To: E. Burke
From: W. Hincy
Subject: Genesis Deep Space Network (DSN) Support Assessment

Section 1.0 Genesis Study Summary

1.1 Overview

This report is composed of the following two sections: Genesis Study Summary and Genesis Detailed Analysis. The Genesis Study Summary includes an Overview, Introduction, Loading Study Criteria, Loading Study Caveats, Loading Study Reference Material, Genesis Mission Parameters and Genesis Study Results. Likewise, the Genesis Detailed Analysis section includes an Approved Downtime Analysis and Genesis DSN Support Analysis.

1.2 Introduction

The Resource Allocation Planning and Scheduling Office (RAPSO) has updated the Genesis DSN requirements in the FASTER database to reflect the new launch date of July 30, 2001. RAPSO has performed an analysis to determine the expected supportable time for Genesis from 2002 through 2004 and identified the periods of contention with other users of the DSN.

1.3 Loading Study Criteria

This study was conducted based upon the Genesis launch date moving from June 27, 2001 to July 30, 2001. An updated Genesis User Loading Profile, which reflected this change, was emailed to RAPSO on April 12, 2001.

1.4 Loading Study Caveats

This loading study begins on January 1, 2002 and ends on September 8, 2004. Genesis 2001 DSN loading is being addressed in Mid-Range Scheduling and as such is not part of this study.

Due to the lack of viewperiod from September 9 through October 16, 2004, RAP could not evaluate the Backup Earth Return phase. However, once the project provides this viewperiod to RAP, we will conduct a supplemental loading study addressing this phase.

For informational purpose, Comet Nucleus Tour (CONTOUR) and Space Infrared Telescope Facility (SRTF) are currently scheduled to launch on July 01 and July 15, 2002, respectively. CONTOUR and SRTF are requesting 34 meter support.

It is important to note that there is high oversubscription from November 2003 through February 2004 that will be initially addressed at the August 2001 RARB.

As always, the results of this analysis are preliminary in that the network load changes as requirements for planned missions are input and updated. We will continue to work with the Genesis project and other users of the DSN to maximize the time available for each user.

1.5 Loading Study Reference Material

This study referenced the following documentation in the development of this report.

- ***Project Service Level Agreement:*** March 1999
- ***Past RAPSO Studies****:* Genesis DSN Support from January 7, 2001 through September 7, 2003 dated March 1, 2000
- ***Signed User Loading Profile:*** November 7, 2000
- ***Updated User Loading Profile:*** April 12, 2001
- ***Baseline Navigation Profile:*** March 12, 2001
- ***Forecasted Viewperiod Range:*** July 30, 2001 through September 08, 2004

1.6 Genesis Mission Parameters

Listed below include some Genesis key parameters.

- ***Mission Objectives:***
  Return the first samples of matter from the sun and analyze them to improve our knowledge of average chemical and isotopic composition of the solar system.

- ***Major Milestones:***
  - Launch: July 30, 2001
  - Start Sample Collection: October 21, 2001
  - End Science: April 01, 2004
  - Earth Passage: May 01, 2004
  - Earth Return: September 08, 2004
  - Backup Earth Return : October 16, 2004

- ***Trajectory Description:***
  - Transfer to L1 orbit, collect samples in L1 orbit and return to Earth for re-entry.

- ***Tracking Requirements***
  - S-Band tracking support has been requested using the DSN 34 meter Beam Wave Guide (BWG) subnet. Refer to the Genesis User Loading Profile, which was emailed to RAPSO on April 12, 2001, shown in attachment 1.

1.7 Genesis Study Results

RAPSO has conducted a FASTER simulation forecast based upon the revised Genesis DSN requirements. Summarized below are the results of this study.

- ***Approved Downtime***
  Figure 1 in section 2 displays the approved DSS Maintenance and Network Simplification Plan (NSP) downtimes in 2002 and 2003. Note that DSS-24, 54 is down for NSP implementation during weeks 40-47 in 2002. Likewise, DSS-34 is down for NSP implementation during weeks 07-14 in 2003.

- ***Viewperiod Restriction***
  Genesis Backup Earth Return is scheduled for October 16, 2004. Genesis is requesting continuous support for this backup option. However, RAP does not have views for this option. Therefore, RAP could not study this option.

- ***Forecasted DSN Supportable Time***
  The total Genesis support requested from 2002 through 2004 is 5,284 hours including pre and post-calibration times. Genesis is forecasted to receive 1,401 hours in 2002, 1,362 hours in 2003 and 2,521 hours in 2004, respectively.

Section 2.0 Genesis Detailed Analysis

2.1 Approved Downtime Analysis

Figure 1 shows the approved DSS maintenance and NSP implementation downtimes for 2002 and 2003. During weeks 40 through 47 in 2002, DSS-24 and 54 are down for NSP implementation. Genesis is forecast to receive their normal support on DSS-34 during these weeks.

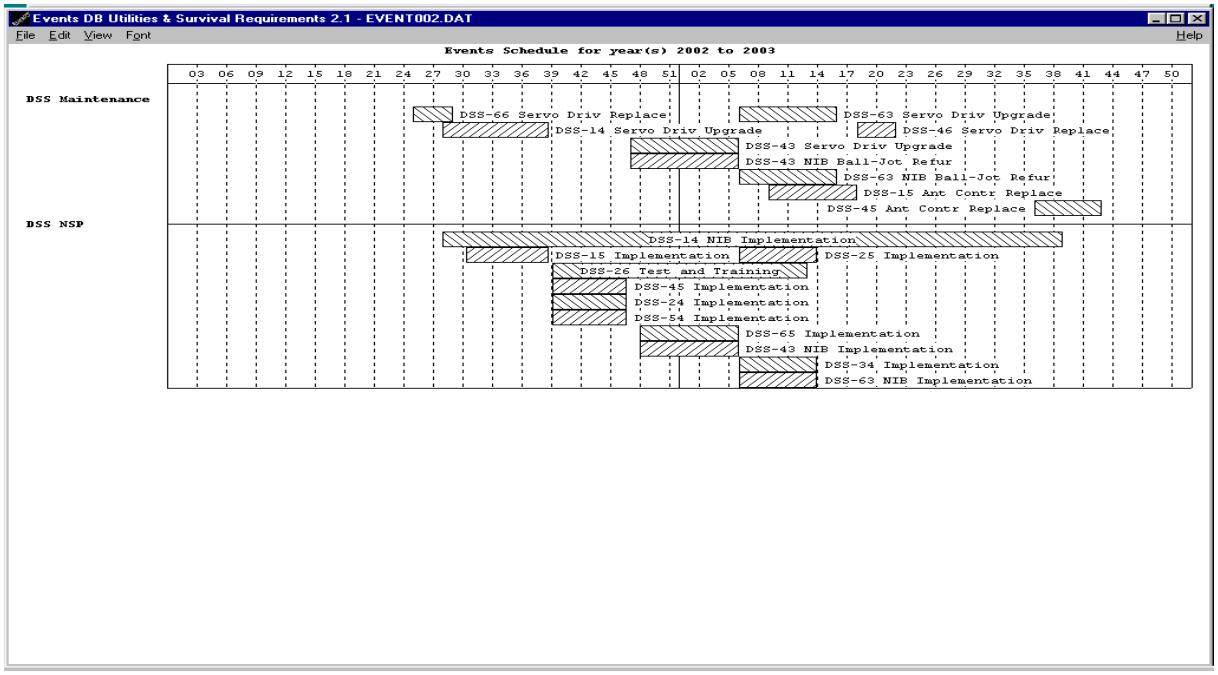

Figure 1

2.2 Genesis DSN Support Analysis

This section provides analysis of Genesis DSN support in 2002, 2003 and 2004. This section includes the following subsections: Weekly DSN Support, Specific Support Analysis, Possible Impact to Other Projects and Viewperiod Overlap with Other Projects.

2.2.1 Weekly DSN Support

In general, Genesis is forecasted to receive greater than 99% of their weekly requested support in 2002. Figure 2 shows Genesis requested hours (green dash line), forecasted supportable hours (solid purple line) and supportable percentage (dashed blue line). This chart clearly shows the Genesis maneuvers in weeks 03, 12, 21, 30, 39 and 50. During the maneuvers, Genesis is forecasted to receive approximately 95% of their requested support.

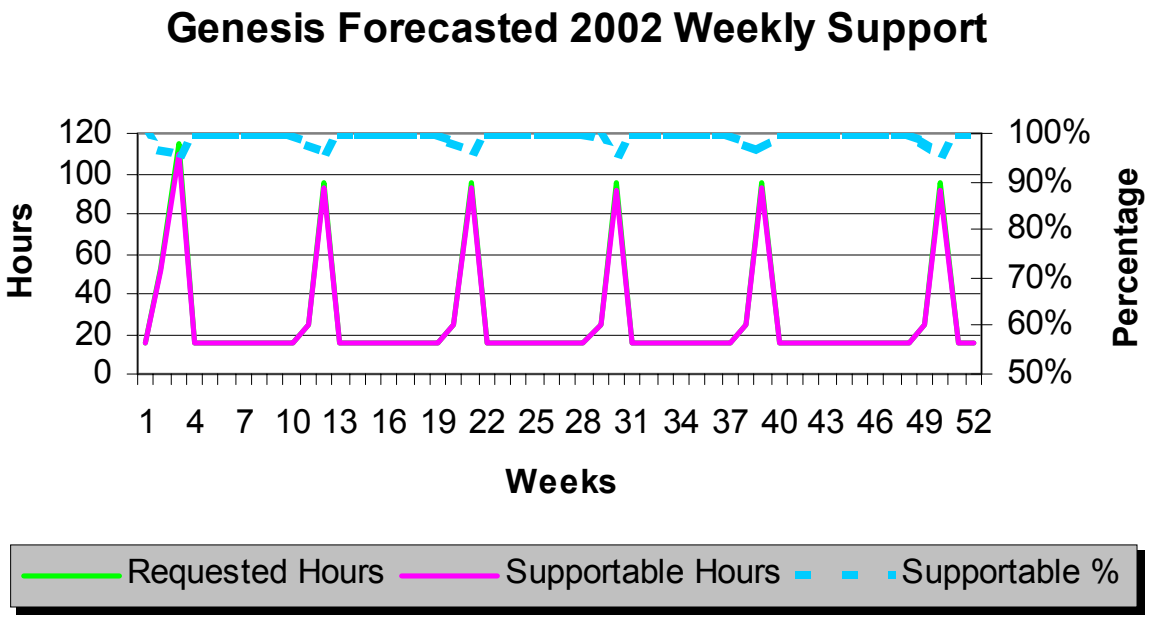

Figure 2

2.2.2 Specific Support Analysis

For example, Genesis is conducting a SafeKeeping Maneuver (SKM) -2b maneuver in week 30 and is requesting six 7-hour passes on the 34 meter BWG subnet to support the SKM-2b maneuver. Also, Genesis is requesting an additional five 8-hour passes on the BWG. Genesis is forecasted to receive 95% of their requested support during this week.

2.2.3 Possible Impact to Other Projects

Other projects that are using the 34 meter BWG subnet and are in Genesis viewperiod during week 30 are: Advanced Composition Explorer (ACE), Chandra X-ray Observatory (CHDR), DSS Maintenance, Space Infrared Telescope Facility (SRTF), Ulysses (ULYS), Voyager 1 (VGR1), Voyager 2 (VGR2), and WIND. ACE is performing routine operations and requesting seven 3.5 hour passes on DSS-24, 27. CHDR is performing routine operations and requesting twenty-one 1-hour passes on the 34 meter BWG. DSS Maintenance is performing routine maintenance and requesting one 8-hour support on DSS-34, one 6-hour support on DSS-34, and one 6-hour support on DSS-54. SRTF is in its launch phase and requesting twenty-one 8-hour passes on DSS-25, 34, 54, 15, 45 and 65. ULYS is performing routine operations and requesting six 5-hour passes on DSS-24 , and four 8-hour passes on DSS-54. VGR1 is performing routine operations and requesting three 4-hour passes on DSS-54. VGR2 is performing routine operations and requesting seven 8-hour passes on DSS-34, 45. WIND is performing routine operations and requesting seven 2.5-hour passes on the 34 meter BWG. Negotiation with these projects to secure additional support is required.

2.2.4 Viewperiod Overlap With Other Projects

Figure 3 graphically shows the percentage of Genesis viewperiod overlap with other projects. For example, Ulysses has a 100% viewperiod overlap with Genesis during week 30 at DSS-34, 54.

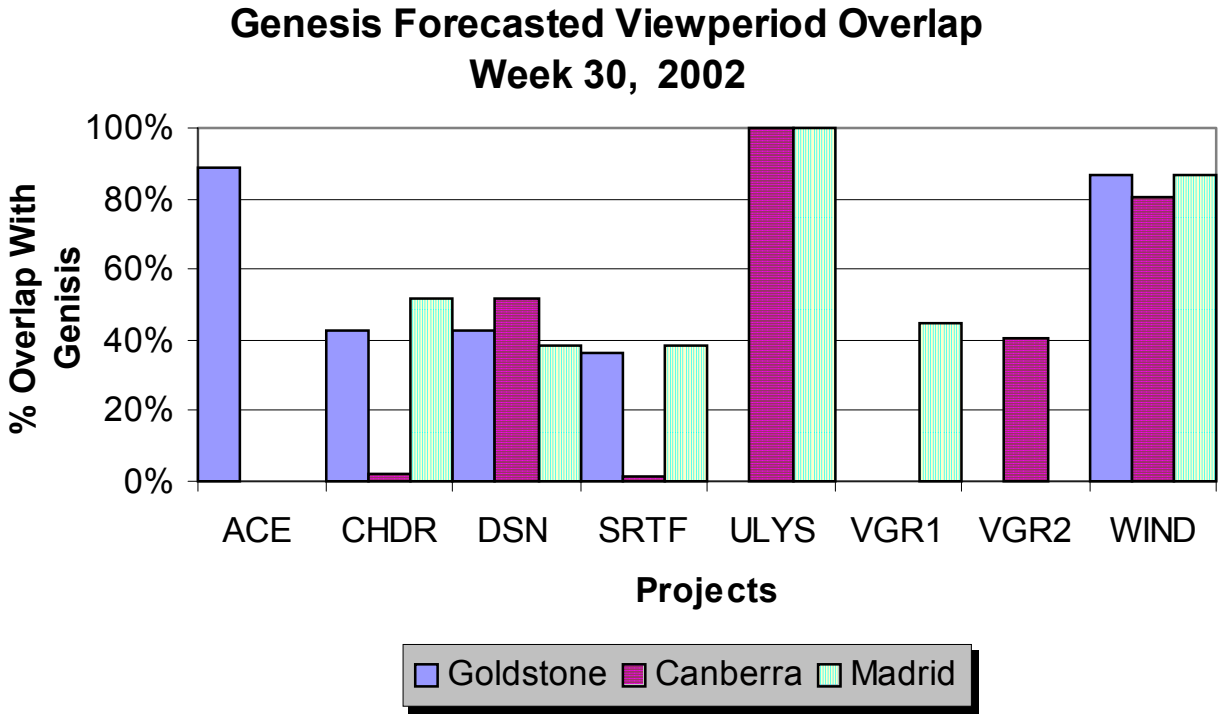

Figure 3

2.3 Weekly DSN Support

In general, Genesis is forecasted to receive greater than 99% of their requested support in 2003. Figure 4 shows Genesis requested hours (green dash line), forecasted supportable hours (solid purple line) and supportable percentage (dashed blue line). This chart shows the Genesis maneuvers in weeks 06, 15, 23, 31, 39 and 47. During the maneuvers, Genesis is forecasted to receive greater than 91% of their requested support.

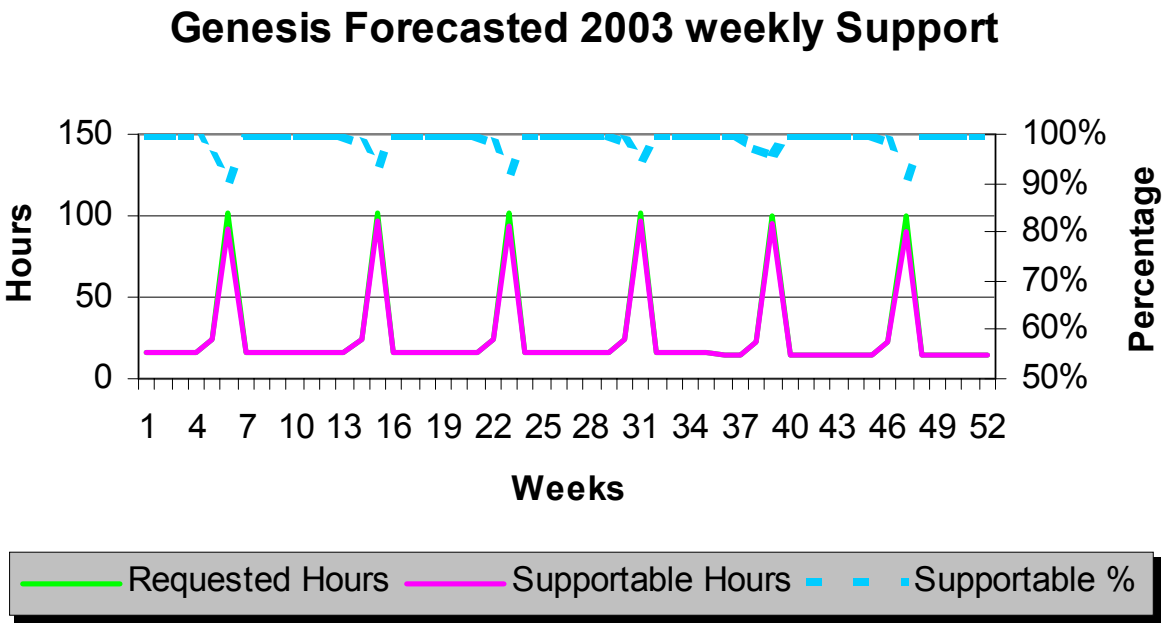

Figure 4

2.3.1 Specific Support Analysis

For example, Genesis is conducting an SKM-3b maneuver in week 06 and requesting six 8-hour passes on the 34 meter BWG subnet. Also, Genesis is requesting an additional five 8-hour passes on the BWG. Genesis is forecasted to receive 91% of their requested support during this week.

2.3.2 Possible Impact to Other Projects

Other projects that are using the 34 meter BWG subnet and are in Genesis viewperiod during week 06 are: CHDR, DSS Maintenance, MARS Global Surveyor (MGS), Mars 01 Odyssey (M01O), NOZOMI (NOZO), Rosetta (ROSE), Ulysses (ULYS), SRTF, and WIND. CHDR is performing routine operations and requesting twenty-one 1-hour passes on the 34 meter BWG subnet. DSS Maintenance is performing routine maintenance and requesting one 8-hour pass on DSS-24, 34 and 54. MGS/M01O is mapping and requesting three 7-hour passes on DSS-25, 34, 63. M01O is mapping and requesting eleven 7-hour passes on DSS-25, 34, 63. NOZO is

performing routine operations and requesting one 8-hour pass on DSS-24, 54. ROSE is performing routine operations and requesting seven 8-hour passes on DSS-54. ULYS is performing routine operations and requesting seven 10-hour passes on DSS-24, 54. SRTF is performing routine operations and requesting fourteen 1-hour passes on DSS-25, 34, 54. WIND is performing routine operations and requesting seven 2.5-hour passes on DSS-24, 34. Negotiation with these projects to secure additional support is required.

2.3.4 Viewperiod Overlap With Other Project

Figure 5 illustrates the percentage of Genesis viewperiod overlap with other projects. The Goldstone complex is shown in dark blue, Canberra is shown in vertical strip light blue nad Madrid is shown in horizontal purple. For example, NOZO has a 100% viewperiod overlap at the Goldstone and Madrid complexes with Genesis during week 06.

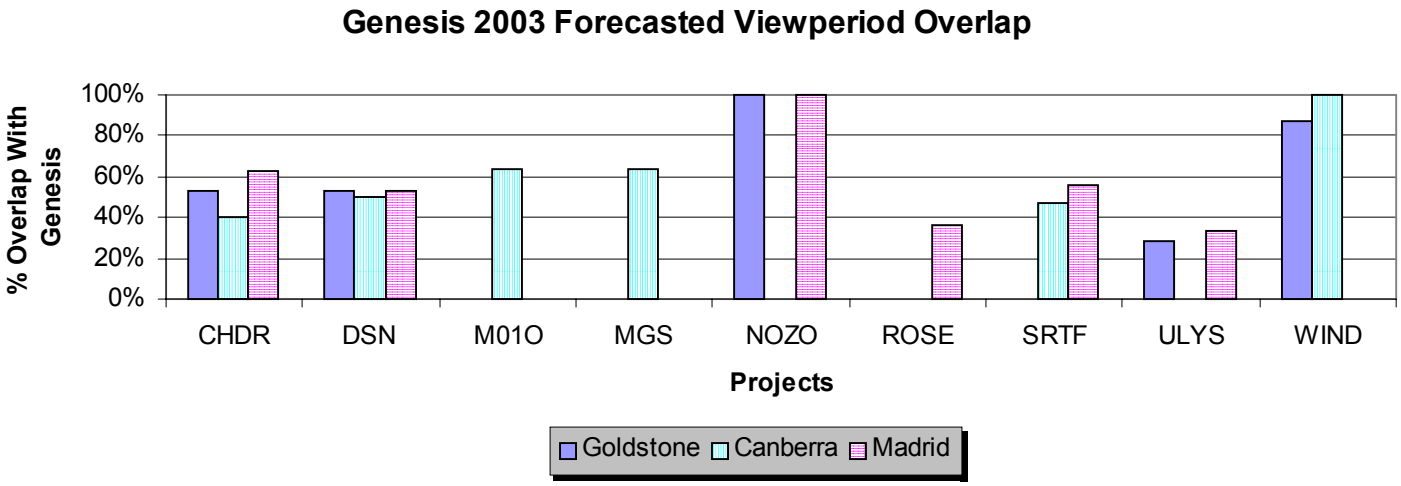

Figure 5

2.4 Weekly DSN Support

In general, Genesis is forecasted to receive greater than 99% of its requested weekly support in 2004. Figure 6 shows Genesis requested hours (green dash line), forecasted supportable hours (solid purple line) and supportable percentage (dashed blue line). This chart shows the Genesis maneuvers in weeks 03, 11, 14, 17, 18, 19, 22, 24, 27, 29, 33, 35, 37 and 42. During the maneuvers, Genesis is forecasted to receive greater than 91% of their requested support.

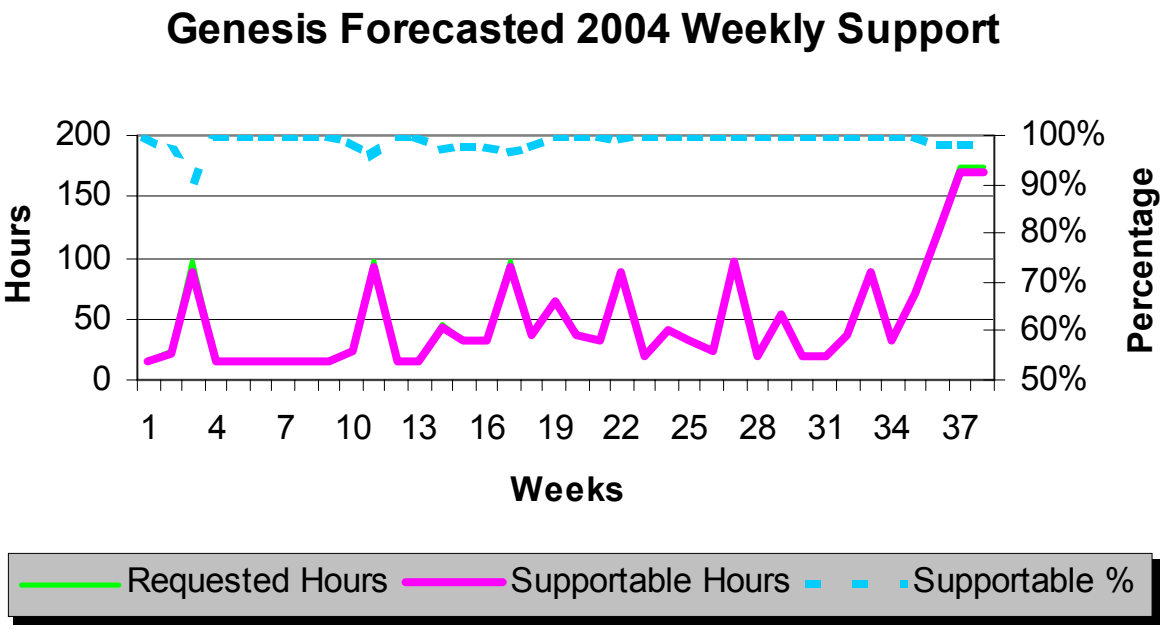

Figure 6

2.4.1 Specific Support Analysis

For example, Genesis is conducting an SKM-5b maneuver in week 03 and requesting six 8-hour passes on the 34 meter BWG subnet. Also, Genesis is requesting an additional five 8-hour passes on the BWG. Genesis is forecasted to receive 91% of its requested support during this week.

2.4.2 Possible Impact to Other Projects

Other projects who are using the 34 meter BWG subnet and are in Genesis viewperiod during week 03 are: CHDR, Deep Impact (DEEP), DSS Maintenance, SRTF, ULYS, Voyager 2 (VGR2) and WIND. CHDR is performing routine operations and requesting twenty-one 1-hour passes on the 34 meter BWG subnet. DEEP is conducting launch operations and requesting twenty-one 8-hour passes on DSS-15, 34, 54. DSS Maintenance is performing routine maintenance and requesting one 8-hour pass on DSS-24, one 6-hour pass on DSS-34 and one 6-hour pass on DSS-54. SRTF is performing routine operations and requesting fourteen 1-hour passes on DSS-25, 34, 54. ULYS is performing routine operations and requesting seven 10-hour passes on DSS-24, 34.VGR2 is performing routine operations and requesting seven 8-hour passes on DSS-34, 45. WIND is performing routine operations and requesting seven 2.5-hour passes on the 34 meter BWG subnet. Negotiation with these projects to secure additional support is required.

2.4.3 Viewperiod Overlap with Other Projects

Figure 7 graphically shows the percentage of Genesis viewperiod overlap with other projects. The Goldstone complex is shown in dark blue, Canberra is shown in vertical strip light blue nad Madrid is shown in horizontal purple. For example, VGR2 has a 100% viewperiod overlap at the Canberra complexe with Genesis during week 03.

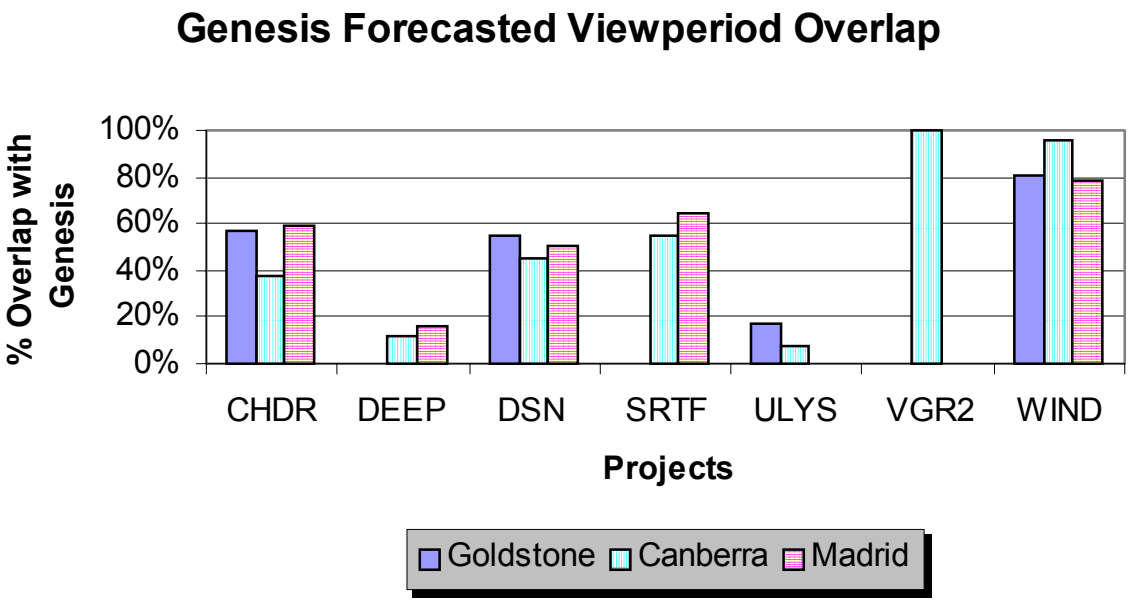

Figure 7

Copy:

R. Bartoo	E. Hampton	R. Hungerford	K. Kim	N. Lacey
F. Leppla	S. Lineaweaver	K. Martinez	D. Morris	J. Valencia

15-May-01

User Loading Profiles

Concurrence: _____

Project Manager Date

Genesis

VP Object	User	Resource	Durations Ave	Min	Calibration Pre	Post	January 1	2	3	4	5	February 6	7	8	9	10	March 11	12	13	14	April 15	16	17	18	19	May 20	21	22	23	24	June 25	26	27	28	July 29	30	31	32	August 33	34	35	September 36	37	38	39	October 40	41	42	43	44	November 45	46	47	48	December 49	50	51	52	53
2001																																																																
GNS	GNS	34B1	4.0	4.0	1.00	0.25																																			2	7	5	7	3	3	2	2	7	3		1	3	3		3	3													
GNS	GNS	34B1	8.0	4.0	1.00	0.25																																			3		7				7	5			7	5		4	7													
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GNS	GNS Launch	34B1	7.9	4.0	1.00	0.25																															20																															
GNS	GNS Maneuver	34B1	8.0	4.0	1.00	0.25																																			6											6					6									
GNS	GNS Maneuver	34B1	7.5	4.0	1.00	0.25																																																											
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GNS	GNS	34B1	8.0	4.0	1.00	0.25		4	7								1	5								1	5								1	5							1	5																	1	5			
GNS	GNS	34B1	7.0	4.0	1.00	0.25																																																												
GNS	GNS	DSS-34	4.0	4.0	1.00	0.25																																									3	3	3	3	3	3	3	3											
GNS	GNS	DSS-34	8.0	4.0	1.00	0.25																																																										
GNS	GNS Maneuver	34B1	8.0	4.0	1.00	0.25																																																										
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GNS	GNS	34B1	8.0	4.0	1.00	0.25					1	5									5							1	5						1	5																										
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GNS	GNS	34B1	8.0	4.0	0.50	0.25																																				1	5											1	5								
GNS	GNS	DSS-24,54	4.0	4.0	1.00	0.25							3	3	3	3	3	3	3	3																																															
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GNS	GNS	34B1	8.0	4.0	0.50	0.25		1	5							1	5			3		5	1	4	2	2	4		2		1	5		5			3	3		1																				
GNS	GNS Maneuver	34B1	8.0	4.0	0.50	0.25			6								6						6					6					6						6		6																				
GNS	GNS Maneuver	34B1	7.4	4.0	0.50	0.25																																																										
NONE	GNS Recovery	34B1	7.5	4.0	0.50	0.25																																					9																					
GNS	GNS Recovery	34B1	7.5	4.0	0.50	0.25																																			15																					