

Inside this Issue

Welcome 1

In the Spotlight -
SM&C WG 1

The Atlanta Report 2

Member Focus:
Dick Carper Makes a
Quiet Exit 3

News Flash! 6

Newsmakers - CCSDS
Missions 8

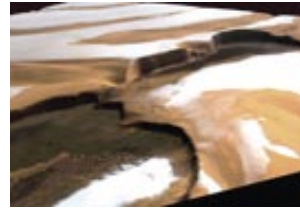
The Document
Update 9

The Calendar - *Save the
Date for Rome!* 10

Welcome to the CCSDS LINK

Welcome to the premier edition of the CCSDS Link, the official newsletter of the Consultative Committee for Space Data Systems.

The Link is a periodic "snapshot" of CCSDS activity produced especially for CCSDS participants and those interested in CCSDS standards development. Future editions of The Link will provide general document updates, highlight the ongoing efforts of our working groups, make relevant announcements, and discuss general topics of interest to the CCSDS community.



Snow on Mars (NASA/ESA)

Within the coming months, we will also unveil the first edition of The CCSDS Network, CCSDS' new journal. The Network will include high-level reports from the Areas, as well as detailed articles on technical topics and mission utilization from within CCSDS.

Please feel free to share your content ideas with us and to make written contributions to future editions of The Link and The Network. While we hope you find this first edition of The Link useful and informative, only with your input going forward will these new publications become the valuable information tools we envision them to be.

Thank you for taking a look at the new CCSDS Link and for your interest in CCSDS.

We wish you a Happy New Year!

Flight controllers monitor SMART-1 (ESA)



(e.g., scientific or educational institutions). The approach's advantages are many, including cross-agency interoperability and increased intra-agency efficiency. Perhaps as important to mission managers, standardized SM&C services will allow them to realize significant mission cost-savings: Users are able to seamlessly transfer data across systems and adopt commercial-off-the-shelf monitor and control applications, saving both time and money in the areas of flight component and ground segment development.

The WG has produced three proposed standards that constitute the foundation of the SM&C approach: the "SM&C Protocol," the "SM&C Common Services" and the "SM&C Core Services". The WG considers these documents a high priority and has put them up for an informal agency review with the goal of building early consensus on the approach.

The SM&C WG also has been tasked with the review of the Object Management Group (OMG) XML Telemetry and Telecommand Exchange (XTCE) with a

final goal of adopting XTCE as a CCSDS Recommended Standard. The work is on-going and the second CCSDS Agency Review of XTCE will take place in the near future. In the meantime, the WG has created a splinter group that is currently producing an XTCE Green Book and an XTCE Magenta Book. This XTCE Magenta Book, a CCSDS Recommended Practice, is meant to tailor OMG XTCE for CCSDS-enabled missions.

If you would like more information about the SM&C WG, please visit their Collaborative Work Environment (CWE) at CCSDS.org or click here. For information on any ongoing or upcoming reviews, please contact Dr. Merri at mario.merri@esa.int.

In the Spotlight

MOIMS Spacecraft Monitor and Control WG

Agency interest in MOIMS' Spacecraft Monitor & Control Working Group (SM&C) has always been great, but if head counts from Atlanta are any indicator, interest in the group may have reached record levels during the Fall meetings. With more than 20 participants per session, the group was able to use its bi-annual face-to-face time to make large strides towards standardizing a service-oriented approach to spacecraft monitor and control.

The innovative SM&C approach allows an agency to make up a large part of their ground system by combining "plug in" monitor and control components, even those made available by other contributing organizations

The Atlanta Report - Fall '05

Twice a year, the working groups that form the technical arm of CCSDS meet in a centralized location for a week long series of face-to-face work meetings. Although sometimes referred to as the frontlines of the organization, the CCSDS working group meetings are where cultural and political differences are set aside, so that the mission of the organization, the development of space communications standards, is accomplished.

This fall, the working groups met in Atlanta but as always, the collaborative environments that emerged during the week allowed participants to exchange information regarding space communications standards on a global scale. Adding to a productive week of information exchange, CCSDS co-located its meetings with the Object Management Group (OMG). Members of the two organizations met in both individual and combined working groups with a shared goal of advancing space domain standards.

The following reports were filed by the directors of CCSDS' six technical areas following the meeting week in Atlanta.

SYSTEMS ENGINEERING AREA (SEA) Submitted by Area Director, Peter Shames (NASA JPL)

Within CCSDS, the System Engineering Area (SEA) is responsible for describing the overall architecture for space mission communications, operations, and cross-support. In order to do this, the Area coordinates and collaborates with other Areas on architectural choices and options, then creates the cross-area Working Groups (WGs) and Birds of a Feather (BoFs) required to advance the work of CCSDS.

The SEA consists of the System Architecture, Information Architecture, and Security WGs; the



LandSat 5 image of Atlanta (NASA)

Space Assigned Numbers Authority (SANA) BoF and the Space Ground Interoperability Architecture (SGIA) BoF; and a Special Interest Group (SIG) that has just started to develop XML Standards & Guidelines (XSG).

This fall in Atlanta, the System Architecture WG continued the development of a high level system reference model, and the formal methodology and tools for describing space data system architectures. The Reference Architecture for Space Data Systems (RASDS) Magenta Book (Recommended Practice) is being finalized and has already been used successfully on a few different mission and instrument architectures.

The Information Architecture WG has developed a companion high level Information Architecture reference model and definitions of active and passive information objects. This Reference Architecture for Space Information Management (RASIM), which aligns well with current trends in distributed information systems, is also being finalized and discussions are underway on how to begin work to define component interfaces and standards.

The Security WG developed a security overview and threat assessment, and is now developing a security architecture, framework and related standards (Key management, Crypto and Authentication Standards). The members of this WG have been collaborating with other WGs as needed.

The Space Assigned Numbers Authority (SANA) BoF produced a draft charter and a draft set of detailed requirements. The goal of the group is

to provide a general service, similar to the Internet Assigned Numbers Authority (IANA), for managing and providing access to a variety of CCSDS assigned numbers.

In response to a request from the Interagency Operations Advisory Group (IOAG), the SEA initiated the creation of a Space Ground Interoperability Architecture (SGIA) BoF. The goal of this group is to develop an end to end space / ground cross support architecture and services catalog.

In recognition of the emergence of several CCSDS XML based standards, the SEA has initiated an XML Standards & Guidelines (XSG) SIG to develop guidelines and standard approaches for XML schema and namespaces. Members include developers of the current XML schema and other experts in the use of this technology. Initial results are expected in early CY 06.

MISSION OPERATIONS AND INFORMATION MANAGEMENT SERVICES AREA (MOIMS)

Submitted by Area Director, Nestor Peccia (ESA)

The MOIMS Area includes all of the flight execution phase applications required to operate the spacecraft mission and its ground system in response to mission objectives, and associated detailed information management standards and processes. The MOIMS Area is currently made up of the following four working groups: Data Archive Ingestion (DAI); Navigation (NAV); Information Packaging & Registries (IPR); and Spacecraft Monitor & Control (SM&C). The DAI and IPR WGs held meetings in December after the main CCSDS fall meetings, but the NAV and SM&C WGs were able to meet with the rest of the organization in Atlanta.

The NAV WG submitted resolutions to the CESG/CMC requesting approval for the initial Red Book releases of the Tracking Data Message (TDM), the Attitude Data Messages (ADM) and the XML Specification (NDM/XML)

Member Focus - Dick Carper Makes A Quiet Exit



Dick Carper at the NASA Software of the Year Awards, 2005

Dick Carper officially retired last September after the working group meetings in Atlanta. With a half-century in aerospace, one may have expected him to make a big deal of his retirement, but it was so low-key that many were unaware that he had even decided to do it.

While Dick's low-key exit may have reflected the unassuming nature of the man, it certainly did not reflect the large impact that he had while at CCSDS. One of the original pathfinders for CCSDS through the then uncharted world of space communications standardization, Dick helped influence the international use and acceptance of CCSDS standards.

Dick Carper started his career in aerospace in the U.S. Army in 1953, essentially at the dawn of spaceflight history. While in the Army, Carper worked on the Corporal Missile System, the U.S.'s first guided ballistic missile, and later became an instructor on radar guidance, doppler radio, analog computers, and telemetry systems.

After an honorable discharge in 1956, Dick went to work on the RCA Missile Test Project, Cape Canaveral, as a Ship's Instrumentation Manager on tracking, telemetry and re-entry vehicle recovery ships in the central and south Atlantic. His responsibilities included the management of the telemetry operation and maintenance team, as well as the diving team assigned for re-entry vehicle recovery. His efforts supporting the Thor, Jupiter,

Atlas, and Snark flight test programs would help land him a gig at NASA's Goddard Space Flight Center (GSFC) in 1960, a gig that would last the next 33 years.

At GSFC, Carper's first assignment was processing data from Vanguard III, which he described as being an almost manual process. Over the next three decades, he would be involved in more than 20 spacecraft projects, including the Orbiting Geophysical Observatory series, the Orbiting Astronomical Observatory series, the Advanced Technology Satellite series, the Geosynchronous Orbiting Environment Satellite series, the Hubble Space Telescope, and the Compton Gamma Ray Observatory - the first CCSDS-enabled mission.

Dick joined CCSDS in 1984 and remained active until his recent retirement. His involvement in the organization led to the development of the Recommendation for Packet Telemetry, the Recommendation for Advanced Orbiting Systems, and the Recommendation for the CCSDS File Delivery Protocol (CFDP).



*Dick Carper,
U.S. Army,
1953.*

In the late 1980s, Dick was assigned to NASA HQ and was instrumental in the adoption of CCSDS Recommendations by the Space Station Freedom Program and the International Partners of the Program. Once back at GSFC, Dick developed a testbed for the validation and further development of space/ground communications

protocols and managed the testbed until he left NASA in 1993.

After leaving NASA, Dick became a consultant and continued to work on the development of space communications protocols and served as Chair of the CCSDS Working Group on CFDP Interoperability Testing until his retirement. In 2003, Dick, a pathfinder for CCSDS for more than 20 years, became the first recipient of the International Telemetry Conference's Telemetry Pathfinder Award.

Now, if you think for a second that Dick is quietly riding off into the sunset, think again. When The Link recently asked him how he planned to spend his retirement, he suggested that "second childhood" might be a better description and listed kayaking, model railroading, working as a test pilot and designer on the X-Plane flight simulator, and getting through a bookshelf full of books from Tacitus to Tony Hillerman as high on his list of priorities.

Dick, your friends at CCSDS wish you the best of luck in pursuit of your second childhood. And if you put down your kayak paddles long enough to work through some of those books on your bookshelf, you might run across the Tacitus quote, "Greater things are believed of those who are absent." In your case, don't believe him. We think you are great now, but we thought you were pretty great while you were with us, as well.

Your dedication to space communications standardization helped make CCSDS the internationally recognized standards development organization it is today.

Thank you.



The Atlanta Report - Fall '05

Continued from Page 2 ...

documents for official CCSDS review. The review will start upon completion of the CESG/CMC approval process.

In addition, the Interagency Operations Advisory Group (IOAG) made a high priority request of CCSDS to develop of the Navigation TDM standard.

The current work of the SM&C WG is highlighted above in the "In the Spotlight" column of this issue of The Link.

CROSS SUPPORT SERVICES AREA (CSS)

Submitted by Area Director, Gerard Lapaian (CNES)

The CSS Area concerns the extension of the space link on the ground between the ground station and the Mission Data Operation Service. At this time, area activity is focused on the production of the Service Management specification and the production of the Data Transfer Service Toolkit White Book.

The Service Management Specification document has been reviewed for the last time and is ready to be proposed to the CESG for international review as a CCSDS Red Book. Most delicate will be commencement of the prototype realization, which will be detailed and decided at a plenary regarding advancing agency review of the Service Management book to be scheduled during the CCSDS Spring 2006 meetings in Rome.

In Atlanta, another important step was made regarding the Data Transfer Service Toolkit when a unanimous agreement was reached on the main component of the toolkit and on the books' production tree. Five white books are now on track to be produced in 2006: Guidelines, Common Principles, Association Control, Generic Procedures, and Operations.

SPACECRAFT ONBOARD INTERFACE SERVICES AREA (SOIS)

Submitted by Area Director, Patrick Plancke (ESA/ESTEC)

The primary objective of the SOIS Area is to radically improve the spacecraft flight segment data systems design and development process by defining generic services that will simplify the way flight software interacts with flight hardware and by permitting interoperability and reusability both for the benefit of Agencies and Industry.

The bi-annual meeting of CCSDS participants in Atlanta was very productive for the SOIS Area. All SOIS working groups, including the Plug and Play and Wireless S/C Interfaces BOFs, met during the working session week.

The Time Critical Onboard Applications Services (TCOAS) working group made significant progress and released two draft red books (Time Access Service and Time Distribution Service) that will be proposed for Agency review before the end of the year.

The Time Critical Onboard Networking (TCONS) and the Onboard Bus and LAN (OBL) working groups also progressed, putting into practice the discussion and reviews to come out of the CCSDS Spring meetings in Athens. The working groups are now close to the releasing draft documents, including the long awaited S/C Intranetwork Service.

Despite the absence of some key members, the Plug and Play BOF was able to meet and define a strategy for pressing forward to the next CCSDS meetings in spring 2006. The Wireless S/C Interfaces BOF was able to make significant progress during its working sessions, producing a draft charter and a position paper which considers manpower and resources issues to justify a future working group.g group.

As a result of the meetings in Atlanta, the following month in Washington, D.C., SOIS presented a workshop that clarified the relationship between the SOIS and SIS areas. Since the workshop was so well received, similar workshops may be organized at ESA/ESTEC in early 2006.

Also last fall, ESTEC hosted a Space

Data System and Software workshop that brought together ESA and European space industry representatives, and also including participation by CNES and JAXA. Industry member Alcatel (Alenia Space-I) presented an early prototyping of SOIS architecture, the result of a three year effort, based initially on the SOIF draft recommendations that clearly show the advantages of this approach.pproach.pproach.

During the Data System Interface session of the ESTEC workshop, EADS-Astrium presented a paper regarding their interest in standardization and especially in SOIS. The paper demonstrates the interest of Industry in SOIS activity but also requests the availability of this standard in the very near future. They also indicated a willingness to collaborate on this effort. The paper creates some healthy pressure on the Area and might result in an important, productive partnership for SOIS.

SPACE LINK SERVICES AREA (SLS)

Submitted by Area Director, Jean-Luc Gerner (ESA/ESTEC)

The SLS Area is responsible for developing efficient space link communications systems common to all participating agencies. It concentrates on layers 1 & 2 (of OSI protocol stack), namely the following: RF & modulation, channel coding and data link layer, for both long-haul (e.g.: spacecraft to ground) and proximity links (e.g.: orbiter to lander). Two additional functions are also covered by the SLS area: data compression for end to end data transfer optimization, and ranging for accurate orbit determination.

The Area is composed of specialized working groups whose shared objective is to develop specific Recommendations. One Recommendation will typically cover one OSI layer or sub-layer. This layering

Continued on next page ...

The Atlanta Report - Fall '05

Continued from Page 4 ...

of Recommendations maximizes flexibility and interoperability with other commercial protocols (e.g., TCP/IP).

In Atlanta, the Data Compression working group finalized its recommendation for image compression which provides a very good compromise between compression performance and implementation complexity for spaceborne applications. Soon, an open source simulation software together with an implementers guide (or CCSDS Green Book) will be made publicly available so that mission planners can evaluate the CCSDS image compression engine using their own data.

A new working group was chartered to develop (or augment) recommendations to cover high rate uplink scenarios typical of next generation lunar and planetary exploration missions. Uplink data rates from 1 to 10 Mbps for both automatic and man-tended missions will be targeted. Backward compatibility with the current CCSDS telecommand recommendations will be taken as a constraint in the design of the new protocols.

In the area of channel coding, two families of codes are being studied for potential future insertion into the CCSDS recommended channel coding schemes: Low Density Parity Check Codes (LDPC) for high rate TM links with stringent bandwidth efficiency requirements, and Long Erasure Codes (LEC) for end to end packet data transfer protection.

In the field of data link layer, an encapsulation service is being finalized which will enable the transfer over CCSDS spacelinks of any type of packetized protocol data units including those of the internet protocol suite (e.g. IP v6). A Recommended Practice Book (so-called Magenta Book) will be

developed to document the interface between IP protocol and CCSDS link layer protocols, IP protocol being a more attractive solution for end to end data transfer across one or more spacelinks.

SPACE INTERNETWORKING SERVICES AREA (SIS)

Submitted by Area Director, Robert Durst (MITRE)

As spacecraft become more complex onboard and as interactions with peer spacecraft and with the ground become more complex, designers will become compelled to consider the use of networking technologies to support those interactions. The SIS Area provides services and protocols to address networked interactions of many forms: between spacecraft and earth-based resources; among spacecraft; between spacecraft and landed elements; and within heterogeneous spacecraft.

The SIS Area deals with communication services and protocols that are independent of specific link technology (as a lower layer bound) and independent of application-specific semantics (as an upper bound). This covers essentially the network through application layers of the OSI reference model. The SIS Area accommodates all ranges of delay, interactivity, and directionality, although not all protocols are appropriate for all environments.

Two Space Internetworking Services (SIS) Area Working Groups and one SIS Area Birds-of-a-Feather (BOF) Group met at the recent CCSDS meetings in Atlanta: the Cislunar Space Internetworking (CSI) Working Group, the Asynchronous Messaging Services (AMS), and the IP-over-CCSDS Birds-of-a-Feather group. One working group, the CFDP Interoperability Testing Working Group, met at JPL just before the Atlanta meetings.

The CSI group discussed, reviewed, and revised their forthcoming Green

Book (target date for completion of the document: December 2005), and discussed details for a follow-on CCSDS Red Book covering IP Infrastructure for Cislunar missions. They met jointly with the High-rate Uplink Services BOF (sponsored by the Space Link Services Area) to discuss implications of these links and CDMA coding on the Cislunar architecture.

The AMS group is newly-formed, and met jointly with the Spacecraft Monitor and Control (SM&C) Working Group of the MOIMS area to discuss how AMS can support SM&C activity and to present a brief AMS demonstration. As part of that meeting, a number of enhancements to the proposed protocol were agreed upon, and the AMS WG will factor these into its document development.

The IP-over-CCSDS BOF met to determine if there was sufficient interest in forming a working group, and to discuss the proposed charter and program of work for that group. The group determined that there was sufficient interest to go forward with a working group charter proposal to consolidate and fully document the CCSDS-recommended ways of carrying IP traffic over CCSDS-defined space link protocols.

The CFDP Interoperability Testing Working Group convened at JPL prior to the Atlanta meeting to conduct interoperability tests. They have almost fully completed testing of the CFDP Extended Procedures, and are approximately 50% complete with the Store-and-Forward Overlay tests. They expect to complete interoperability tests by the end of the calendar year, and have, to date, identified two issues that will be addressed by CFDP specification changes.





Lift off for Ariane 5 with SMART-1 (ESA 2005)

CCSDS News *FLASH!*

The CCSDS News Flash! area of The Link will be a regular feature highlighting miscellaneous news items from the CCSDS Community. If you have news or an announcement for the Link, please contact Penelope Walz at ccsds.publicaffairs@gmail.com.

- CCSDS welcomes two new Member Agency representatives to the CCSDS Management Council:

Federal Space Agency
Mr. Gennadiy Dmitriev
Chief, Automated Space Complexes and Control Systems
Shepkina Str. 42 129857
Moscow, Russian Federation
<http://www.federalspace.ru/>

Japan Aerospace Exploration Agency
Mr. Junjiro Nakahara
Japan Aerospace Exploration Agency 2-1-1, Sengen
Tsukuba-city, Ibaraki, 305-8505 Japan
http://www.jaxa.jp/index_e.html

- CCSDS welcomes new Commercial Associate Member GMV Space Systems, Inc.:

GMV Space Systems, Inc.
Mr. Gonzalo Garcia - VP, Operations
1 Research Court, Suite 450
Rockville, MD 20850 USA
Phone: +1 301 216 3840
ggarcia@gmvspacesystems.com
Sponsor: NASA
Products: Hifly® Satellite Control System

- On December 19, 2005, Duncan Fortune (Melacom Operations Engineer, QinetiQ) reported another successful MER - Mars Express communication link: "AOS by Mars Express was achieved at 2005-12-17 00:19:08. During the subsequent 4min 38sec pass, 271,054 bytes of lander data were received. From the digital information available, the link margin would appear to be very good, as there were no errors detected or retransmissions required. The effective (average) data transfer rate was 7800bits per second. LOS was at 00:23:46. Congratulations to all involved on another successful demonstration of the nascent international, inter-planetary network."

- SCPS Reference Software is now available through Open Channel Foundation. Please visit OpenChannelSoftware.com for more information.

- In an effort to more closely coordinate the work of ISO Technical Committee 20, Subcommittee 14 (SC14) and SC13, Dr. Mario Merri (ESA/ESOC), chair of the CCSDS SM&C working group, participated in the most recent meeting of SC14, Working Group 3 (Operations and Ground Support) in Köln-Porz, 14-17 November.

Following the meeting, Dr. Merri reported that initial topics for future cooperation and coordination between the two organizations will be in the field of navigation and orbital information exchange.

"I find CCSDS participation in my working group very necessary and beneficial to the program and I encourage more direct interaction between these organizations," said Mr. Larry Schultz (NASA), chair of ISO/TC20/SC14/WG3. "Orbit Collision Avoidance is becoming an issue and we need to put in place mechanisms so that proper information can be exchanged in a timely and standardized manner."

- CCSDS Participants Earn Two NASA Software of the Year Awards

CCSDS participants credited with the development of CFDP and Proximity-1 were honored with the NASA Software of the Year "Group Achievement" Award on June 22, 2005.

NASA established the award in 1994 to recognize software that rated outstanding in the areas of usability, science and technological significance, impact on NASA's mission, and innovation, among other criteria.

Accepting the 2005 award on behalf of the CFDP team was Ed Greenberg (JPL) and accepting for the Proximity-1 team was Greg Kazz (JPL).

Continued from page 6 ...

Individual members of both teams are listed below.

CCSDS congratulates all of its participants whose dedication and hard work made winning this prestigious award possible.

CFDP

"For the creation of CCSDS File Delivery Protocol (CFDP) from its infancy in the DS1 CIUP and CIDP protocols to its blue book recommendation within CCSDS." -NASA Award Nomination for CFDP

Team Members:

Scott Burleigh
Ed Greenberg
Greg Kazz
Neal Kuo
John Rohr
Sandy Krasner
Tim Ray (GSFC)
Dick Carper
Adrian Hooke
Leigh Torgerson
Peter Shames

Proximity-1

"For design, development, implementation, and testing of the CCSDS Proximity-1 Space Link Protocol (Prox-1) for reliable and expedited data interchange to and from spacecraft operating in in-situ near Earth and other planetary environments.

In order to ensure future interoperability for telecommunications at Mars, the NASA Mars Program has required that all future missions to Mars will fly the Proximity-1 protocol including the Phoenix lander, Mars Reconnaissance Orbiter (MRO), Mars Science Laboratory (MSL) and Mars Telecom Orbiter (MTO)." -NASA Award Nomination for Prox-1

Team Members:

Ed Greenberg
Greg Kazz
Tim Ray (GSFC)
Lester Waugh (BNSC)
Matt Cosby (BNSC)
Gian Paolo Calzolari (ESA)
Andrea Barbieri
Dave M. Hansen
Gary Noreen

Ken Peters
Steve Allen
Dai Stanton (BNSC)
Arvydas Vaisnys
Neal Kuo
Doug Merz (CE)
Mark Dapore (CE)
Stan Butman

- Internet pioneers Vint Cerf and Bob Kahn have been awarded America's highest civilian honor. (10NOV05)

Excerpt of Q&A with Vint Cerf and Bob Kahn regarding White House honor:

Robert (Vienna, Virginia) asks Dr. Cerf:
Which current project are you most "passionate" about? Why?

Dr. Cerf:
The Interplanetary Internet Project at the Jet Propulsion Laboratory because it is as close as you can come to living a science fiction story.



Mars Express Orbiter, enabled by CCSDS.

CCSDS Newsmakers - MISSIONS

Missions enabled by CCSDS protocols now number into the hundreds. For more information about all CCSDS-enabled missions, please visit the Missions page at CCSDS.org.



Mars Rover enabled by CCSDS (NASA JPL)

[Final Countdown: New Horizons Spacecraft Due to Launch Tomorrow](#) (17JAN06)

[NASA's Comet Tale Draws to a Successful Close in Utah Desert](#) (Stardust) (15JAN06)

[Huygens Landing: One Year Later](#) (15JAN06)

[NASA Stardust Spacecraft Returns Comet Samples Safely to Earth](#) (15JAN06)

[NASA probe \[Stardust\] carrying comet dust to return to Earth](#) (11JAN06)

[Spitzer Reveals Unexpected Disks Around Interacting Stars](#) (10JAN06)

[NASA's Chandra Finds Black Holes Stirring Up Galaxies](#) (10JAN06)

[Hubble Space Telescope Shows There's More to the North Star than Meets the Eye](#) (09JAN06)

[ESA probes make prestigious Science top ten](#) (Huygens, Deep Impact, SMART-1 all mentioned) (04JAN06)

[Death-Defying Mars Rovers Keep Surprising Scientists - Spirit and Opportunity Have Long Outlived Their Expected 90-Day Life Spans](#) (03JAN06)

[Rovers Still Exploring Mars After 2 Years](#) (02JAN06)

[Deep Impact Mission Update - December 2005: How Do Comets Evolve?](#) (29DEC05)

[Europe's Newest Meteosat Launches on Solstice Night](#) (21DEC05)

[Mars discoveries lead Science's Top 10 list](#) (16DEC05)

[MESSENGER Engine Burn Puts Spacecraft on Track for Venus](#) (12DEC05)

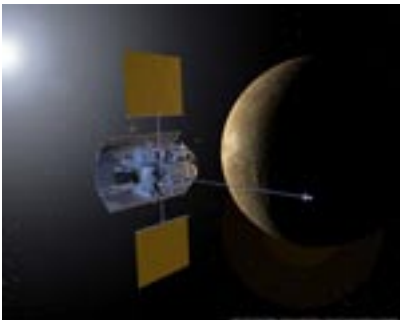
[Cassini Images Reveal Spectacular Evidence of an Active Moon](#) (06DEC05)

[A Giant Hubble Mosaic of the Crab Nebula](#) (01DEC05)

[Chandra Proves Black Hole Influence Is Far Reaching](#) (01DEC05)

The CCSDS Document Update

Below you will find the latest CCSDS document update. To see a complete list of all of our active publications, please visit the Publications area of CCSDS.org.



Messenger enabled by CFDP (NASA/JHU APL)

Space Link Identifiers. Recommendation for Space Data System Standards, CCSDS 135.0-B-2. Blue Book. Issue 2. Washington, D.C.: CCSDS, November 2005.

The CCSDS Recommended Standard for Space Link Identifiers documents the identifiers that are defined or reserved by CCSDS as part of the specification of the CCSDS space link protocols, and it shows how these identifiers are managed at the CCSDS level. The current issue adds Proximity-1 Port ID values.

Cross Support Reference Model Part 1: Space Link Extension Services. Recommendation for Space Data System Standards, CCSDS 910.4-B-2. Blue Book. Issue 2. Washington, D.C.: CCSDS, October 2005.

This Recommendation establishes a common framework and provides a common basis for the specification of data services that extend the space-to-ground communication services previously defined by CCSDS. It allows implementing organizations within each agency to proceed coherently with the development of compatible derived standards for the ground systems that are within their cognizance. The current issue updates terminology to be consistent with current CCSDS usage and adds new subsections on cross support security and the time span of SLE agreements and packages.

Radio Frequency and Modulation Systems Part 1: Earth Stations and Spacecraft. Recommendation for Space Data System Standards, CCSDS 401.0-B-15. Blue Book. Issue 15. Washington, D.C.: CCSDS, September 2005.

Numerous concise recommendations appear in the notebook volume bearing the number 401.0-B. Each recommendation is dated, and the date of the most recent revision is shown in the table of contents. These recommendations are developed for conventional near-Earth and deep-space missions having moderate communications requirements.

The current version includes all updates approved by the CCSDS Management Council through August 2005. The most recent release updates the following recommendations: 2.1.8B, 2.2.4, 2.2.6, 2.3.3A, 2.3.5, 2.4.2, 2.4.10, 2.4.14A, 2.4.14B, 2.4.15A, 2.4.15B, 2.4.16, 2.4.6, 2.4.7, 2.4.9, 2.5.6B, 3.1.1, 3.1.6B, 3.2.1A, 3.3.1, 3.3.2A, 3.6.2A, 4.1.5, 4.2.1, 4.2.2, 4.2.3. Terminology subsection 5.1 has also been updated with this release.

CCSDS File Delivery Protocol (CFDP). Recommendation for Space Data System Standards, CCSDS 727.0-B-3. Blue Book. Issue 3. Washington, D.C.: CCSDS, June 2005.

This Recommendation defines a protocol suitable for the transmission of files to and from spacecraft data storage and capable of operating in a wide variety of mission configurations. In addition to the purely file delivery related functions, the protocol includes file management services to allow control over the storage medium. Although the protocol can operate over a wide range of subnetwork services, this Recommendation assumes the use of existing CCSDS packet services. The current issue adds procedures for unacknowledged-mode handling of metadata and file data received after the arrival of the EOF PDU for the same transaction.

Mission Operations Services Concept. Report Concerning Space Data System Standards, CCSDS 520.0-G-1. Green Book. Issue 1. Washington, D.C.: CCSDS, May 2005.

This CCSDS Report presents a set of concepts, reference architecture, and service framework for spacecraft monitoring and control.



Rome/Vatican City taken by Quickbird (2004)

This spring the CCSDS bi-annual technical meetings will take place in Rome, Italy, the week immediately preceding SpaceOps 2006. We hope to see you at both of these worthwhile events.

June 12 – 16, 2006

Spring 2006 CCSDS Technical Meetings

Hosted by ASI, the Spring 2006 CCSDS Technical Meetings will take place in Rome from 12-16 June, the week before SpaceOps 2006, at the following meeting site:

ISA (Istituto Superiore Antincendi)

Via del Commercio 13

00154 Roma ITALY

For all of the latest CCSDS meeting information, please visit the Meetings area of CCSDS.org.

Other Events of Interest

March 4-11, 2006

- 2006 IEEE Aerospace Conference

Big Sky, Montana (USA)

Contact: R. Profet

Tel: +1 310 545 9670

Fax: +1 310 545 7821

E-mail: rprofet@gte.net

<http://www.aeroconf.org>

March 28-30, 2006

- Ground System Architectures Workshop - GSAW'06

Preworkshop Tutorials - March 27, 2006

Manhattan Beach Marriott

Manhattan Beach, California (USA)

April 24 - 25, 2006

- Inside Aerospace . . . An International Perspective

Hosted by the AIAA & the Space Foundation

Renaissance Washington Hotel, Washington, D.C.

Inside Aerospace will attract leaders from around the world as they discuss provocative issues affecting the global aeronautics and space communities.

<http://www.insideaerospace.org/>

April 24-27, 2006

- 2006 IEEE Position, Location and Navigation Symposium
Coronado, California (USA)

Contact: L. Beaty

Tel: +1 703 383 9688

Fax: +1 703 383 9689

E-mail: lbeaty@ion.org

<http://www.plans2006.org>

May 2 – 5, 2006

- European Telemetry Conference
Garmisch-Partenkirchen, Germany
Arbeitskreis Telemetrie e.V.

European Society of Telemetering

Rudolf-Diesel-Str. 29a

82216 Gernlinden

Tel.: +49-(0)8142-284582-9

Fax: +49-(0)8142-284582-2

<http://www.aktm.org>

<http://www.etc2006.de>

June 19 – 23, 2006

- SpaceOps 2006: Earth, Mars, Moon and Beyond

Grand Hotel Parco Dei Principi

00198 Roma Via G. Frescobaldi, 5

<http://www.spaceops2006.org>

CCSDS representatives will be at NASA's Marshall Space Flight Center's booth at SpaceOps. Please volunteer to help out at the booth or just stop by and say hello!