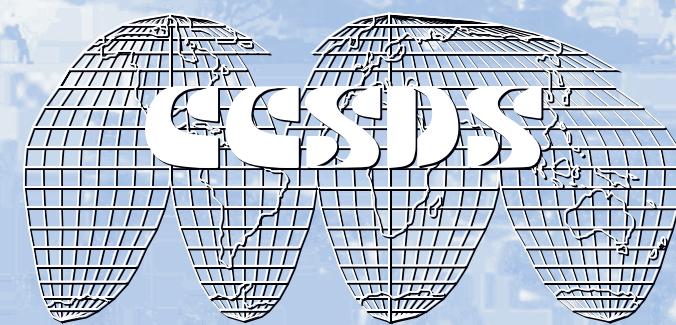


# CCSDS Implementations

Missions and Products



**NASDA**  
NATIONAL SPACE DEVELOPMENT AGENCY OF JAPAN  
宇宙開発事業団



Draft 6  
October 2001

# **CCSDS IMPLEMENTATIONS**

## **MISSIONS AND PRODUCTS**

**Draft 6  
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## Foreword

This report contains preliminary results of an ongoing survey of implementations conforming to Consultative Committee for Space Data Systems (CCSDS) Recommendations for Space Data System Standards. The information herein has been compiled by the CCSDS Secretariat. It is known to be incomplete and is intended only to provide an overview of the range of CCSDS-compatible implementations that have been developed around the world. Questions or comments about the contents of this report should be forwarded to the CCSDS Secretariat at the address on page ii.

At time of publication, the active Member and Observer Agencies of the CCSDS were:

Member Agencies

- Agenzia Spaziale Italiana (ASI)/Italy.
- British National Space Centre (BNSC)/United Kingdom.
- Canadian Space Agency (CSA)/Canada.
- Centre National d'Etudes Spatiales (CNES)/France.
- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)/Germany.
- European Space Agency (ESA)/Europe.
- Instituto Nacional de Pesquisas Espaciais (INPE)/Brazil.
- National Aeronautics and Space Administration (NASA)/USA.
- National Space Development Agency of Japan (NASDA)/Japan.
- Russian Space Agency (RSA)/Russian Federation.

Observer Agencies

- Austrian Space Agency (ASA)/Austria.
- Central Research Institute of Machine Building (TsNIIMash)/Russian Federation.
- Centro Tecnico Aeroespacial (CTA)/Brazil.
- Chinese Academy of Space Technology (CAST)/China.
- Commonwealth Scientific and Industrial Research Organization (CSIRO)/Australia.
- Communications Research Centre (CRC)/Canada.
- Communications Research Laboratory (CRL)/Japan.
- Danish Space Research Institute (DSRI)/Denmark.
- European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)/Europe.
- European Telecommunications Satellite Organization (EUTELSAT)/Europe.
- Federal Service of Scientific, Technical & Cultural Affairs (FSST&CA)/Belgium.
- Hellenic National Space Committee (HNSC)/Greece.
- Indian Space Research Organization (ISRO)/India.
- Institute of Space and Astronautical Science (ISAS)/Japan.
- Institute of Space Research (IKI)/Russian Federation.
- KFKI Research Institute for Particle & Nuclear Physics (KFKI)/Hungary.
- MIKOMTEK: CSIR (CSIR)/Republic of South Africa.
- Korea Aerospace Research Institute (KARI)/Korea.
- Ministry of Communications (MOC)/Israel.
- National Oceanic & Atmospheric Administration (NOAA)/USA.
- National Space Program Office (NSPO)/Taipei.
- Swedish Space Corporation (SSC)/Sweden.
- United States Geological Survey (USGS)/USA.

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# Introduction

The Consultative Committee for Space Data Systems (CCSDS) was formed in 1982 by the major space agencies of the world to provide a forum for discussion of common problems in the development and operation of space data systems. It is currently composed of nine member agencies, twenty-three observer agencies, and over 100 industrial associates.

CCSDS products are data- and information-system Recommendations intended to serve as baseline documents for the applicable standards of the participating agencies. Through its association with International Organization for Standardization (ISO) Technical Committee 20 (TC 20)/Subcommittee 13 (SC 13), the CCSDS has progressed the majority of its Recommendations to ISO International Standards.

The Recommendations of the CCSDS have been widely accepted by the international space community (space agencies and their partners). And although the CCSDS has been in existence for fewer than twenty years, internationally over 100 space missions using CCSDS-recommended data systems are either in operation or in active development, and an impressive infrastructure of CCSDS-compatible ground data systems has grown up to support those missions. At the same time, despite the relatively small size of the commercial market for space information systems, a strong base of international commercial developers has emerged, and today a wide variety of CCSDS-compatible products are available commercially.

This report presents an overview of known CCSDS-compatible missions and products. The lists of missions and products are the result of ongoing studies and are known to be incomplete. They will be updated as information on new missions and products comes to light. Current lists of CCSDS-compatible missions and products can be found on the Web at the following location:

<http://ccsds.gst.com/implementations/>

## CCSDS Missions

The table below lists missions known to be using CCSDS-recommended protocols. For the missions listed, CCSDS protocol use ranges from CCSDS Version 1 Transfer Frames for telemetry (early missions) to the full suite of conventional and/or Advanced Orbiting Systems (AOS) telemetry and telecommand protocols. Many of these missions also follow CCSDS Recommendations for data archiving, Space Link Extension (SLE) services, Time Code Formats, and Lossless Data Compression; the majority conform to CCSDS Recommendations for Radio Frequency and Modulation Systems.

The table is a product of a compilation of information gathered from several sources. In many cases, information was obtained from requirements, design, and interface-control documents prepared for individual missions. Reports and technical papers discussing use of CCSDS-recommended standards in particular missions, mission-related Web pages, and CCSDS agency reports to the CCSDS Management Council were also consulted. Where no documents were available, information was obtained through discussions with mission personnel.<sup>†</sup>

	Mission		Launch	Lead
1	ERS-1	ESA Remote Sensing Satellite 1	Jul-91	ESA
2	SAMPEX (SMEX-1)	Solar, Anomalous and Magnetospheric Particle Explorer (Small Explorer 1)	Jul-92	NASA/GSFC
3	EURECA	European Retrieval Carrier satellite	Jul-92	ESA
4	Spacelab-Deutsche 2		Apr-93	DLR
5	STRV-1 A/B	Space Technology Research Vehicles 1A/1B	Jun-94	BNSC
6	MIR-18 and follow-on missions		Various	NASA, RSA
7	ERS-2	ESA Remote Sensing Satellite 2	Apr-95	ESA
8	ISO	Infrared Space Observatory	Nov-95	ESA
9	Radarsat-1		Nov-95	CSA
10	SOHO	SOHO International Solar Terrestrial Physics Program (ISTP/COSTR)	Dec-95	ESA
11	ROSSI XTE	Rossi X-Ray Timing Explorer	Dec-95	NASA/GSFC
12	NEAR Shoemaker	Near Earth Asteroid Rendezvous/Shoemaker(Discovery Program 1)	Feb-96	NASA/APL
13	BeppoSAX	Satellite per Astronomia X (Beppoin honor of Giuseppe Occhialini)	Apr-96	ASI, NIVR, ESA
14	Cluster		Jun-96	ESA

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<sup>†</sup> (1) A list of acronyms appears at the end of the table.  
 (2) Launch dates for future missions are volatile, and some of the projected dates shown in the table may no longer be consistent with current mission planning.  
 (3) For telecommunications satellites, use of CCSDS protocols is generally limited to spacecraft command and control.

## ***CCSDS Implementations—Missions***

	<b>Mission</b>		<b>Launch</b>	<b>Lead</b>
15	TOMS-EP	The Total Ozone Mapping Spectrometer Earth Probe	Jul-96	NASA/GSFC
16	FAST (SMEX-2)	Fast Auroral Snapshot Explorer	Aug-96	NASA/GSFC
17	MGS	Mars Global Surveyor	Nov-96	NASA/JPL
18	MPF	Mars Pathfinder (Discovery Program 2)	Dec-96	NASA/JPL
19	ARIANE 5		Various	CNES
20	ACE	Advance Composition Explorer	Aug-97	NASA/GSFC
21	Hotbird-3	Telecommunications Satellite	Sep-97	ESA
22	Cassini/Huygens		Oct-97	NASA/JPL
23	TEAMSAT	Technology, science and Education experiments Added to MaqSAT	Oct-97	ESA
24	YES	Young Engineers' Satellite	Oct-97	ESA
25	ETS-VII	Engineering Test Satellite VII	Nov-97	NASDA
26	TRMM	Tropical Rainfall Measuring Mission	Nov-97	NASDA
27	Sirius 2		Nov-97	Nordiska Satellit AB
28	Lunar Prospector	Discovery Program 3	Jan-98	NASA/ARC
29	SNOE	Student Nitric Oxide Experiment	Feb-98	NASA/LASP
30	Hotbird-4	Telecommunications Satellite	Feb-98	ESA
31	NileSat 101	Telecommunications Satellite	Apr-98	NileSat
32	TRACE (SMEX-4)	Transition Region and Coronal Explorer (Small Explorer 4)	Apr-98	NASA/GSFC
33	Planet-B	a.k.a. NOZOMI	Jul-98	ISAS
34	Eutelsat W2	Telecommunications Satellite	Oct-98	Eutelsat
35	HotBird-5	Telecommunications Satellite	Oct-98	Eutelsat
36	DS-1 (NMP)	Deep Space 1 (New Millennium Program)	Oct-98	NASA/JPL
37	AfriStar	Telecommunications Satellite	Oct-98	WorldSpace
38	Spartan 201-5	Technology Experiment Augmenting Spartan (TEXAS) (STS-95)	Oct-98	NASA
39	Mars Surveyor 1998 Orbiter	Mars Climate Orbiter	Dec-98	NASA/JPL
40	SWAS (SMEX-3)	Sub-millimeter Wave Astronomy Satellite (Small Explorer 3)	Dec-98	NASA/GSFC
41	International Space Station		Various	Multinational
42	ROCSAT-1		Jan-99	NSPO
43	Mars Surveyor 1998 Lander	Mars Polar Lander	Jan-99	NASA/JPL
44	Stardust	Stardust (Discovery Program 4)	Feb-99	NASA/JPL
45	Oersted		Feb-99	DSRI

## ***CCSDS Implementations—Missions***

	<b>Mission</b>		<b>Launch</b>	<b>Lead</b>
46	Arabsat 3A	Telecommunications Satellite	Feb-99	Arabsat
47	Eutelsat W3	Telecommunications Satellite	Apr-99	Eutelsat
48	Landsat-7	Landsat 7	Apr-99	NASA/GSFC
49	ABRIXAS	A BRoad-band Imaging X-ray All-sky Survey	Apr-99	DLR/GSOC
50	QuikSCAT	Quick Scatterometer Mission	Jun-99	NASA/LASP
51	FUSE	Far Ultraviolet Spectroscopic Explorer	Jun-99	NASA/GSFC
52	Chandra X-Ray Observatory	Formerly, Advance X-Ray Astrophysics Facility-Imaging (AXAF)	Jul-99	NASA/MSFC
53	MTSAT	Multifunctional Transport Satellite	Aug-99	NASDA
54	Sesat	Siberian-European Satellite (Telecommunications Satellite)	Nov-99	Eutelsat-Intersputnik
55	WIRE (SMEX-5)	Wide-Field Infrared Explorer (Small Explorer 5)	1999	NASA/GSFC
56	Terra	Earth Observing System AM-1	Dec-99	NASA/GSFC
57	KOMPSAT-1	Korea Multi-purpose Satellite	Dec-99	KARI
58	XMM-Newton	X-ray Multimirror Mission	Dec-99	ESA
59	X-38	Crew Return Vehicle	Various	NASA
60	Hispasat 1C	Telecommunications Satellite	Feb-00	Hispasat S.A.
61	AsiaStar	Telecommunications Satellite	Mar-00	WorldSpace
62	Eutelsat W4	Telecommunications Satellite	May-00	Eutelsat
63	CHAMP	CHAllenging Microsatellite Payload	May-00	DLR/GSOC
64	QuickBird-1	Commercial remote sensing satellite	Jun-00	EarthWatch
65	OrbView-3	Commercial remote sensing satellite	Jun-00	ORBIMAGE
66	STENTOR	Satellite Technologique pour Experimenter des Nouvelles Techniques en ORbite	Jun-00	CNES
67	NEMO	Naval EarthMap Observer	Jun-00	NRL
68	Intelsat K-TV	Telecommunications Satellite	Jul-00	TBD
69	EO-1 (NMP-2)	Earth Observing-1 (New Millennium Program 2)	Aug-00	NASA/GSFC
70	NileSat 102	Telecommunications Satellite	Aug-00	NileSat
71	ASTRA 2B	Telecommunications Satellite	Sep-00	SES/Astra
72	Eutelsat W1	Telecommunications Satellite	Sep-00	Eutelsat
73	STRV-1 C/D	Space Technology Research Vehicles 1C/1D	Nov-00	BNSC
74	IMAGE (MIDEX-01)	Imager for Magnetopause-to-Aurora Global Exploration (Medium Class Explorer Program 1)	2000	NASA/GSFC
75	MTI	Multispectral Thermal Imager	2000	DOE
76	MITA	Microsatellite Italiano a Technologia Avanzata (Italian Advanced Technology Micro-satellite)	2000	ASI
77	ASTRO-E		2000	ISAS
78	Cluster II		2000	ESA
79	RESSAT	Telecommunications Satellite	2000	Eutelsat

## ***CCSDS Implementations—Missions***

	<b>Mission</b>		<b>Launch</b>	<b>Lead</b>
80	Eurasiasat 1	Telecommunications Satellite	Jan-01	Eurasiasat
81	SICRAL	Satellite Italiano di Comunicazioni Riservate ed Allarmi (Telecommunications Satellite)	Feb-01	Italian Ministry of Defense
82	Eutelsat W1R (EUROBIRD)	Telecommunications Satellite	Mar-01	Eutelsat
83	Mars Odyssey	Mars Surveyor 2001 Orbiter	Apr-01	NASA/JPL
84	MAP (MIDEX-02)	Microwave Anisotropic Probe (Medium Class Explorer 2)	Jun-01	NASA/GSFC
85	FedSat-1	Federation Satellite One	Jun-01	CSIRO
86	Meteor-3M/SAGE III		Jun-01	RSA, NASA
87	VCL (ESSP-01)	Vegetation Canopy Lidar (Earth System Science Pathfinder 1)	Jul-01	NASA/GSFC
88	ARTEMIS	Advanced Relay and Technology Mission Satellite	Jul-01	ESA
89	Genesis (Discovery 5)	(formerly Suess-Urey)	Jul-01	NASA
90	Proba	PRoject for On-Board Autonomy (ESA Technology Demonstration Program	Aug-01	ESA
91	TIMED	Thermosphere-Ionosphere-Mesosphere Energetics and Dynamics	Aug-01	NASA/APL
92	JASON		Aug-01	CNES
93	Bird	Small Satellite Project	Aug-01	DLR/GSOC
94	QuickBird-2	Commercial remote sensing satellite	Aug-01	EarthWatch
95	OrbView-4	Commercial remote sensing satellite	Sep-01	ORBIMAGE
96	HESSI (SMEX-6)	High Energy Solar Spectroscopic Imager	Sep-01	NASA/GSFC
97	Atlantic Bird 2	Telecommunications Satellite	Sep-01	Eutelsat
98	QuikTOMS	Quick Total Ozone Mapping Spectrometer	Sep-01	NASA
99	ENVISAT-1		Oct-01	ESA
100	GRACE (ESSP)	Gravity Recovery and Climate Experiment (Earth System Science Pathfinder)	Nov-01	NASA
101	Aqua	Earth Observing System PM-1	Dec-01	NASA/GSFC
102	Triana	Named for Rodrigo de Triana, Pinta lookout.	2001	NASA/SIO
103	Astra 1K	Telecommunications Satellite	Dec-01	SES/Astra
104	Atlantic Bird 1	Telecommunications Satellite	2001	Eutelsat
105	ULDB	Ultra-Long Duration Balloon Program	2001	NASA/GSFC
106	MOST	Microvariability and Oscillations of STars	2001	CSA
107	GALEX (SMEX-7)	Galaxy Evolution Explorer	Jan-02	NASA/GSFC
108	Coriolis		Jan-02	NRL
109	ADEOS-II	Advanced Earth Observing Satellite II	Feb-02	NASDA
110	CATSAT (STEDI 3)	Cooperative Astrophysics and Technology SATellite (Student Explorer Demonstration Initiative 3)	Mar-02	NASA/U of NH, Weber State U, U of Leicester

## ***CCSDS Implementations—Missions***

		<b>Mission</b>	<b>Launch</b>	<b>Lead</b>
111	ICESat	Formerly EOS Laser Altimetry Mission (LAM) [sole instrument = Geoscience Laser Altimeter System (GLAS)]	Mar-02	NASA/GSFC
112	INTEGRAL	International Gamma Ray Astrophysical Laboratory	Apr-02	ESA
113	Stellat		Apr-02	Stellat (France Telecom and Europe*Star)
114	SCISAT-1	Small Science Satellite-1	Jun-02	CSA
115	SIRTF	Space InfraRed Telescope Facility	Jul-02	NASA/JPL
116	CONTOUR (Discovery 6)	Comet Nucleus Tour	Jul-02	NASA/APL
117	SORCE	Solar Radiation and Climate Experiment	Jul-02	NASA/LASP
118	ETS-VIII	Engineering Test Satellite VIII	Aug-02	NASDA
119	HTV	H-2 Transfer Vehicle	Aug-02	NASDA
120	GP-B	Gravity Probe B; a.k.a. Relativity	Oct-02	NASA/GSFC
121	MSG-1	Meteosat Second Generation-1	2002	ESA
122	Aura	EOS Chemistry Mission (EOS CHEM-1)	Dec-02	NASA/GSFC
123	DEMETER	Detection of Electro-Magnetic Emissions Transmitted from Earthquake Regions	2002	CNES
124	Radarsat-2		2002	CSA
125	Hotbird-6	Telecommunications Satellite	2002	Eutelsat
126	MUSES-C	Sample return mission to the asteroid Nereus	2002	ISAS
127	MESSENGER	MErcury Surface, Space ENvironment, GGeochemistry and Ranging	2002	NASA/APL
128	USERS	Unmanned Space Experiment Recovery System	2002	NASDA
129	SMART-1	Small Mission for Advanced Research in Technology--ESA Horizon 2000	2002	ESA
130	Lunar-A		2002	ISAS
131	SMOS	Soil Moisture and Ocean Salinity	2002	ESA/CNES/SNP
132	FBM	French-Brazilian Microsatellite	2002	CNES, INPE
133	NI-Alpha-1	New Intelsat-Alpha	2002	Intelsat
134	NI-Alpha-2	New Intelsat-Alpha	2002	Intelsat
135	Hotbird-7	Telecommunications Satellite	2002	Eutelsat
136	GE-12	Communications Satellite	2002	GE Americom
137	GE-14	Communications Satellite	2002	GE Americom
138	Hispasat 1D	Telecommunications Satellite	2002	Hispasat S.A.
139	SERVIS-1	Space Environment Reliability Verification Integrated System	2002	NASDA
140	Shuttle CS Gateway	Space Shuttle Consolidated Systems Gateway	Various	NASA/KSC

## ***CCSDS Implementations—Missions***

	<b>Mission</b>		<b>Launch</b>	<b>Lead</b>
141	ALOS	Advanced Land Observation Satellite	Jan-03	NASDA
142	METOP1	Meteorological Operational Satellite 1	Jan-03	EUMETSAT
143	MER-1	Mars Exploration Rover-1	May-03	NASA
144	Mars Express		Jun-03	ESA
145	MER-2	Mars Exploration Rover-2	Jun-03	NASA
146	Beagle 2	Mars Exobiology Lander	Jun-03	BNSC
147	NPOESS	National Polar-orbiting Operational Environmental Satellite System	Dec-03	NOAA, DoD
148	Picard		2003	CNES
149	ASTRO-F		2003	ISAS
150	Rosetta		2003	ESA
151	Selene		2003	NASDA
152	ATV	Automated Transfer Vehicle	2003	ESA
153	Europa Orbiter		2003	NASA/JPL
154	SWIFT (MIDEX 3)	Swift Gamma Ray Burst Explorer (Medium-class Explorer 3)	2003	NASA
155	PICASSO-CENA (ESSP-3)	Pathfinder Instruments For Cloud And Aero-sol Spaceborne Observations-Climatologie Etendue des Nuages et des Aerosols (Earth System Science Pathfinder 3)	2003	NASA/CNES
156	CloudSat (ESSP-4)	Earth System Science Pathfinder 4	2003	NASA
157	CryoSat	Earth Explorer Opportunity Mission-1	2003	ESA
158	Roue interférométrique	“Interferometric Cartwheel”	2003	CNES
159	ST5	Space Technology 5	2003	NASA
160	KOMPSAT-2	Korea Multi-purpose Satellite	2003	KARI
161	COSMIC	Constellation Observing System for Meteorology, Ionosphere and Climate	2003	UCAR, NSPO
162	MTSAT-1R	Multifunctional Transport Satellite-1R	2003	NASDA
163	ESSAIM	Constellation (Swarm)	2003	French Ministry of Defense
164	GE-1i	Communications Satellite	2003	GE Americom
165	GE-2i	Communications Satellite	2003	GE Americom
166	W3A	Communications Satellite	2003	Eutelsat
167	GE-3i	Communications Satellite	2003	GE Americom
168	GE-4i	Communications Satellite	2003	GE Americom
169	AGILE	Astro-rivelatore Gamma a Immagini LEggero	2003	ASI
170	HypSEO	HyperSpectral Earth Observer	2003	ASI
171	Syracuse 3	Syracuse 3 next generation military satellite communications system	Dec-03	Ministère de la Défense (France)

## ***CCSDS Implementations—Missions***

	<b>Mission</b>		<b>Launch</b>	<b>Lead</b>
172	GE 2E	Communications Satellite	2003	GE Americom
173	GE 3E	Communications Satellite	2003	GE Americom
174	Deep Impact		Jan-04	NASA/U of Maryland
175	STEREO	Solar Terrestrial Relations Observatory	Jun-04	NASA/APL
176	MMS	Magnetospheric Multi-Scale	Dec-04	NASA
177	Solar-B		2004	ISAS
178	Pluto-Kuiper Express		2004	NASA/JPL
179	FAME (MIDEX 4)	Full-sky Astrometric Mapping Explorer (Medium-class Explorer 3)	2004	NASA
180	COROT	COvaporation ROTation à Transits planétaires (COvaporation ROTation and planetary Transits)	2004	CNES
181	PARASOL		2004	CNES
182	MICROSCOPE	Micro Satellite à traînée Compensée pour l'Observation du Principe d'Equivalence	2004	CNES
183	GIFTS (EO3)	Geostationary Imaging Fourier Transform Spectrometer—Earth Observing 3	2004	NOAA, ONR, NASA
184	INMARSAT 4F1	INternational MAritime SATellite 4F1	2004	INMARSAT
185	INMARSAT 4F2	INternational MAritime SATellite 4F2	2004	INMARSAT
186	INMARSAT 4F3	INternational MAritime SATellite 4F3	2004	INMARSAT
187	Pléiades	Sensor Web	2004	CNES/ASI
188	ROCSAT-2		2004	NSPO
189	ARIES-1	Australia Resource Information and Environmental Satellite	2004	CSIRO, Auspace Pty Ltd., ACRES
190	MSG-2	Meteosat Second Generation-2	2004	ESA
191	Mars Netlander	Mars Network Lander	2005	FMI, ASI, CNES, DLR, IKI
192	GLAST	Gamma-ray Large Area Space Telescope	2005	NASA
193	Megha-Tropiques		2005	CNES/ISRO
194	Starlight (ST3)	Space Technology 3	2005	NASA
195	MRO	Mars Reconnaissance Orbiter	2005	NASA/JPL
196	SERVIS-2	Space Environment Reliability Verification Integrated System	2005	NASDA
197	SIM	Space Interferometry Mission	2006	NASA/JPL
198	Solar Probe		2007	NASA/JPL
199	FIRST	Far InfraRed and Submillimetre Telescope--ESA Horizon 2000 cornerstone 4 (CS4)	2007	ESA
200	Plank		2007	ESA
201	MSG-3	Meteosat Second Generation-3	2007	ESA
202	SDO	Solar Dynamics Observatory	2007	NASA/GSFC

## ***CCSDS Implementations—Missions***

	<b>Mission</b>		<b>Launch</b>	<b>Lead</b>
203	METOP2	Meteorological Operational Satellite 2	2008	EUMETSAT
204	Magnetospheric Constellation		2010	NASA
205	METOP3	Meteorological Operational Satellite 3	Dec-10	EUMETSAT

### ***Acronyms***

ACRES	Australian Centre for Remote Sensing
APL	Johns Hopkins University Applied Physics Laboratory (United States)
ASI	Agenzia Spaziale Italiana (Italy)
BNSC	British National Space Centre (United Kingdom)
CNES	Centre National d'Etudes Spatiales (France)
CSA	Canadian Space Agency (Canada)
CSIRO	Commonwealth Scientific and Industrial Research Organization (Australia)
DLR	Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)
DoD	Department of Defense (United States)
DOE	Department of Energy (United States)
DSRI	Danish Space Research Institute (Denmark)
ESA	European Space Agency (Europe)
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites (Europe)
FMI	Finnish Meteorological Institute
IKI	Institute of Space Research (Russian Federation)
ISAS	Institute of Space and Astronautical Science (Japan)
ISRO	Indian Space Research Organization
KARI	Korea Aerospace Research Institute
LASP	University of Colorado Laboratory for Atmospheric and Space Physics (United States)
NASA	National Aeronautics and Space Administration (United States)
NASDA	National Space Development Agency of Japan
NIVR	Netherlands Agency for Aerospace Programs
NOAA	National Oceanic & Atmospheric Administration (United States)
NRL	Naval Research Laboratory (United States)
NSPO	National Space Program Office (Taipei)
RSA	Russian Space Agency (Russian Federation)
SES	Société Européenne des Satellites
SIO	Scripps Institution of Oceanography (United States)
SNP	Spanish National Program
SSC	Swedish Space Corporation
SSS	Space Sciences Laboratory, University of California
STS	Space Transportation System
UCAR	University Corporation for Atmospheric Research

# **CCSDS:** *The Fleet*



## CCSDS Compatible Products

The CCSDS Secretariat has undertaken to identify CCSDS-compatible commercial products, and research in this area is ongoing. The presence of a product in the following listing implies only that the Secretariat has evidence of that product's availability; in no way does it imply endorsement of that product by the CCSDS or any CCSDS member agency. In the same way, the absence of a product in the listing indicates only that the Secretariat does not have sufficient information to include it. Vendors who wish to inform the Secretariat of the existence of a CCSDS-compatible product should contact

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## Spacecraft Platforms

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UK  
<http://www.matra-marconi-space.com>

Phone: +44 01438 773698  
Fax: +44 01438 773069

## ***CCSDS Implementations—Products***

***Spacecraft Platforms (continued)***

**Ball Aerospace (BCP 600, BCP 2000)**  
1600 Commerce St.  
Boulder, CO 80301  
USA  
<http://www.ball.com/aerospace/>

Phone: +1 303 939 6100  
Fax: +1 303 939 6104  
E-mail: [commercial@ball.com](mailto:commercial@ball.com)

**Lockheed Martin Missles & Space Company**  
1111 Lockheed Martin Way  
Sunnyvale, California 94089-3504  
USA  
<http://lmms.external.lmco.com>

Phone: +1 408 742 4321

**NASA/Goddard Space Flight Center (Spartan Platform)**  
Goddard Space Flight Center  
Mailstop Code 860  
Greenbelt, MD 20771  
USA  
<http://spartans.gsfc.nasa.gov/>

*Point of Contact:*

Donald Carson  
Phone: +1 301 286 4968  
Fax: +1 301 286 1694  
E-mail: [Donald.E.Carson.1@gsfc.nasa.gov](mailto:Donald.E.Carson.1@gsfc.nasa.gov)

## ***CCSDS Implementations—Products***

*Spacecraft Platforms (continued)*

**Orbital Sciences Corporation (FUSE, LEOStar™, MidStar™, PegaStar™, PicoStar™, StarBus™)**  
Space Systems  
20301 Century Boulevard  
Germantown, MD, 20874-1182  
USA  
<http://www.orbital.com>

*Point of Contact:*

Charles Williamson  
Phone: +1 301 428 6289  
Fax: +1 301 428 6622

**Space Systems/Loral (SS/L) (LS-400)**  
3825 Fabian Way  
Palo Alto, California 94303-4697  
USA

<http://www.ssloral.com>

Phone: +1 650 852 4000  
Fax: +1 650 852 4788

**SpaceDev (Orbital Maneuvering and Transfer Vehicle (MTV))**  
13855 Stowe Drive  
Poway, CA 92064  
USA  
<http://www.spacedev.com>

Phone: +1 858 375 2012  
E-mail: [info@SpaceDev.com](mailto:info@SpaceDev.com)

**Spectrum Astro (SA-200HP, SA-200S)**  
1440 N. Fiesta Blvd.  
Gilbert, AZ 85233  
USA  
<http://www.spectrumastro.com>

Phone: +1 480 892 8200  
Fax: +1 480 892 2949  
E-mail: [ProgramDevelopment@Specastro.com](mailto:ProgramDevelopment@Specastro.com)

## ***CCSDS Implementations—Products***

*Spacecraft Platforms (continued)*

### **Surrey Satellite Technology Limited (SSTL) (Minisat 400)**

Centre for Satellite Engineering Research

University of Surrey

Guildford

Surrey, United Kingdom

GU2 5XH

<http://www.sstl.co.uk/>

Phone: +44 (0)1483 259 278

Fax: +44 (0)1483 259 503

E-mail: [sstl@ee.surrey.ac.uk](mailto:sstl@ee.surrey.ac.uk)

### **Swales Aerospace (SMEX/MIDEX Platforms)**

5050 Powder Mill Road

Beltsville, MD 20705

USA

<http://www.swales.com>

Phone: +1 301 595 5500

Fax: +1 301 902 4114

### **TERMA Elektronik AS**

Hovmarken 4

DK-8520 Lystrup

Denmark

<http://www.terma.com>

Phone: +45 87 43 60 00

Fax: +45 87 43 60 01

E-mail: [terma.hq@terma.com](mailto:terma.hq@terma.com)

### **TRW Space & Electronics Group (T100, T200A)**

One Space Park

Redondo Beach, CA 90278

USA

<http://www.trw.com>

Phone: +1 310 812 4321

# On-Board Systems and Components

**Optical Data Handling Subsystem  
PSK X-band Transmitter  
QPSK Modulator and Solid State Power  
Amplification**

**Alcatel Space**  
Telecommunication Sales Division  
Industrial site: 26, Avenue JF Champollion  
BP 1187 - 31037 Toulouse Cedex  
France

[www.alcatel.com/space/obeqpt/](http://www.alcatel.com/space/obeqpt/)

Phone: +33 (0) 5 4 35 51 48  
Fax: +33 (0) 5 35 35 55 85  
E-mail: [cecile.ha-minh-tu@space.alcatel.fr](mailto:cecile.ha-minh-tu@space.alcatel.fr)

## T<sup>2</sup>C<sup>2</sup>TM (Telemetry, Timing, Command, & Control)

**B.F. Goodrich Aerospace**  
Space Flight Systems  
6600 Gulton Court, N.E.  
Albuquerque, NM 87109  
USA  
<http://www.bfg-datasystems.com/>  
Phone: +1 505 345 9031

## Integrated Spacecraft Controller (ISC)

**General Dynamics Information Systems**  
8800 Queen Avenue South, BLCS1P  
Bloomington, MN 55431  
USA  
<http://www.gd-is.com/sections/products.html>  
E-mail: [info@gd-is.com](mailto:info@gd-is.com)

*Point of Contact:*  
Deb Newberry  
Phone: +1 612 921 6692  
Fax: +1 612 921 6823  
E-mail: [deb.m.newberry@gd-is.com](mailto:deb.m.newberry@gd-is.com)

## Telemetry Data Return Link Processor (PCI card)

**L3 Communications Telemetry—East**  
47 Friends Lane  
PO Box 328  
Newtown, PA 18940-0328  
USA

<http://www.l-3com.com/te/>

*Point of Contact:*  
Richard Margraff  
Sales Manager  
Phone: +1 215 968 4271  
Fax: +1 215 968 3214  
E-mail: [Sales/Mktg@TE.L-3com.com](mailto:Sales/Mktg@TE.L-3com.com)

## C&DH Systems

**Litton Amecom**  
5115 Calvert Road  
College Park, MD 20740  
USA  
<http://www.littonas.com>

Phone: +1 301 454 9208  
E-mail: [space@littonas.com](mailto:space@littonas.com)

## Central Electronics Unit Remote Interface Unit

**Orbital Sciences Corporation**  
Space Systems  
20301 Century Boulevard  
Germantown, MD, 20874-1182  
USA  
<http://www.orbital.com>

*Point of Contact:*  
Charles Williamson  
Phone: +1 301 428 6289  
Fax: +1 301 428 6622

## ***CCSDS Implementations—Products***

### *On-Board Systems and Components—Commercial Suppliers (continued)*

#### **Satellite Subsystems**

##### **Samsung Aerospace Industries, Ltd.**

15th Fl., Samsung-YokSam Bldg.  
647-9, YokSam-Dong, Kangnam-Gu  
Seoul, Korea 135-080  
<http://www.samsungcamera.com/product/director.html>

Phone: +82 2 3467 7000  
Fax: +82 2 3467 7080

#### **On-Board Software**

##### **Software Validation Facilities**

**TERMA Elektronik AS**  
Hovmarken 4  
DK-8520 Lystrup  
Denmark  
<http://www.terma.com>

Phone: +45 86 22 20 00  
Fax: +45 86 22 27 99  
E-mail: [terma.hq@terma.com](mailto:terma.hq@terma.com)

#### **Command & Telemetry Module VME Processor**

##### **Southwest Research Institute (SwRI)**

SwRI Main Office  
6220 Culebra Road  
P.O. Drawer 28510  
San Antonio, Texas 78228-0510  
USA  
<http://www.SwRI.org/default.htm>

*Point of Contact:*

Mike McLellan  
Phone: +1 210 522 3360  
E-mail: [MMcLellan@swri.edu](mailto:MMcLellan@swri.edu)

#### **Flight Software**

##### **The Hammers Company**

7474 Greenway Center Drive, Suite 710  
Greenbelt, MD 20770  
USA  
<http://www.hammers.com>

Phone: +1 301 345 5300  
Fax: +1 301 345 6892  
E-mail: [info@hammers.com](mailto:info@hammers.com)

#### **Uplink/Downlink Board (ULDL)**

##### **Spectrum Astro**

1440 N. Fiesta Blvd.  
Gilbert, AZ 85233  
USA  
<http://www.spectrumastro.com>

*Point of Contact:*

Dan Toomey  
Phone: +1 480 892 8200  
Fax: +1 480 892 2949

# Space Qualified ASICs

**AOS Packet Telemetry Chip**  
**Packet Telecommand Decoder**  
**Reed-Solomon Encoder**  
**Virtual Channel Assembler and Multiplexer**

**ESA/European Space Technology Center**  
Keplerlaan-1, Box 299  
2200 A.G. Noordwijk  
The Netherlands  
<http://www.estec.esa.nl/microelectronics>

*Point of Contact:*  
Agustín Fernández León  
ESA/European Space Research and Technology  
Centre  
Technical & Operational Support Directorate  
Electrical Engineering Department  
Control & Data Systems Division  
Microelectronics Section  
ESA/ESTEC D/TOS-ESM/AFL  
Postbus 299  
NL-2200 AG Noordwijk ZH  
The Netherlands  
Phone: +31 (0)71 565 3736  
Fax: +31 (0)71 565 429  
E-mail: Agustin.Fernandez-Leon@esa.int

**Reed-Solomon Encoder**  
**Universal Source Encoder for Space (USES)**

**ICs**  
801 University SE, #206  
Albuquerque, NM 87106  
<http://www.mrc.unm.edu>

*Point of Contact:*  
Jody Gambles  
Phone: +1 505 272 7060  
E-mail: hotmaster@mrc.unm.edu

**Imaging/Time Distribution**

**Interuniversity Microelectronics Center (IMEC)**  
Kapeldreef 75  
B-3001 Leuven  
Belgium  
<http://www.imec.be>

Phone: +32 (0) 16/28 12 11  
Fax: +32 (0) 16/22 94 00  
E-mail: info@imec.be

**AOS Frame Formatter**

**Lockheed Martin Missles & Space Company**  
1111 Lockheed Martin Way  
Santa Cruz, CA 80301  
USA  
<http://lmms.external.lmco.com>

*Point of Contact:*  
Vince Lopez  
Phone: +1 408 756 9337  
E-mail: vince.lopez@LMSO.com

**AOS Frame Formatter**  
**Packet Telecommand Decoder**  
**Virtual Channel Assembler and Multiplexer**

**Mitsubishi Electric Corporation**  
2-2-3 Marunouchi, Chiyoda-ku  
Tokyo, Japan 100  
[http://www.mitsubishi.com/ghp\\_japan/home.html](http://www.mitsubishi.com/ghp_japan/home.html)

*Point of Contact:*  
NASDA CCSDS Secretariat  
Tsukuba Space Center  
2-1-1, Sengen  
Tsukuba-city, Ibaraki 305-8505  
JAPAN  
Phone: +81 298 59 2978  
Fax: +81 298 50 1916  
E-mail: NASDA.CCSDS@nasda.go.jp

# Ground Systems and Components

## Commercial Ground Networks

### **Multi-user Satellite Commercial Ground Network**

#### **Universal Space Network (USN)**

1501 Quail Street  
Suite 103  
Newport Beach, CA 92660  
USA  
<http://uspacenetwork.com>

Phone: +1 949 476 3432  
Fax: +1 949 851 9485  
E-mail: [info@uspacenet.com](mailto:info@uspacenet.com)

### **DataLynx Satellite Command, Control, and Communications Network**

#### **DataLynx**

Honeywell Technology Solutions, Inc.  
7000 Columbia Gateway Drive  
Columbia, MD 21046  
USA  
<http://www.honeywell-tsi.com/DataLynx/>

Phone: +1 800 638 6417 x7700  
Fax: +1 410 964 7300

## ***CCSDS Implementations—Products***

*Ground Systems and Components (continued)*

## **Telemetry and Command Data Processing**

### ***Technology Transfer***

The Microelectronics Systems Branch (MSB) at NASA/Goddard Space Flight Center has developed a variety of CCSDS-compatible hardware and software that is available through technology transfer. The technology transfer contact at GSFC for MSB-developed technology is:

Evette Brown-Conwell  
Code 702  
Office of Commercial Programs  
NASA Goddard Space Flight Center  
Greenbelt, MD 20771  
USA

Phone: +1 301 286 0561  
E-mail: econwell@pop500.gsfc.nasa.gov

### ***Commercial Suppliers***

#### **TDP 2200**

**Acroamatics, Inc.**  
70 South Kellogg Ave, Suite A  
Goleta, CA 93117  
USA  
<http://www.acroam.com/index.html>

*Point of Contact:*  
Ron Ralson  
Phone: +1 805 967 9909  
Fax: +1 805 967 8375  
E-mail: ron@acroamatics.com

#### **Forward Error Correction Products**

**Advanced Hardware Architectures, Inc.**  
2365 NE Hopkins Court  
Pullman, WA 99163-5601  
USA  
<http://www.aha.com>

Phone: +1 509 334 1000  
Fax: +1 509 334 9000  
E-mail: sales@aha.com

#### **Reed-Solomon Compiler**

**Altera Corporation**  
101 Innovation Drive  
San Jose, CA 95134  
USA  
<http://www.altera.com>

Phone: +1 408 544 7000

## **CCSDS Implementations—Products**

*Ground Systems and Components—Telemetry and Command Data Processing (continued)*

### **VMEwindow (Software)**

**AP Labs**  
5871 Oberlin Drive  
San Diego, CA 92121  
USA  
<http://www.aplabs.com>

*Point of Contact:*  
Tracy D'Acquisto  
Phone: +1 619 546 8626

### **Data Multiplexer/Demultiplexer System**

**Apogee Labs, Inc.**  
121 Dickerson Road, Suite 3  
North Wales, PA 19454  
USA  
<http://www.apogeelabs.com>

*Point of Contact:*  
David Grebe  
Phone: +1 215 699 2060  
Fax: +1 215 699 2061  
E-mail: [davidg@apogeelabs.com](mailto:davidg@apogeelabs.com)

### **Telemetry Processing**

**ARSC Aerospace Corp.**  
6411 Ivy Lane, Suite 610  
Greenbelt, MD 20770  
USA  
<http://www.akspace.com>

Phone: +1 301 345 4500  
Fax: +1 301 345 9274  
E-mail: [busdev@akspace.com](mailto:busdev@akspace.com)

**Frame Synchronizer/PCM Simulator**  
**TDM Telemetry Simulator—VM 6140**  
**TLM/TC System/Programmable TLM Processor**  
**TDM Telemetry Processor**

**Avtec Systems, Inc.**  
10530 Rosehaven Street  
Suite 300  
Fairfax, VA 22030  
USA  
<http://www.avtec.com>

*Point of Contact:*  
Rob Ritter  
Phone: +1 703 273 2211  
Fax: +1 703 273 1313  
E-mail: [rritter@avtec.com](mailto:rritter@avtec.com)

### **Desktop Satellite Data Processor**

**Century Computing, Inc.**  
8101 Sandy Spring Rd.  
Laurel, MD 20707  
USA  
<http://www.cen.com/dsp/dsdp2.html>

*Point of Contact:*  
Charlie Shaw  
Phone: +1 301 953 3330  
Fax: +1 301 953 2368  
E-mail: [cshaw@centurycomputing.com](mailto:cshaw@centurycomputing.com)

### **Command and Control Toolkit**

**Command and Control Technologies Corporation**  
1425 Chaffee Dr., Suite 1  
Titusville, FL 32780  
USA  
<http://www.cctcorp.com/>

Phone: +1 321 264 1193  
Fax: +1 321 383 5096  
E-mail: [info@cctcorp.com](mailto:info@cctcorp.com)

## **CCSDS Implementations—Products**

**Ground Systems and Components—Telemetry and Command Data Processing (continued)**

### **OPEN 2000 Ground Station**

**Datron Systems Incorporated**  
3030 Enterprise Court  
Vista, CA 92083  
USA  
<http://www.dtsi.com/h2rec.html>

Phone: +1 760 734 5454  
Fax: +1 760 734 5450

### **CCSDS Telemetry Generator and Recorder** **Telecommand CCSDS Interface Card** **Telemetry CCSDS Interface Card**

**ELTA (TECHNICATOME GROUP)**  
BP 48  
14, Place Marcel DASSAULT  
31702 BLAGNAC Cedex  
France  
<http://www.elta.fr>

*Point of Contact:*  
Christophe Chatain  
Phone: +33 (0)534 36 10 00  
Fax: +33 (0)534 36 10 01  
E-mail: +33 (0)534 36 10 01

### **Ground Segment Spacecraft Command Interface Software**

**ESYS Limited**  
1 Stoke Road  
Guilford, Surrey  
GU1 4HW  
UK  
<http://www.esys.co.uk>

Phone: +44 (0) 1483 304545  
Fax: +44 (0) 1483 303878  
E-mail: [info@esys.co.uk](mailto:info@esys.co.uk)

### **Open System/Integrated Control Center™**

**Exigent Software Technology, Inc.**  
1225 Evans Road  
Melbourne, FL 32904-2314  
USA  
<http://www.xgnt.com>

Phone: +1 800 586 2200  
+1 407 723 3999  
Fax: +1 407 676 4510  
E-mail: [jon@xgnt.com](mailto:jon@xgnt.com)

### **Telemetry Data Processing**

**GATS, Inc**  
11864 Canon Blvd., Suite 101  
Newport News, VA 23606  
USA  
<http://www.gats-inc.com>

Phone: +1 757 873 5920  
Fax: +1 757 873 5924  
E-mail: [gats@gats-inc.com](mailto:gats@gats-inc.com)

### **VME Bus AOS Telemetry Processor Board/ PC-based System**

**GDP Space Systems**  
A Division of Delta Information Systems  
300 Welsh Road, Bldg. 3  
Horsham, PA 19044  
USA  
<http://www.gdpspace.com>

*Point of Contact:*  
Ed Snyder  
Phone: +1 215 657 5270 x119  
Fax: +1 215 657 5273  
E-mail: [snydered@gdpspace.com](mailto:snydered@gdpspace.com)

## **CCSDS Implementations—Products**

**Ground Systems and Components—Telemetry and Command Data Processing (continued)**

### **SkipWare**

#### **Global Science & Technology**

6411 Ivy Lane  
Suite 300  
Greenbelt, MD 20770  
USA  
<http://www.gst..com>

Phone: +1 301 474 9696

Fax: +1 301 474 5970

#### *Point of Contact:*

Ingrid Shipton  
Phone: +1 301 474 9696  
E-mail: skipware@gst.com

#### **Packet TC Simulator**

**Stand-alone PC TC Decoder**  
**Standalone PC Telecommand Encoder**  
**Telecommand Decoder Shell**  
**Telecommand Encoder Shell**  
**Telecommand Products**

### **I B + M A de Lande Long Software Consultancy**

Im Weingarten 13  
D-64342 Seeheim  
Germany  
<http://www.delandelong.com>

Phone: +49 6151 54926

Fax: +49 6151 595701

E-mail: contact@delandelong.com

### **Integrated Test and Operations System (ITOS)**

#### **The Hammers Company, Inc**

7474 Greenway Center Drive, Suite 710  
Greenbelt,  
Maryland 20770  
<http://www.hammers.com/>

#### *Point of Contact:*

Stephen Hammers  
Phone: +1 301 345 5300  
Fax: +1 301 345 6892  
E-mail: shammers@hammers.com

### **Universal Source Decoder for Science**

#### **ICs**

801 University SE, #206  
Albuquerque, NM 87106  
<http://www.mrc.unm.edu>

#### *Point of Contact:*

Christy Custer  
Phone: +1 505 272 7060  
E-mail: hotmaster@mrc.unm.edu

### **Magali Telemetry Workstation Software**

#### **High Tech Systems**

Ergopolis, Route d'Elne  
66200 Montescot  
France  
<http://www.magali.com/magali2.htm>

Phone: +33 4 68 37 36 35

Fax: +33 4 68 37 36 34

E-mail: magali@htsys.com

### **EPOCH 2000**

#### **Integral Systems**

5000 Philadelphia Way  
Lanham, MD 20706-4417  
USA  
<http://www.integ.com>

Phone: +1 301 731 4233

Fax: +1 301 731 9606

E-mail: sales@integ.com

## **CCSDS Implementations—Products**

*Ground Systems and Components—Telemetry and Command Data Processing (continued)*

### **Command and Control Environment**

#### **Interface & Control Systems**

8945 Guilford Road Suite 120  
Columbia, MD 21046  
USA  
<http://www.interfacecontrol.com/>

Phone: +1 301 596 2888  
Phone: +1 877 808 2668 (toll free)  
Fax: +1 410 290 7737

#### *Point of Contact:*

Allan Posner  
E-mail: [posner@md-mail.sclrules.com](mailto:posner@md-mail.sclrules.com)

### **Direct Ingestion Server**

**Kongsberg Spacetec**  
Prestvannveien 38  
N-9292 Tromso  
Norway  
<http://www.spacetec.no>

Phone: +47 77 66 08 00  
Fax: +47 77 65 58 59  
E-mail: [marketing@spacetec.no](mailto:marketing@spacetec.no)

### **IMPACT 2000—Space Link Processor**

**L3 Communications Telemetry & Instrumentation**  
15378 Avenue of Science  
San Diego, CA 92128  
USA  
<http://www.L-3Com.com/ti>

#### *Point of Contact:*

Mike Jones  
Marketing Manager  
Phone: +1 800 351 8483 x4110  
E-mail: [sales-mktg@ti.L-3Com.com](mailto:sales-mktg@ti.L-3Com.com)

### **CCSDS Data Unit Decoder Module**

**CCSDS Data Unit Encoder Module**

**L3 Communications Telemetry—East**  
47 Friends Lane  
PO Box 328  
Newtown, PA 18940-0328  
USA

<http://www.l-3com.com/te/>

#### *Point of Contact:*

Richard Margraff  
Sales Manager  
Phone: +1 215 968 4271  
Fax: +1 215 968 3214  
E-mail: [Sales/Mktg@TE.L-3com.com](mailto:Sales/Mktg@TE.L-3com.com)

### **Parallel Integrated Frame Synchronizer (PIFS) Chip**

**Return Link Processor Board**  
**Service Processor (SP) Chip**  
**Telemetry and Command Data Processing H/W & S/W Software**

**NASA/Goddard Space Flight Center**  
Microelectronics Systems Branch  
Code 702  
Office of Commercial Programs  
NASA Goddard Space Flight Center  
Greenbelt, MD 20771  
USA  
[econwell@pop500.gsfc.nasa.gov](mailto:econwell@pop500.gsfc.nasa.gov)

#### *Point of Contact:*

Evette Brown-Conwell  
Phone: +1 301 286 0561

## **CCSDS Implementations—Products**

*Ground Systems and Components—Telemetry and Command Data Processing (continued)*

### **NetAcquire**

**NetAcquire**  
733 7 Ave.  
Kirkland, WA 98033  
USA  
<http://www.netacquire.com/ccsds.htm>

Phone: +1 888 675 1122 (toll-free)

Phone: +1 425 576 0822  
Fax: +12 888 670 1122 (toll-free)  
E-mail: [info@netacquire.com](mailto:info@netacquire.com)

### **Monitor and Control Software**

**Science Systems (Space) Ltd.**  
Clothier Road  
Bristol  
BS4 5SS  
UK  
<http://www.scisys.co.uk>

Phone: +44 (0) 117 971 7251  
Fax: +44 (0) 117 971 1125  
E-mail: [space.marketing@scisys.co.uk](mailto:space.marketing@scisys.co.uk)

### **Satellite Ground Segment**

**Space Applications Services**  
Leuvensesteenweg 325  
B-1932 Zaventem  
Belgium  
<http://www.spaceapplications.com>

Phone: +32 (0) 2 721 54 84  
Fax: +32 (0) 2 721 54 44  
E-mail: [marketing@spaceapplications.com](mailto:marketing@spaceapplications.com)

### **Ground Station Telemetry and Command Data Processing System**

**TRW Components International**  
19951 Mariner Avenue  
Torrance, CA 90503  
USA

Phone: +1 310 812 4321

### **CCSDS-ESA Packet TM/TC Workstation (CSW)**

**Satellite Services B.V.**  
Scheepmakerstraat 40  
2222 AC Katwijk aan Zee  
the Netherlands  
<http://www.satserv.nl/general/index.htm>

Phone: +31 (0) 71 402 8120  
Fax: +31 (0) 71 402 7934  
E-mail: [info@satserv.nl](mailto:info@satserv.nl)

### **CCSDS Uplink/Downlink Interface Card Forward Error Correction Module**

**SBS Berg Telemetry Systems**  
2250 Camino Vida Roble  
Carlsbad, CA 92009  
USA  
<http://www.sbs-bergsys.com>

Phone: +1 760 438 5656  
Fax: +1 760 438 0056  
E-mail: [info@bergsys.com](mailto:info@bergsys.com)

***CCSDS Implementations—Products***  
*Ground Systems and Components—Telemetry and Command Data Processing (continued)*

**Telemetry and Telecommand Systems**

**TSI Telsys, Inc.**

7100 Columbia Gateway Drive, Suite 150  
Columbia, MD 21045  
USA  
<http://www.tsi-telsys.com/products/products.htm>

Phone: +1 410 872 3900

+1 800 346 3282

Fax: +1 410 872 3901

E-mail: [info@tsi-telsys.com](mailto:info@tsi-telsys.com)

**PC-based Telemetry Server Suite**

**Voss Scientific**

418 Washington St., SE  
Albuquerque, NM 87108  
USA  
<http://www.vosssci.com/vs609.html>

Phone: +1 505 255 4201

Fax: +1 505 255 4294

E-mail: [vosssci@vosssci.com](mailto:vosssci@vosssci.com)