Consultative Committee for Space Data Systems

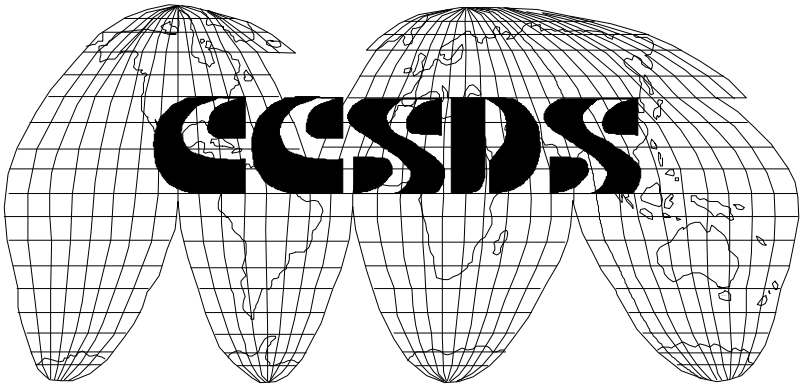
REPORT OF THE
MANAGEMENT COUNCIL

CCSDS MANAGEMENT COUNCIL MEETING MINUTES

CCSDS B10.0-Y-17

YELLOW BOOK

November 1998



DISTRIBUTION

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BNSC	Mr. Peter A. Vaughan
CNES	Mr. Roland Ivarnez
CSA	Mr. Arvind Bastikar
DLR	Mr. Hubertus Wanke
ESA	Dr. Carlo Mazza
INPE	Dr. Eduardo W. Bergamini
NASA HQ	Mr. David L. Townley
NASDA	Mr. Koichi Ayabe
RSA	Mr. Vladimir Starostin

CCSDS Observer Agencies

ASA	Dr. Klaus Pseiner
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MOC	Mr. Avi Rahav
NOAA	Mr. George W. Saxton
NSPO	Dr. Jun-ji Lee
SSC	Mr. Lennart Marcus
TsNIIMash	Mr. O. D. Sokolov
USGS	Mr. Tom Kalvelage

Panel/Subpanel Chairmen

P1		Dr. K. Lenhart (ESA/ESOC)
	P1A	Mr. M. MacMedan (NASA/JPL)
	P1E	Mr. Jean Luc Gerner (ESTEC/ESA)
	P1F	Mr. A. Hooke (NASA/JPL)
	P1J	Mr. Felipe Flores-Amaya (NASA/GSFC)
P2		Dr. David Giaretta (BNSC/RAL)
		Mr. Nestor Peccia (ESA)
		Mr. D. Sawyer (NASA/GSFC)
P3		Mr. Maurice Winterholer (CNES)
		Ms. Patricia Lightfoot (NASA/GSFC)
		Mr. J. Kaufeler (ESA/ESOC)
		Dr. H. Uhrig (ESA/ESOC)

Information

Mr. G. Delmas (ESA/ESOC)
Mr. M. Drexler (DLR/GSOC)
Ms. Michele LeSaux (SAC/CSIR)
Mr. W. Poland, Jr. (NASA/GSFC)
Mr. R. Stephens (SGT)
Mr. N. Dissinger (AST)
Mr. T. Gannett (J&T)

CONTENTS

SUBJECT: Minutes of the Consultative Committee for Space Data Systems (CCSDS) Management Council (MC) Meeting

PLACE: Darmstadt, Germany

DATE: 5-6 November 1998

I. ATTENDANCE

Organization	Name
BNSC/RAL	Peter Vaughan David Giaretta
CNES	Roland Ivarnez Maurice Winterholer Jean Latour
CSA	Arvind Bastikar
DLR	Manfred Drexler
ESA	Erhard Jabs Carlo Mazza Klaus Lenhart Horst Kummer
INPE	Eduardo Bergamini
ISAS	Takahiro Yamada
NASA	David Townley Adrian Hooke Neil Dissinger Howard Weiss
NASDA	Masami Kashimoto Yoshio Inoue
CASI	Qian Xiaolian Wang Guangyue Li Pan

II. INTRODUCTION

The meeting was convened by Mr. David Townley, CCSDS Co-Chairman. The delegates and other attendees introduced themselves.

III. WELCOMING REMARKS

On behalf of the ESA Director, Dr. Carlo Mazza welcomed members of the CCSDS Management Council.

IV. AGENDA REVIEW AND APPROVAL

The agenda is shown in Attachment A. The discussion of CCSDS Web Page Enhancements was deleted from the agenda and will be discussed before the next MC meeting via e-mail correspondence. A presentation concerning the CCSDS Security Working Group was added to the agenda. The MC approved the meeting agenda.

V. REVIEW OF MINUTES FROM TOKYO

The draft minutes from the Spring 1999 meeting in Tokyo, Japan were reviewed and accepted.

VI. SECRETARIAT REPORT

The Secretariat's report (Attachment B) was previously distributed to all members. This report included the CCSDS Documents Register and Directories of the CCSDS Member Agencies, Observer Agencies, and Associates.

VII. REVIEW AND REPORT OF OPEN ACTION ITEMS

The list of open action items is included as Attachment C.

98-2 CLOSED. Agency comments have been received for the SLE Red Books.

98-4 OPEN. Graphic files of spacecraft have been received and a "Fleet Chart" collage was distributed to the attendees. Agencies are asked to provide graphics of additional spacecraft that need to be included in the collage.

98-5 CLOSED. NSPO provided information concerning the use of CCSDS Recommendations for RocSat-1.

98-6 OPEN. Mr. Lenhart suggested that the template for panel reports be developed after the CCSDS Strategic Plan is reviewed and finalized. He suggested that the Work Breakdown Structure format could be used to indicate an item's change within the work program.

98-7 OPEN. No inputs have been received.

98-8 OPEN. No inputs have been received.

98-13 OPEN. Mr. Townley reported that there has been no activity in the designated liaisons with other standards groups. He suggested that the Panels review the appointments of liaison representatives and discuss them at the next TSG meeting.

98-15 CLOSED. This item was deferred to the discussion of the Roadmap & Vision Statement Working Group Report (CCSDS Strategic Plan).

98-16 OPEN. NASA and NASDA have responded to the CCSDS Utilization Questionnaire. Other Agencies stated that they found it difficult to provide precise and useful information on the questionnaire. Mr. Lenhart responded that the agencies should provide inputs as soon as possible and that he would clarify any obscure information. The information obtained from the questionnaires would provide useful data for agencies to plan cross-support activities.

98-17 OPEN. Mr. Giaretta suggested that the CCSDS Strategic Plan would provide a good marketing tool and that the ideas contained in the plan could be used to develop a marketing brochure. A draft of the brochure would be presented at the next MC meeting. Mr. Mazzo recommended that a coordinated activity be used to develop all marketing materials and methods (brochures, web page, presentations, etc.). Messrs. Giaretta, Bergamini, and Townley will form a marketing committee to review existing materials promoting CCSDS and develop recommendations for coordinating these elements into a cohesive marketing strategy (See Action Item 98-23.)

98-18 OPEN. The marketing committee will address this issue.

98-19 OPEN. Mr. Townley reported that a limited response has been received from U.S. industries. ESA is currently updating their CCSDS-implementations information and CNES is conducting an industry survey to be forwarded to the Secretariat.

98-21. CLOSED. Mr. Mazzo reported that ASI is withdrawing as a member of CCSDS and will not host the fall 1999 MC meeting. Instead, ESRIN in Frascati, Italy will be asked to host the meeting.

98-22 OPEN. The Agencies and Observers who have not responded will be contacted to provide Agency Representatives for requesting SCIDs.

VIII. AGENCY REPORTS

BNSC. Mr. Vaughan reported that BNSC support continues at around two man-years for all three panels and with an increased effort on SLE Services associated with Panel 3. An archiving workshop was held in the U.K. that was productive in that it stressed the importance of standards work within CCSDS, ISO and BSi. BNSC continues to support the STRV 1b mission and the ACE mission which uses a CCSDS-compatible decoder. TT&C operations for STRV 1c and d are scheduled to begin September 1999. (The BNSC report is included as Attachment D.) Mr. Hooke reported that operations personnel are unable to shut down the power on the STRV 1b spacecraft to terminate the mission. Continued S-band transmissions from the spacecraft could cause bandwidth problems in the future. It was suggested that Panel 1E should consider a recommendation to design spacecraft with the ability to shut down power to cease RF transmissions (see Action Item 98-24).

CNES. Mr. Ivarnez reported that CNES continues its level of support at four man-years and the use of CCSDS standards at the agency is increasing. S-band ground stations are currently being refurbished to include CCSDS equipment. He noted that the CCSDS Strategic Plan would be useful in the decision as to which activities CNES resources would be devoted. The CNES report is included as Attachment E.

DLR. Mr. Drexler reported that DLR continues to emphasize the work of Panel 3 and monitor the work of the other panels. A new Ku-band ground station in Weilheim which uses CCSDS standards has been successfully operated and verified during the EUTELSAT W2 LEOP in October 1998. Mr. Drexler suggested that the introduction of Ground Domain Services as a work item for P3 be reviewed in order to prevent an overlap of work between P2 and P3. Future work for CCSDS within DLR-GSOC will have to rely more upon internal DLR-GSOC staffing, rather than on contractual personnel. The DLR report is included as Attachment F.

ESA. Mr. Mazza reported that ESA is currently implementing SLE services in two phases through a contract with industry. Phase 1 will be used to support the Integral mission in 2001. Phase 2, which allows full interoperability of station equipment, will support the Rosetta mission in 2003. ESA has recently established an Engineering Standardisation Board (ESB) which will look to incorporate CCSDS recommendations into the ECSS (European Cooperation for Space Standardisation) series of standards. The current level of ESA resources of between four and five man-years will remain the same for 1999. The ESA report is included as Attachment G.

INPE. Mr. Bergamini reported that INPE continues its support of CCSDS, but cannot commit major manpower this year. A continuing effort is being made to disseminate CCSDS Recommendations among Brazilian aerospace industry, research and academic institutions. There is a possibility that research labs could provide manpower for the development of CCSDS Recommendations in 1999. INPE is also involved with industry in the development of a segment of the International Space Station which will incorporate CCSDS Recommendations. The INPE report is included as Attachment H.

NASA. Mr. Hooke presented the NASA report. He reported that NASA has officially adopted most of the CCSDS Recommendations as NASA Preferred Standards. The NASA

standardiation budget for 1999 will not be sustained at the higher level achieved in fiscal year 1998. The current level of resources consists of two full-time NASA Civil Service employees and 13 NASA-JPL and contractor staff.

The Consolidated Space Operations Contract (CSOC) and its effect on CCSDS was explained by Mr. Hooke. The CSOC strategy consists of transferring NASA ground station operation to contractors which allows them to select the standards to be used. There is a concern that the space link architecture may use an "IP-over-ATM" protocol that would be used primarily for ISS and Shuttle missions and relegate the CCSDS protocols for use with legacy systems. NASA needs to discuss the technical implications with the contractor on this architecture. Another impact of the CSOC contract on outside agencies would be that reimbursable agreements would be negotiated with the contractor (Lockheed-Martin) instead of NASA.

Mr. Hooke reported that NASA has signed an agreement with the Centre Commun D'Etudes De Telediffusion et Telecommunications (CCETT) for the use of Turbo Codes. Other agencies are encouraged to negotiate their own agreement with CCETT. If these issues are promptly addressed, the Turbo Code technology can be adopted as a CCSDS Recommendation. The NASA report is included as Attachment I.

NASDA. Mr. Kashimoto presented the NASDA report. NASDA supported all three Technical Panels as well as the TSG and MC. Panel support activities included participation in review and analysis of Panel 2 OAIS red book and review of three Panel 3 SLE red books. The overall level of NASDA support to CCSDS remains at two persons per year. Mr. Koichi Ayabe was announced as the new NASDA Delegate to CCSDS. NASDA is widely implementing CCSDS Recommendations for Telecommand and AOS. Mr. Ivarnez requested that NASDA provide lessons-learned feedback from their use of AOS Recommendations (Action Item 98-25). The NASDA report is included as Attachment J.

ISAS. Mr. Yamada reported that ISAS has successfully launched the Planet-B spacecraft that is CCSDS-compliant. This year, ISAS will support CCSDS with .3 man-years. ISAS is implementing CCSDS Recommendations for telemetry and telecommand in several spacecraft and ground installations and intends to implement SLE services on MUSES-C. The ISAS report is included as Attachment K.

CSA. Mr. Bastikar reported that the Radarsat mission is using CCSDS Recommendations and that many of the CSA systems are CCSDS-compatible. However, there is a new emphasis at CSA to use outside contractors for standards development and selection. Mr. Bastikar said he hopes to maintain the standards activity at CSA, but the agency may have to discontinue its membership with CCSDS. A presentation will be given to persuade the new CSA management to commit to CCSDS.

IX. PANEL AND TSG REPORTS

Panel 1: Mr. Lenhart presented the Panel 1 report. He reported that Panel 1E continues its work on bandwidth efficiency despite the decision by NASA to withdraw its support until new funding can be obtained. Panel 1F has completed the review of the CCSDS File Delivery Protocol (CFDP) red book. A work plan has been defined and a draft white book has been developed by Panel P1J for navigational data transfer. The P1 report is included as Attachment L.

Panel 2: Mr. Giaretta presented the Panel 2 report. He noted that the new draft of the Data Entity Dictionary Specification Language (DEDSL) Recommendation addresses the overlap with other standards organizations. Also, DEDSL will divided and expanded into separate books for Abstract Definition (BB), PVL Implementation (BB and GB), and XML Implementation (BB and GB). The Abstract Definition red book will be delayed until the PVL Implementation red and green books are completed (May 1999). A red book is expected by the Spring 1999 MC meeting for the Catalogue Interoperability Protocol (CIP-B) which was developed under CEOS. Also, an Archiving Reference Model red book is due for release by May 1999. Panel 2 has suggested changes to the terminology used in the draft of the Strategic Plan and recommended that the importance of archives should added. The Panel 2 report is included Attachment M.

Panel 3: Mr. Winterholer reported that SLE documentation is being developed for the Integral mission. The Panel 3 Work Breakdown Structure and document production schedule was also discussed (see Attachment N). The major challenge for Panel 3 is to finalize the SLE services and then work on the Ground Element specifications. Panel 3 will also work with Panel 1 to define end-to-end services using IP technology.

TSG: Mr. Lenhart presented a brief report of the TSG meeting. Topics discussed at the meeting concerned the activities of the Addressing, Security, and Strategic Plan working groups. Details of the meeting are available in the TSG Meeting Minutes.

X. REPORT FROM LIAISONS

The current list of liaisons is included as Attachment O. No significant activity was reported. Action Item 98-13, which requests the review of liaison activity by the TSG, remains open and will be addressed at the next TSG meeting. Mr. Bastikar stated his opinion that if the IAA Committee on Operations, Quality and Safety includes the concept of standards in its activities, then they should change their name to include the word "standards." The Secretariat will submit a letter to the IAA Committee requesting this change (Action Item 98-27).

XI. NEW WORK ITEM TEMPLATE

Mr. Townley presented the New Work Item Template (NWIT) and associated changes to the Procedures Manual that defined software development and distribution issues. The template and procedures have been distributed for review and comments have been incorporated. However, before the template is approved, it was suggested that security issues be included. Also, the

Strategic Plan may have an impact. Mr. Townley recommended that the NWIT be deferred until these topics are addressed.

XII. CCSDS STRATEGIC PLAN

Mr. Kummer distributed a summary of discussion on the CCSDS Strategic Plan that was presented at the TSG meeting. The presentation is included in Attachment P. Mr. Hooke stated that after the Principal Delegates agree on the plan, the documents will be presented to each agency's senior management to promote CCSDS and demonstrate future plans. Mr. Ivarnez commented that the Strategic Plan will be an excellent tool that will assist in the allocation of scarce resources. His comments are included in Attachment Q. Two agency review cycles are scheduled before a TSG and MC review in Spring 1999. An action item was issued for the agencies to provide comments (Action Item 98-26). Mr. Ivarnez's comments (Attachment Q) should be considered when reviewing the themes and sub-themes that are described in Volume 2. Observer agencies will be included in the review. Both Volume 1 and 2 will be presented to higher agency authorities after approval by the MC. Mr. Townley commended the Strategic Plan Working Group for their considerable effort in developing this document.

XIII. CCSDS SCPS RED BOOKS AND AOS UPDATES

SCPS Red Books. Mr. Townley reported that the series of SCPS books have been approved as draft international standards. However, the ISO schedule for final approval would mean that the books would be approved as a final international standard before the official CCSDS MC approval as a Blue Book next Spring. A P1F editorial review needs to be completed before submission as an ISO standard. Mr. Townley will submit a letter to ISO Central requesting approval to delay the processing of the SCPS DIS documents to FDIS status until Spring 1999.

AOS 5-year Updates. Mr. Hooke stated that the CCSDS 701 (AOS Architectural Specification), 704 (Audio/Video), and 705 (LOTOS) documents are scheduled for their 5-year review (see Attachment R). The 701 document will be reconfirmed pending Mr. Yamada's report on the consolidated link layer. The 704 document needs to be updated to include new Audio/Video technology. The 705 document describes technology that is no longer used and should be downgraded to a Green Book. Mr. Lenhart stated that Panel 1 will evaluate the 704 and 705 documents to determine if resources can be dedicated for the update or recommend that the books be downgraded to Green status (Action Item 98-30). In the meantime, the 704 Recommendation should be withdrawn as an ISO DIS.

XIV. SPACECRAFT CODE IDENTIFICATION BLUE BOOK REVIEW

Mr. Townley reported that CCSDS 320.0-B-1 is due for reconfirmation and will be revised. The update would include deleting an incorrect reference, updating the list of Agency Representatives, and adding an annex that provided guidance for commercial use of SCIDs. A question was asked as to where the latest list of Spacecraft Code Identifiers could be obtained.

The list is available on the CCSDS web page and will be verified by the Secretariat (Action Item 98-28). The attendees discussed the policy statement that would allow commercial spacecraft to use CCSDS SCIDs. Mr. Hooke stated that the future use of IP addressing for spacecraft could make the use of SCIDs redundant in providing a unique identifier. It was recommended that P1 and the TSG consider the long-term implications of IP addressing on SCIDs (Action Item 98-29). The MC approved the proposed updates to CCSDS 320.0-B-1, but excluded the policy statement annex.

XV. MARS 2001 - INTERPLANETARY INTERNET

Mr. Hooke presented the status of CCSDS activities in the development of the Interplanetary Internet. He stated that new technology is being developed that can potentially allow the Internet to be replicated throughout the Solar System. This "Interplanetary Internet" will be proposed for use in the planned international research missions to Mars. To accomplish this, Mars will need a communications and navigation infrastructure. This infrastructure will consist of a micro-satellite constellation which will need internationally interoperable proximity links for navigation and communication. CCSDS will participate with Lockheed-Martin in the development of standards for the proximity links. A meeting at ESTEC is scheduled to discuss this activity among the CCSDS member agencies. Mr. Tom Gannett is responsible for writing a White Book for the standard. The Interplanetary Internet presentation is included in Attachment S.

XVI. AD-HOC WORKING GROUP ON SECURITY

Mr. Weiss presented the report from the Ad-hoc Working Group on Security (Attachment T). This group was chartered to identify data protection issues and threats across the three CCSDS panels and propose recommendations. The current security activities among CCSDS Panels and Observer Agencies consist of the following:

- Panel 1. Security issues are discussed in the Telecommand Green Book, AOS Green Book, and SCPS Security Protocol. A P1A Security Green Book is being developed.

- Panel 2. No security-related work is underway, but access control is being considered for the Data Archiving Reference Model.

- Panel 3. No security-related work is underway, but there is interest in providing secure cross-support.

- CAST. Data protection mechanisms at the packet telecommand and telemetry transfer layer is being developed.

Mr. Weiss recommended that the MC needs to consider the following actions:

- Perform a detailed security risk analysis.

- Require that all work items include consideration of security issues.

- Expand the P1A Security Green book to include Panels 2 and 3 to create a cross-panel security document.

- Implement SCPS security protocol on all CCSDS missions.

- Develop a generic CCSDS Space Mission System Security Policy that would aid mission developers.

The MC endorsed the recommendations of the Security Working Group and requested that the results of the security threat analysis be presented at the next meeting. ESA, BNSC, and CNES stated that they will try to improve their participation with the Security Working Group. Mr. Lenhart proposed that the panels should immediately consider security issues in their current work instead of waiting until after the security threat analysis.

XVII. NEW BUSINESS

Conference Participation. Mr. Hooke reported on CCSDS participation in two European conferences scheduled for 1999. The first conference, the IAA/IAF, is scheduled for October in Amsterdam. This conference will provide a good opportunity to advertise CCSDS accomplishments to technical experts in the space community. The second conference, the UN Committee on Peaceful Uses of Outer Space is scheduled for July in Vienna. It was suggested that a representative from the European agencies should attend. Pursuit of corporate sponsorship for conference activities could benefit CCSDS in the future. Also, it was recommended that a CCSDS booth be created for promotional use at European conferences. NASA will provide the specifications of the CCSDS booth (used at U.S. conferences) to ESA (Action Item 98-31).

Stable Red Book Designation. Mr. Hooke noted that the final draft status, otherwise known as "Stable Red Book" needs to be distinguished from the normal definition of "Red Book." The Secretariat will write a statement that would be included in stable red books that explains the implications of final draft status (Action Item 98-32).

XVIII. PLANNING FOR NEXT TSG/MC MEETINGS

The following schedule was tentatively agreed to by the MC:

Spring 1999 meetings sponsored by JPL in the Los Angeles, U.S. area:

Panel meetings - 3 May - 14 May

TSG - 14 May 1999, 17 May (a.m.)

MC - 17 May (p.m.), 18 May

SC13 - 19 May (a.m.)

Fall 1999 meetings sponsored by ESA/ESRIN in Frascati, Italy:

Panel Meetings - 4 October - 15 October

TSG - 18 October

MC - 19 October, 20 October (a.m.)

SC13 - 20 October (p.m.)

Spring 2000 meetings hosted by CNES in Toulouse, France.

Fall 2000 meetings hosted by INPE in São José dos Campos, Brazil.

XIX. APPROVAL OF RESOLUTIONS

Mr. Dissinger read the resolutions, which were approved. Draft copies of the Resolutions and Action Items will be distributed via e-mail.

DRAFT RESOLUTIONS

CCSDS Management Council
5-6 November 1998
Darmstadt, Germany

MC-F98-1. CCSDS resolves to approve the release of CCSDS 320.0-B-2 that incorporates changes presented at the meeting.

MC-F98-2. CCSDS resolves to move ahead rapidly to work with all international elements of the Mars program to recommend a full suite of CCSDS protocols suitable for Mars data communications relay, and that the interim recommendation that follows will be respected in terms of being a supported feature in that final recommended suite of communications capabilities.

MC-F98-3. CCSDS resolves to endorse recommendations of the Security Working Group and that they continue their work to present a more detailed security analysis at the next TSG meeting.

MC-F98-4. CCSDS resolves to express its appreciation to the Strategic Planning Working Group Committee for their outstanding contributions to the development of a CCSDS Long-range strategic plan.

MC-F98-5. CCSDS resolves to express its sincere appreciation to ESA/ESOC for their excellent support and hospitality provided to the MC at the 5-6 Nov 1998 meeting in Darmstadt, Germany.

MC-F98-6. CCSDS resolves to accept the proposal of the NASA to host the Spring 1999 panel, TSG, MC, and SC 13 meetings in the vicinity of the Jet Propulsion Laboratory in Los Angeles, California, USA. The scheduled dates are 3 May - 14 May for panel meetings, 14 and 17 May for the TSG, 17 - 18 May for MC, and 19 May for SC 13 meetings.

MC-F98-7. CCSDS resolves to accept the proposal of ESA/ESRIN to host the Fall 1999 panel, TSG, MC, and SC 13 meetings in Frascati, Italy. The dates proposed are 4 October - 15 October for panel meetings, 18 October for the TSG, and 19-20 October for the MC and SC 13 meetings.

MC-F98-8. CCSDS resolves to accept the proposal of CNES to host the Spring 2000 TSG, MC, and SC 13 meetings in Toulouse, France.

MC-F98-9. CCSDS resolves to approve the release CCSDS 320.0-B-2, *CCSDS Global Spacecraft Identification Field: Code Assignment Control Procedures*.

DRAFT ACTION ITEMS

CCSDS Management Council Meeting
5-6 November 1998
Darmstadt, Germany

The following actions were continued from previous meetings:

98-4 Agencies are asked to provide graphics of CCSDS-compliant spacecraft to the Secretariat to enable the creation of a collage showing the full complement of such spacecraft.

Assignee: All Agencies
Due Date: Next MC Meeting

98-6 The TSG shall develop a template for the panel reports to the MC that differentiates between active and inactive items in the work program, shows changes since the last report, panel document status, the schedule for the work, and any issues impacting panel production.

Assignee: TSG Chair
Due Date: Next MC Meeting

98-7 All Agencies should submit their requirements for SLE services.

Assignee: All Agencies
Due Date: Next MC Meeting

98-8 All Agencies should submit documentation material relevant to actual cross support interface implementations.

Assignee: All Agencies
Due Date: Next MC Meeting

98-13 The TSG shall review the list of liaisons and determine the appropriate organizations and the appropriate persons to act as liaisons.

Assignee: TSG Chair
Due Date: Next TSG Meeting

98-16 The Agencies shall respond to the Agency CCSDS Utilization Questionnaire, which was provided as part of the Secretariat Mail-out Package.

Assignee: All Agencies
Due Date: Next TSG Meeting

98-17 Mr. Giaretta will develop specifications for a Top Management Oriented Marketing Brochure.

Assignee: Mr. Giaretta
Due Date: Next MC Meeting

98-18 Member Agencies shall consider the proposal for a Top Management Oriented Marketing Brochure with regard to whether they have resources to devote to development of such a document.

Assignee: All Agencies
Due Date: Next MC Meeting

98-19 The Agencies shall collect information on products developed within their respective countries and provide it to the Secretariat for inclusion in the CCSDS-Related Implementations Green Book

Assignee: All Agencies
Due Date: Next MC Meeting

98-22 All Agencies shall provide updated information on Agency Representatives for requesting SCIDs.

Note: all Member agencies have responded. Follow-up needed for Observer agencies that have not responded.

Assignee: All Agencies
Due Date: Next MC Meeting

The following new actions were assigned:

98-23 Review existing materials promoting CCSDS and develop recommendations for coordinating these elements into a cohesive marketing strategy.

Assignee: D. Townley, D. Giarerra, and E. Bergamini
Due Date: Next MC Meeting

98-24 Panel 1E will research perceived requirement that all S/C have the capability to shut-down when mission concludes to prevent RF interference with operational S/C and determine if CCSDS has a role in promulgating a standard related to this issue .

Assignee: P1E
Due Date: Next MC Meeting

98-25 NASDA to provide to MC lessons-learned feedback on CCSDS AOS recommendations used on the ETS-VII mission.

Assignee: NASDA
Due Date: Next MC Meeting

98-26 All agencies should review CCSDS Strategic Plan and submit comments according to the following schedule:

Assignee: All Agencies
Due Date: First Review - 31, Jan 1999
Second Review - 30, April 1999

98-27 To highlight the difference in the role of standards compared to quality and safety, the Secretariat will submit a letter to the IAA requesting that they change their name to Operations, Standards, Quality and Safety.

Assignee: Secretariat
Due Date: Next MC Meeting

98-28 The Secretariat will verify the web address of the SCID number assignments and distribute to MC members.

Assignee: Secretariat
Due Date: Next MC Meeting

98-29 Panel 1 and the TSG should consider future requirements of SCID number assignments in light of development of IP technology and its application to space communications and develop recommendation for consideration by the MC.

Assignee: P1 and TSG
Due Date: Next MC Meeting

98-30 Panel 1 to recommend action on AOS Blue Books 704 and 705 as to whether books should be updated to reflect current technology or downgraded to Green Book status for reference use.

Assignee: P1
Due Date: Next MC Meeting

98-31 NASA to supply information to ESA to create CCSDS booth to promote CCSDS at European conferences.

Assignee: NASA
Due Date: Next MC Meeting

98-32 Secretariat to draft statement explaining final draft status that would be included in stable red books.

Assignee: Secretariat
Due Date: Next MC Meeting

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ATTACHMENT A

AGENDA

DRAFT AGENDA
CCSDS MANAGEMENT COUNCIL
Darmstadt, Germany
November 05/06, 1998

1. Call to Order (9:00 AM)
2 Introduction of Delegates
3. Welcoming Remarks
4. Agenda Review and Approval
5. Review of Minutes from Tokyo, Japan
6. Secretariat Report
7. Review and Report of Open Action Items
8. Agency Reports
9. Summary Reports from Technical Panels
   - Panel 1*
   - Panel 2*
   - Panel 3*
   - TSG**

   * Chairperson reports should include (1) resource and schedule status, (2) panel documents requiring MC approval, and (3) an identification of which of that panel's Blue Books should be considered for submission as future ISO standards.

   ** Only Technical items not discussed at the TSG Meeting should be brought forward to the MC.

10. Report from Liaisons & Review of Liaison Relationships
11. Special Topics:
    - Roadmap & Vision Statement Working Group Report
    - New Work Item Template/Procedures Manual Changes
    - SCPS Red Book Status and Future Schedule
    - Proposed Enhancements to CCSDS Home Page
    - SCID Blue Book Update/5 Yr. Review
    - CCSDS Response to Mars 2001 Program Requirements
12. Any New Business
13. Planning for next TSG/MC meetings
14. Approval of Resolutions/Action Items
15. Adjourn (not later than 12 noon 06 November)

ATTACHMENT B

SECRETARIAT REPORT

CCSDS SECRETARIAT PACKAGE

CCSDS MANAGEMENT COUNCIL MEETING
Darmstadt, Germany
5-6 November 1998

- Directory of CCSDS Principal Delegates
- CCSDS Associates List
- CCSDS Document Register

DIRECTORY OF CCSDS PRINCIPAL DELEGATES October 1998

Instructions regarding telephone and facsimile dialing

The telephone and facsimile numbers listed in this directory are given in international format. The "+" sign at the start of each number refers to the whatever digits must be dialed in the country of origin in order to get an international access circuit. For calling within a country, this access code, the country code, and perhaps the city/area code should not be dialed.

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CCSDS DOCUMENT REGISTER (BRIEF)

Revision Date: October 1998

Document Title	Date	Color	Number	Remarks
ADMINISTRATIVE				
CCSDS GSCID Field Code Assignment Control Procedures	**93-10**	**Blue**	**320.0-B-1**	
CCSDS GSCID Field Code Assignment Control Procedures	**96-11**	**Blue**	**320.0-B-1 Cor. 1**	**Corrigendum 1**
CCSDS GSCID Field Technical Specification for Code Assignment	96-09	White	321.0-W-1	Under Development
Procedures Manual for the Consultative Committee for Space Data Systems	**96-05**	**Yellow**	**A00.0-Y-7**	
Achievements and Products	95-04	Yellow	A10.0-Y-5	Draft Yellow Book
An Introduction to CCSDS	98-08	Yellow	A10.1-Y-3.1	CCSDS Leaflet
CCSDS-Related Implementations	**96-11**	**Green**	**A12.0-G-1**	
CCSDS Publications Manual	**94-05**	**Yellow**	**A20.0-Y-1**	
CCSDS Glossary	**97-07**	**Green**	**A30.0-G-3**	
Report of the Management Council — Meeting Minutes, April 9-10, 1990	90-04	Yellow	B10.0-Y-1	
Report of the Management Council — Meeting Minutes, September 20-21, 1990	90-11	Yellow	B10.0-Y-2	
Report of the Management Council — Meeting Minutes, October 2-3, 1991	91-10	Yellow	B10.0-Y-3	
Report of the Management Council — Meeting Minutes, May 21-22, 1992	92-05	Yellow	B10.0-Y-4	
Report of the Management Council — Meeting Minutes, November 16-17, 1992	92-11	Yellow	B10.0-Y-5	
Report of the Management Council — Meeting Minutes, June 8-9, 1993	93-06	Yellow	B10.0-Y-6	
Report of the Management Council — Meeting Minutes, October 28-29, 1993, 1993	93-10	Yellow	B10.0-Y-7	
Report of the Management Council — Meeting Minutes, May 1993	94-05	Yellow	B10.0-Y-8	
Report of the Management Council — Meeting Minutes, November 1994	94-11	Yellow	B10.0-Y-9	
Report of the Management Council — Meeting Minutes, May 1995	95-05	Yellow	B10.0-Y-10	
Report of the Management Council — Meeting Minutes, November 1995	95-11	Yellow	B10.0-Y-11	
Report of the Management Council — Meeting Minutes, May 1996	96-05	Yellow	B10.0-Y-12	
Report of the Management Council - Meeting Minutes, November 1996	96-11	Yellow	B10.0-Y-13	
Report of the Management Council - Meeting Minutes, May 1997	97-05	Yellow	B10.0-Y-14	
Report of the Management Council — Meeting Minutes, November 1997	97-11	Yellow	B10.0-Y-15	
Report of the Management Council — Meeting Minutes, June 1998	98-06	Yellow	B10.0-Y-16	

GSCID = Global Spacecraft Identification

NOTE – This list contains current issues as well as superseded issues of Blue Books. Superseded Red, Pink, Yellow, and Green books have been omitted for the sake of brevity. Titles of superseded issues appear in italics; titles of current issues appear in bold type. Minutes of past MC meetings are not considered to be superseded.

Document Title	Date	Color	Number	Remarks
PANEL 1 DOCUMENTS				
Telemetry Summary of Concept and Rationale	**87-12**	**Green**	**100.0-G-1**	
Telemetry Channel Coding	*84-05*	*Blue*	*101.0-B-1*	
Telemetry Channel Coding	*87-01*	*Blue*	*101.0-B-2*	
Telemetry Channel Coding	**92-05**	**Blue**	**101.0-B-3**	**Reconfirmed June 1998**
Telemetry Channel Coding	98-06	Pink	101.0-P-3.1	Not yet received by Secretariat
Packet Telemetry	*84-05*	*Blue*	*102.0-B-1*	
Packet Telemetry	*87-01*	*Blue*	*102.0-B-2*	
Packet Telemetry	*92-11*	*Blue*	*102.0-B-3*	
Packet Telemetry	**95-11**	**Blue**	**102.0-B-4**	
Packet Telemetry Services	**96-05**	**Blue**	**103.0-B-1**	
Lossless Data Compression: Summary of Concept and Rationale	**97-05**	**Green**	**120.0-G-1**	
Lossless Data Compression	**97-05**	**Blue**	**121.0-B-1**	
Telecommand Summary of Concept and Rationale	**87-01**	**Green**	**200.0-G-6**	
Telecommand Part 1 — Channel Service	*87-01*	*Blue*	*201.0-B-1*	
Telecommand Part 1 — Channel Service	**95-11**	**Blue**	**201.0-B-2**	
Telecommand Part 2 — Data Routing Service	*87-01*	*Blue*	*202.0-B-1*	
Telecommand Part 2 — Data Routing Service	**92-11**	**Blue**	**202.0-B-2**	**Reconfirmed June 1998**
Telecommand Part 2.1 — Command Operation Procedures	**91-10**	**Blue**	**202.1-B-1**	**Reconfirmed June 1998**
Telecommand Part 3 — Data Management Service	**87-01**	**Blue**	**203.0-B-1**	**Reconfirmed November 1995**
Time Code Formats	*87-05*	*Blue*	*301.0-B-1*	
Time Code Formats	**90-04**	**Blue**	**301.0-B-2**	**Reconfirmed November 1995**
Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft	*87-01*	*Blue*	*401.0-B*	
Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft	*89-09*	*Blue*	*401.0-B*	

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PANEL 1 DOCUMENTS (CONTINUED)				
Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft	*93-06*	*Blue*	*401.0-B*	
Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft	*94-11*	*Blue*	*401.0-B*	
Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft	**97-05**	**Blue**	**401.0-B**	**Preparing for publication**
Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft	98-06	Red	401.0-R	Not yet received by Secretariat
Radio Frequency and Modulation—Part 1: Earth Stations	**97-05**	**Green**	**411.0-G-3**	**Published electronically, hardcopy not yet available**
Radio Frequency and Modulation Systems—Spacecraft-Earth Station Compatibility Test Procedures	**92-05**	**Green**	**412.0-G-1**	
Report of the Proceedings of the RF and Modulation Subpanel Meeting at the Ames Research Center, April 11-20	89-09	Green	421.0-G-1	
Proceedings of the CCSDS RF and Modulation Subpanel 1E Meeting at the German Space Operations Centre September 20-24, 1993	93-10	Yellow	B20.0-Y-1	
Advanced Orbiting Systems, Networks and Data Links: Summary of Concept, Rationale and Performance	**92-11**	**Green**	**700.0-G-3**	
Advanced Orbiting Systems, Networks and Data Links, Architectural Specification	*89-10*	*Blue*	*701.0-B-1*	
Advanced Orbiting Systems, Networks and Data Links: Architectural Specification	**92-11**	**Blue**	**701.0-B-2**	**Reconfirmed June 1998 for one year**
Advanced Orbiting Systems, Networks and Data Links: Audio, Video and Still-Image Communications Services	**94-05**	**Blue**	**704.0-B-1**	
Advanced Orbiting Systems, Networks and Data Links: Audio, Video and Still-Image Communications Services	**94-05**	**Green**	**704.1-G-3**	
Advanced Orbiting Systems, Networks and Data Links: Formal Definition of CPN Protocols, Methodology and Approach	**93-10**	**Green**	**705.0-G-2**	
Advanced Orbiting Systems, Networks and Data Links: Abstract Data Type Library—Addendum to CCSDS 701.0-B-2	**94-05**	**Blue**	**705.1-B-1**	
Advanced Orbiting Systems, Networks and Data Links: Formal Specification of the Path Service and Protocol—Addendum to CCSDS 701.0-B-2	**94-05**	**Blue**	**705.2-B-1**	

Document Title	Date	Color	Number	Remarks
PANEL 1 DOCUMENTS (CONTINUED)				
Advanced Orbiting Systems, Networks and Data Links: Formal Specification of the VCLC Service and Protocol—Addendum to CCSDS 701.0-B-2	**94-05**	**Blue**	**705.3-B-1**	
Advanced Orbiting Systems, Networks and Data Links: Formal Specification of the VCA Service and Protocol—Addendum to CCSDS 701.0-B-2	**94-05**	**Blue**	**705.4-B-1**	
Space Communications Protocol Specification (SCPS)—Rationale, Requirements, and Application Notes	97-06	Green	710.0-G-0.3	Draft Green Book
Space Communications Protocol Specification (SCPS)—Users Guide (SCPS-UG)	97-09	Green	711.0-G-0.2	Draft Green Book
Space Communications Protocol Specification (SCPS)—Network Protocol (SCPS-NP)	97-09	Red	713.0-R-3	
Space Communications Protocol Specification (SCPS)—Security Protocol (SCPS-SP)	97-09	Red	713.5-R-3	
Space Communications Protocol Specification (SCPS)—Transport Protocol (SCPS-TP)	97-09	Red	714.0-R-3	
Space Communications Protocol Specification (SCPS)—File Protocol (SCPS-FP)	97-09	Red	717.0-R-3	

Document Title	Date	Color	Number	Remarks
PANEL 2 DOCUMENTS				
Space Data Systems Operations with Standard Formatted Data Units: System and Implementation Aspects	**87-02**	**Green**	**610.0-G-5**	
Standard Formatted Data Units -- Structure and Construction Rules	*88-02*	*Blue*	*620.0-B-1*	
Standard Formatted Data Units — Structure and Construction Rules	**92-05**	**Blue**	**620.0-B-2**	**Reconfirmed June 1998 for one year**
Standard Formatted Data Units — Structure and Construction Rules	**96-11**	**Blue**	**620.0-B-2 Cor. 1**	**Corrigendum**
Standard Formatted Data Units — A Tutorial	**92-05**	**Green**	**621.0-G-1**	
Standard Formatted Data Units — Referencing Environment	**97-5**	**Blue**	**622.0-B-1**	
Standard Formatted Data Units — Control Authority Procedures	**93-06**	**Blue**	**630.0-B-1**	**Reconfirmed June 1998 for one year**
Standard Formatted Data Units — Control Authority Procedures Tutorial	**94-11**	**Green**	**631.0-G-2**	
Standard Formatted Data Units — Control Authority Data Structures	**94-11**	**Blue**	**632.0-B-1**	
Parameter Value Language Specification (CCSD0006)	**92-05**	**Blue**	**641.0-B-1**	**Reconfirmed June 1998 for one year**
Parameter Value Language — A Tutorial	**92-05**	**Green**	**641.0-G-1**	
Language Usage in Information Interchange Tutorial	**89-10**	**Green**	**642.1-G-1**	
ASCII Encoded English (CCSD0002)	**92-11**	**Blue**	**643.0-B-1**	Reconfirmed June 1998
The Data Description Language EAST Specification (CCSD0010)	**97-05**	**Blue**	**644.0-B-1**	
The Data Description Language EAST — A Tutorial	**97-05**	**Green**	**645.0-G-1**	
The Data Description Language EAST — List of Conventions	**97-05**	**Green**	**646.0-G-1**	
Data Entity Dictionary Specification Language (DEDSL) (CCSD0011/CCSD0012)	96-11	Red	647.0-R-1	
CCSDS Panel 2 Methodology for Development of Recommendations	98-06	Yellow	???.?-Y-1	Not yet received by Secretariat

CCSDS DOCUMENT REGISTER (BRIEF)

Revision Date: October 1998

Document Title	Date	Color	Number	Remarks
PANEL 3 DOCUMENTS				
Introduction To CCSDS Cross Support	**90-06**	**Green**	**910.0-G-1**	**Expected to be withdrawn by Panel 3**
CCSDS Cross Support System Description Volume 1	**90-06**	**Green**	**910.1-G-1**	**Expected to be withdrawn by Panel 3**
Standard Terminology, Conventions, and Methodology (TCM) for Defining Data Services	**94-11**	**Green**	**910.2-G-1**	
Cross Support Concept — Part 1: Space Link Extension Services	**95-05**	**Green**	**910.3-G-1**	
Cross Support Reference Model Part 1: Space Link Extension Services	**96-05**	**Blue**	**910.4-B-1**	
Space Link Extension—Return All Frames Service Specification	97-11	Red	911.1-R-1	
Space Link Extension—Return Virtual Channel Frames Service Specification	97-11	Red	911.2-R-1	
Space Link Extension—Forward CLTU Service	97-11	Red	912.1-R-1	
Space Link Extension—Forward Space Packet Service Specification	97-11	Red	912.3-R-1	
PANEL 4 DOCUMENTS				
Radio Metric and Orbit Data	**87-01**	**Blue**	**501.0-B-1**	**Reconfirmed May 1994**

ATTACHMENT C

OPEN ACTION ITEMS

ACTION ITEM STATUS

98-2 Agencies to submit review comments on SLE Red Books.

(Note--Desire to have comments on Red Books before October Meetings. Books will be released by end of July.)

Assignee: All Agencies
Due Date: **September 30, 1998**
STATUS: **OPEN** - This action is a reminder to member agencies to provide comments on the series of P3 Red Books which are being released for review. RIDs are being received.

98-4 Agencies to provide graphics of CCSDS compliant spacecraft to the Secretariat to enable the creation of a collage showing the full complement of such spacecraft.

Assignee: All Agencies
Due Date: **July 15, 1998**
STATUS: **OPEN** - Information received from NASDA is being integrated into a collage and a poster made for display at future conferences/symposia.

98-5 Mr. Lee/NSPO will provide information on use of CCSDS Recommendations on RocSat -1.

Assignee: Jun-Ji Lee
Due Date: **July 15, 1998**
STATUS: **CLOSED**

NSPO has implemented the CCSDS standard into ROCSAT-1, a LEO scientific space mission for both Telemetry and Command. This satellite will be launched in January, 1999.

For the ROCSAT-2, a remote sensing satellite, NSPO also plans to use it for both telemetry and command. The program is now in procurement stage. It will be launched in the year of 2002.

98-6 The TSG shall develop a template for the panel reports to the MC that differentiates between active and inactive items in the work program, shows changes since the last report, panel document status, the schedule for the work, and any issues impacting panel production.

Assignee: TSG Chair
Due Date: **Next MC Meeting**
STATUS: OPEN

98-7 All Agencies should submit their requirements for SLE services.
(Note: 98-7 : This is a request to Agencies to identify their requirements for the development of specifications in the area of SLE services. This information is requested to provide a basis for prioritizing new services.)

Assignee: All Agencies
Due Date: **Next MC Meeting**
STATUS: OPEN

98-8 All Agencies should submit documentation material relevant to actual cross support interface implementations.

(Note: 98-8: This is a request to forward to Panel 3 [WG1] existing documents related to cross support interface definitions which are/will be used in actual cross support situations.)

Assignee: All Agencies
Due Date: **June 30, 1998**
STATUS: OPEN

98-13 The TSG shall review the list of liaisons and determine the appropriate organizations and the appropriate persons to act as liaisons.

Assignee: TSG Chair
Due Date: **September 15, 1998**
STATUS: OPEN

98-15 Member agencies shall provide comments on the draft Vision-Mission Statement to be circulated for review by Mr. Hooke.

Assignee: All Agencies
Due Date: **September 1, 1998**
STATUS: OPEN

98-16 The Agencies shall respond to the Agency CCSDS Utilization Questionnaire, which was provided as part of the Secretariat Mail-out Package.

Assignee: All Agencies
Due Date: **September 15, 1998**
STATUS: OPEN

98-17 Mr. Giaretta will develop specifications for a top management oriented Marketing Brochure.

Assignee: Mr. Giaretta
Due Date: **August 15, 1998**
STATUS: OPEN

98-18 Member Agencies shall consider the proposal for a top management oriented Marketing Brochure with regard to whether they have resources to devote to development of such a document.

Assignee: All Agencies
Due Date: **Next Meeting**
STATUS: OPEN

98-19 The agencies shall collect information on products developed within their respective countries and provide it to the Secretariat for inclusion in the CCSDS-Related Implementations Green Book.

Assignee: All Agencies
Due Date: **September 30, 1998**
STATUS: OPEN - NASA and NASDA have responded to this Action Item.

98-21 ESA shall contact ASI about hosting the Fall 1999 meetings or identify an alternative candidate location.

Assignee: ESA
Due Date: **Next Meeting**
STATUS: OPEN

98-22 All Agencies shall provide updated information on Agency Representatives for requesting SCIDs.

Assignee: All Agencies
Due Date: **September 30, 1998**
STATUS: **OPEN** - Member Agencies that have responded include:
BNSC
CNES
DLR
INPE
NASDA
NASA

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ATTACHMENT D

BNSC REPORT

BNSC REPORT TO THE CCSDS MANAGEMENT COUNCIL 5/6
November 1998

The BNSC support to **CCSDS** continues at around 2 staff years per year covering the work of all three panels and with increased effort on SLE Services associated with Panel 3. Additional funding is being sought to implement some level of SLE services in the UK and further software tools within data interchange systems together with logical modelling of ground space data systems.

Panel 1
BNSC work within this panel has been on protocol X and plans are underway to trial this on STRV. We have funded the "Security Green Book" and Nick Shave will represent Panel 1 on the CCSDS security working group. BNSC is also working in the new working group set up to develop lossy compression algorithms. We are trying to provide co-ordination between the work of PlJ and CEOS.

Panel 2
In addition to the Chainnanship of the panel BNSC has made contributions to the Red Book for the Reference Archive Model which should be ready by November 98. This has been delayed to include a number of clarifications.
There has been work on the DEDSL and a Red Book is imminent and. PVL is being reviewed with an aim of internationalisation. Work has also continued on software tools for Panel 2 and in particular a start made on JAVA interface routines which allow the interfacing of objects which represent tables and images. See Panel 2 minutes for more technical detail.

Roadmap
BNSC provided inputs to the generation of the Roadmap and **Strategic Plan for CCSDS** and this has been carried forward by D Giaretta as a member of the Strategy Working Group. It is planned to circulate this map within the UK in order to get more comprehensive feedback from the users.

CIP
It has now been agreed that the Catalogue Interoperability Protocol developed by CEOS will be submitted to Panel 2 for review with the aim that that review would not change the existing content but provide the addition of examples on how the CIP can be applied to disciplines other than Earth Observation.

Panel 3
Work has been carried out by Vega, some under contract to ESTEC. In addition we still plan to carry out some implementation of the SLE services within the UK in conjunction with the STRV programme. We will investigate the possibility of implementing some of the NASA and ESA pilot software if such arrangements are acceptable to NASA and ESA.

Meetings and Workshops
Two internal progress meetings on CCSDS have been held in the UK with DERA, BNSC, Logica and Vega.

A Workshop on “Data Access - Archives to Real Time” was held in Edinburgh. This was sponsored by RSS, CEO, ESA and BNSC and covered both Earth Observing and Data Standards. It was very productive in making the EO community and non-space users familiar with the importance of the standards work within CCSDS, ISO and BSi and provided another opportunity for user inputs.

The 5th CCSDS UK Workshop on ~~New Technologies, New Standards” will be held at the lEE, Savoy Place, London on 9.11.98. (see the lEE Electronics and Communications November 98 Programme for details).

ACE and STRV Operations
We have continued receiving telemetiy data during daylight hours from the Real Time Solar Wind Experiment on the NASA Advanced Composition Explorer using the CCSDS compatible Decoder. A redundant Decoder may be provided by NOAA if resources permit this. TT&C operations for STRV ic and d should start next September using the antennas at RAL and DERA West Freugh with the control centre at DERA Famborough. We may also work STRV lb at the end of this year if the spacecraft is still usable.

CEOS
BNSC has several representatives within CEOS and continues to attach importance to good ties between CEOS and CCSDS particularly via Panel 2.

P Vaughan 30.10.98

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ATTACHMENT E

CNES REPORT

CNES REPORT
CCSDS MANAGEMENT COUNCIL

Darmstadt
November 1998

INTRODUCTION

- After the last Management Council CNES maintains its interest for CCSDS activities.
- CNES has participed in CCSDS meetings in Houston (panels 1 A, 1F, 1E ,1J , 2 and 3.)
- CNES continues to provide the chairmanship of Panel 3 and the chairmanship of ISO/TC 20/ SC 13.
- The main criteria for CNES participation in CCSDS working groups will be the applicability of new recommendation to identified project (national or international in cooperation.)
- The CNES manpower involved in CCSDS activities is maintains at a constant level (4 man years.)

NEW IMPLEMENTATION OF CCSDS RECOMMANDATIONS

- CNES has completed acceptance test of CCSDS Telemetry and Telecommand ground facilities .dedicated for PROTEUS /JASON project.
- Implementation of VITERBI function in new facilities for every 2 Ghz Ground Stations is in progress.

CNES SUPPORT TO CCSDS ACTIVITIES

- CNES has supported the review of following Red Book:

  647 .0-R-1 Data entity dictionary Specification language . CNES manages this review.

  911.1-R-1 SLE Return Frames Service Specification .5 RID (1Technical fact, 3 editorial 1 recommendation).

  911.2 -R-1 SLE Return Virtual Channel Frames Service Specification 1 RID (Recommendation).

  912.3-R-1 S L E Space Link Extension Forward CLTU Service 1 RID (Recommendation).

  727.0-R-1 CCSDS File Delivery Protocol ..Analysis is in progress.

- CNES activities into Panels are following:

Panel 1 A

- CNES continued to support panel 1 A by participation in working meetings.

Panel 1 E

- CNES has actively supported activities of panel 1 E.

Panel 1 F

- CNES has organized the P 1 F meeting at Toulouse in October.
- CNES is analysing the File Transfer Packet Protocol (CFDP).
- CNES will support the process for CFDP evaluation.

Panel 1 J

- CNES has actively supported the panel P 1 J in Houston meeting.
- CNES analyses if the attitude standardization is really necessary in the CCSDS Domain.

Panel 2

- CNES has organized the Panel 2 meeting at Toulouse in October.
- CNES has actively supported all activities of Panel 2.
- Rewriting of the Data Entity Dictionary Specification Language(Red Book, 647.0-R-1) The document has been submitted to P2 members for comments to be discussed at Toulouse.
- Preparation of the detailed plan for a DEDSL Tutorial green book, to be discussed at Toulouse.
- Study of the XML standard as a possible implementation for the DEDSL.
- P2 report to the CCSDS Ad-hoc working group on Security.
- CNES performs the French translation for:

  622-0-B-1 SFDU Referencing Environment, forwarded to ISO.

  644-0-B-1 Language EAST Specification. French version will be forwarded end of November.

Panel 3

- CNES continues to support all areas of work in Panel 3.
- CNES participated actively in the process for production of Panel 3 red Books with a lot of difficulties because manpower for Panel 3 is decreasing.

- CNES analysed 3 Panel 3 Red Books, and forwarded some RIDs to Panel 3 members.

OTHER SPACE STANDARDIZATION ACTIVITIES

- CNES is working for ECSS (European Cooperation for Space Standardization) ,notably in drafting group E 70 Space Engineering Ground Systems and Operation .The ECSS Document E 70 Draft 12 has been approved by ECSS Technical Panel in September.
- For ISO/TC20/ SC 14 /WG 3 CNES is involved in following drafting groups:

  WD 14620 Launch Operations (in DIS)

  WD 14950 Satellite Operability (in new issue after committee draft comments)

  WD 14711 Space System Mission Operations Concept Checklist (new issue)

ATTACHMENT F

DLR REPORT

DLR- GSOC
Status Report to the CCSDS Management Council
at
ESA-ESOC
November 1998

1 INTRODUCTION

DLR-GSOC continued its work within the reporting period with emphasis on the work of panel 3 and monitored the work of the other panels. DLR was active in implementations of software for CCSDS TM/TC and SLE services to support its projects in said period.

2 PANEL RELATED REPORT

2.1 PANEL 1

- Panel 1E: RF/Mod:

  DLR continued to stay in an active role in Panel 1E. This included participation in the Efficient Modulation Study.

  The new DLR-GSOC KU-Band Station in Weilheim, which was established following the CCSDS Standards, was successfully operated and verified in its functions during the EUTELSAT W2 LEOP in October 98.

- Panel 1J, Navigation:

  DLR-GSOC will define its participation in the P1J work after a work plan is established.

- All other Panel 1 Sub-Panels:

  DLR stayed in a monitoring role.

2.2 PANEL 2

No activity by DLR.

2.3 PANEL 3

Since last meeting three new red books (Forward Space Packet FSP, Return All Frames RAF and Return Virtual Channel Frame RVCF) were presented. RIDs were processed during the Darmstadt meeting and new red books (R-2) will be produced for RVCF and FSP until the end of year. Based on those books Forward TC Frame FTCF and Operational Control Field OCF books have to be updated accordingly and published as red books. Since major parts of those documents contain the same content, it is planned to combine those for consistency reasons in the long term.

On basis of those services published, agencies can go along with implementations. These implementations should also be used for prototyping and checking of the definitions.

First implementations of those services are planned for ESA Mission INTEGRAL and NASDA mission MUSES.

DLR's contribution for the panel was the continuation of the FTCF-book. M. Pilgram contributed with the coordination of the Subgroup 2/3: SLE-Services.

The review of the published books by DLR was not possible in a wider extent due to manpower problems. Some comments were presented, but DLR will install a proper review group for future work (see below).

The introduction of Ground Domain Services as a work item for P3 should be rethought in order to not to provoke overlap of the work between P2 and P3.

DLR will still be active in supporting the work in P3 but is also planning some reallocation for the manpower needed continuing the work. The reason is the ongoing reorganisation within DLR as explained below.

2.4 TSG

DLR has been attending the TSG Meeting in Houston. DLR-GSOC will support in future actively the work in TSG, having in mind that TSG is now more and more in a role of a technical working entity.

2.5 MANAGEMENT COUNCIL

DLR will stay in its role at the MC as a member agency.

3 DLR-GSOC CCSDS IMPLEMENTATIONS

3.1 Panel 1 related implementations.

The following implementations were done at GSOC:

Eutelsat W24:
Telemetry: only transfer layer is used.
Telecommand: the full packet standard is used

CHAMP CCS:
Telemetry: fully compliant including the packet layer. Software was developed supporting:

- Transfer Frame Validation (check of counters and check bytes)
- Virtual Channel Demultiplexing
- CLCW Extraction
- Source Packet Extraction

TC System: fully compliant

The following implementations are under progress at GSOC:

CHAMP MOS:
1. Telemetry: Transfer and Packet Layer Processing
2. TC: see CHAMP CCS

ABRIXAS:
TM / TC as Champ – but special processing of dump data necessary (no first header pointer available)

None of the projects uses Reed-Solomon Coding, only check bytes in the transfer frames.

A general overview can be given as follows:

Project	*Launch*	*Uplink*			*Downlink*		
		Packets	*Frames*	*Code*	*Packets*	*Frame*	*Code*
EUTELSAT	10/98	Y	Y	Y	N	Y	Y**
ABRIXAS	6/99	Y	Y	Y	Y*	Y***	Y**
CHAMP	7/99	Y	Y	Y	Y*	Y	Y**
BIRD	t.b.d.	……..……		****……			
GRACE	t.b.d.	…….		****	…….		

* : no segmentation
** : no R-S coding
*** : no 1st header pointer for VC-dump
****: extent under definition

EUTELSAT W2 mission was launched successfully last month and the LEOP services were executed by DLR-GSOC. The S/C is already handed over to EUTELSAT Paris for routine operations.

3.2 Panel 3 related implementations.

SLE related software was planned for development, to be implemented in 3 phases with the following strategy:

- Realisation of a complete new and independent SLE service environment
- Two phase integration into existing control centre services and functions
- Provision of interfaces to external agencies and experimenters

SLE Services themselves are not implemented until now by DLR. The necessary processing engines supporting RAF, RVCF respectively RSP are implemented. Interfaces supported are still proprietary. Engines for the Command system (Forward Services) do exist partly, supporting the complete CCSDS Packet TC.

The standing activity ‘Modernisation of the DLR-GSOC Ground System’ will push the CCSDS development task in future.

4 DLR-GSOC REORGANIZATION

A GSOC internal reorganisation was initiated this summer by the top level management of DLR. Since then, head of GSOC is Prof. Dr. Klaus Wittmann.

Internal structures are on the way to be redefined and a first organisation chart will be available soon. Future work for CCSDS within DLR-GSOC will have to rely more upon internal DLR-GSOC staffing, rather than on contractual personal, as done in the past. Mr. H. Wanke will stay as the DLR representative, with Mr. M. Drexler as a deputy. Mr. M. Drexler will also actively support the work within TSG and Mr. M. Pilgram will stay in its active role in panel 3.

H. Wanke / M. Drexler
CCSDS Representatives
DLR- GSOC

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ATTACHMENT G

ESA REPORT

CCSDS Management Council
ESA Report

Darmstadt, 5 November 1998
C. Mazza
Head of Ground Systems Engineering Department in D/TOS

ESA confirms its endorsement of CCSDS activities. ESA has recently established an Engineering Standardisation Board (ESB), the mandate of which is to coordinate within ESA all standardisation activities, including CCSDS. The ESB would look into the incorporation of CCSDS recommendations into the ECSS (European Cooperation for Space Standardisation) series of standards. ECSS standards replace the previous PSS series. In addition, the ESB may request, through its ESA representative in CCSDS, the initiation of new work items

Resources

Currently (1998) there are 16 ESA staff involved in CCSDS activities (MC, TSG, P1, P2, P3) for a total effort of between 4 and 5 man-years. This level of resources is confirmed also for 1999.

Implementation of SLE Services

ESA is in the process of implementing SLE services through a contract with industry in two phases.

Phase 1 will cover the interface with the control centre, a gateway to NASA stations and the space and ground segment software simulator and will be used to support the Integral mission (launch in early 2001).

Phase 2 will cover also the baseband equipment in the ground stations and will be ready for support of the Rosetta mission (launch early 2003). ESA is in contact with NASA/JPL so that a common approach is taken, particularly in the definition of the API. DLR will also be involved in the implementation of the ESA software.

ESA’s ultimate goal is to reach full interoperability with other Agencies.

ATTACHMENT H

INPE REPORT

INPE Report
to the
CCSDS Management Council

Darmstadt, Germany
05 November, 1998

INPE expresses its continuing support to the CCSDS effort, although it can not commit major man power to it, in the current year. However, a continuing effort has been made to disseminate the CCSDS Recommendations not only within the organization but also, to a significant extent, among other members of the Brazilian aerospace industry, research and academic institutions and their related communities.

A 'latu-sensu', pos-graduate level specialization course in 'Management, Standardization and Certification of Space Activities' is now being offered by the State University of São Paulo (UNESP) to promote the academic specialization of professionals, related or with interests in the pertinent market. Specific instruction on the scope of the CCSDS Recommendations has been given to this specific academic community, under this course. Now, this specific topic is already incorporated in the regular curriculum of this course.

Also, within the community which is being formed to execute SC-13/TC-20/ISO corresponding activities in Brazil, the CCSDS Recommendations are being widely disseminated. Not only that, but also, by extension, they have been also disseminated among the other communities being formed in Brazil, around the many corresponding Working Group Activities of SC-14/TC-20/ISO.

As a result of the effective, growing involvement of the mentioned space related standard academic and professional communities in Brazil, there is a clear, promising trend, indicating that a potential, significant man power availability may result, with positive results, in support to the commitment of INPE with the development and adoption of CCSDS Recommendations. It is expected that by 1999 this type of adherence may start occurring, in the domain of space data systems.

At INPE, three different development initiatives incorporate and point, in different degrees, to the actual use of CCSDS Recommendations:

The gradual build up of a Control Authority (CA) structure, related to data bases covering the three main areas of application of the organization. Namely:

- Earth Observation;
- Space and Atmospheric Sciences;
- Meteorology;

The effort which is being made with NASA to develop a joint capability for end-to-end servicing of payloads, departing from the superMOCA concept;

INPE is getting heavily committed in the construction of a segment of the International Space Station (ISS). In its current stage, high priority is being given to the hardware of the mechanical design and construction of this segment. It is expected that in the next phases of this project, involving the electrical and electronic systems design, the incorporation of CCSDS Recommendations, which are already being considered in the ISS project as whole, will be naturally incorporated to the INPE servicing platforms and pertinent payloads, to come.

INPE has successfully launched its second satellite, the SCD-2 (Data Collection), in 21 of October of 1998. A bid being placed by INPE is now under way for the build up of a multi purpose application satellite platform. The same concept is also being applied in cooperation with CNES, in a small scale, for application with scientific experiments. It is not clear yet if CCSDS Recommendations will be adopted in these upcoming projects.

INPE, as a Member, continues in its participation with CEOS Committee. Part of it is related to the CEOS IDN commitment, since 1995. Growing perspectives are also being devised in the context of CEOS WWW Working Group.

INPE has also done efforts in promoting the dissemination of the CCSDS initiative in the domain of the IAF Space Exploration Committee.

INPE is confirming, again, that it expects to host CCSDS TSG, MC and SC-13/TC-20/ISO meetings in São José dos Campos, in the Fall of 1999.

EDUARDO W. BERGAMINI
INPE Principal Delegate to CCSDS
November, 1998

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ATTACHMENT I

NASA REPORT

CCSDS Management Council:
NASA Report
Darmstadt, FRG, 05 November 1998
Adrian J. Hooke
Manager, NASA Space Mission Operations Standards Program

Personnel Changes
Since the last meeting there have been some organizational and personnel changes in the space communications arena within NASA. At NASA Headquarters, in the Office of Space Flight, the position of Deputy Associate Administrator (AA) for Space Communications has been eliminated and the function has been placed under the Deputy AA (Operations), formerly the Deputy AA (Space Shuttle).

In the Space Operations Management Office (SOMO) at Johnson Space Center, Mr. Stan Newberry (who was Acting Director of SOMO) has since been officially selected for that position. In addition, Mr. Earl Thompson has moved on to another position; he was the Head of the Engineering & Operations Office and was the individual to whom Mr. Hooke reported as the Manager of the NASA Space Mission Operations Standards Program. Mr. Thompson has been replaced by Mr. Patrick M. Duffin, formerly the Manager of Systems Engineering within the Engineering & Operations Office under Mr. Thompson.

At JPL, Dr. Vint Cerf has been appointed as a Distinguished Visiting Scientist. Dr. Cerf is generally recognized as the "Father Of The Internet" and will be working with the NASA-CCSDS community to identify ways in which the Earth's Internet can be extended to support space exploration and exploitation as the "Interplanetary Internet". In addition at JPL, Mr. Leigh Torgerson has come aboard to manage SCPS, CCSDS File Delivery Protocol and Interplanetary Internet activities.

NASA Preferred Standards
NASA has officially adopted the vast majority of the CCSDS Recommendations as NASA Preferred Standards. This was accomplished by way of a letter on Oct 13, 1998, from the Associate Administrator of the Office of Space Flight (Mr. Joe Rothenberg) to the NASA Chief Engineer under the authority of internal NASA policy directives that give Mr. Rothenberg the responsibility to establish space communications standards. While NASA has been a strong proponent of the use of the CCSDS Recommendations and has implemented them on numerous flight missions, it was not until now that NASA has officially adopted them as Agency-wide standards.

Budget
As noted at the last meeting, it was not possible to sustain the NASA standardization budget for the U.S. Fiscal Year 1999 (October 1998 through September 1999) at the one-time increased level that was achieved in Fiscal Year 1998. Accordingly, the annual NASA budget (from all sources) has reverted to approximately $3.6 million, down from its previous level of approximately $4.5 million. The current level of resources translates into approximately 2 full time equivalent NASA Civil Service employees and 13 full time equivalent NASA-JPL and Contractor staff. NASA has responded to this challenge by general belt-tightening, with first priority being given to maintaining support for high priority activities:

- Panel 1: funding for key P1A, P1E and P1F development is maintained, but the P1E Efficient Modulation work may have to be curtailed and new funding for SuperMOCA (see below) and P1J has not been secured. NASA is seeking supplemental funding from other government agencies to support Efficient Modulation and new "Interplanetary Internet" architectural studies.
- Panel 2: increased support for the popular Archiving work continues.
- Panel 3: the funding emphasis is in completing the SLE services, with modest resources being provided to start the Ground Domain and Telecommunications activities.

The Space Project Mission Operations Control Architecture (SuperMOCA) task was approved for additional funding in the new Fiscal Year. However, the resources were programmed to be covered by under-run funds

that later turned out to have been absorbed elsewhere. As a final attempt to stay viable, the SuperMOCA activity is currently working with the new "X2000" multi-mission technology project at JPL to identify a possible role in spacecraft control. If this is unsuccessful, SuperMOCA will be terminated at the end of this calendar year and the development team will be disbanded.

Consolidated Space Operations Contract (CSOC)

As part of NASA's strategy to turn-over routine space operations to the private sector, the CSOC was awarded to Lockheed Martin on September 25, 1998; there will be a three-month phase in period. The contract runs from Oct '98 to December 2003 with options to extend it to December 2008. There are many working interface details yet to be defined and implemented but there are some early favorable indications that the contractor recognizes the value of standards - one of the stated objectives of the CSOC Integrated Operations Architecture is to provide data transmitted in standardized protocols and make extensive use of the internet to allow direct communications between the principal investigator and his experiment on board the spacecraft. On the negative side, early indications are that the contractor is proposing an "IP-over-ATM" protocol architecture for the space link that appears to relegate the CCSDS protocols to the status of "legacy systems". There is clearly a significant amount of mutual technical education to be performed during the upcoming months and we do yet know how the CCSDS/ISO program currently in place will be impacted as the contractor phases into full operation. One of the expected most noticeable changes for outside agencies is that reimbursable agreements will be negotiated with the CSOC contractor instead of through NASA. We should have a better grasp of the impact of this contract by the next meeting.

Turbo Code Licensing

NASA and the Centre Commun D'Etudes De Telediffusion ET Telecommunications (CCETT) - who is representing France Telecom/CNET and Societe Anonyme Telediffusion de France - have been negotiating an agreement for NASA use of the patented coding and decoding schemes generally known as Turbo Codes. These negotiations have been successfully concluded and NASA signed the proposed agreement on October 5, 1998; it has been forwarded to CCETT for their signature. While NASA is precluded by the agreement from revealing the terms and conditions of that document, we strongly encourage each of the CCSDS member agencies to seek their own agreement with CCETT. If these issues are promptly addressed, we are optimistic that we can move forward with adopting this technology as a CCSDS Recommendation.

IAF, IAA and UNISPACE III

The International Astronautical Federation (IAF) and the International Academy of Astronautics (IAA) next plan to meet in Amsterdam from 04-08 October 1999. The committee meetings are held on the Saturday before the conference starts, i.e., on Saturday, 2 Oct. 1999. The IAF committee on Solar System Exploration will probably also be held on this Saturday. The final dates and times of these meetings will be set at the IAF meeting in Paris in April 1999. The chairman of the IAA Committee on Quality of Space Programs (which is currently being merged with its parent committee and changing its name to the IAA Committee on Operations, Quality, Safety) is Dr. Macgregor Reid, who has recently retired from JPL but is now retained as a consultant. Dr. Reid has suggested that a major presentation on CCSDS should be given both to his Committee and to the IAF Space Exploration Committee. The IAA committee is expanding and already has many members from 16 countries, all of whom are "high level" in their respective countries. Significant advantages may possibly be gained from merging the concepts of "standards" in general with the concepts of "quality" and "safety".

NASA has had a constructive dialog with the Secretariat of ISO/TC20/SC14 concerning next year's UNISPACE III Technical Forum. The United Nations holds UNISPACE at irregular intervals as a way to keep Third World nations abreast of into emerging technologies. UNISPACE III will be held in Vienna from 19-30 July 1999 and there are several 3-hour slots available for major technical sessions. It has been agreed in principle to propose a joint SC13/SC14 session at UNISPACE III.

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ATTACHMENT J

NASDA REPORT

NASDA STATUS REPORT

ISO/TC20/SC13(ESOC Nov. 6th, 1998)

NASDA
NATIONAL SPACE DEVELOPMENT AGENCY OF JAPAN

Following 7 Documents are Approved by Space Data Committee

ISO/DIS	**15887 : Space data and information transfer systems - Data systems - Lossless data compression**
ISO/DIS	**15888: Space data and information transfer systems - Standard formatted data units - referencing environment**
ISO/DIS	**15889: Space data and information transfer systems - Data description language - EAST specification**
ISO/DIS	**15891: Space data and information transfer systems - Protocol specification for space communications - Network protocol**
ISO/DIS	**15892: Space data and information transfer systems - Protocol specification for space communications - Security protocol**
ISO/DIS	**15893: Space data and information transfer systems - Protocol specification for space communications - Transfer protocol**
ISO/DIS	**15894: Space data and information transfer systems - Protocol specification for space communications - File protocol**

Following Document is Approved by Space Data Committee with comment

ISO/DIS	**15890: Space data and information transfer systems - Advanced orbiting systems, networks and data links - Audio, video and still - image communications services**

There are many standard referred in DIS 15890, that are existed, name changed or proposed. It is necessary to clarify the correspondance between referred standards and existing standards.

NASDA STATUS REPORT

CCSDS MC (ESOC, Nov. 5-6th, 1998)

NASDA
NATIONAL SPACE DEVELOPMENT AGENCY OF JAPAN

2. PANEL ACTIVITIES

Panel 1.

- Continuing support P1a, 1f, 1j.
- Review CFDP Red book and analysis of CFDP.

Panel 2.

- Supporting P2 activities.
- NASDA reviewed OAIS Red Book.

Panel 3.

- Continuing support all area of P3.
- NASDA reviewed 3 SLE Red Books.
- NASDA will study for cross support to adopt the CCSDS recommendation

3. NASDA Standards for CCSDS

- NASDA maintains NASDA standard for Telecommand and AOS.
- Study of revising NASDA TTC Standard including of CCSDS RF&MOD.

4. Organization and Manpower

NASDA CCSDS members as follows.
(NASDA Delegate was changed to Mr. Ayabe.)

Delegate	Koichi Ayabe
TSG/MC/ISO	M. Kashimoto
	S. Ogawa
Panel 1	S. Ogawa (P1a)
	Y. Nonaka (P1e, P1f)
	M. Sawabe (P1j)
Panel 2	Y. Inoue
Panel 3	K. Shinohara
	D. Asoh
Secretariat	Y. Nonaka

Total manpower has kept 2 persons / year.

NASDA STATUS REPORT

CCSDS MC (ESOC, Nov. 5-6th, 1998)

NASDA
NATIONAL SPACE DEVELOPMENT AGENCY OF JAPAN

NASDA CCSDS Activity Report after the last MC meeting.

1. Implementation of the Recommendation

1) ONBOARD

- ETS - VII (Rendezvous docking, Launched in Nov. 1997)
  Uplink - Telecommand / Downlink - AOS
  Now we have receive AOS telemetry and transmitted telecommand normally on orbit.
- TRMM (Precipitation Radar, Launched in Nov. 1997 ON orbit)
  Uplink - Telecommand / Downlink - AOS
- ADEOS -II (Earth Observation Satellite, Launch in Nov. 2000)
  Downlink - AOS
- JEM (Space Station, Launch in 2001)
  Uplink - AOS / Downlink - AOS
- HTV (H-2 Transfer vehicle, Launch in Aug. 2002)
  Uplink - Telecommand / Downlink - AOS
- ETS - VIII (Engineering Test Satellite, Launch in Aug. 2002)
  Uplink - Telecommand / Downlink - AOS
- ALOS (Land Observation Satellite, Launch in Feb. 2003)
  Uplink - Telecommand / Downlink - AOS
- SELENE(Selenological & Eng. Explorer, Launch in 2003)
  Uplink - Telecommand / Downlink - AOS

2) GROUND System

- Currently EPAP is processing AOS Tlm and telecommand through TDRSS replacing COMETS. Because of COMETS Injection failure to geostationary orbit.
- CCSDS packet data processing equipment is now designed and developed for JEM. This equipment is installed in the DRTS (Data relay test satellite) BBE of space tracking network.
- As the next generation ground tracking network system, we start the design phase of ground station supporting CCSDS recommendation.

ATTACHMENT K

ISAS REPORT

ISAS Report, November 1998

ISAS REPORT TO CCSDS MANAGEMENT COUNCIL

ESOC, Germany, November 5-6, 1998

Takahiro Yamada

1. IMPLEMENTATION OF CCSDS RECOMMENDATIONS

1.1 ONBOARD

Spacecraft	Mission	Launch Year	TLM Pkt	TLM Frm	TLM Code	TC Pkt	TC Frm	TC Code
PLANET-B	Mars orbiter	1998		✓	✓			
LUNAR-A	Lunar penetraters	1999		✓	✓			
ASTRO-E	X-ray telescope	2000	✓	✓	✓			
MUSES-C	Asteroid sample return	2002	✓	✓	✓	✓	✓	✓
ASTRO-F	Infrared telescope	2003	✓	✓	✓	✓	✓	✓
SOLAR-B	Solar observatory	2004	✓	✓	✓	✓	✓	✓

1.2 GROUND

Complex	Function	TLM Pkt	TLM Frm	TLM Code	TC Pkt	TC Frm	TC Code
SSOC	Spacecraft Control Center	U	O	-	U	U	U
KSC	Ground Station (Near Earth)	U	O	O	U	U	-
UDSC	Ground Station (Deep Space)	U	O	O	U	U	-

O: Operational
U: Under development

ISAS plans to use SLE services for data transfer between ISAS and JPL for MUSES-C (probably RAF and CLTU services). SLE services will be supported by a gateway at SSOC (Sagamihara Space Operations Center) of ISAS.

2. PANEL ACTIVITIES (From June 1998 to October 1998)

2.1. PANEL 1

ISAS supported most activities of Subpanels lA and 1F.

ISAS is editing the following Draft White Books:
- Space Data Link Protocol, Synchronous 1 (Conventional TM Frames),
- Space Data Link Protocol, Synchronous 2 (AOS Frames),
- Space Data Link Protocol, Asynchronous 1 (TO Frames),
- Space Packet Protocol,
- Space Link Reference Model.

The first three Draft White Books are complete and have been distributed to Panel members for review.

ISAS reviewed the following documents and submitted formal RIDs:
- Security Draft Green Book,
- CCSDS File Delivery Protocol Red Book.

2.2. PANEL 3

ISAS fully supported activities of WG 1, partly supported activities of WG 2, and hopes to support WG 4 in the near future.

ISAS reviewed the following documents and submitted RIDs and comments:
- SLE Return All Frames Red Book,
- SLE Return Virtual Channel Frames Red Book,
- SLE Forward Space Packet Red Book,
- SLE Service Management White Book,
- Management Parameters of SLE Services.

3. STUDY ACTIVITIES

ISAS is performing study activities related to COSOS in the following areas:
- Space link addressing,
- Space link management/control,
- High performance file transfer protocol,
- Data description language for mission data bases.

4. AVAILABLE MANPOWER RESOURCES

Only one person is available at ISAS for supporting CCSDS activities, and he does this work on a part-time basis. The manpower available to support CCSDS in this year (1998) is 1/3 man-year.

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ATTACHMENT L

PANEL 1 REPORT

P1 CHAIRMAN PROGRESS REPORT

TO THE CCSDS TSG&MC

NOVEMBER 1998 IN DARMSTADT

BY

K.G.LENHART (ESA/ESOC)

CONTENTS

I. MEETINGS

PAST MEETINGS

- A P1A meeting took place from October 19th to 22nd in Darmstadt

- A P1F meeting took place from October 14th to 16th in Toulouse

- A P1J meeting took place from November 2nd to 3rd in Darmstadt

FUTURE MEETINGS

- Subject-dedicated WG meetings (e.g. Mars-link) will take place late 1998 and most likely early 1999

- The next round of Sub-Panel meetings will take place in May 1999 in the US

- The next Panel 1 Plenary Meeting will take place in May 1999 as well.

II. STATE OF ACTIVITIES

SUB-PANEL 1A

- Data Compression Books: Blue and Green Books have been approved and issued; work on lossy data compression continues
- Telecommand Green Book: New Draft Green Book has been reviewed
- Telemetry Green Book: slow progress
- An updated Space Link Reference Model has been developed; this will be a basis for restructuring of the Panel 1 Recommendations
- Communication security on the Link Layer: a Draft Green Book has been reviewed and will be finalised
- Coding aspects:
  - Development of Recommendations concerning Turbo Codes continues in particular with application to deep space
  - Preparation of Coding Green Book necessary, but not yet started
- Time Aspects: a number of work items have been identified, but are on hold.

SUB-PANEL 1E

- The working group on radio relay links for Mars missions started work in special WG sessions
- Other activities continued as shown in the plan below.

SUB-PANEL 1F

- CCSDS File Delivery Protocol (CFDP, former Protocol X) Red Book has been reviewed

SUB-PANEL 1J

- A plan of work has been defined and will be presented in this meeting.

III. RESOLUTIONS

Resolutions not yet available.

IV. CURRENT WORK BREAKDOWN OF PANEL 1 ACTIVITIES (Update November 1998)

Panel-Level

P100: P1 Management

- P110: Management of P1 activities
- P120: Management of P1 meetings
- P130: Management of P1 contributions to TSG and MC meetings

P200: P1 System Activities

- P210: Architecture/Space Data System Model: Review consistency between P1 and P3 (on hold, but being taken into account by A730)

P300: Management Work Items requiring Panel Coordination

This includes:
- agreement on needs in the light of existing recommendations/books
- resource estimates
- assignment of tasks to Sub-Panels

- P310: Preparatory activities for advanced telemetry and telecommand system
- P320: Pass management (on hold)
- P330: Data protection for space communication (e.g. see A450)
- P340: Spacecraft ID (on hold)
- P350: Restructuring of Panel 1 Documents (being considered, still to be approved, related to P310)

P400: Sub-Panel 1A/1E Technical Interface

P500: Management of Conformance Assessment

P600: Management of Compatibility/Interoperability Tests

Sub-Panel 1A

A100: Management of Sub-Panel 1A

- A110: Management of Sub-Panel activities
- A120: Management of Sub-Panel meetings
- A130: Management of Sub-Panel contributions to Panel 1 and other CCSDS meetings

A200: Telemetry

- A210: Services Blue Book (complete, progressing to ISO)
- A220: New Green Book (in slow progress)
- A230: Packet Telemetry Blue Book (Version 4 complete)
- A240: Data Compression
- A241: Lossless Data Compression (BB and GB complete and distributed)
- A242: Lossy Data Compression (research work item)
- A250: Sub-Packets and Packet Utilisation (WP has been deleted)

A300: Telecommand

- A310: New Green Book (in advanced progress)
- A320: Revision of existing Blue Books (Parts 2 and 2.1 up for reconfirmation, Parts 1 and 3 for later reconfirmation)

A400: Advanced Telemetry and Telecommand Systems

- A410: Support WP P310
- A420: Interim Link Layer aspects (e.g. to support Packets such as SCPS-NP; White Paper text was presented)
- A430: New Generation Link Layer (research work item)
- A440: Optical Communication Protocols (has been discussed and was deleted for the time being)
- A450: Application of CCSDS Protocols for Secure Systems (Green Book covering the space link aspects is in progress)

A500: Time Aspects

- A510: Revision of Time Code Blue Book (on hold)
- A520: On-board Data/Time Interface Standard (on hold)
- A530: Time Correlation (on hold)

A600 Restructuring of Space Communication Recommendations

A610: Support of WP 350
A620: Reorganize and rewrite P1 Recommendations according to newly layered Structure

A700: Other Tasks

A710: Production of Option Matrices/Conformance Proformas (will be performed as exisiting books will be revised)
A720: Accomplishment of compatibility/interoperability tests (status to be confirmed)

Sub-Panel 1E

E100: Management of Sub-Panel 1E

E110: Management of Sub-Panel activities
E120: Management of Sub-Panel meetings
E130: Management of Sub-Panel contributions to Panel 1 and other CCSDS meetings

E200: Policy Matters

E210: Ka-Band recommendation development
E220: Data Relay satellites
E230: Lunar missions communications policy
E240: Orbiter-Lander communications standardization

E300: Technical Matters

E310: Bandwidth efficient communications
E320: Interference mitigation techniques
E330: Design tools (Software and Algorithms)
E340: Earth-to-Space Link Updates
E341: Medium data rate telecommand link
E342: High data rate uplinks
E343: X-band for deep space and near Earth
E350 Low cost missions
E351: Small fully automated earth station for support of low earth orbiters
E352: Near-earth missions: low-cost designs and operations
E360: Proximity and EVA links

E370: Ka-band link design for deep space
E380: Lunar/planetary missions communication systems
E381: Orbiter-lander communications for lunar, Mars and other planetary missions
E382: Wide-band links at 37/40GHz for lunar & planetary missions
E383: Single aperture multi-link (SAML) systems
E390: Optical communications

A400: Coding

A410: Support of WP P400
A420: Enhanced codes for Telemetry and Telecommand (research work item)
A430: Supplementation and Revision of Channel Coding Blue Book
A440: Development of Green Book (the subject has been taken out from the Telemetry Green Book)

E500: Other Tasks

E510: Support WP P400 (Joint coding studies with Sub-Panel 1A)
E520: Review existing Blue Book recommendations
E530: Complete Blue Book with respect to capability areas.
E540: Accomplishment of conformance assessment
E550: Accomplishment of compatibility/interoperability tests

Sub-Panel 1F

F100: Management of Sub-Panel 1E

F110: Management of Sub-Panel activities
F120: Management of Sub-Panel meetings
F130: Management of Sub-Panel contributions to Panel 1 and other CCSDS meetings

F200: Advanced Telemetry and Telecommand Systems

F210: Support WPs P310 and P350
F220: Following of SCPS development
F230: Protocol-X Development (research work item)

F300: Maintenance of Books (deployment work item)

- F310: AOS Book
- F311: Link Layer
- F312: Audio/Video
- F320: SCPS Books
- F321: File Protocol
- F322: Transport Protocol
- F323: Security Protocol
- F324: Network Protocol
- F330: Protocol-X Book

F400: Other Tasks

- F410: Production of Option Matrices/Conformance Proformas (will be performed as exisiting books will be revised)
- F420: Accomplishment of compatibility/interoperability tests.

Sub-Panel 1J

J100: Management of Sub-Panel 1J
- J110: Management of Sub-Panel activities
- J120: Management of Sub-Panel meetings
- J130: Management of Sub-Panel contributions to Panel 1 and other CCSDS meetings

J200: Update of existing Blue Book
- J210: Develop White Book
- J220: Publish revised Blue Book

J300: New Recommendations
- J310: Investigate areas where new standards are needed
- J320: Assess impact on agencies for implementation of navigation standards

J330: Propose concepts for technical papers

CCSDS PANEL 1 WORK BREAKDOWN STRUCTURE (approval of P1 Plenary pending) (Status 1. November 98)

PANEL-LEVEL ACTIVITIES

P100 Management
- P110: Mngmt of P1 activities
- P120: P1 meetings
- P130: Mngmt of P1 contributions to TSG and MC

P200 System Activities
- P210: CCSDS Architecture/ Space Data System Model

P300 Management of new Work Items
- P310: Prep. activ. f. advanced telem&telecom. systems
- P320: Pass Management
- P330: Data Protection
- P340: Spacecraft ID
- P350: Restructuring of P1 Docs

P400 Sub-Panels 1A/1E Interface

P500 Management of Conformance Assessment

P600 Management of Compatibil./ Interop. Tests

A700 Other Tasks
- A710: Option Matrices/Conformance Proformas
- A720: Compatibility & Interoperability tests

SUB-PANEL A ACTIVITIES

A100 Management
- A110: Mngmt of S-P activ.
- A120: S-P 1A meetings
- A130: Mngmt o. S-P contrib. to P1 & other CCSDS meetings

A200 Telemetry
- A210: Services Blue Book
- A220: New Green Book
- A230: Packet Telem. BB
- A240: Data Compression
- A250: Sub-Packets & Packet Utils.

A300 Telecommand
- A310: New Green Book
- A320: Revision of exist. BBs

A400 Advanced Telem. & Telecommand Systems
- A410: Support of WP P310
- A420: Interim Link Layer Aspects
- A430: New Generation Link Layer
- A440: Optical Comm. Protocols
- A450: Secure Systems

A500 Time Aspects
- A510: Revision of Blue Book
- A520: On-board Data/Time interface
- A530: Time Correlation

A600 Restructuring of Space Communication Recommendations
- A610: Support of WP P350
- A620: Rewrite P1 Recommendations

SUB-PANEL E ACTIVITIES

E100 Management
- E110: Mngmt of S-P activ.
- E120: S-P 1E meetings
- E130: Mngmt o. S-P contrib. to P1 & other CCSDS meetings

E200 Policy Subjects
- E210: Higher Frequencies recomm. developmt
- E220: Data Relay satellites
- E230: Lunar missions communications policy
- E240: Orbiter-lander communications standardization

E300 Technical Subjects
- E310: Bandwidth efficient communications
- E320: Interference mitigation techniques
- E330: Design tools (software & algorithms)
- E340: Earth-to-space link upgrades
- E350: Low cost missions
- E360: Proximity and EVA links
- E370: Ka-band link design for deep space
- E380: Lunar/planetary mission coms systems
- E390: Optical communications

A400 Coding
- A410: Support of WP P400
- A420: Enhanced codes
- A430: Revision of Coding BB
- A440: Devlpmt of GB

E500 Other Tasks
- E510: Support of WP P400
- E520: Review exist. BB/GB recommendations
- E530: Complete BB with respect to capability areas
- E540: Accomplishment of conformance assessment
- E550: Accomplishment of compatibility/interoperability test

SUB-PANEL F ACTIVITIES

F100 Management
- F110: Mngmt of S-P activ.
- F120: S-P 1F meetings
- F130: Mngmt o. S-P contrib. to P1 & other CCSDS meetings

F200 Advanced Telem. & Telecommand Systems
- F210: Support of WP P310 & 350
- F220: Following of SCPS Development
- F230: Protocol-X development

F300 Maintenance of Books
- F310: AOS Books
- F320: SCPS Books
- F330: Protocol-X Book

F500 Other Tasks
- F410: Option Matrices/Conformance Proformas
- F420: Compatibility/interop tests

SUB-PANEL J ACTIVITIES

J100 Management
- J110: Mngmt of S-P activ.
- J120: S-P 1J meetings
- J130: Mngmt o. S-P contrib. to P1 & other CCSDS meetings

J200 Update of existing BB
- WP210: Develop White Book
- WP220: Publish revised BB

J300 New Recommendations
- WP310: Investigate areas where new standards are needed
- WP320: Assess impact on agencies for implementation of navigation standards
- WP330: Propose concepts for technical papers

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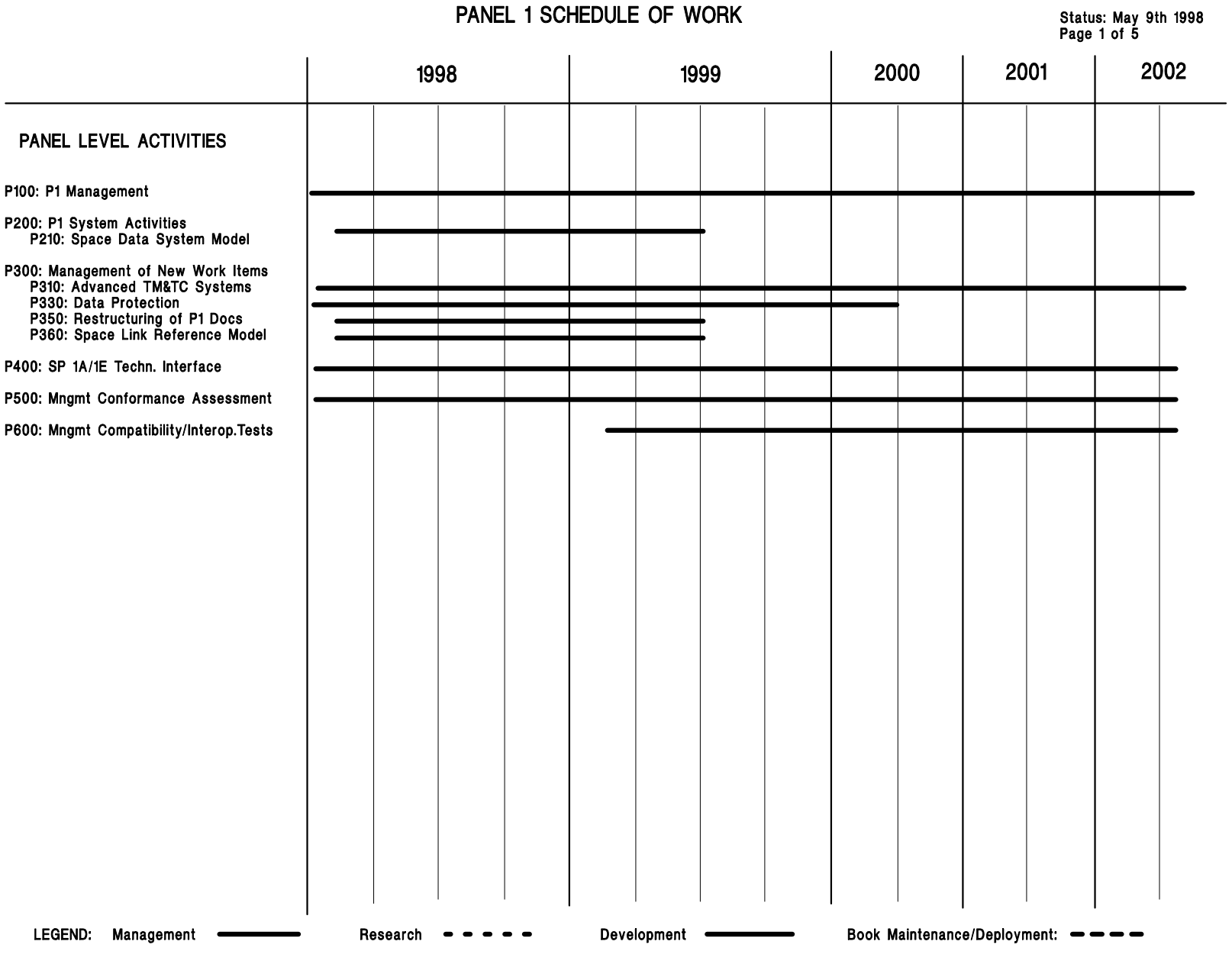
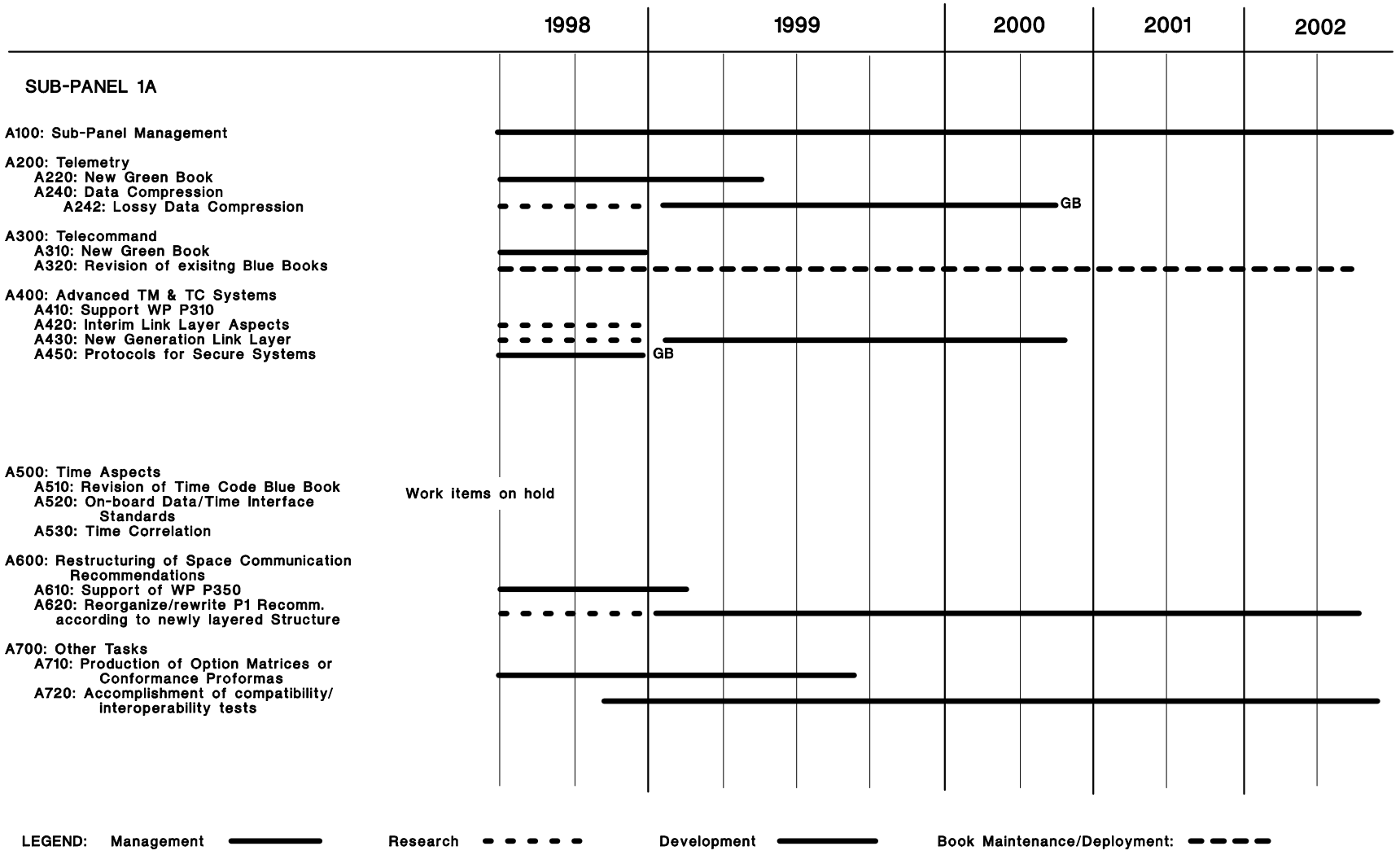

PANEL 1 SCHEDULE OF WORK
Status: May 9th 1998
Page 1 of 5
1998
1999
2000
2001
2002
PANEL LEVEL ACTIVITIES
P100: P1 Management
P200: P1 System Activities
P210: Space Data System Model
P300: Management of New Work Items
P310: Advanced TM&TC Systems
P330: Data Protection
P350: Restructuring of P1 Docs
P360: Space Link Reference Model
P400: SP 1A/1E Techn. Interface
P500: Mngmt Conformance Assessment
P600: Mngmt Compatibility/Interop.Tests
LEGEND: Management
Research
Development
Book Maintenance/Deployment:

PANEL 1 SCHEDULE OF WORK (approval by P1 Plenary pending)

Status: Nov.1st 1998
Page 2 of 5



PANEL 1 SCHEDULE OF WORK (approval by P1 Plenary pending)

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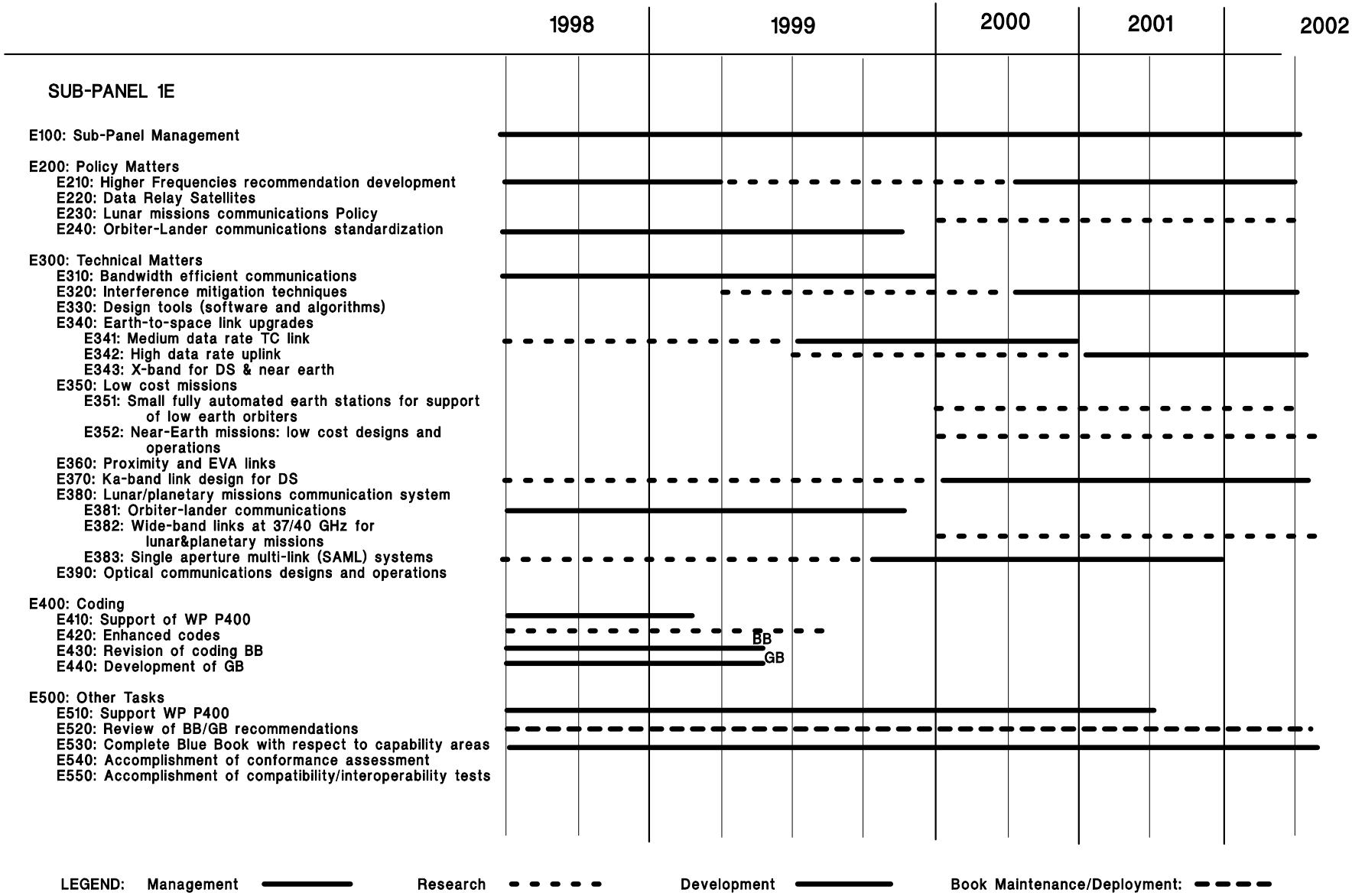
Page 3 of 5



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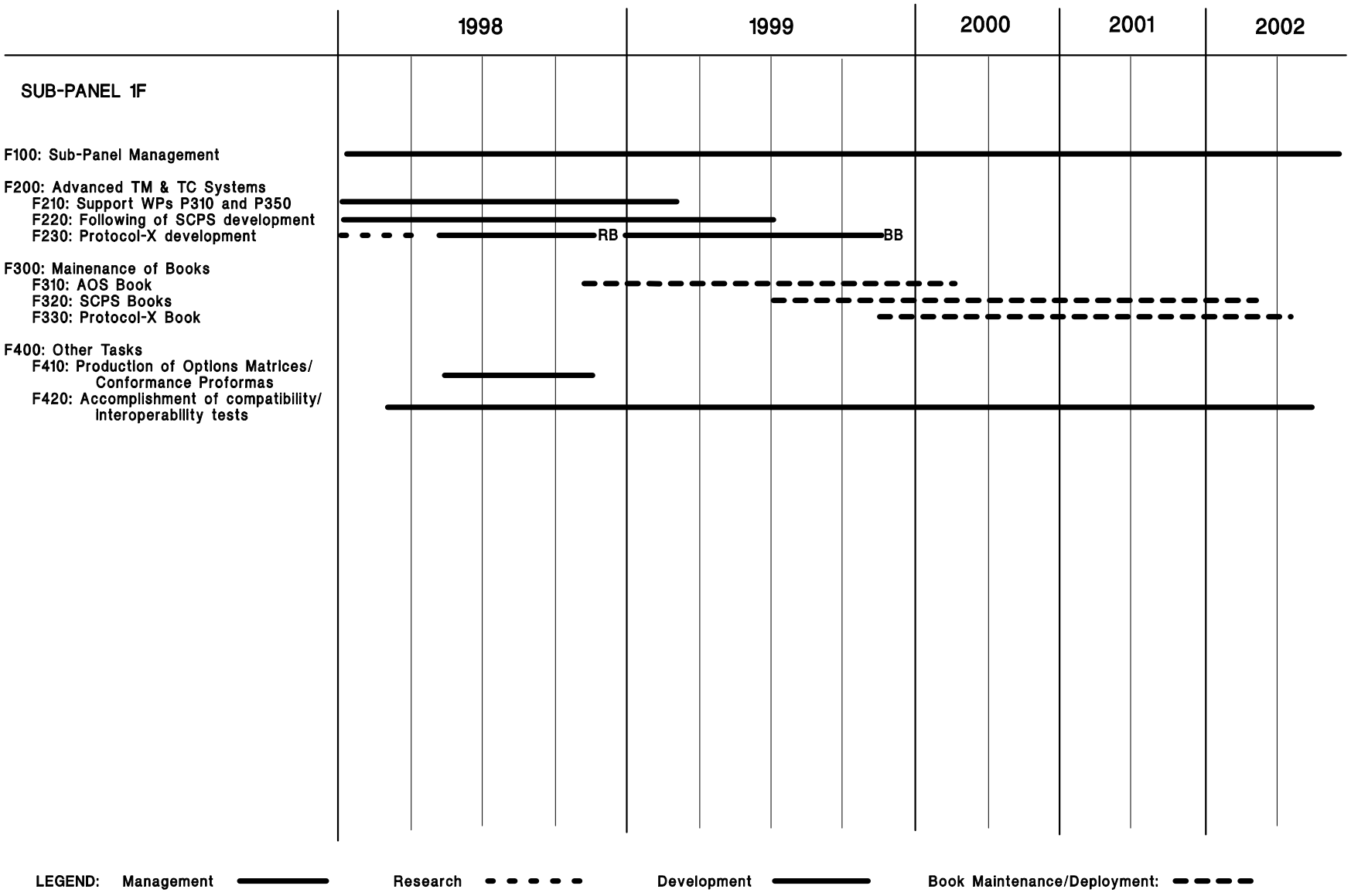
Status: May 9th 1998
Page 4 of 5



PANEL 1 SCHEDULE OF WORK

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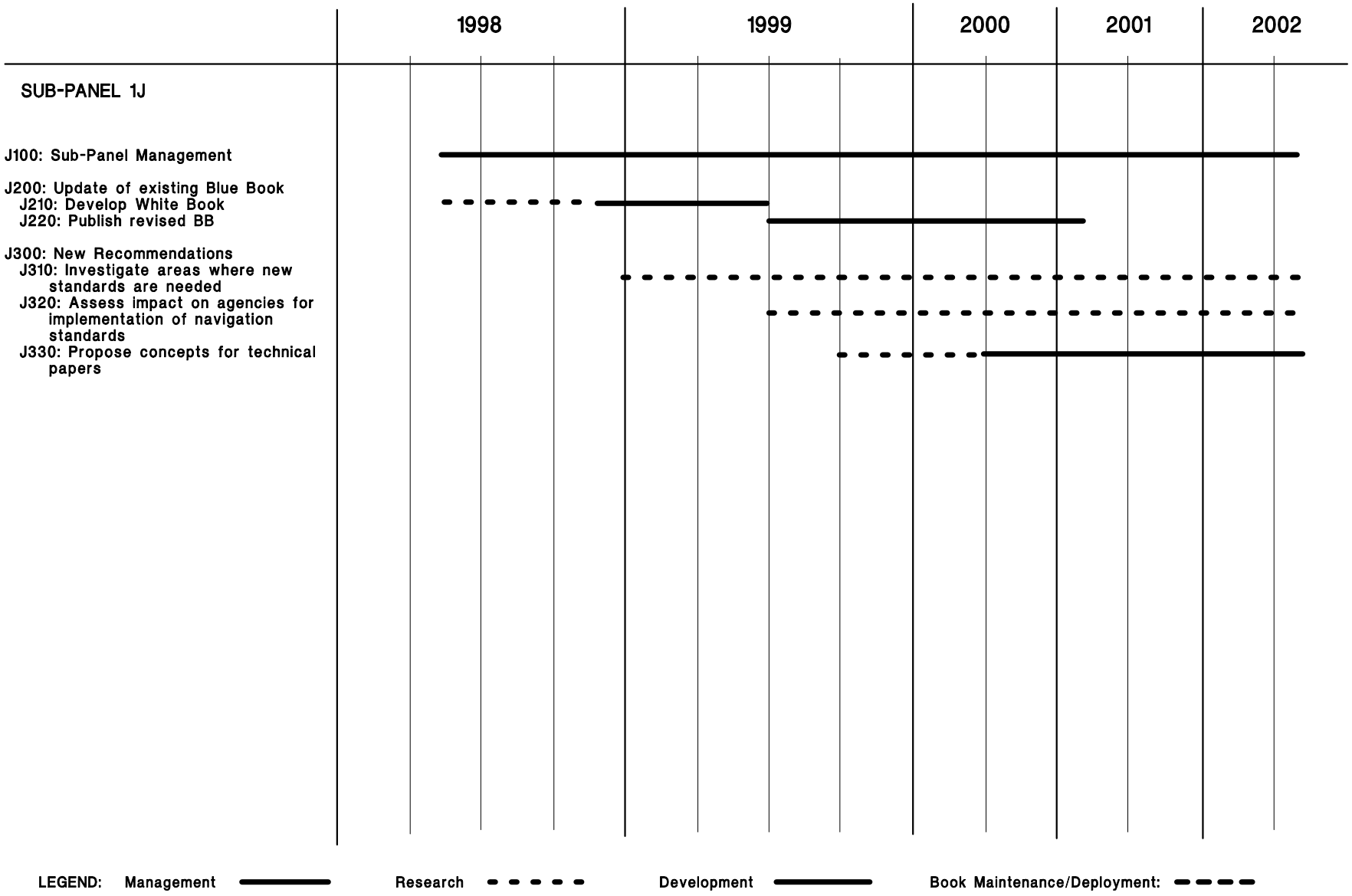
Page 5 of 5



V. ISSUES FOR TSG/MC

- **Lack of technical experts manpower**

- **Lack of continuity concerning the attendance of experts in Technical Panel meetings**

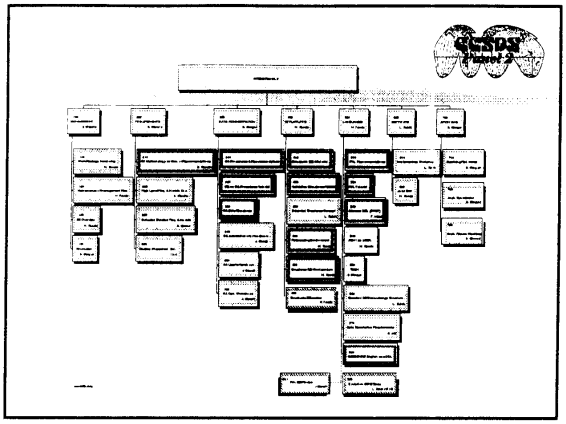
- **In case the CCSDS Strategic Plan is approved by the MC and the agencies access to additional resources is required.**

ATTACHMENT M

PANEL 2 REPORT

CCSDS Panel 2 Report to TSG/MC

David Giaretta
November 1998



WP200 - Requirements

- Encourage Object Oriented analysis of project related entities
- Relate to JAVA implementations in projects
  - Rapid Prototyping
  - Software tools
- Help requirements analysis
- Work with other standards-type bodies

WP300 - Control Authority

- Continued clarification of how the Control Authority fits into the broader ISO registration process

WP500 - Languages

- Data Entity Dictionary Spec. Language
  - new draft addresses overlap with X3.285
  - "Object Oriented"
  - Split into separate books for
    - Abstract Definition BB
    - PVL Implementation BB and GB
    - XML Implementation BB and GB
  - Will delay issuing "Abstract Definition" RB until PVL Implementation RB and GB ready - May 99

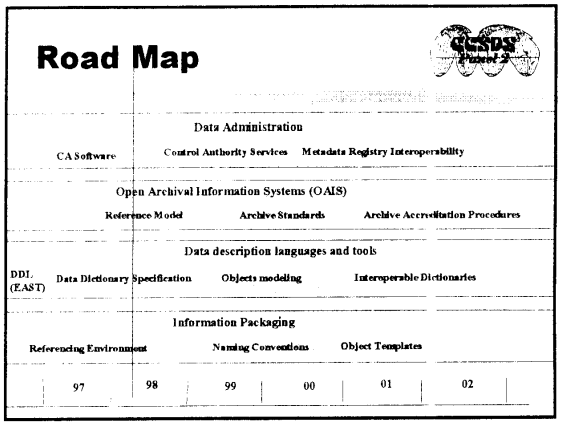
WP500 - Languages (cont)

- Catalogue Interoperability Protocol (CIP-B) developed under CEOS.
  - Reorganisation and new material for CIP document has been identified
    - in particular need to add examples from another discipline e.g. Space Physics
  - Resources will be sought from BNSC to fund editorial work
  - Redraft should be treated as mature draft RB with no technical changes and minimal editorial changes

WP700 - Archiving

- Red Book, and simultaneous submission as ISO DIS - slipped by (further) 6 months to May 1999
  - Detailed timetable for edits agreed
  - Wide community support
  - Terminology already being used by projects

Road Map



Strategic Plan: Panel 2 changes

- Use the term **Information** instead of **Data**
- **Information Services** instead of **Data Interchange**
- Add importance of **ARCHIVES**
- Add services for **Future Generations** i.e. Long-term view
- Services **Increase Value** of the information
- Reiterate seamless join with global information infrastructure

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ATTACHMENT N

PANEL 3 REPORT

Panel 3 Presentation

Maurice Winterholer
Centre National d'Etudes Spatiales
Toulouse, FRANCE

PANEL 3

PANEL 3

PROGRESS REPORT TO

Technical Steering Group

Maurice Winterholer

P3 CHAIRMAN

Report to TSG & MC DARMSTADT , D 4, 5 Nov 98 Winterholer

PANEL 3

PRESENTATION

- Work plan

- **Document Tree**
- **Work Breakdown Structure**
- **Planning and Milestones**
- **Organization/ Work priorities**

- Present Achievement :Documentation production
- P3 Workshop #21 Activities
- Meetings
- Conclusions

Report to TSG & MC DARMSTADT , D 4, 5 Nov 98 Winterholer

PANEL 3

WORKPLAN

The Work plan was revised and updated at the P3 Workshop 21, in DARMSTADT,D October 26-30, 98 .

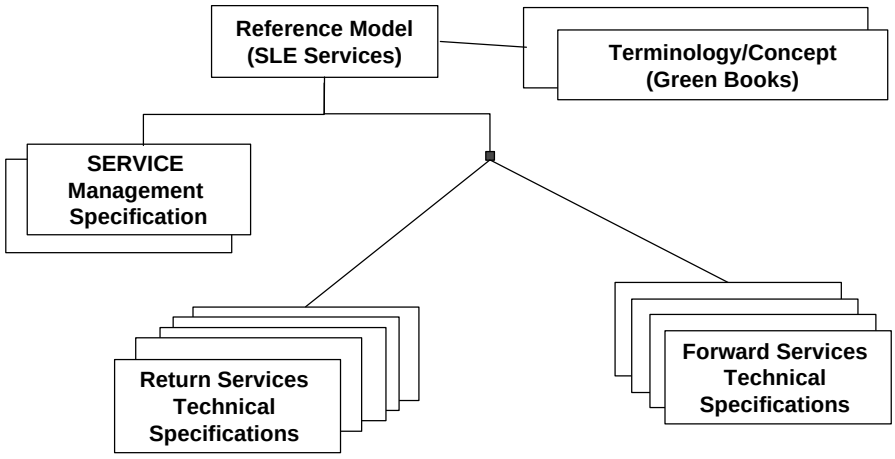
1. WORK PRIORITIES MAINTAINED on the production of :
- SLE Service management recommendations
- SLE Transfer Services recommendations :

2. ORGANISATION MAINTAINED :
- Working Groups WG1, WG2/3, WG4, WG5

Report to TSG & MC DARMSTADT , D 4, 5 Nov 98 Winterholer

PANEL 3

SLE Documentation Tree



Report to TSG & MC DARMSTADT , D 4, 5 Nov 98 Winterholer

PANEL 3 — WORK PROGRESS since HOUSTON

Last issues of Documents release

WP 223 : SLE Service Management	**: 910.5-W-1.16**	**Sept 98**
WP 311 : Return AF Service	**: 911.1-R-1**	**July 98**
WP 312 : Return VC Frame	***: 911.2-R-1***	***July 98***
WP 313 : Return MC/VC-OCF Service	**: 911.3-W-3**	**October 98**
WP 315 : Return Space Packet	**: 911.7-W-1**	**August 98**
WP 316 : MC FSH & VC FSH	**: 911.5-W-1**	**July 98**
WP 321 : Forward CLTU Service	**: 912.1-R-1**	**3 March 98**
WP 321 : Forward CLTU Service UPDATED	**: 912.1-XXX**	**April 98**
WP 322 : Forward TC Frame Service	***: 912.2-W-3***	***October 1998***
WP 323 : Forward Space Packet Service	***: 912.3-R-1***	***July 1998***
WP 324 : Other Forward Services : TC-VCA	***: 912.4-W-2***	***July 1998***

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PANEL 3

SLE Transfer Services Specifications

SLE Transfer Services provide operations for:

- Data transfer
- User notification and reporting
- User control

SLE Return Services:

1.	**Return All Frames (RAF)**	*- existing RB under agencies' review*
2.	**Return (Virtual) Channel Frame (RCF)**	*- RB under agencies' review* ***(next R2 02/99)***
3.	**Return OCF (RMC/VC-OCF)**	*- existing WB ; submitted to* ***Red 04/99***
4.	**Return FSH (RMC/VC-FSH)**	*- existing WB ;*
5.	**Return Space Packet (RSP)**	*- existing WB ; not Red before end 99*

SLE Forward Telecommand Services:

1.	**Command Link transmission Unit (CLTU)**	***- RB ; to be reissued (date TBD)***
2.	**Telecommand frame (TC Frame)**	*- existing WB ; submitted to Red 04/99*
3.	**Forward Space Packet (FSP)**	*- RB under agencies' review (next R2 02/99*
4.	**Telecommand VCA (TCVCA)**	*- existing WB ;*

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PANEL 3

SLE Service Management Specification

+ **The SLE service Management provides operations for the exchange of management information between the MDOS and the SLE System**

+ **SLE service management includes:**
  - **Scheduling of services**
  - **Set-up, configuration, and termination of service provision**
  - **Management of service production**
  - **Management reporting and accountability**
  - **Fault management**
  - **Security management**

+ **Documentation**

SLE Service Management Tutorial	***- existing draft ; revision needed***
SLE Service Management Specification	***- existing WB; RED end 98***
SLE Managed Object Formal Specifications	***- existing draft***
SLE Service S/C Information Specifications	***- existing draft;***
SLE Functional Group managed Object Specs	*- existing draft*

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PANEL 3 Fall 98 Workshop outcome
Documents production schedule

	1997	1998	1999	2000
SVC Mgmt	White		***RED***	***BLUE***
GDMO Spec		White	***RED***	Blue
Information files			White	Red
FGMO		Draft	White	
RAF Service		Red		***Blue***
VC ***& MC*** Frame		Red	***R2***	***Blue***
Return OCF		***White***	***Red***	***Blue***
Return FSH		White		
Return Space Packet				
TC CLTU		Red		***Blue***
Frwd TC Frame		***White***	***Red***	***Blue***
Frwd Packet		Red	***R2***	***Blue***
Frwd TC VCA		***White***		***Blue***
SLE application API			***Draft***	***White***
SLE Security issues			***Draft?***	

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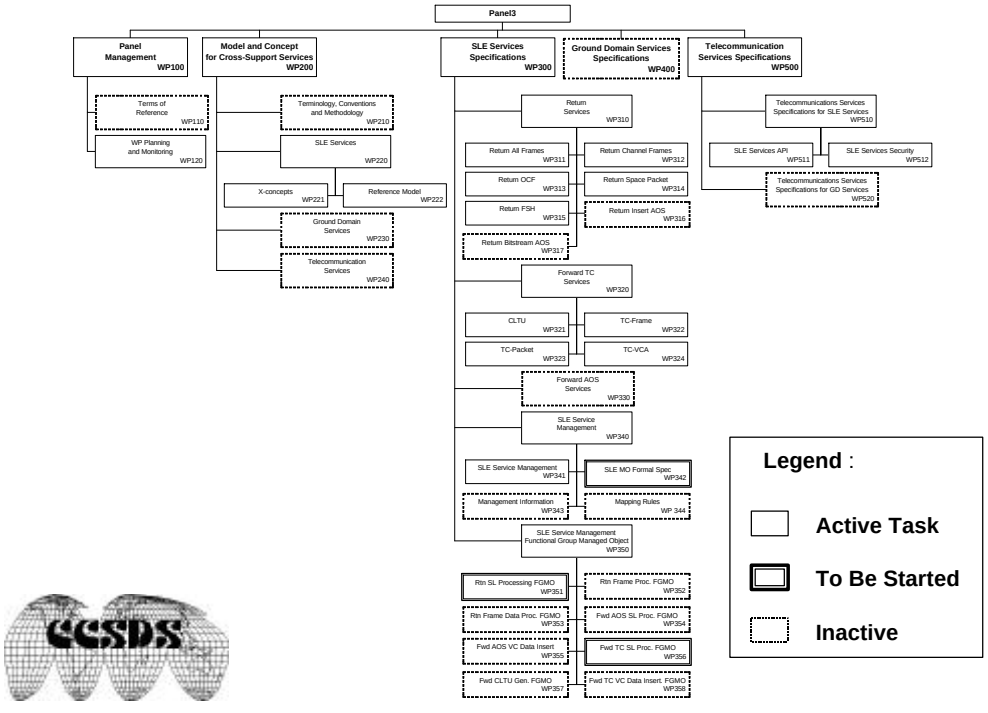
Panel 3 Work Breakdown Structure



PANEL 3 — Work Package Status

WP ID	PACKAGE TITLE	STATUS
WP 110	Terms of reference	*closed / YB*
WP 120	WP Planning and monitoring	active
WP 210	TCM	*closed / GB*
WP 221	Cross Support Concept	*active / GB*
WP 222	SLE-Reference Model	*active / BB*
WP 311	RAF Service Specification	active
WP 312	Return Frames (VC& MC)	active
WP 313	Return OCF (MC & VC)	active
WP 314	Return Space Packet	active
WP 315	Return FSH (MC& VC)	active
WP 321	CLTU Service Specification	active
WP 322	Forward TC Frame Specification	active
WP 323	Forward Space Packet	active
WP 324	Forward TC-VCA	active

active : WP under process
closed : WP achieved GB/BB/YB
waiting : WP not started

Report to TSG & MC DARMSTADT , D 4, 5 Nov 98 Winterholer

PANEL 3 — Work Package Status

WP ID	PACKAGE TITLE	STATUS
WP 341	SLE-Service Management FW Specs	active
WP 351	FGMO specification (RAF aspects)(1)	to be started
WP 356	FGMO specification (CLTU aspects) (1)	to be started
WP 511	SLE application programming interface(2)	to be started
WP 512	SLE security framework (2)	to be started

(1) this work in WG4 covers all RF and modulation production issues,
(2) this work is done in WG5

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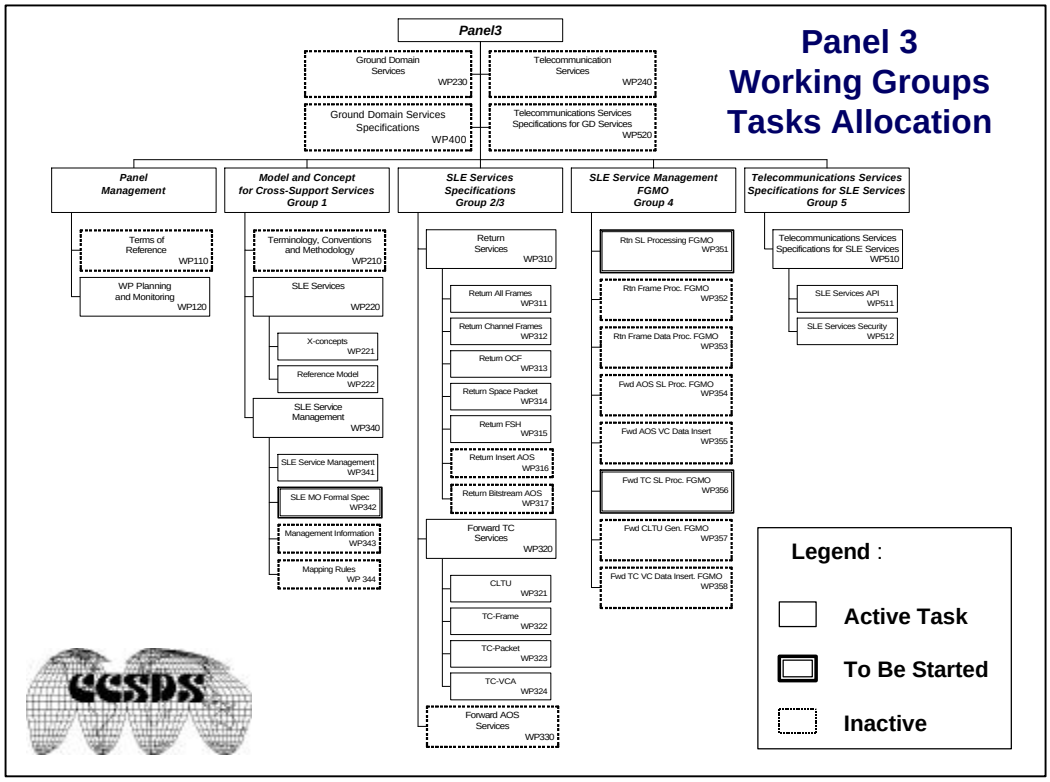

PANEL 3

PRESENT ACHIEVEMENT

Panel 3 Workshop #21 Activities

1. **Agreement on Specific technical issues**
2. **Review of Red Book RIDs and Panel discussions**
3. **Review & revision of SLE Service Management Recommendation**
4. **Grouping option of SLE-Services specifications**
5. **Revised Panel 3 Work Plan and schedule**
   current work plan revision and update
6. **Agreement upon future meetings**
7. **Assigned Action Items to accomplish planned work**

Report to TSG & MC DARMSTADT , D 4, 5 Nov 98 Winterholer

PANEL 3

MEETINGS of Panel 3

Past meetings

Workshop 16 in May 1-7 , 96 in PASADENA
Workshop 17 in November,4-8 , 96 in OBERPFAFFENHOFEN
Workshop 18 in May 19-23, 97 in SILVER SPRING
Workshop 19 in November 3-7, 97 in VILLAFRANCA
Workshop 20 in May 4-8, 98 in HOUSTON
Workshop 21 in Oct 26-30, 98 in DARMSTADT

Working groups meetings in 1998 :
- 1 intermediate meeting for WG1 (July/ESA/ESTEC)
- 1 intermediate meeting for WG2-3-4-5 (Sept/DLR/GESOC)

Next P3 Workshop 22
- Spring 1999 : NASA/JPL PASADENA

Futures intermediate Working groups meetings

WG1 : Jan 99 USA May 99 (?)
WG2/3/4/5 : Jan 99 ?

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PANEL 3 **Requests/information**

5) P3 requests the CCSDS to approach ISO for the definition of an ICD specific to CCSDS, and to develop a relevant control authority for the naming of the various components, objects and data structure identified in P3 CCSDS recommendations (Agencies, Complexes names, ASN1 definitions and Managed Object)

6) P3 intends to produce the Red version of Service management book before next May workshop.

7) P3 intends to group the services specifications documents into ONE book; the corresponding study will be produced for the next workshop.

Report to TSG & MC DARMSTADT , D 4, 5 Nov 98 Winterholer

PANEL 3 **CONCLUSIONS :**

- **Good progress**
- **High priority on the production of the SLE-Service transfer Recommendations and the Service Management**
- **proposal of 2 new RED services specifications and One Red book for the Service management by next Spring**
- **Need for reinforced agencies support, especially for WG 4 & 5**
- **in order to facilitate the start of complementary work in the area of management and communication interface.**

Thanks to ESA for the great hospitality in DARMSTADT

Report to TSG & MC DARMSTADT , D 4, 5 Nov 98 Winterholer

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ATTACHMENT O

LIAISONS LIST

CCSDS Liaisons

MC-S97-26

MC-S97-26.Appointment/Confirmation of CCSDS Liaison Representatives. CCSDS appoints or confirms the following individuals as its Liaison Representatives to the groups indicated:

	Representative	Liaison To	Subject (if appropriate)
1.	Bastikar, A	TC 20/SC 14	General Issues
2.	Sawyer, D.	JTC1/SC 2	Panel 2
3.	Sawyer, D.	TC 46/SC 4	Panel 2
4.	Sawyer, D.	TC 211	Panel 2
5.	Jabs, E.	TC 20/SC 14/ WG 3	Panel 3
6.	Townley, D.	COSPAR	General Issues
7.	Townley, D.	INTELSAT	General Issues
8.	Townley, D.	ISPRS	General Issues
9.	Townley, D.	CEOS	General Issues
10.	Townley, D.	WMO	General Issues

ATTACHMENT P

CCSDS STRATEGIC PLAN

CCSDS B10.0-Y-17

STRATEGIC PLANNING WORKING GROUP MEETING

RESULTS OF MEETING FROM 21. - 23.OCTOBER 1998

H. Kummer

122

November 1998

GENERAL:

- **PARTICIPATION:** Lenhart, Giaretta, Baize, Gerner, Hooke, Gannett, Kummer

- **AGENDA:** present status - future needs (in terms of vision, mission, approach) - strategic goals - development plan - organisational aspects

- **SUMMARY OF INPUT RECEIVED FROM THE AGENCIES AND THE PANELS:**
  - Efficient modulation methods for near-earth communications
  - Communications relay through Mars orbiter
  - Spacecraft control standards
  - Space data system reference model
  - On-board interfaces
  - Generalised data exchange protocols
  - Space Internet.

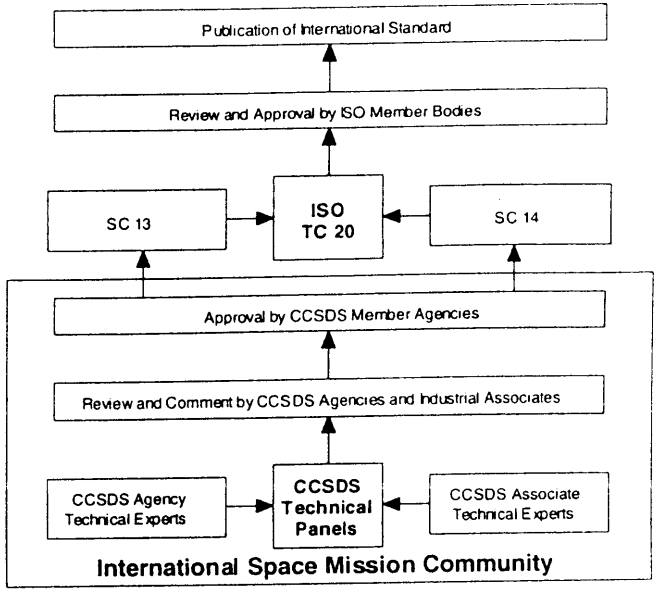
RESULTS OF THE MEETING:

♦ **VISION**

- The CCSDS to lead the seamless integration of space mission information systems including their operational and archival systems with the global information infrastructure
- Thus enhancing the international exploration and utilisation of space while simultaneously realizing significant cost and development time savings.

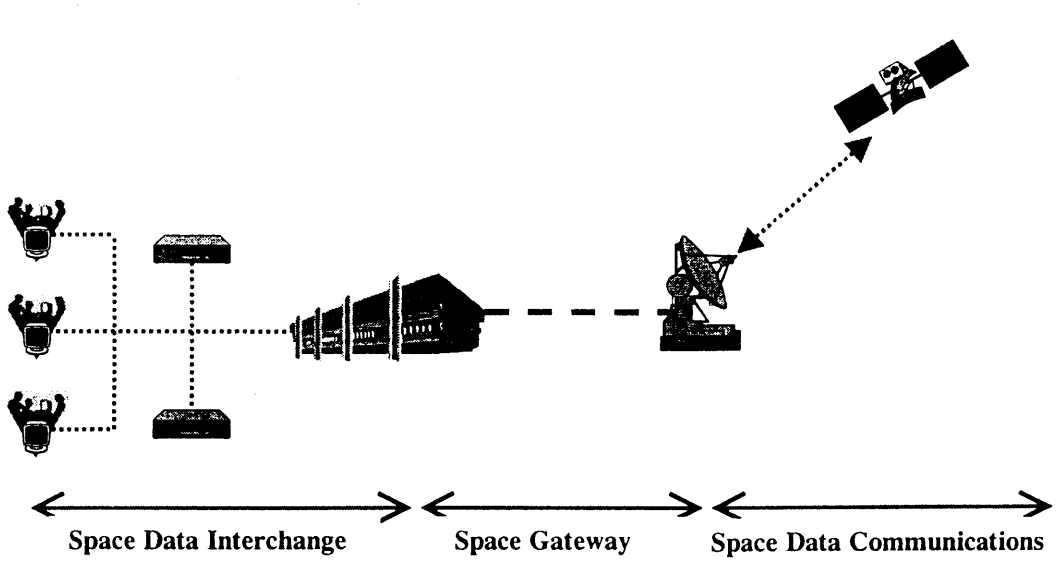
♦ **MISSION**

- ISO chartered the CCSDS to provide the means for space agencies to reach voluntary consensus on common problems concerning the design of space mission information systems.
- The fruits of that consensus will be made available as new international standards
- The CCSDS will provide the infrastructure for their development.



♦ **APPROACH**

- The CCSDS will promote standardization across the three space mission operations service domains:
  - *Space Data Commmunications Service* that allow user applications to exchange information through the data networks that interconnect the space and grond segments of the mission operations system
  - *Space Gateway Services* that are needed to interface the space data communications service with the ground segment of the operations system
  - *Space Data Interchange Service* that allow users to access and exchange space mission information across a data network



♦ STRATEGIC GOALS

- Maintain and propagate the existing set of robust CCSDS spasce data handling techniques that currently support the needs of virtually all
  - free-flying scientific spacecraft in the vicinity of the earth and deep space
  - space stations and related supply vehicles.
- Extend these capabilities to meet the new requirements of the international missions to be flown in the first decade of the new Millennium, including
  - fleets and constellations of spacecraft in the vicinity of the earth
  - clusters of spacecraft in deep space
  - orbiting and in-situ landed vehicles deployed around and on other Solar System bodies.
- Use these aggregate capabilities to stimulate the build-up of internationally interoperable space data communications and navigation infrastructure throughout the Solar System, to support a mix of both robotic and eventual human exploration.
- In particular, to play a leading role in the development of standardised communications and navigation capabilities to support the international exploration of the planet Mars.
- Exploit the power of standardisation to achieve measurable reductions in mission costs and integration time, while supporting increased performance, safety, and reliability.
- Accomplish these measurable advancements by encouraging the development of space as a commercial marketplace through adoption of standardised, interoperable data and information transfer systems across the international space community.
- Increase the value of the information gathered by space missions by making that information understandable and available to the widest contemporaneous audience and to future generations.
- Define a profile of new and existing standards to be used to facilitate interoperability between agencies.

♦ DEVELOPMENT PLAN

The following pages show the 6 tables contained in Volume II of the CCSDS Strategic Plan, Revision 1 of the Preliminary Draft 0, dated October 1998.

Table 1: Develop Interfaces with Commercial Systems

Version 1.0 Date: 26 Oct. 1998

No.	Sub-Task	Elements/Justifications	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	**Interface** with near-Earth communications constellations	▪ Provide low cost and near-real-time telemetry/ telecommand access ▪ Enables potential support to Space Station and LEO Operations ▪ Extend institutional communications ▪ infrastructure without requiring new investment ▪ GCSDS will work with private sector to identify gateways between space mission and public communications systems	Potentially all LEO missions	Medium term	P1E plus P1A then P3	Mode 1
2	Interface with commerctal near- Earth navigation systems (e.g. GPS, GLONASS, etc.)	▪ Provide tow-cost spacecraft position determination service without requiring unique institutional tracking systems ▪ CCSDS will point to existing capabilities and recommend an integrated space navigation concept	Potentially all LEO missions	Short term	P1E plus P1J	Mode 1
3	Interface with commercial audio and video data distribution	▪ Support easy bridging of space audio/video into public media distribution systems ▪ Enable low cost public Telepresence in space exploration ▪ CCSDS will adopt/adapt standard commercial capabilities such as MPEG, JPEG	Potentially all LEO missions, in particular manned missions	Short term	Px then P3	

Short term: less than 2 years
Medium term: between 2 and 5 years
Long term more than 5 years

Mode 1: Developer is CCSDS
Mode 2: Developer is subset of CCSDS
Mode 3: Alliance with outside CCSDS entity for development
Mode 4: Use of existing standards or elements of them

Table 2: Develop Highly Efficient Communications in Resource-Constrained Environments

Version 1.0 Date: 26 Oct. 1998

No.	Sub-Task	Elements/Justifications	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	Single Aperture/Multi-user RF links	▪ Allow multiple spacecraft to share a single ground antenna	Deep space uplink and downlink	Short term (Mars mission)	P1E	Mode 1
2	Higher Frequencies (e.g. KA-Band, optical)	▪ Migrate away from congested/contested lower frequency bands ▪ Provide increased data transmission capacity ▪ Reduce tracking time to alleviate network over-subscription	Missions using "desert ground stations" (deep space) Satellite to satellite links	Short term for Ka-band Long term for optical	P1E	Mode 1
3	Efficient Modulation Methods	▪ Provide Bandwidth-efficient modulation techniques to maximize use of limited spectrum resources ▪ Provide Power-efficient modulation techniques for deep space missions, landed and roving vehicles, etc.	Potentially all missions	Short term for bandwidth efficient modulations Medium term for poser-efficient modulations	P1E	Mode 1 or 2
4	High Performace Coding	▪ Provide improved performance without requiring larger RF aperture/power ▪ Reduce tracking time to alleviate network over-subscription	Potentially all missions	Medium term	P1E	Mode 1
5	New Proximity and In-Situ Communications and Navigation Links	▪ Provide proximity spacecraft-spacecraft and EVA links for constellations and fleets ▪ Provide relay links (surface-orbirter or surface-surface) to stimulate buildup of interoperable data communications infrastructure on and around other Solar System bodies (e.g. Mars) ▪ Integrated communications and positioning services	Mars mission; Space stations	Short term	P1E, P1A, P1F, P1J (for the positioning)	Mode 1 and Mode 4
6	Multicast Data Transmission	▪ Allow multiple users to share a common communications channel	Potentially all GEO and DS missions (using Globalstar/Tele-desic concept)	Medium/Long term	P1E and P1A	Mode 1 or 3

Table 2: Continued

Version 1.0 Date: 26 Oct. 1998

No.	Sub-Task	Elements/Justifications	Missions	Schedule	Imple-menter	Mode of Implemen-tation
7	File Transfer Protocols	▪ Support autonomous spacecraft ▪ Enable exchange of large quantities of key information during short duration tracking passes ▪ Enable automation of labor-intensive ground operations	Potentially all missions, in particular with data storage capability	Short term	P1F	Mode 1 and 3
8	Advanced Data Compression	▪ Adopt/adapt commercial file compression capabilities (such as ZIP) to extent onboard file storage capabilities ▪ Develop new space-unique lossy compression schemes as necessary to maximize return of large quantities of information	Potentially all mission, in particular with storage capability	Medium term	P1A	Mode 1 and Mode 4
9	Security and Privacy	▪ Protect Data links against unintentional intrusion (e.g. radio interference) ▪ Provide end-to-end data protection against intentional intrusion ▪ As space missions become more internetworked, risk of malicious activity increases	In particular mission with audio and video communications Elements of International Space Station	Short term	P1E, PX, and P3	Mode 1, Mode 3 and Mode 4

Table 3: Develop Space Missions as "Nodes on Internet"

Version 1.0 Date: 26 Oct. 1998

No.	Sub-Task	Elements/Justifications	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	Extend the Internet into near-Earth vicinity	▪ Develop alliances with Internet standardization bodies to allow terrestrial Internet capabilities tobe extended into near-Earth space ▪ Allow experimenters to use familiar Internet-based communications mechanisms and standard application dialogues ▪ Reduce cost by using well-tested commercially available systems ▪ Extend addressing capability	Potentially all missions, in particular fleets of satellites	Medium term	P1F, P2, P3	Mode 3
2	Extend the Internet into deep space	▪ Develop alliance with Internet standardization bodies to allow terrestrial Internet capabilities to be utilized in deep space and on/around other Solar System bodies ▪ Deploy fragments of the Earth's Internet throughout the Solar System, interconnected by gateways and long-haul communications links, to build up slowly and "Interplanetary Internet" ▪ Extend addressing capability	Planetary orbiters and rovers	Short term	P1F, P2, P3	Mode 3

Table 4: Develop Interoperable "Plug-n-Play" Spacecraft Components

Version 1.0 Date: 26 Oct. 1998

No.	Sub-Task	Elements/Justifications	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	Enable space deveices and subsysems to be "network ready	▪ Develop on-board bus/network interfaces ▪ Develop on-board network services ▪ Develop on-board time distribution systems ▪ Develop on-board resource management interfaces ▪ Fill in the mechanical aspects of standardization (e.g., plug and pin power, cooling, mounting interfaces etc.)	All missions, in particular missions with international participation	Medium-Long term	Px	Modes 3, Mode 4 (Establish joint working groups with ISO/TC 20/SC 14 and industry participants

Table 5: Develop Interoperable "Plug-n-Play" Spacecraft Components

Version 1.0 Date: 26 Oct. 1998

No.	Sub-Task	Elements/Justifications	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	Standadize spacecraft monitor and control	▪ Develop/adopt messaging systems for transmitting commands to space systems and verifying responses ▪ Use commercial/industrial automation approaches	All missions, in particular cross support missions, e.g., Integral, Mars missions	Short term	P3	Mode 1
2	Standardize ground system monitor and control	▪ Develop messaging systems for transmitting commands to supporting ground network systems and verifying responses ▪ Use commercial/industrial automation approaches	All missions	Short term (CSOC); otherwise Medium term	P3	Mode 4
3	Standardize tracking and navigation services	▪ Develop orbit determination services ▪ Develop trajectory analysis service ▪ Develop maneuver planning/design service ▪ Develop rendezvous and docking techniques	All Mars missions, space stations	Short term	P1J & P3	Mode 2 (e.g., NASA and CNES)
4	Standardize flight engineering services	▪ Develop spacecraft health/safety monitoring service ▪ Develop performance-analysis service ▪ Develop spacecraft time correlation service ▪ Develop telecommunications link analysis service	Potentially all missions	Medium term	P3	Mode 1 and 2
5	Standardize mission planning services	▪ Develop mission profile design service ▪ Develop mission sequence design service	Potentially all missions	Medium term	P3	Mode 1 or 2
6	Standardize telecommunications services	▪ Develop ground network communications services ▪ Develop audio/video distribution service	Potentially all missions	Medium term	P3 (P2)	Mode 1 or 2

Table 6: Develop Standard Data Interchange and Archiving Services

Version 1.0 Date: 26 Oct. 1998

No.	Sub-Task	Elements/Justifications	Missions	Schedule	Imple-menter	Mode of Implemen-tation
1	Standadize information infrastructure architecture for space data		All missions	Medium term	P2	All modes
2	Develop space data archiving techniques		All missions, in particular science and Earth observation missions	Short term	P2	All modes

Short term: less than 2 years
Medium term: between 2 and 5 years
Long term more than 5 years

Mode 1: Developer is CCSDS
Mode 2: Developer is subset of CCSDS
Mode 3: Alliance with outside CCSDS entity for development
Mode 4: Use of existing standards or elements of them

♦ ORGANISATIONAL ASPECTS

- Mode of Implementation, i.e. production of CCSDS Recommendations and ISO Standards

Owing to shrinking resources of the CCSDS agencies a modified approach of recommendations/standards development has to be adopted.

Mode	Generation of Requirements	Development	Review	Approval
1	CCSDS	CCSDS	CCSDS	CCSDS
2	CCSDS	One or several agencies of CCSDS	CCSDS	CCSDS
3	CCSDS	CCSDS in an alliance with other entities	CCSDS	CCSDS
4	CCSDS	Adopt existing standards	CCSDS	CCSDS

- Supplementation of existing panel and sub-panel organisation
- P1E takes over that part of the coding which is near to the physical layer
- P1A takes care of the link layer
- P1F will be responsible for the layers above the link layer
- a new panel is needed for the standards of interoperable plug-and-play spacecraft components

- Completion and Maintenance of Strategic Plan
- Discussion and commenting of Preliminary Draft 0 by TSG
- Discussion and approval of PD 0 by MC and converting it into Draft 1
- Review of Draft 1 by agencies
- Processing of agency comments by Strategy Working Group and production of Draft 2 by mid Feb 99
- Agency review of Draft 2 by mid March
- Strategy Working Group to produce Draft 3 by end March for TSG and MC review in Spring 99
- Eventually it is planned to have Volume I approved by higher agency authorities.

- Implementation of Strategic Plan
- The panels will modify their plans of work in accordance with the approved CCSDS Strategic Plan

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ATTACHMENT Q

CNES COMMENTS FOR CCSDS STRATEGIC PLAN REVIEW

CNES COMMENTS ON STRATEGIC PLAN

We are looking for efficiency (best use of scarce resources) and not for an occupation => we should concentrate on topics where CCSDS brings a high value added.

The strategic plan is an excellent tool and the outcome of the WG is a very good starting point.

To obtain the efficiency we should:

1. Define the potential customer(s) and identify their requirements
2. Assess the value added by CCSDS versus already made decision.
3. For selected topics, conduct a Phase O study (feasibility, issues) and assess the likelihood to do the work with available resources.
4. For decided topics:
   a) Define priorities taking into account the logic between tasks (e.g. internet into space depends on security and privacy issues.
   b) Establish a program plan with agency subscription.

ATTACHMENT R

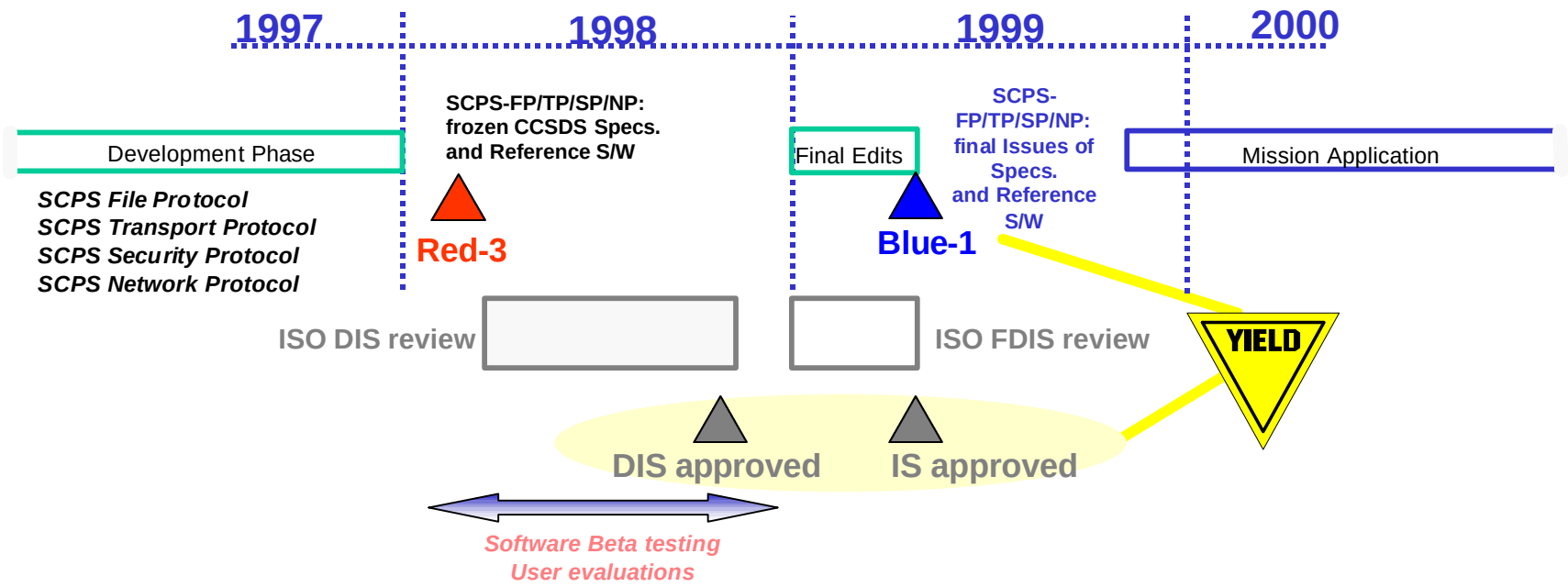
AOS DOCUMENTS REVIEW

121
Data
Compression
704
Audio, Video
and
Still Image
717
SCPS
File
Protocol
727
CCSDS File
Delivery
Protocol
300
Time Code
Formats
720
Upper
Layer
protocols
714
SCPS
Transport
Protocol
200
Telecommand:
Packet
Frame
COP
Coding
700
Advanced
Orbiting
Systems
710
Internet-
Derived
protocols
713.5
SCPS
Security
Protocol
701
Architectural
Specification
100
Telemetry:
Packet
Frame
Coding
713
SCPS
Network
Protocol
705.1/2/3/4
Formal
protocol
Specifications
(LOTOS)
400
Radio
Frequency &
Modulation
CCSDS
Subpanel-1F,
Advanced
Orbiting
Systems
CCSDS
TSG/MC
ESOC
Nov 98

Periodic (5-year) Updates of AOS

- **701 document (AOS Architectural Specification) was reconfirmed pending the Yamada report of consolidated Link layer**
  - *Many technical issues have been addressed by Yamada's "Synchronous 2" draft specification*
- **704 (Audio/Video) and 705 (LOTOS) both come due for reconfirmation in 5/99**
  - *Audio/Video partially used; no current resources to update them.*
  - *LOTOS specs. have served their purpose.*
- **Recommendations:**
  - ***Retain 701 until Yamada activity complete, then transfer to P1A for consolidation as "Synchronous-2" protocol***
  - ***Downgrade 705 (LOTOS specs.) to (4) informative Green Books***
  - ***Circulate notice of "Intent to Downgrade" 704 spec. (Audio-Video) to an informative Green Book. Seek Agency support to revise and update the Blue Book; otherwise downgrade to Green at next meeting***
    - ***Meanwhile, withdraw Audio/Video as ISO DIS.***

SCPS Finalization



Recommendations:

(1) At the November 1998 meeting, the CCSDS Management Council should approve Red-3 Blue-1 transition, subject to P1F approving (via mail review) a list of editorial changes.

(2) To avoid an "IS-before-Blue" anomaly, submit request to ISO Secretariat to delay FDIS final review until it can be synchronized with mail review cycle noted in (1)

ATTACHMENT S

INTERPLANETARY INTERNET

1

TSG Reports:

1. NASA Report on SuperMOCA
2. NASA Report on Interplanetary Internet

CCSDS
Technical Steering Group Meeting
ESOC, Darmstadt
04 November, 1998
Adrian J. Hooke, NASA

2

1. SuperMOCA[1] Status

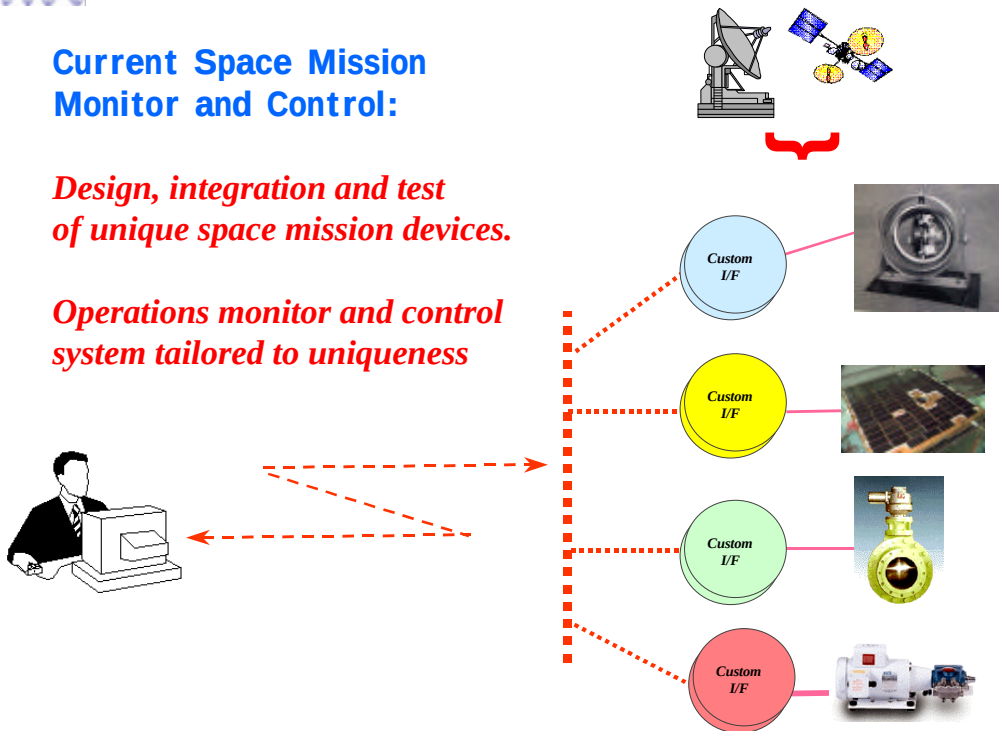
([1] Space Project Mission Operations Control Architecture)

3

Current Space Mission Monitor and Control:

Design, integration and test of unique space mission devices.

Operations monitor and control system tailored to uniqueness



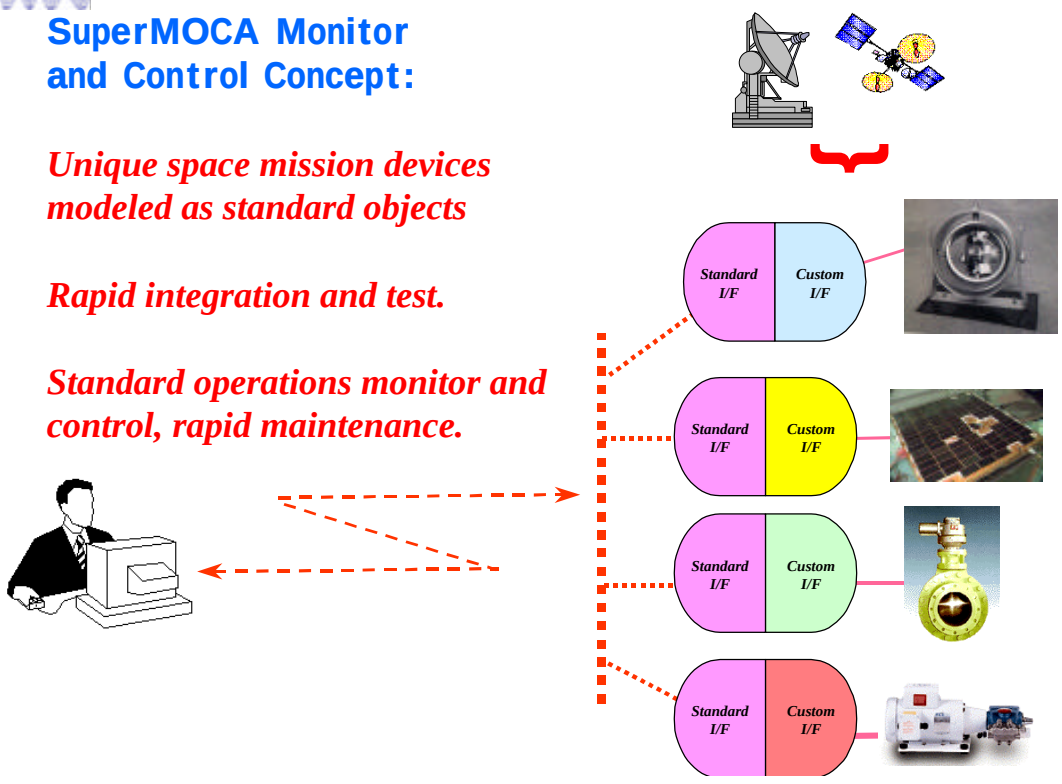
4

SuperMOCA Monitor and Control Concept:

Unique space mission devices modeled as standard objects

Rapid integration and test.

Standard operations monitor and control, rapid maintenance.



5

SuperMOCA Status

- **When support was requested, CCSDS Agencies did not endorse the need for standardized space mission monitor and control**
- **SuperMOCA therefore "went it alone" as a NASA R&D project**
- **Scraped-by the last two years on random funding**
- **Funding was approved for this year (Oct '98-99) *but***
  - **Resources were assumed to be provided by other project under-run money that did not materialize**
- **Current status is that unless SuperMOCA can get adopted by the JPL-X2000 project, it will be canceled by year's end:**
  - **the future of SuperMOCA will now be decided by one project at one center of one national space agency.**

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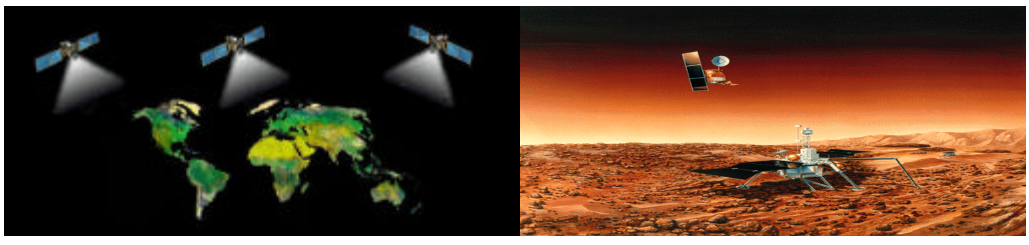
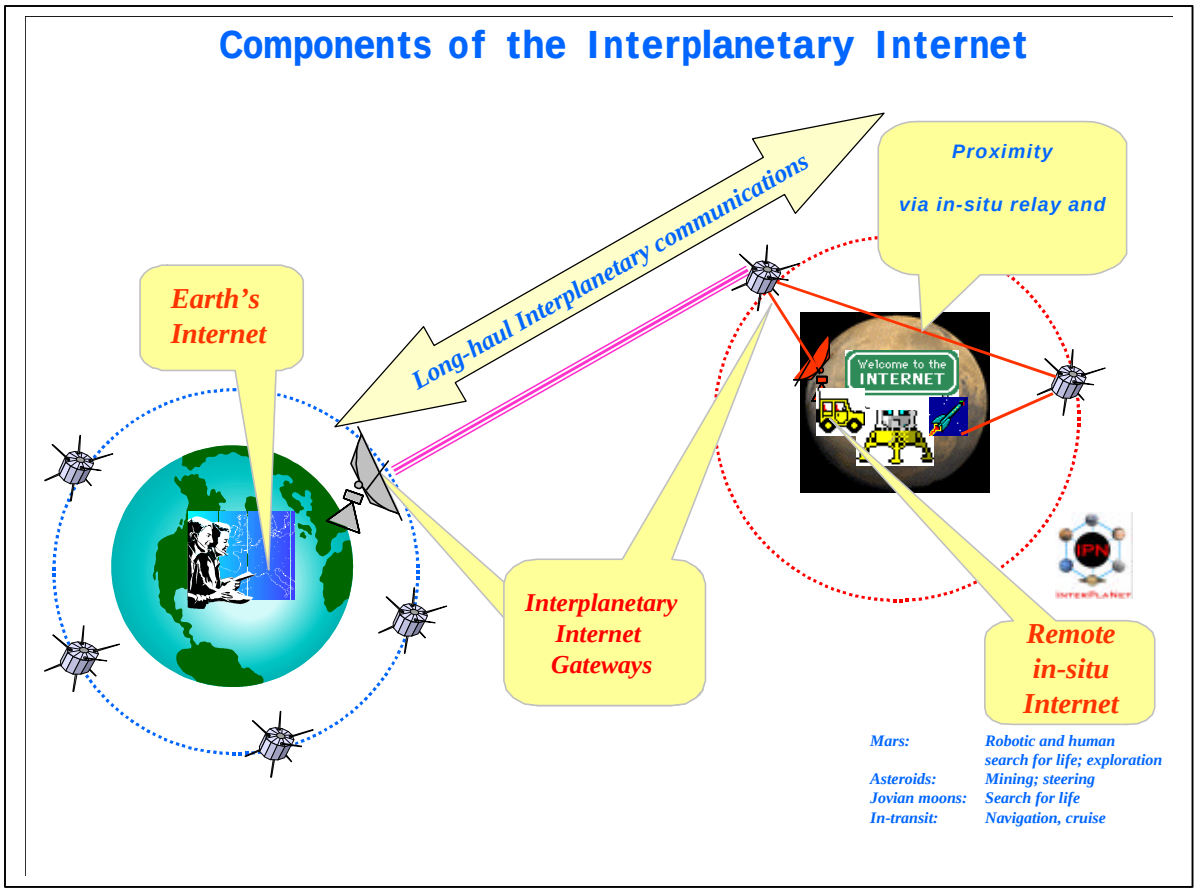
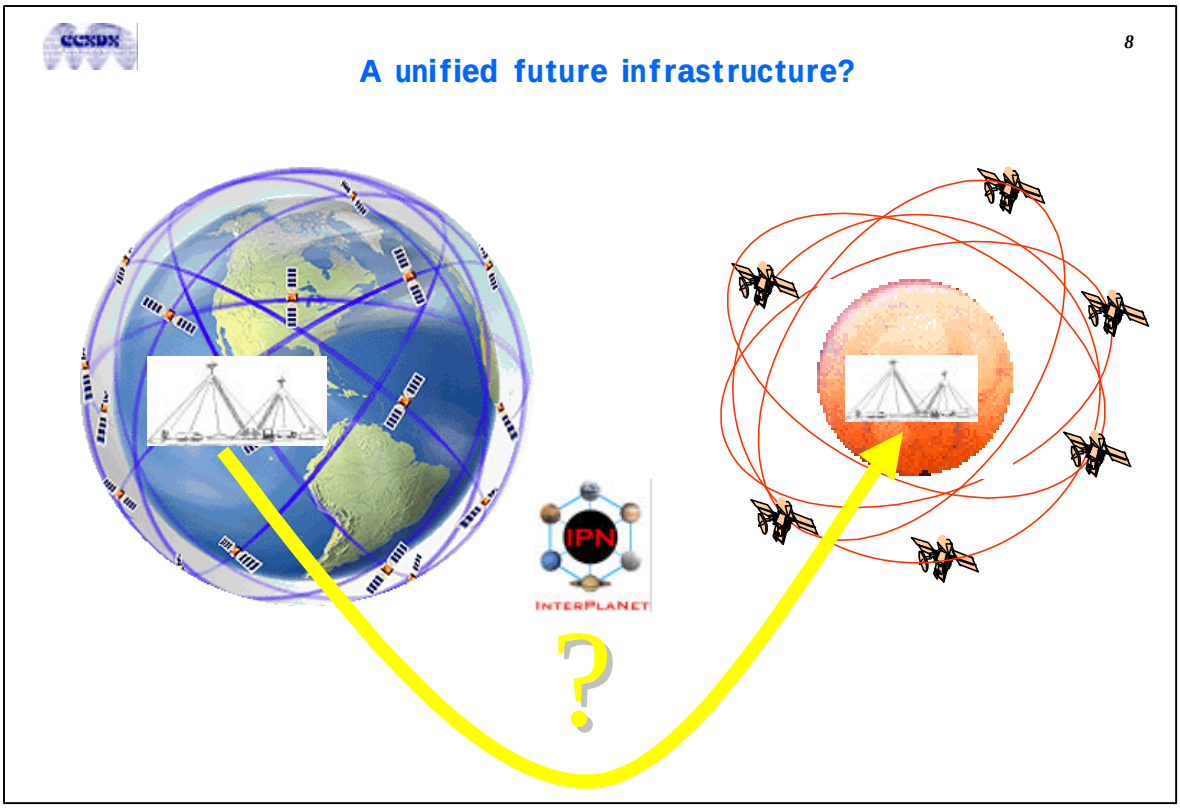
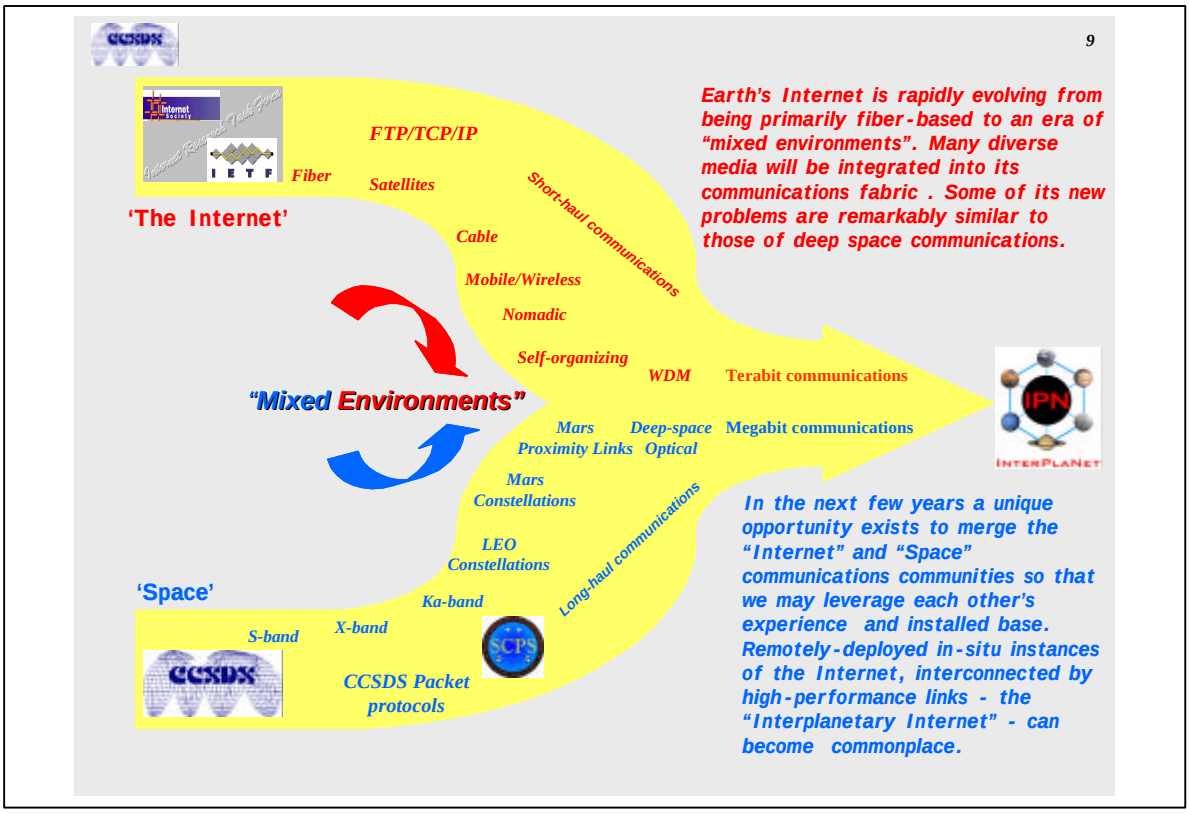
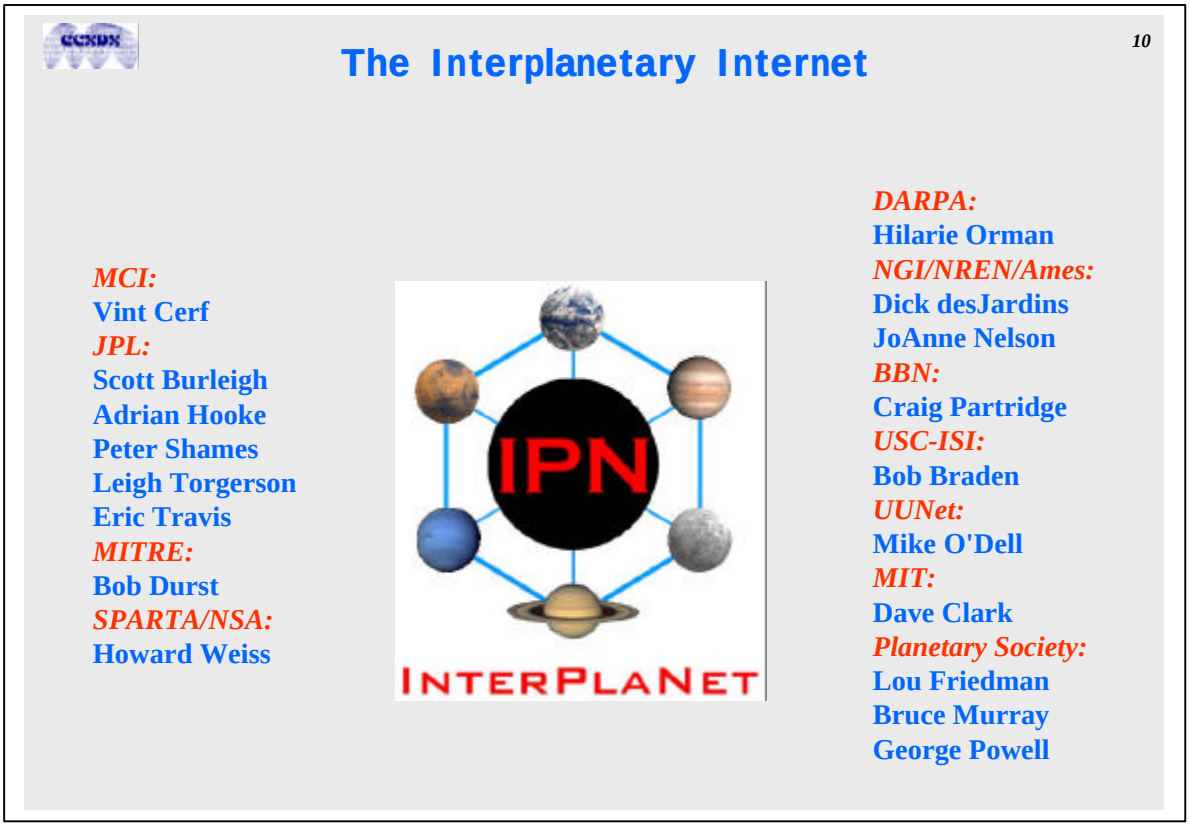
2. InterPlanetary Internet (IPN) Status



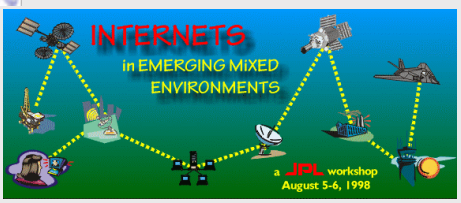

Components of the Interplanetary Internet
Earth's Internet
Long-haul Interplanetary communications
Proximity
via in-situ relay and
Welcome to the INTERNET
Interplanetary Internet Gateways
Remote in-situ Internet
Mars: Robotic and human search for life; exploration
Asteroids: Mining; steering
Jovian moons: Search for life
In-transit: Navigation, cruise

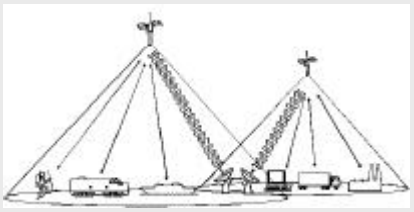

8
A unified future infrastructure?
IPN
INTERPLANET
?


9
'The Internet'
FTP/TCP/IP
Fiber
Satellites
Short-haul communications
Cable
Mobile/Wireless
Nomadic
Self-organizing
WDM
Terabit communications
"Mixed Environments"
Mars
Deep-space
Megabit communications
Proximity Links
Optical
Mars Constellations
LEO Constellations
Long-haul communications
'Space'
Ka-band
S-band
X-band
CCSDS Packet protocols
Earth's Internet is rapidly evolving from being primarily fiber-based to an era of "mixed environments". Many diverse media will be integrated into its communications fabric . Some of its new problems are remarkably similar to those of deep space communications.
In the next few years a unique opportunity exists to merge the "Internet" and "Space" communications communities so that we may leverage each other's experience and installed base. Remotely-deployed in-situ instances of the Internet, interconnected by high-performance links - the "Interplanetary Internet" - can become commonplace.


10
The Interplanetary Internet
MCI:
Vint Cerf
JPL:
Scott Burleigh
Adrian Hooke
Peter Shames
Leigh Torgerson
Eric Travis
MITRE:
Bob Durst
SPARTA/NSA:
Howard Weiss
IPN
INTERPLANET
DARPA:
Hilarie Orman
NGI/NREN/Ames:
Dick desJardins
JoAnne Nelson
BBN:
Craig Partridge
USC-ISI:
Bob Braden
UUNet:
Mike O'Dell
MIT:
Dave Clark
Planetary Society:
Lou Friedman
Bruce Murray
George Powell

11





(Earth Orbiting) Satellite
- *High bandwidth-delay products*
- *Potential loss due to bit-errors and/or link outages*
- *Potential asymmetric data rates*

Wavelength Division Multiplexing
- *Data multiplexed onto individual laser wavelengths*
- *Fiber capacities in the Terabits/second*
- *Ultra high bandwidth-delay product*
- *Bandwidth-delay product >> typical transaction size*

Interplanetary In-Situ Network (IPN-I)
- *Power management of preeminent importance*
- *Some losses due to bit-errors*
- *Mobile/wireless self-organizing networks*
- *Initially small to moderate bandwidth-delay products*

Mobile/Wireless
- *Supports mobile, self-organizing networks*
- *Power management of preeminent importance*
- *Losses due to bit-errors and handovers*
- *Small, but increasing bandwidth-delay products*

Interplanetary Relay Network (IPN-R)
- *Ultra high bandwidth-delay product*
- *Asymmetric data rates*
- *Losses due to bit-errors and handovers*
- *Bandwidth-delay product >> typical transaction size*

Cable Modem/xDSL
- *Asymmetric data rates*
- *Some losses due to bit-errors*
- *Moderate bandwidth-delay products*

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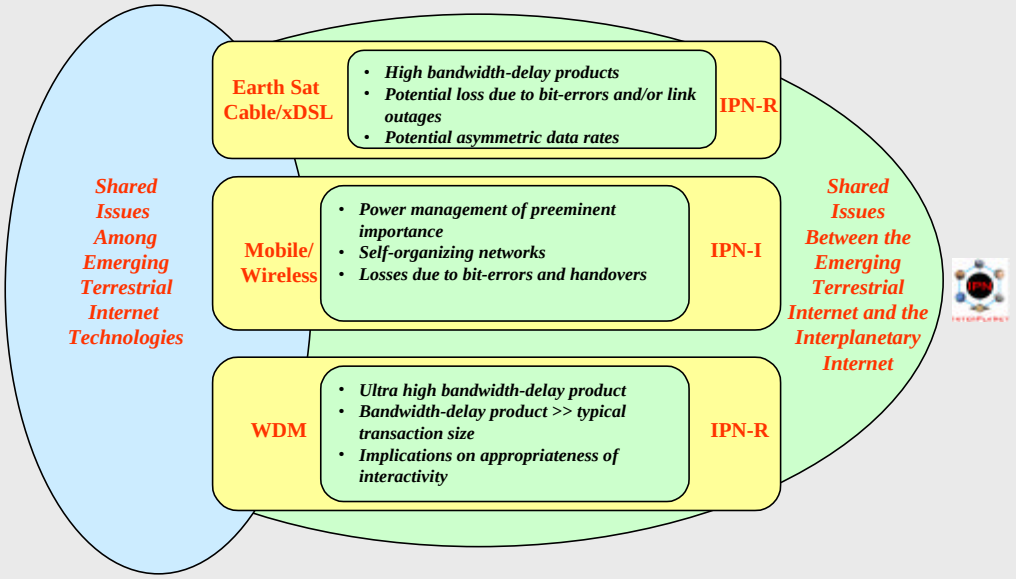
Internet and InterPlaNet (IPN)

Shared Technology Issues



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ATTACHMENT T

AD-HOC WORKING GROUP ON SECURITY

Report on the CCSDS Ad-Hoc Working Group on Security (AHWGS)

Howard Weiss
SPARTA, Inc.
Hsw@sparta.com
November 1998

Background

- The Ad-hoc Working Group on Security (ahwgs) was formed at the Houston CCSDS TSG meeting (May 1998).
  - Adrian Hooke (NASA/JPL) made a presentation calling for CCSDS to address data protection issues that have been or will come to be of concern for space missions.
  - As a result, the TSG voted to create the AHWGS.

AHWGS Charter

- The AHWGS was chartered by the TSG to:
  - identify data protection issues and threats across the three CCSDS panels
  - formulate a proposal for the course of action (if any) that CCSDS should pursue (technical scope of work, recommended organization, rough order of magnitude estimate of schedule/resources)
  - present results to the TSG at their next meeting in November 1998 at ESA/ESOC in Darmstadt, Germany

AHWGS Members

- Chair: Howard Weiss (NASA/SPARTA)
- Panel 1 rep: Nick Shave (BNSC/Logica)
- Panel 2 rep: Patrick Mazal (CNES)
- Panel 3 rep: Michael Stoloff (NASA/JPL)
- At Large:
  - Zhao Heping (CAST)
  - Steve Foley (BNSCIDERA)

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Background: What Are The Security Issues?

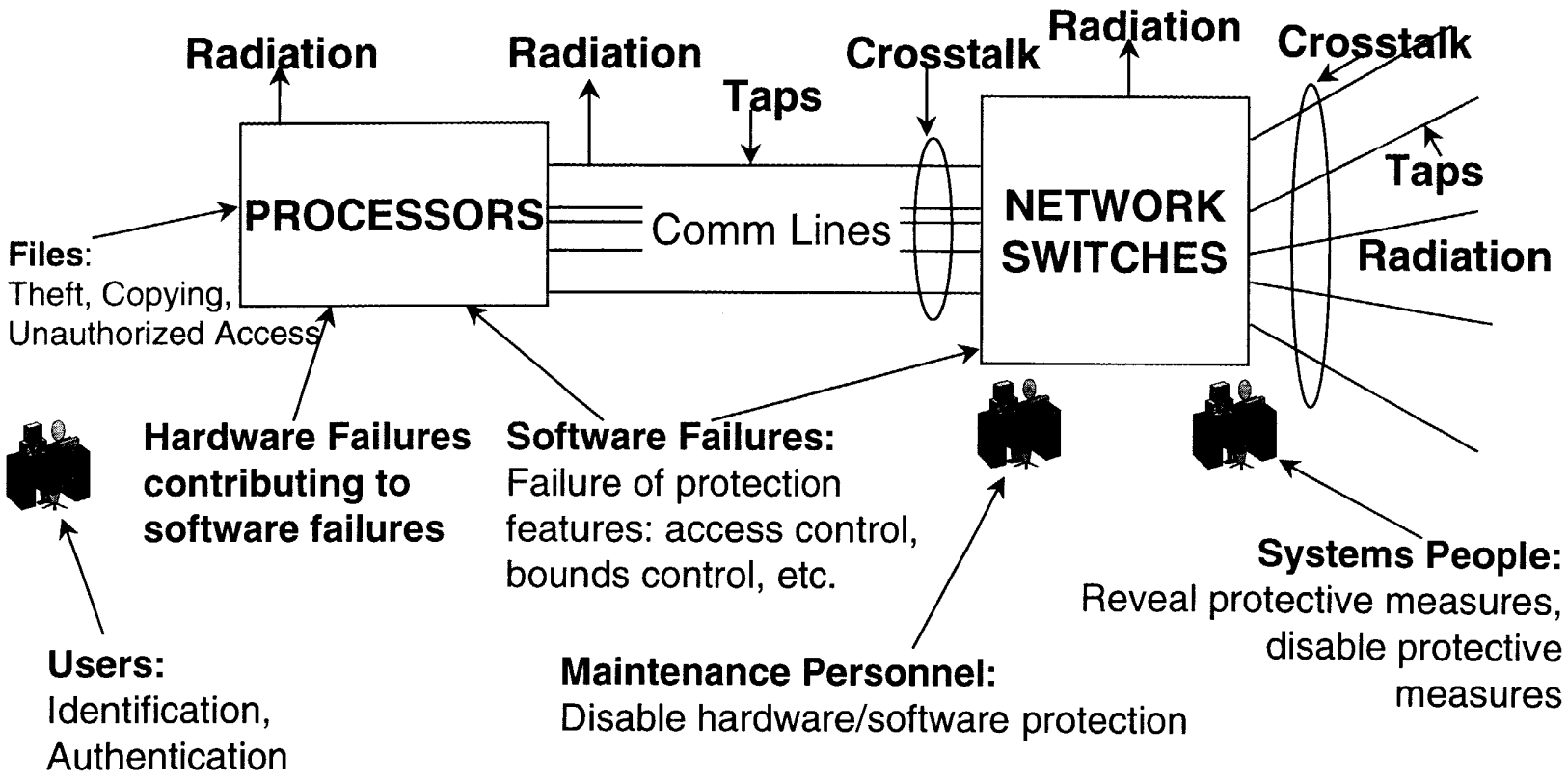
- Identification and authentication (I&A)
  - assurance of the correct identity of a spacecraft “user”
- Access controls
  - who can command a spacecraft (command authentication)
  - who can obtain or change data (from a spacecraft or from a ground-based archive)
- Confidentiality
  - protect against eves-dropping of radiated RF signal
- Data Integrity

Background: Generic Threats

- Ubiquitous network connectivity results in greater ability of outsiders to gain unauthorized access
  - use of more on-line technology for controlling spacecraft and for performing science provides more opportunities for external hacking
  - Masquerading
  - unauthorized person(s), centers acting as authorized to take over control, receive unauthorized data, or make unauthorized modification of data
  - - Space-ground RF transmissions can easily be intercepted

SPARTA

Network Vulnerabilities



From the Defense Science Board Report on Security Controls for Computer Systems, January 1970.

AHWGS: First Order of Business

- Established mailing list
  - ahwgs@columbia-sparta.com
- Requested each working group member to provide a short summary of the security work that is on-going in the panel/agency represented
- Inputs received from:
  - Panel 1 (from Nick Shave)
  - Panel 2 (from Patrick Mazal)
  - Panel 3 (from Michael Stoloff)
  - CAST (from Zhao Heping)

SPARTA

Highlights of Panel 1 Inputs

- Telecommand Green Book "Data Protection Concepts" annex.
- AOS Green Book data protection concepts
- SCPS Security Protocol
- PlA Security Green Book (in development)
- Identification of missions using CCSDS recommendations & security:
  - ESA telecommand authentication (but apparently never used an ESA mission)
  - EUMETSAT telemetry encryption
  - UK STRV 1 c/d
  - Space Station (AOS security on uplink)

Highlights of Panel 2 Inputs

- Panel 2 is aware of security issues but.....
  - No security-related work underway now.
- *Data Archiving Reference Model* has had high level considerations on security policies concerning access control to restrict or allow access to elements of the archives, but these considerations have not been refined.

Highlights of Panel 3 Inputs

- No security work currently on-going in P3, but there is great interest in providing *secure* cross-support.
- Security issues of interest:
  - Security domains between cross-support entities.
  - End-to-end vs. hop-by-hop security between security domains
  - Public key infrastructure and X.509 certificates

Highlights of CAST Inputs

- CAST is internally developing data protection mechanisms at the packet telecommand and telemetry transfer layer
  - this work was presented to PlA in May 1998 (at the Houston meeting).
  - based on the data protection mechanism concepts in CCSDS200.0-G-6, Telecommand, Summary of Concept and Rationale, January 1987

Course of Action (#l)

- Recommendation #1: CCSDS should undertake a work program to perform a detailed assessment of the security risks. and threats against civil space missions.
- Risk analysis and vulnerability study
  - Threat analysis to determine likelihood of successful exploitation of any uncovered vulnerabilities.
  - Design mission security to counter threats and residual risks.

Course of Action (#2)

- **Recommendation #2:** CCSDS requirement for all Panels to include security in all work-items or explain, in detail, why not:
  - All panels must examine the security implications of their projects from the outset.

    >> As a result security becomes an integral portion of all CCSDS work items
    >> security awareness is greatly improved
    >> security mechanisms will be specified

  - Books should not be approved without having performed a security analysis.

Course of Action (#3)

- **Recommendation #3:** The current PlA Security Green Book work should be expanded to include Panels 2 and 3.
  - this would form a CCSDS work-item to develop a cross-panel security document which would facilitate the identification of security issues and provide example solutions.

Course of Action (#4)

- **Recommendation #4:** SCPS Security Protocol should be implemented on all CCSDS missions having an identified security threat:
  - CCSDS should consider performing a flight test (e.g., STRV-1 c/d)
  - provides the ability to perform cross-support in a secure, end-to-end manner.

Course of Action (#5)

- **Recommendation #5:** A generic CCSDS Space Mission System Security Policy to aid CCSDS mission developers should be developed
  - could be done independently or as part of the cross-panel security green book development.

Summary, Observations and Conclusions

- *The Good News:*
  - - CCSDS is more aware of security issues than we first thought
  - - however, security is not yet *ubiquitous*

Summary, Observations and Conclusions

- *The Bad News:*
  - CCSDS still has a long way to go to ensure secure**,** interoperable space data systems

    >> many work items ignore security

    >> other work items are cognizant of security needs, but are not actively pursuing security solutions

    >> no coordinated approach for assessing security within CCSDS

    >> the perception still lives on that security is not an issue in many (most) civil missions (i.e., overcoming the mindset that security is a military mission problem)

Summary, Observations and Conclusions

- *The Bottom Line:*
  - A working group should be chartered to implement the specific actions recommended by the Ad-Hoc Working Group on Security and to develop additional recommendations and actions.