

April 21, 2004

TO: G. Burke
FROM: S. Guduru
SUBJECT: Preliminary Phoenix Study

Phoenix is a mission to explore Mars. It is a mission designed to land in the high northern latitudes of Mars. It will follow up on Mars Odyssey's spectacular discovery of near-surface water ice and will land in a terrain suspected of harboring as much as 80 percent water ice by volume within one foot of the surface. It will conduct the first subsurface analysis of ice bearing materials on another planet.

The purpose of this study is to evaluate the support that Phoenix is expected to receive during its prime mission.

Analysis was accomplished using the FASTER (forecasting and scheduling tool for earth-based resources) forecasting system and the updated mission set database from the February 2004 Resource Allocation review Board (RARB).

Overall Phoenix is expected to be over 90% supportable. A detailed analysis of this study follows.

Assumptions

Launch occurs on the first day of the launch window [08/09/07 – 08/28/07]

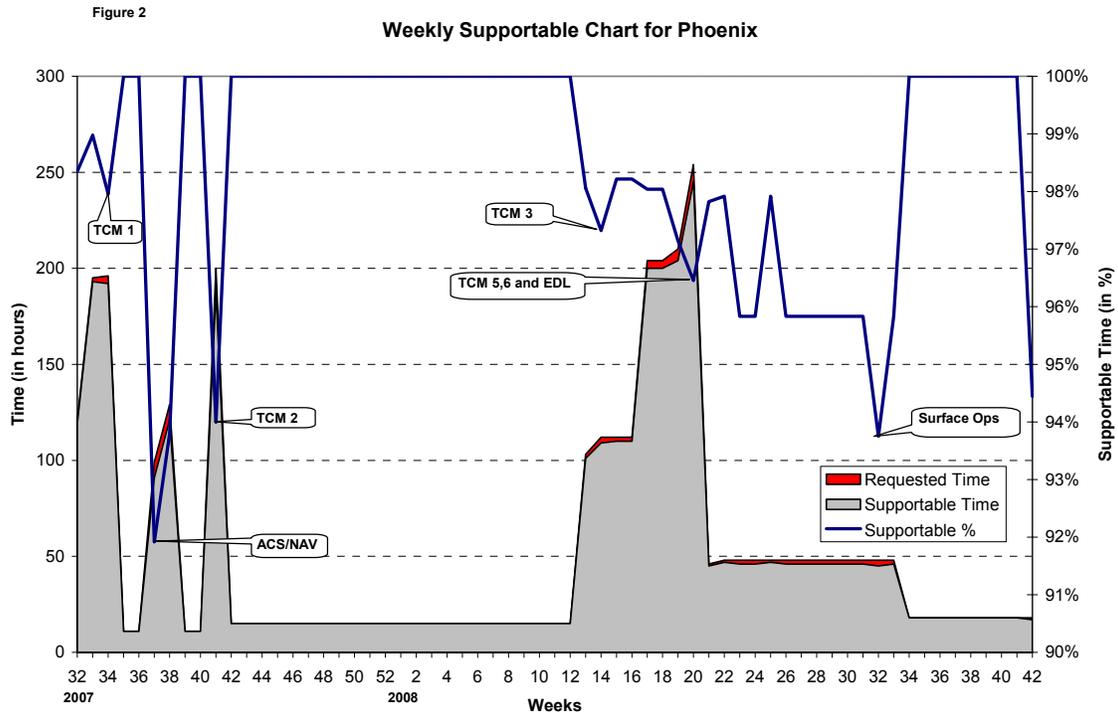
The updated trajectory information provided by the project for this mission was not used for this study due to issues inhibiting view period generation. In order to complete this study, the previously processed trajectory information for the Mars 2007 Scout placeholder mission (M07S) was used. The M07S view periods do not begin until week 37 of 2007. Consequently Mars planetary view periods with a 6 degree mask are used from launch through TCM1; the M07S view periods are used until entry, descent and landing (EDL); and the Mars planetary view periods are used thereafter for the surface operations phase.

Mission Requirements

The requirements for this mission were taken from the Phoenix Mission Deep Space Mission System Service Agreement (DSA) [which includes mission requirements on the cost calculation sheet], User Loading Profile (ULP), and via emails from Mark Garcia dated March 02, March 11 and April 02 of 2004.

Phoenix is an X-band mission and primarily requires 34M support for initial and routine operations and 70M support for contingency, EDL and surface operations. It requires 26M support for launch and initial acquisition only. The original ULP has been modified and updated to reflect the changes accordingly.

of the requested time on an average during its prime mission. A few sampled weeks were analyzed further: weeks 37, 38 and 41 of 2007 and week 32 of 2008.



In week 37, 38 of 2007 (i.e. 14th – 20th September), Phoenix is in their ACS NAV phase and requires continuous support with 5 passes overlapping for 1-hour DDOR measurement. It has contention, with requirements supporting Deep Space Station (DSS) preventative maintenance, Mars Reconnaissance Orbiter (MRO), Mars Global Surveyor (MGS) and Wind on the 34-meter subnet.

Phoenix view periods overlap nearly 100% with MRO and MGS, 34% with DSS Maintenance and 53% with Wind.

Table 1.0 shows the requirements of each of the mission listed above in weeks 37-38.

Table 1.0

Mission	No. Of Supports	Duration of each support (in hours)	Event
DSS	3	6-8	Preventative maintenance
MGS	3- 4	14	Mapping
MRO	2	8	Ka-band Ops demo
Wind	7	2.5	Routine tracking

In week 41 of 2007 (i.e. 8th – 14th October), Phoenix has a Trajectory correction Maneuver (TCM) and requires continuous support. It has contention with requirements supporting DSS preventative maintenance, Mars Express Orbiter (MEX) and Mars

Odyssey (M01O) on the 70M subnet and Cassini (CAS), Chandra X-ray Observatory (CHDR), DSS preventative maintenance, MRO, MGS, Stereo Ahead (STA) and Wind on 34B1 and 3B2 subnet.

Phoenix view periods overlap nearly 100% with MEX, MRO, MGS and M01O. It overlaps 30-40% with DSS Maintenance, 70% with CAS, 90% with STA, and 20-30% with Wind.

Table 1.1 shows the requirements of each of the mission listed above in week 41.

Table 1.1

Mission	No. Of Supports	Duration of each support (in hours)	Event
CAS	7	9	Saturn tour
CHDR	21	1	Routine tracking
DSS	3 (on each subnet)	6-8	Preventative maintenance
MEX	2 (on DSS-43)	4	Radio science bi-static
MGS	3- 4	14	Mapping
M01O	7	10	Mapping
MRO	2	8	Ka-band Ops demo
STA	7	4.3	Prime science
Wind	7	2.5	Routine tracking

In week 32 of 2008 (i.e. 4th – 10th August), Phoenix requires twenty-one 1-hour passes for relay and surface operations and has contention with requirements supporting CAS, DSS, MRO and STF on the 70M subnet.

Phoenix view periods overlap 100% with MRO and CAS, 80% with DSS and 95% with STF.

CAS requires three 9-hour passes for Saturn tour, DSS requires 3 supports ranging from 6-8 hours for preventative maintenance and two 8-hour supports at DSS-14 for antenna calibration and bearing maintenance, MRO requires three 8-hour passes for prime science and STF requires seven 1-hour passes for routine tracking.

Overall Phoenix is above 90% supportable. This study does not take into account the impact that the future missions which are not yet identified will have on the DSN Loading. Currently support for Phoenix in the period 2007 to 2008 appears excellent.