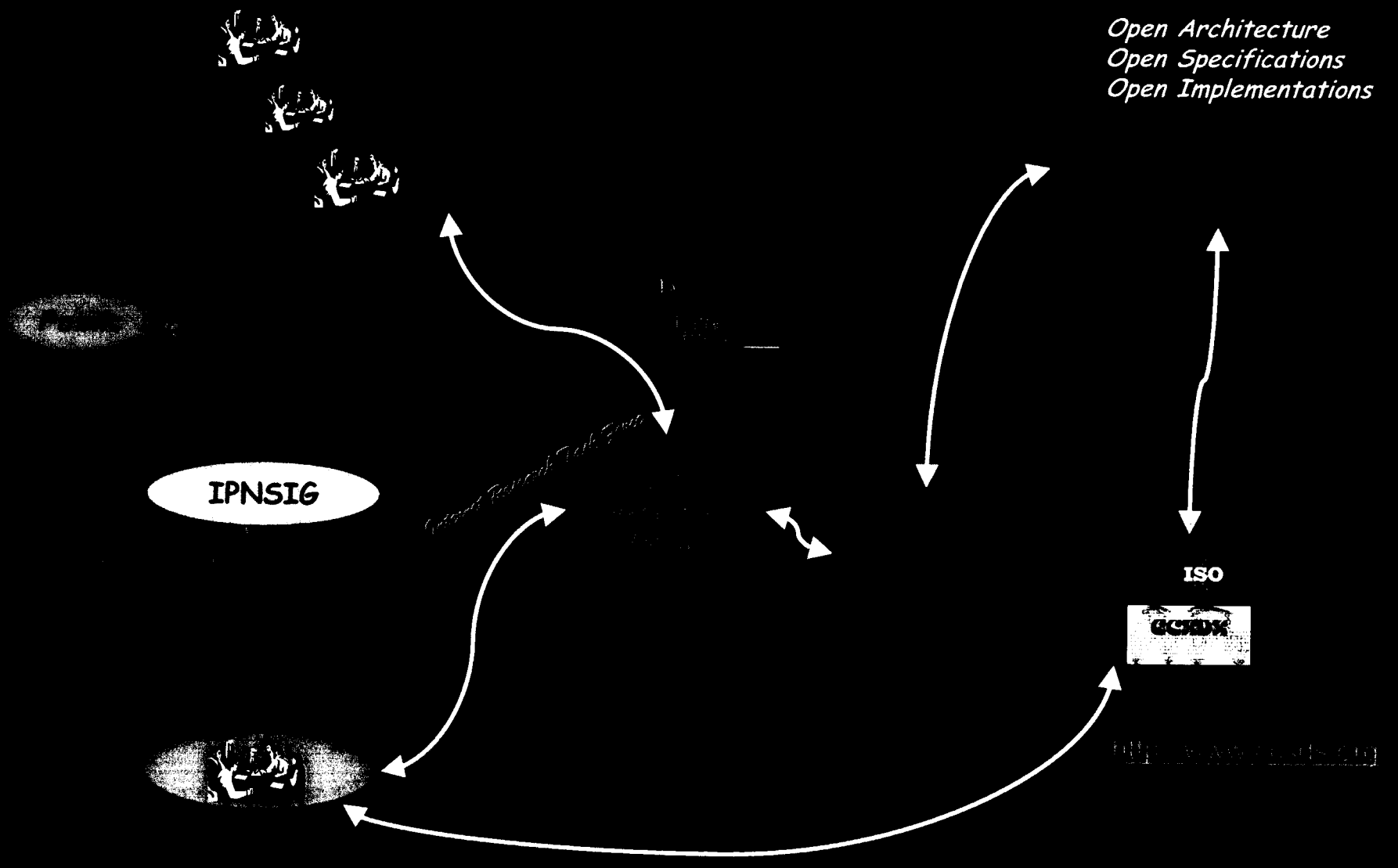
http://www.dtnrg.org

dtn-interest@mailman.dtnrg.org

Broader applicability
Nearer term utility
Larger research community

Delay Tolerant Networking:

Open Architecture
Open Specifications
Open Implementations



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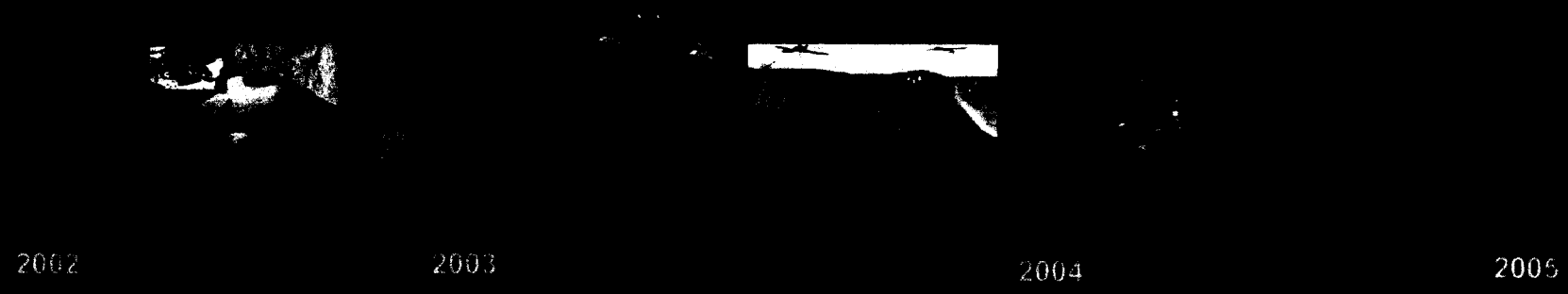


DTN Research Group:

Delay Tolerant Networking

DTN Core Engineering

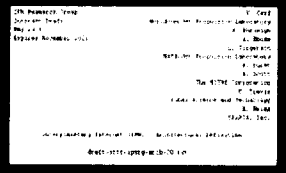
- DTN Architecture
- DTN Design Documents

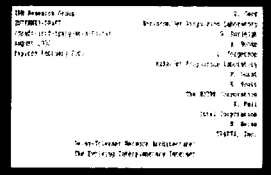
DTN Open Source

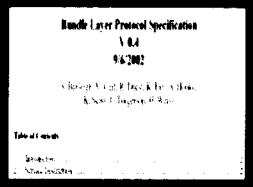
- Reference Software
- Configuration Control

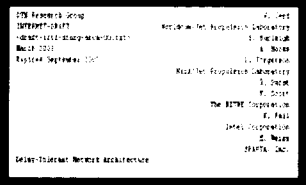
DTN Standardization

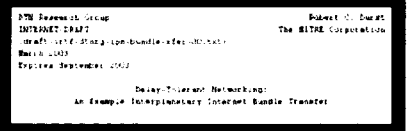
- International Standards

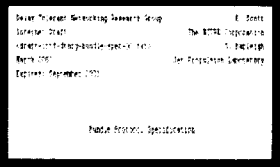




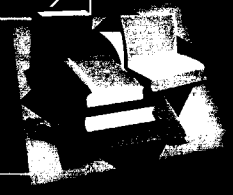






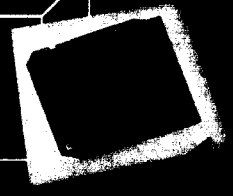


Bundle Specification

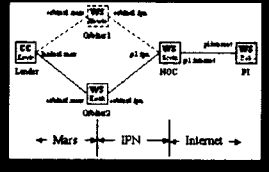


Specifications
+ Code base

Bundle Prototyping



1st Rough Cut
August 2000



2nd Proto Code
May 2002

3rd Proto Code
July 2002

4th Proto Code
Sept 2002

5th Proto Code
Nov 2002

Open Source
Release1 Code
March 2003

http://www.dtnrg.org

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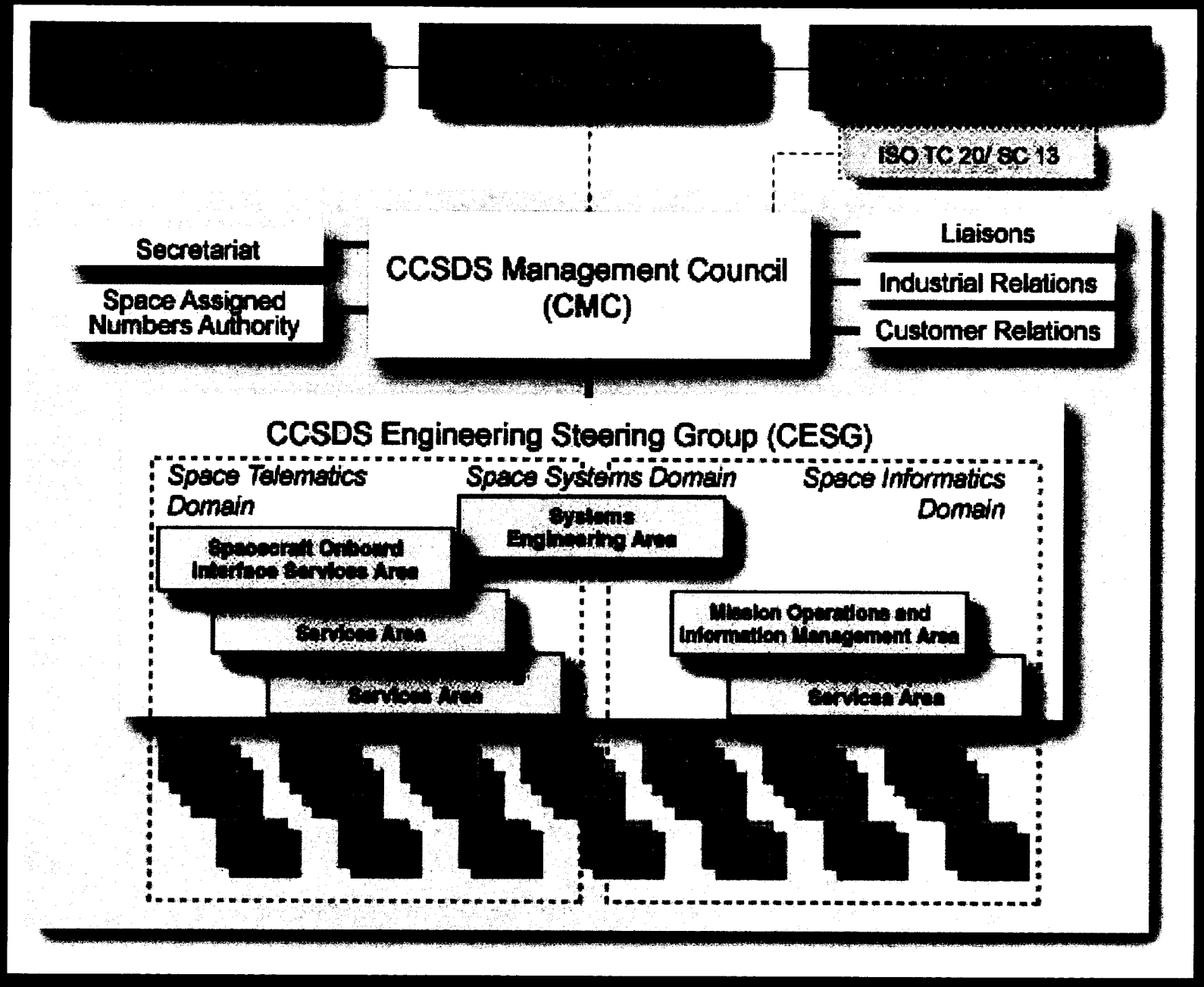
04 June, 2003


ISO TC 20/ SC 13
Secretariat
Space Assigned Numbers Authority
CCSDS Management Council (CMC)
Liaisons
Industrial Relations
Customer Relations
CCSDS Engineering Steering Group (CESG)
Space Telematics Domain
Space Systems Domain
Space Informatics Domain
Systems Engineering Area
Spacecraft Onboard Interface Services Area
Services Area
Services Area
Mission Operations and Information Management Area
Services Area

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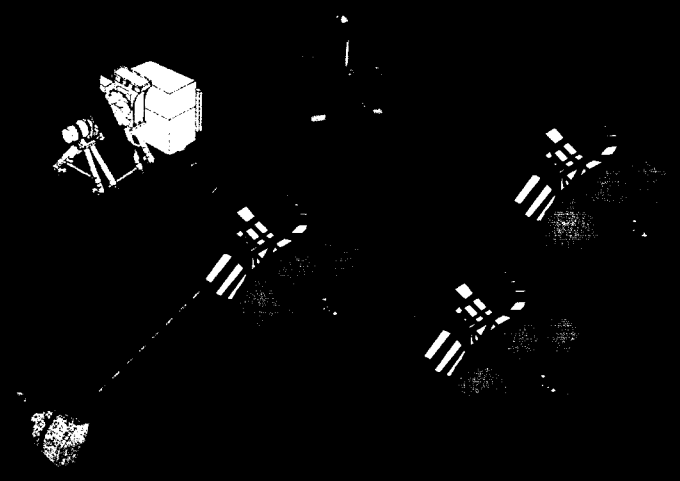
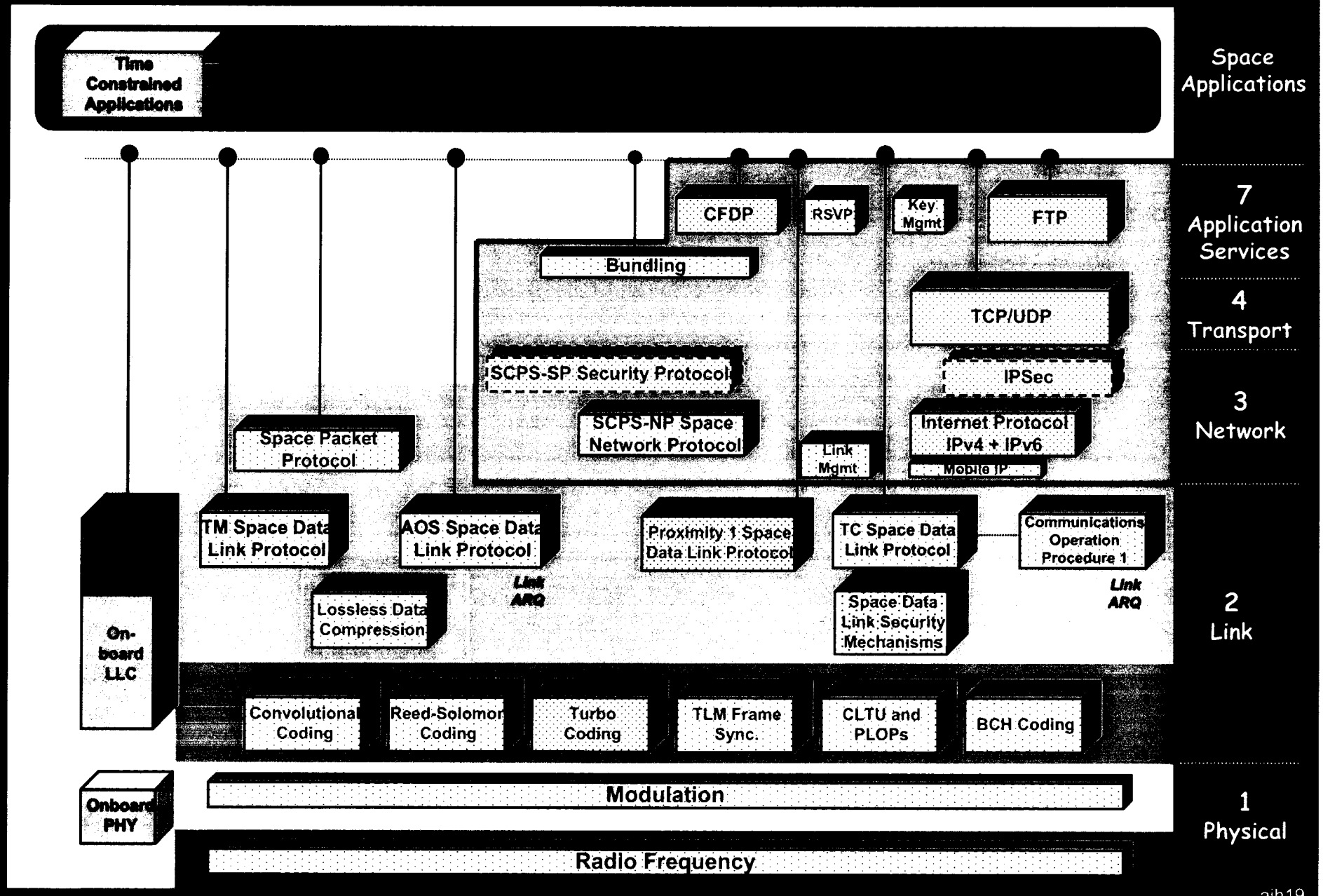


Commodity
Communications &
Navigation
Systems

International Space Data Standardization Thrusts

ajh18
04 June, 2003

Current CCSDS Space Internet Protocol Stack



ajh19
04 June, 2003

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