



Human Spaceflight (HSF) Network Support Group (NSG) Meeting

March 31, 2011



The STS-134 crew members are Commander Mark Kelly, Pilot Gregory H. Johnson and Mission Specialists Michael Fincke, Greg Chanitoff, Andrew Feustel, and European Space Agency astronaut Roberto Vittori. Endeavour will deliver spare parts including two S-band communications antennas, a high-pressure gas tank, additional spare parts for Dextre and micrometeoroid debris shields. This will be the 36th Space Shuttle mission to the International Space Station.

**Human Spaceflight (HSF)
Network Support Group (NSG)
Meeting**

March 31, 2011

**Johnson Space Center (JSC), TX
Gilruth Center**

A handwritten signature in black ink that reads "James A. Bangerter". The signature is written in a cursive style with a horizontal line underneath the name.

James A. Bangerter
Human Spaceflight Network Director
Goddard Space Flight Center

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Network Support Group Attendance

The attendees listed below attended all or part of the March 28 – March 31, 2010 NSG (splinter sessions and/or main forum).

<i>Last Name</i>	<i>First Name</i>	<i>Email Address</i>	<i>Affiliation</i>	<i>Telephone Number</i>
Adams	Erin	erin.adams@lmco.com	JSC/LM	281-336-5398
Aquino	Joseph	Joseph.M.Aquino@nasa.gov	JSC/NASA/SCIO	281-483-4033
Bangerter	Jim	James.A.Bangerter@nasa.gov	GSFC/NASA/HSF ND	301-286-7306
Bankert	Jeff	jeff.bankert@nasa.gov	GSFC/NISN	301-395-4613
Banks	Turonald	Turonald.Banks.contractor@itt.com	GSFC/HSF	301-823-2563
Baum	Earl	earl.j.baum@nasa.gov	JSC/NOIT/DD43	281-483-2321
Beck	Tom	thomas.beck@nasa.gov	WSSH-WSTF	575-524-5556
Blizzard	Melissa	Melissa.Blizzard@itt.com	GSFC/HSF	301-823-2622
Boatwright	Ernest	Ernest.Boatwright@ljtinc.com	MILA	321-867-1068
Booker	Harrison	Harrison.Booker@itt.com	GSFC/HSF	301-823-2627
Boster	John	John.Bosterii@escg.jacobs.com	JSC/ESCG/EV7	281-461-5476
Bowman	Joshua	Joshua.Bowman@nasa.gov	JSC/USA	281-282-3936
Bradley	Michael	michael.j.bradley-1@nasa.gov	MSFC/NISN	256-961-9492
Brogan	Jonathan	Jonathan.W.Brogan@nasa.gov	JSC/TOPO	281-244-6442
Bruchmiller	Tom	thomas.d.bruchmiller@nasa.gov	JSC/NAV	281-483-2825
Bullard	Michelle	Michelle.r.Bullard@nasa.gov	JSC/USA/JSC NAV	281-483-0445
Calhoun	Melvin	Melvin.Calhoun@itt.com	GSFC/HSF	301-823-2644
Cappellari	Jim	jim.cappellari@nasa.gov	GSFC/FDF/HTSI	301-286-3296
Carlson	Rita	rita.j.carlson@nasa.gov	JSC/USA	281-244-0252
Cauthen	Philip	philip.cauthen@nasa.gov	MSFC/NISN	256-544-4204
Chavali	Rama	Rama.S.Chavali@lmco.com	JSC/USA/FDOC	281-336-5053
Clapsadle	James	James.E.Clapsadle@nasa.gov	GSFC/NASA	301-286-5111
Clark	Liz	Elizabeth.Clark@itt.com	GSFC/HSF	-----
Colaluca	Victor	victor.colaluca@nasa.gov	KSC/IMCS	321-867-2286

Network Support Group Attendance

<i>Last Name</i>	<i>First Name</i>	<i>Email Address</i>	<i>Affiliation</i>	<i>Telephone Number</i>
Corley	Bryan	bryan.m.corley@nasa.gov	JSC/NASA/TOPO	281-483-8013
Culbertson	Robert	Robert.Culbertson-1@nasa.gov	JSC/GC office	281-483-0133
Damiano	Sharon	Sharon.C.Damiano@nasa.gov	GSFC/NASCOM/HTSI	301-286-6468
Daniel	Earl	Earl.Daniel.contractor@itt.com	GSFC/HSF/Docs	301-823-2560
Delong	Patrick	----	GSFC	----
Delpozo	Desi	desi.delpozo@lmco.com	JSC	281-336-5326
Dempsey	Gary	gary.l.dempsey@nasa.gov	MSFC	256-544-5113
Dooley	Jesse	-----	MILA/SW	321-867-3518
Douglas	Scott	Scott.C.Douglas@nasa.gov	GSFC/NASA/NISN	301-286-9550
Duffy	Dan	Daniel.J.Duffy@nasa.gov	GSFC/NASA	301-286-5110
Early	Tim	Timothy.W.Early@nasa.gov	JSC/ISS Comm & Trk	281-483-1461
Fahey	Donald	donald.l.fahey@nasa.gov	KSC/IMCS/Abacus	321-867-2500
Fanders	Michael	michael.t.fanders@nasa.gov	JSC/NACAIT	281-483-6069
Foster	William	William.M.Foster-1@nasa.gov	JSC/GC Office	281-483-0640
Fox	Ame	Fox_Ame@bah.com	GSFC/BAH/SGSS	301-286-5338
Frazier	Robert	Robert.B.Frazier@nasa.gov	JSC/NACAIT	281-483-4444
Frith	Aaron	Edward.A.Frith@nasa.gov	JSC/GC Office	281-483-8074
Fulford	George	george.fulford@patrick.af.mil	45 Space Wing/ER	321-853-8326
Gardea	Ray	rgardea@mail.wsc.nasa.gov	WSC	-----
Gawel	Michael	michael.gawel@patrick.af.mil	45 Space Wing/ER	321-853-8118
Gaylor	Kent	Kent.L.Gaylor@nasa.gov	JSC/NASA	281-244-6418
Glasscock	David	dglassco@mail.wsc.nasa.gov	WSC	575-527-7035
Gowda	Shashi	Shashi.Gowda-1@nasa.gov	JSC/GSCB/NACAIT	281-483-7057
Greatorex	Scott	Scott.A.Greatorex@nasa.gov	GSFC/NASA/NIMO	301-286-6354
Greer	Luke	Luke.Greer-1@nasa.gov	JSC/GC Office	281-482-6249
Griffin	Ken	kenneth.r.griffin@nasa.gov	WFF	757-824-2478

Network Support Group Attendance

<i>Last Name</i>	<i>First Name</i>	<i>Email Address</i>	<i>Affiliation</i>	<i>Telephone Number</i>
Haines	Bob	robert.e.haines@nasa.gov	GSFC/NISN	240-684-1082
Hampton	RuMica	rumica.p9.hampton@lmco.com	JSC/FDOC/LM	281-336-5306
Harris	Mark	Mark.A.Harris@nasa.gov	WFF	443-310-9041
Hasan	Syed	syed.o.hasan@nasa.gov	GSFC/FDF/HTSI	301-286-0995
Hendrickson	J. R.	james.r.hendrickson@nasa.gov	WFF	757-824-1778
Herd	Heath	Heath.Herd-1@nasa.gov	JSC/Comm Tech	281-483-3291
Hervey	Jewel	jewel.r.hervey@nasa.gov	JSC/NASA/SSP,ISS	281-483-0359
Hester	Daryl	daryl.t9.hester@lmco.com	JSC/FDOC/Eng.	281-853-2128
Hill	Eric	Eric.S.Hill@nasa.gov	GSFC/HSF	301-823-2628
Hoge	Sue	Susan.L.Hoge@nasa.gov	GSFC/NASA/595	301-286-3661
Holman	Kitty	kitty.c.cunningham@nasa.gov	JSC/PRD	281-483-0572
Holmes	Tom	Thomas.f.holmes@nasa.gov	JSC/GC Office	281-483-6876
Holt	Greg	Greg.M.Holt@nasa.gov	JSC/NASA/NAV	281-483-0292
Hopkins	Chris	christopher.p.hopkins@lmco.com	JSC/Boeing	281-244-4407
Hopkins	Wes	whopkins@mail.wsc.nasa.gov	WSC	310-607-4000
Hudgins	Bob	bhudgins@mail.wsc.nasa.gov	WSC/Scheduling	575-527-7078
Honeycutt	Randy	Randy.B.Honeycutt@nasa.gov	GSFC/NISN	301-286-0771
Ihnat	William	william.h.ihnmat@nasa.gov	GSFC/NISN	301-902-6018
Jackson	Dan	Dan.Jackson-1@nasa.gov	JSC/CATO	281-483-9526
Johnson	David	David.C.Johnson@nasa.gov	GSFC	301-805-3009
Jones	Brian	Brian.Jones-1@nasa.gov	JSC	281-483-0555
Jones	Ken	ken.jones-2@nasa.gov	JSC/Comm Integration	281-483-7671
Jones	Robert	robert.l.jones-1@nasa.gov	DFRC	661-816-1356
Jones	William	William.R.Jones-1@nasa.gov	GSFC/NASA	301-286-2573
Kindrick	Larry	kindrick@mail.wsc.nasa.gov	WSC	-----
Kirchoff	Ronna	Ronna.Kirchoff@itt.com	GSFC/SCNS	301-486-4269

Network Support Group Attendance

<i>Last Name</i>	<i>First Name</i>	<i>Email Address</i>	<i>Affiliation</i>	<i>Telephone Number</i>
Kraesig	Rick	richard.a.kraesig@nasa.gov	JSC/DFE/Cimarron	281-336-5090
Krypel	Joe	joseph.e.krypel@nasa.gov	MSFC	256-544-8685
Levin	Ryan	Ryan.Levin.contractor@itt.com	GSFC/HSF	301-823-2641
Lipford	Jay	James.P.Lipford@nasa.gov	JSC/Comm	281-483-4455
Louw	Aldora	Aldora.Louw@lmco.com	JSC	281-336-5085
Manley	Robert	-----	GSFC	-----
Marriott	Robert	Robert.R.Marriott@nasa.gov	JSC/NOIT	281-483-6879
Marsh	Mike	Michael.K.Marsh@nasa.gov	JSC/NOIT/GC Office	281-483-4761
Marston	Sharon	Sharon.S.Marston@nasa.gov	JSC/NASA	281-483-2256
Martin	Kelly	kelly.l.martin@nasa.gov	GSFC/NISN	301-286-2722
Martinez	Juan	Juan.u9.Martinez@lmco.com	JSC/LM	281-853-2138
May	Jennifer	Jennifer.May.contractor@itt.com	GSFC/HSF	301-823-2629
McGuyer	Michael	michael.mcguyer@nasa.gov	JSC/SSP Office	281-483-7734
McLamb	Monique	monique.mclamb-1@nasa.gov	KSC/NASA	321-867-8540
Mendoza	Marcella	Marcella.M.Mendoza@nasa.gov	JSC/Attitude-Pointing	281-483-0787
Mitchell	Warren	warren.j.mitchell@nasa.gov	GSFC/FDF	301-286-5092
Molina	Refugio	refugio.molina-1@nasa.gov	JSC/MOS/ISS PTG	281-244-5718
Moore	Randy	Randall.C.Moore@nasa.gov	JSC/OD AAD	281-244-1079
Moquin	Heidi	heidi.moquin@nasa.gov	GSFC/762	301-286-1447
Morgan	Randal	randal.r.morgan@nasa.gov	JSC/MOD/DM	281-483-1938
Morris	Joe	Billy.J.Morris@nasa.gov	JSC/GC Office	281-483-6874
Morse	Gary	Gary.A.Morse@nasa.gov	KSC/NASA	321-867-3514
Nesbitt	Avis	avis.nesbitt-1@nasa.gov	GSFC/NISN	301-286-9587
Parker	Joel	joel.j.k.parker@nasa.gov	GSFC/FDF	301-286-3604
Patel	Kush	Kush.H.Patel@nasa.gov	GSFC/HSF/GNOM	----
Pavlicek	James	james.r.pavlicek@nasa.gov	DFRC/NASA	661-276-2671

Network Support Group Attendance

<i>Last Name</i>	<i>First Name</i>	<i>Email Address</i>	<i>Affiliation</i>	<i>Telephone Number</i>
Pifer	Fred	Fred.Pifer.contractor@itt.com	GSFC/HSF	301-823-2646
Richards	Erik	Erik.Richards@itt.com	GSFC/HSF	301-823-2645
Riley	Kevin	Kevin.Riley@itt.com	GSFC/HSF	301-823-2647
Roberts	Penny	penny.e.roberts@nasa.gov	JSC/NASA	281-483-1485
Rogers	Karen	karen.m.rogers@nasa.gov	JSC/GC Office	281-483-6889
Russell	Thomas	Thomas.Russell@itt.com	GSFC/HSF	301-823-2626
Saurez	Jean	jean.m.suarez@nasa.gov	KSC/UNITeS/CSR	321-867-7726
Schenk	Harry	Harry.Schenk@itt.com	GSFC/NENS	301-823-2600
Serna	Diego	Diego.E.Serna@nasa.gov	281-483-0779	281-483-0779
Sham	Catherine	catherine.c.sham@nasa.gov	JSC/NASA	281-483-0124
Shaver	Matthew	Matthew.D.Shaver@usa-spaceops.com	JSC/USA/NAV	281-282-4776
Shields	Robert	robert.a9.shields@lmco.com	JSC/LMCO	281-336-5395
Sieg	Alan	Alan.Sieg@nasa.gov	MSFC	256-544-7397
Smith	Ben bsm	ith@mail.wsc.nasa.gov	WSC	575-527-7115
Solomon	Douglas	douglas.m.solomon@nasa.gov	GSFC/NISN	301-286-6864
Sparks	Ray	Ray.N.Sparks@nasa.gov	MSFC/CSC/HOSC	256-544-7664
Spinolo	Chris	Michael.C.Spinolo@nasa.gov	GSFC/NISN	301-286-7552
Sypher	Steve	ssypher@mail.wsc.nasa.gov	WSC	-----
Testoff	Steven	steven.b.testoff@nasa.gov	GSFC/ASRC/HSF	301-286-6538
Thomas	Martyn	martyn.thomas@honeywell.com	MILA Station Mgr.	321-266-1278
Thomas, Sr.	Michael	Michael.L.Thomas@nasa.gov	JSC/NISN	281-483-7544
Thompson	Craig	craig.thompson-1@nasa.gov	JSC/SSP/ISS/COTS	281-483-0241
Thornton	Roderick	Roderick.M.Thornton@nasa.gov	KSC/Comm	321-867-2241
Tibbs	James	James.H.Tibbs@nasa.gov	JSC/MCCS	281-483-6305
Trahan	Jacqulyne	Jacqulyne.M.Trahan@nasa.gov	JSC/GC Office	281-483-0749
Venable	Mitch	Mitchell.K.Venable@nasa.gov	JSC/GC Office	281-483-6075

Network Support Group Attendance

<i>Last Name</i>	<i>First Name</i>	<i>Email Address</i>	<i>Affiliation</i>	<i>Telephone Number</i>
Watson	Erin	erin.watson@nasa.gov	JSC/MOD/ADCO	281-483-0365
Whitney	Joe	Joseph.L.Whitney@nasa.gov	JSC/GC Office	281-483-6878
Wiley	Claudette	claudette.s.wiley@nasa.gov	GSFC/NISN	301-286-1807
Williamson	Gary	gary.williamson@nasa.gov	GSFC/FDF	301-286-1323
Willingham	Eugene	willingham.eugene@orbital.com	OSC	----
Wilson	Nicholas	Nicholas.M.Wilson@nasa.gov	JSC/DO4	281-788-1065
Wolfe	Nelson	Nelson.Wolfe.ctr@patrick.af.mil	ER/CSR	321-853-8227
Yettaw	Mike	Michael.e.Yettaw@nasa.gov	DFRC/NASA	661-276-3253
Zhou	Jen Jen.Zhou@itt	.com	GSFC/ITT/SCNS	301-486-4219
Zimmerman	Patrick	patrick.zimmerman@nasa.gov	JSC/USA/TOPO	281-483-2849

Network Support Group Minutes

INTRODUCTION

Mr. Jim Bangerter convened the March 31, 2011, Human Spaceflight (HSF) Network Support Group (NSG) meeting to discuss requirements, planning, and issues in support of the Space Shuttle, International Space Station (ISS), and Visiting Vehicles (VV). Mr. Bangerter welcomed the attendees and thanked them for their attendance at the NSG.

Mr. Bangerter thanked Mr. Earl Baum for his support in coordinating logistics for the meeting.

March 2011 NSG splinter session and main forum presentations and minutes can be accessed at the following URL: <http://scp.gsfc.nasa.gov/hsfnsg/nsg/0510/nsg.htm>

HSF RAIL REVIEW

Mr. Steven Testoff provided a review of the HSF Rolling Action Item List (RAIL) (refer to the presentation, *Human Spaceflight [HSF] Action Item Status*). Mr. Testoff reported that there were 15 meetings with open Action Items (AI) for a total of 24 open items, 5 over due items, and 4 meetings with overdue items. Mr. Testoff reviewed the open action items which will be updated in the next RAIL.

HSF DOCUMENTATION STATUS

Mr. Earl Daniel provided an HSF documentation status (refer to the presentation, *Human Space Flight Documentation Status/Plan*).

- A. Mr. Daniel stated that HSF documentation goes through several levels of review; local team review, general review, and Goddard Space Flight Center (GSFC) Configuration Control Board (CCB) review.
- B. Mr. Daniel reviewed the documents updated/published since the last NSG. Four documents were updated: *Network Integration Center Standard Operating Procedures*, 450-SOP-NIC, Revision 2; *Tracking and Data Relay Satellite System Network Operations Support Plan (TNOSP for International Space Station (ISS), SpaceX Dragon Annex*, 450-TNOSP-ISS Dragon Annex, Revision 1; *Goddard Space Flight Center Human Spaceflight Program Contingency Action Plan*, 450-CAP-GSFC-HSF (formerly 451-CAP-GSFC-HSF), Revision 1; and the *Tracking and Data Relay Satellite System Network Operations Support Plan (TNOSP) for the Space Shuttle*, 45-TNOSP-Space Shuttle, Revision 1, Documentation Change Notice (DCN) 001. Changes to these documents included updating procedures to reflect current operations support requirements, updates to terminology, documenting new commercial spacecraft, and removing references. Examples include changing the Voice Distribution System (VDS) to Mission Operations Voice Enhancement (MOVE); creating a document for the VV from SpaceX; removing the Air Force Satellite Control Network (AFSCN) and Remote Tracing Sites (RTS); adding procedures for Dual TDRS support and updating the Virtual Spacecraft procedure; and GSFC Simulation Operations Center (SOC) and Compatibility Test Lab (CTL) descriptions.

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- C. Mr. Daniel reported that one document will be submitted for CCB review; the *Network Operations Procedures for Space Network (SN)/Near Earth Network (NEN) Television, 450-NOP-TV/DS*.
- D. Mr. Daniel reported that two documents are in General review.
- E. Mr. Daniel reported that four documents are in Local/Team review.
- F. Mr. Daniel discussed the document updates scheduled for the next Fiscal Year (FY). He reviewed the Documentation Plan table which provides the document, edition, review start date, date due back from review, planned completion date, remarks, and book manager name.

NSG SPLINTER SESSION SUMMARIES

Each splinter Chairperson or designee was asked to provide a brief summary of the splinter session activities.

- A. Obsolescence Driven Avionics Redesign (ODAR) Status (refer to the presentation, *ODAR Project Splinter Summary*). Ms. Aldora Louw provided an ODAR splinter summary.
 - 1. Ms. Louw reported that a good discussion was held on the following open ODAR actions: ODAR Architecture Control Document (ACD), ISS IP Ground Routed Network (IIGoR) Network Latencies, eFDP Training, Space Link Extension (SLE) version on the eFDP, and canned data to simulate the forward link on the eFDP. The only schedule item that was discussed was the White Sands Complex (WSC) 25-Mbps schedule. The ODAR End-to-end (ETE) testing discussion was started. A representative from each National Aeronautics and Space Administration (NASA) facility was identified to participate in the test plan.
 - 2. Ms. Louw stated that the network latency is 120 ms for the carrier, but the ODAR network could be as high as 240 ms. The latency numbers are important for the eFDP and Communications Data Processor (CDP). Training will be conducted at the Electronic Systems Test Laboratory (ESTL). There is a disconnect in the versions of the eFDP and CDP. Canned data will be used to simulate the forward link so that the Mission Control Center (MCC) will not be needed to test at ESTL and Sunny Carter.
 - 3. Mr. Joe Aquino asked how the ACD will interact with the Johnson Space Center (JSC) 11534 Interface Control Documents (ICD). Mr. Dave Theriault works the ICDs. Ms. Louw stated that ODAR wants to follow the IDEA model. The Front End Processor Replacement (FEPR) ACD is in work. Mr. Bob Marriott stated that the intent is to take the as-built and modify the 11534. An 11534 volume can be created for ODAR. Ms. Louw stated that she will look at what content is contained in each document and work with Mr. Theriault. The ACD is supposed to be an all encompassing document. Mr. Aquino asked Mr. Marriott to track this JSC effort.
 - 4. Several follow-up actions resulted from the splinter session:
 - (a) Mr. Ray Sparks to provide the ODAR ACD to Ms. Erin Adams so that Ms. Adams can insert the JSC portions of the ACD.
 - (b) Mr. Ray Sparks to provide Mars Hall Space Flight Center (MSFC) schedule updates to Ms. Aldora Louw.

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- (c) Mr. Ray Sparks to provide eFDP training information to Ms. Erin Adams.
 - (d) Ms. Aldora Louw to follow up with Mr. Tom Wickline on eFDP SLE version.
 - (e) Mr. Ray Sparks to follow-up with Mr. David Zoller on providing eFDP canned data.
 - (f) White Sands Complex (WSC) to provide updated 25 Mbps schedule inputs.
 - (g) Mr. Ray Sparks and the MSFC team to provide eFDP SLE performance results with high network latencies (240ms).
- B. WSC Very High Frequency (VHF) Support Telecon and VHF Status (refer to the presentation, *ISS/SOYUZ VHF Support Team*). Mr. Kevin Riley provided a WSC operational issues and VHF status splinters summary. The purpose of the meetings was to discuss WSC support concerns, provide a VHF network update, and review Soyuz-26/27/28 launches. Items that were discussed were issues with WSC operational support, current troubleshooting that is taking place, and review of a go forward plan.
1. Mr. Riley reviewed the action items assigned at the WSC VHF operational issue splinter.

AI No.	Assignee	Action	Discussion
032811-WSC VHG-01	David Glasscock/ WSC	Provide the composite MP3 file for GSFC testing; additionally look into providing a file using a 1k tone.	No additional discussion during the splinter review.
032811-WSV VHF-02	Mike Yettaw/ DFRC	Provide Mr. Russ Jones with a data package on the antenna rotators that DFRC is using.	DFRC has more robust rotators and will provide data.
032811-WSC VHF-03	David Glasscock/ WSC	Develop a cable priority list, as part of an overall cable test plan, to be used in testing the VHF system cabling.	This is a part of the go forward plan. It is believed that there could be an issue with cables leaking. Mr. Russ Jones has suggested upgrading to a better shielded cable.
032811-WSC VHF-04	David Glasscock/ WSC	Develop a procedure to ensure that the VHF antenna is pointed correctly prior to each pass.	There was a bad pass and it was discovered that the antenna was not pointing correctly. The antenna was commanded to a certain point, but did not to the correct position. There was no feedback from the system. It would be highly desirable to install a camera so that that the personnel can see the antenna.
032811-WSC VHF-05	Karen Rogers/ JSC	Work with the ISS planners to schedule an ISS pass for VHF	No additional discussion during the splinter review.

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AI No.	Assignee	Action	Discussion
		engineering testing.	
032811-WSC VHF-06	Patrick Delong/ GSFC	Ship the MRT back to WSC.	A MRT Chassis was shipped to WSC and it was delivered to WSC April 4, 2011. Ed Ex tracing number 8756 9292 8932. CLOSED
032811-WSC VHF-07	J. R. Hendrickson/ WFF	Review the WFF Maximo entries to determine if there are other problems that have occurred at WFF that could be factors in the WSC VHF issue.	No additional discussion during the splinter review.

2. Mr. Riley reviewed the action items assigned at the VHS status splinter.

AI No.	Assignee	Action	Discussion
032811-VHF Status-01	Kevin Riley/ GSFC	Get with Mr. Patrick Delong to determine his status in the motor M2 motor evaluation activity.	M2 has a new motor which is not a direct replacement and being evaluated.
032811-VHF Status-02	James Bangerter/ GSFC/NASA/ HSF ND	Determine if the MRF will exist as part of the SCNS contract and determine what functions it will perform.	No additional discussion during the splinter review.

3. Mr. Riley stated that it will be necessary to identify the required C-band support services so that they will not be deleted post Space Shuttle.

- C. HSFC WG. Mr. Michael Thomas provided an HSFC WG splinter summary (refer to the splinter group presentation, *Human Spaceflight Comm Working Group*). Mr. Thomas reported that the NetworX transition is 95 percent complete. NASA Integrated Services network (NISN) Service Request (NSR) 34555 is ready to be put into service once some additional testing is completed. NSR 34843 is waiting on AT&T to deliver services and provide port assignments. Mr. Thomas reported that ISS video was discussed. There is a Study NSR in place to study and test Moving Picture Experts Group (MPEG) 4 decoders due to the continuing issues with the Amino boxes. Mr. Thomas reported that Space Shuttle retirement was discussed. NISN will provide the Space Shuttle program (SSP)

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with a list of what services NISN is providing to Space Shuttle. The NASA Integrated Communications Services (NICS) contract was awarded to SAIC. Space Shuttle retirement work should be completed prior to contract transition.

- D. Mission Operations Voice Enhancement (MOVE). Mr. Bob Haines provided a MOVE splinter summary (refer to the presentation, *MOVE Enhancements*). The purpose of the meeting was to make MOVE sites users aware of new MOVE enhancements. Discussion highlights included Keypad Auto Login, Voice over IP (VoIP) 30 Second Keep Alive, Voice Activity Indicator, Trouble Ticket Fixes, Type F Keypads, and Type B Keypads. Keypad auto login was implemented for the Jet Propulsion Laboratory (JPL) and is available on all keypads. The capability can be enabled or disabled. The VoIP capability was implemented for sites with VoIP. This was implemented at the request of JPL. The Voice Activity capability was implemented for the Kennedy Space Center (KSC). Software version 1.6.4 will be made available for implementation in April. GSFC has completed testing and JSC has the software on its non-operational system. Trouble ticket items are being addressed in both 1.6.4 and 2.0.0. No action items were assigned.
- E. C-band Scheduling. Mr. Jim Bangerter provided a summary of the C-band splinter (refer to the presentation, *C-band Communications Contingency Procedure Splinter Summary*). The purpose of the meeting was to review a DRAFT C-band VV contingency procedure. Mr. Bangerter stated that due to budget pressures, C-band support needs to be reduced for VV nominal support. The plan is to phase out current Soyuz support by 27S (May 2011). Other VV demo and first flights will continue to be supported. C-band requirements will be reviewed periodically with ISS to identify reductions. During review of the procedure, the White Sands Missile Range (WSMR) was removed as WSMR provides Space Shuttle support and the Flight Dynamics Facility (FDF) was added. It was recognized that Points-of-contact (POC) and phone numbers need to be updated and that site operational hours need to be provided / confirmed. One action item was assigned to Mr. Mike Gawel to determine if the sites can use the low-speed 46 character data. (Editor/s Note: Mr. Gawel has determined that all C-band data will be low speed 46-character data. This action item is **CLOSED**.) Mr. Bangerter stated that one issue was defined; the need to identify required C-band support service (circuits, etc.) so they are not deleted post Space Shuttle. Mr. Gary Morse asked if there is a call-up requirement for the FDF. Mr. Bangerter responded that the FDF is on console for all VV flights for critical support periods. If FDF is required for onorbit support, the network has a procedure in place to call up FDF. Mr. Bangerter stated that the Program Requirements Document (PRD) will be updated for the changed VV support requirements when finalized and approved. Mr. Jerry Wolfe stated that NAV was asked to consider decreasing STS-134/135 C-band passes. Mr. Morse stated that the request was to look at the scheduled passes to remove passes scheduled only for proficiency and this request is in response to the added budget pressures.
- F. Space Shuttle Mission Planning. Mr. Erik Richards provided a summary of the Space Shuttle mission planning splinter (refer to the presentation, *STS-134/-135 Mission Planning*). Mr. Richards reported that discussion highlights included the upcoming Near Earth Networks Services (NENS) to Space Communications Network Services (SCNS)

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contract change, STS-133 In Flight Anomaly (IFA) status, dual TDRSS ascent support, Alpha Magnetic Spectrometer (AMS) payload testing and issues with Guam, and mission overviews for STS-134 and 135. The Spaceflight Mission Managers (SMM), Ground Network Operations Managers (GNOM), and documentation personnel will transition to the new contract. The issue with the AMS testing with Guam was resolved by WSC engineering. Additional testing with Guam will be scheduled. No action items were assigned.

- G. Automated Transfer Vehicle (ATV) Update and H-II Transfer Vehicle (HTV) Mission Status. Mr. Erik Richards provided a summary of the ATV/HTV splinter (refer to the presentation, *ATV-2 and HTV-2 Mission Status*). Discussion highlights included mission overviews, Space Network (SN) support and service usage figures from launch, Discrepancy Reports (DR) to date, and lessons learned. Mr. Richards reported that the following lessons learned were discussed: ATV-2 (Root Cause and Corrective Action [RCCA] 00794) launch scrub rescheduling and HTV-2 ETE testing, scheduling launch events, and MSFC Huntsville Operations Support Center (HOSC) Backup Control Center (BCC) testing. Additional MSFC HOSC BCC testing is desired. No action items were assigned.
- H. SN Scheduling. Mr. Erik Richards provided an SN Scheduling splinter summary (refer to the presentation, *SN Scheduling Working Group*). The following items were discussed: ATV-2 RCCA, tolerance and duration scheduling criteria, ISS Critical Period Interim Support Instructions (ISI), and the VV Critical Period ISIs. The attendees discussed methods for improving the ISIs. It was agreed that that Space Shuttle ISIs would remain in Mission Elapsed Time (MET) and VV ISIs would be Greenwich Mean Time (GMT). One action item was assigned to Mr. Bob Culbertson to provide Mr. Jim Bangerter with a presentation or list of SNAS parameter items that JSC needs clarified to facilitate further discussion or the formation of a WG. (Editor's Note: Mr. Culbertson responded to this action item and this action item is **CLOSED**.)
- I. Integrated Requirements Post Space Shuttle. Mr. Joe Aquino provided a summary of the integrated requirements post Space Shuttle splinter (no presentation was provided). There are three future programs Orion Test Flight (OTF)-1 (which is funded), Multi Purpose Crew Vehicle (MPCV) (unfunded), and MCC-21. There will be a requirement to maintain a CORE infrastructure to support the three programs without much vision at this time. A CORE infrastructure is needed and it has not been defined yet. It will be more expensive to turn down the CORE services and bring them up again in the future. When the SSP ends, we need to make sure NISN is not stuck with the tail circuits (which are Space Shuttle unique).
- J. Nortel Router Replacement Project (NRRP) (no presentation was provided). Mr. Spinolo reported that he presented a project status and provided a detailed design and summary charts. NISN is meeting with the sites. Mr. Chris Spinolo reported that no action items were assigned at the meeting.
- K. Tracking and Data Relay Satellite System (TDRSS) Eccentricity (refer to the presentation, *Ku-band Open Loop Performance Assessment at Higher TDRS Eccentricities*). Ms. Bullard stated that there is no S-band or Auto Track impact.

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Ms. Bullard stated that the TDRS network cannot allow the orbits of the TDRS satellites to go to a higher eccentricity than 0.0035 without impacting Open Loop operations at 150 Mbps. One half that number is recommended to maintain 100 percent reliability of the 150-Mbps Open Loop service. The Trajectory Operations Officer (TOPO) can get some down-track accuracy relief to update their flight rule currently indicating that only 90 Km of down track error can be accepted. The flight rule can be updated to 308 Km allowable error. Some successful 300 –Mbps Open Loop operations can be supported. There is additional work to be done to develop workarounds. It is recommended that TDRS eccentricity not be increased beyond the current values. The TDRS 171 analytical value is 0.0023552 and this is very near the maximum value that be tolerated. A cap of 0.00175 should be pursued. Mr. Bangerter stated that he took an action to carry this information back to the SN. Mr. Bangerter stated that it is his belief that the SN will elect to stay at the current levels. The SN is not scheduled to go to 300-Mbps return and 25-Mbps forward service until the end of 2011. Mr. Bullard stated that once the ISS software is updated, the problem will be eliminated.

- L. SN Ground Segment Sustainment (SGSS)/TDRS-K/L. Mr. Jim Bangerter provided a Guam Data Interface System Replacement (GDISR), SGSS, and TDRS-K/L splinter summary (no presentation was provided). Mr. Bangerter stated that Mr. Jim Clapsadle presented an SGSS overview. Mr. Bangerter had provided a TDRS-K/L presentation provided by the project. The presentation provided a basic review the system and satellite elements and capabilities. Changes will be made to the WSC hardware and software. Software changes are being delivered now. The project is requesting ISS and user support for its onorbit testing. No action items were assigned.
- M. Guam Architecture. Mr. David Glasscock provided a Guam architecture splinter summary (no presentation was provided). Mr. Glasscock stated that encapsulation for Guam support was discussed at the last NSG. This support has been successfully used since STS-132 in July. Errors were experienced during STS-133 on the Channel 2, 2-Mbps data and the S-band 192-kbps data. It has not been possible, to date, to identify the issues. WSC has provided information to RT Logic. WSC has the action to develop a contingency plan for STS-134.

MILA/PDL STATUS

Mr. Ray Boatwright presented a Merritt Island Launch Annex (MILA)/Ponce deLeon (PDL) status (refer to the presentation, *MILA/PDL Status*). Mr. Boatwright reviewed the STS-133 problems. Dropouts were noted on the PDL T-1 during the January prelaunch activities. The problem was determined to be a timing issue with the KSC equipment and a software configuration change corrected the problem. An ISI was issued. Multi-function Receiver (MFR) #5 was not configured correctly for tracking on a 2-way proficiency pass. This was due to an Operator Error (OE) and additional training has been provided. Mr. Boatwright discussed the MILA/PDL closure. The 6-week phase out operation begins on the completion of the last Space Shuttle flight. An equipment/property list was provided to the network elements. PDL will cease operations with the completion of the last Space Shuttle launch. The building will remain intact. MILA will be demolished. KSC assumes the responsibility for MILA/PDL following

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closure. Mr. Morse stated that KSC cooperation is key. Their cooperation will save the program money. Staffing is sufficient to meet all requirements. Mr. Martyn Thomas has been hired as the new Station Manager. Two data and one Radio Frequency (RF) Technician retired at the contract change. Two retirees with Ground Network (GN) experience were recruited. These personnel will be assigned non-critical duties during STS-134. MILA is ready to support STS-134.

SN STATUS

Mr. David Glasscock presented an SN status (refer to the presentations, *TDRS Constellation Status WSC Software & Hardware Activities*).

A. Mr. Glasscock reviewed the current TDRS fleet status/configuration

1. The TDRS configuration is the same as the last NSG.
2. WSC had received NASA concurrence to relax the TDRS eccentricity requirements to less than 0.0035 to minimize conjunction possibilities should a spacecraft anomaly occur. Based on potential issues with the ISS, this action was suspended in March 2010. WSC is awaiting suspension release from JSC.
3. TDRS-3 is in storage mode. It is ready to replace TDRS-4 if required. This would require a 24-hour turnaround. TDRS-3 has the highest eccentricity.
4. The TDRS-3 Space-to-Ground Link (SGL) dedicated downlink Traveling Wave Tube Amplifier (TWTA) #2 helix current is rising. The TWT has been shut off for storage. It will be reactivated as the composite link if TDRS-3 is activated.
5. TDRS-4 K-band Single Access (KSA)-2 forward power is below specification. A spare is available for the service.
6. TDRS-4 is experiencing telemetry errors. SGL Terminal (SGLT)-1/TDRS-4 is experiencing the errors. Spare TWTA1 replaced TWTA2 on March 17 because trending data indicated a failure in April.
7. TDRS-4 has experienced power system degradation. Battery 1 has failed and battery 2 has shown signs of a soft short in at least one cell. The spring eclipse season runs January 20 through March 23, 2011. A Network Advisory Message (NAM) was released to advise no SA1 service available from Day of Year (DOY) 048 through 080. SA1 and MAF were activated following the spring eclipse season.
8. TDRS-4 is experiencing intermittent Multiple Access (MA) errors. The system is designed to meet specifications with 20 of 30 elements operational. No data loss has been directly attributed to the anomaly.
9. Mr. Bangerter stated that TDRS-3 has polarization constraints/restrictions. There was a plan that there would be no KSA-1 services. TDRS-3 payload restrictions need to be reviewed if it is possible that it will be used to replace TDRS-4.

B. Mr. Glasscock provided a WSC hardware status. MOVE will replace the current Multi-Conference Digital Switch (MDS). Cabling and keyset installation is complete at the Second TDRSS Ground Terminal (STGT) and will be complete at the end of April at the White Sands Ground Terminal (WSGT). The Guam Remote Ground Terminal (GRGT) installation is scheduled for the end of the second quarter. Cutover to the NTR-1 at STGT was completed December 2010. The antenna Subsystem Controllers (SSC)

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replacement will replace obsolete equipment and there will be no changes to the Tracking, Telemetry and Control (TT&C) Automatic Data processing Equipment (ADPE). Units are being tested in the Software Maintenance and Test Facility (SMTF). Testing of the 25-Mbps forward service is almost complete.

- C. Mr. Glasscock provided a WSC software status. Delivery STN-102 was delivered to SGLT-2 ADPE on March 18, 2011. Delivery STS-103 was delivered to the SGLT-2 B side IRs on March 3, 2011. SNAS delivery 10.2 was delivered to the servers and MOCC clients on March 10, 2011. Delivery 10007 TDRS-K testing is in progress. The 25-Mbps forward software code merge is in progress and scheduled for delivery to the Network Control System Data System (NCCDS) on March 30, 2011.

WALLOPS GROUND STATION STATUS

Mr. Mark Harris presented a Wallops Ground Station (WGS) status (refer to the presentation, *Wallops 11M Status*). Mr. Mark Harris provided a status since the last NSG. The MOVE system was installed on February 25, 2011. This allowed the addition of the transmit and receive audio record capabilities on VHF-1/2. Transition to upgraded Windows XP version of Wallops Orbital Tracking Resource Scheduler (WOTRS) at WSC is complete. There have been no changes due to NENS to SCNS transition. The station configuration remains the same for STS-134: the 11M is prime for all launch and orbital services and the 7.3M is backup for launch only (no command capability). Mr. Harris provided a VHF status. There have been no software or hardware upgrades and there are no current issues. There is no VHF open work. Mr. Harris reviewed the open DRs. DR 54755 is on the intermittent Wallops Acquisition Data Archive Transfer (WADAT) timeout error which affects delivery of Internet Predicts (INP)/Improved Interrange Vector (IIRV) data. The source of this problem has not been found, but it does not impact operations. This item will be tracked until September. DR 58470 is on the Antenna Control Unit (ACU). We believe it is a hardware issue. The unit will be replaced after STS-134. The unit will be sent back to the vendor for evaluation. The system is rebooted daily. DR 259384 is on the inadvertent uplink. A software fix was put in place and has tested good. DR 259394 is on the backup generator. A generator will be run in parallel during the STS-134 mission. DR 259371 is on the WOTRS crash. The system is rebooted when the problem occurs. A fix will be installed in April. Open work includes ACU Operating System SP3 install post STS-134 and the X-band engineering change to facilitate Wallops Range support of SubTec-4. Facilities are Green. Staffing is sufficient to meet all requirements.

WALLOPS ROC STATUS

Mr. Mark Harris presented the Wallops Range Operations Contract (ROC) status (refer to the presentation, *Wallops Range Operation Contract Status*). There have been no 7.3 M or Ultra High Frequency (UHF) Air-to-Ground (A/G) hardware or software changes. There are no open DRs. The 7.3M and UHF configuration has not changed. There is no open work. Facilities are Green. Staffing is sufficient to meet all requirements. Mr. Scott Groatorex asked if the ROC had gone down recently. Mr. Harris stated that the 7.3M is in the same building as the 7M and on the same generator. The UHF system has its own generator.

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STS-134 OVERVIEW

Mr. Luke Greer provided an STS-134 mission overview (refer to the presentation, *STS-134 / ULF-6 Mission Overview*). The scheduled launch date is April 29, 2011. Mission objectives are: the delivery of the EXPRESS Logistics Carrier 3 (ELC3); delivery of the AMS; and delivery of spare parts including two S-band communications antennas, a high-pressure gas tank, additional spare parts for Dextre, and micrometeoroid debris shields. Mr. Greer reviewed the mission timeline overview. Four Extra Vehicular Activities (EVA) are planned (originally three were planned). The Sensor Test for Orion Rel-Nav Risk Mitigation (STORRM) hardware will be used for re-rendezvous for the first time.

STS-135 OVERVIEW

Mr. Brian Jones provided an STS-135 mission overview (refer to the presentation, *STS-135 / ULF-7 Mission Overview*). The launch is scheduled for June 28, 2011. There will be a crew of four vice the usual seven. Mission objectives are: the resupply & equipment transfer to ISS using the Multipurpose Logistics Module (MPLM)-2; delivery of the Robotics Refueling Mission (RRM); and return of downmass payloads. RRM is the test of an automated refueling of satellites via robotics. Mr. Jones reviewed the mission timeline overview. Cargo transfer is estimated to take 175 hours. Mission duration is 12+0+2 which is a change. One EVA is planned. The EVA will be conducted by the ISS crew and not the Space Shuttle crew. A failed ammonia pump will be retrieved for study. The emphasis will be the MPLM transfer activity.

DFRC STATUS

Mr. Mike Yettaw provided a Dryden Flight Research Facility (DFRC) status (refer to the presentation, *DFRC Range Status*). Mr. Yettaw reviewed DFRC open work and recent items. Due to persistent unresolved problems with the Long Range Optics (LRO), it was decided to remove and replace the pedestal with an on-site spare. The new system is functional. Depot Level Maintenance (DLM) has been completed on DFRC. The communications facility VHF Comm-1 high reflected power feed has been replaced and the system is functional. The VHF Comm-3 Azimuth drive failed. The repaired motor is due back March 25. The estimated completion for this work is April 15. The Comm-3, 4.57 meter mesh reflector has been replaced with a 6 meter solid dish, due to the problem with the mesh pulling away. Feed replacement and realignment is still pending. Mr. Yettaw discussed the DFRC STS-133 support. Standard support was provided. There was an Azimuth channel anomaly. The problem was found prepass, the radar switched, and there was no mission impact. There was a Radar Information Processing System (RIPS) day of year problem. There was no impact due to work around using DES playback. It has been determined that it is not economical to implement software upgrades due to Space Shuttle program termination. FRCC and DFRC were unable to support due to high winds and support was provided by other sites. DFRC was unable to acquire using Two Line Element (TLE) 899 which was reported as having a negative time bias of 9 seconds. It was later determined that ISS orbit adjustment invalidated the TLE. No DR has been assigned. On Orbit 60, there was an echo on the Cooling Net following DFRC extending the loop to the Shuttle Processing Area (SPA). The equipment reset at the SPA cleared the echo. Mr. Yettaw reviewed the DFRC support configuration. Aeronautical Test Facility (ATF)-1 7M S-band is prime; ATF-

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2 7M S-band is backup; and ATF-3 4M S-band is backup landing contingent only. Comm 1 and 2 are available, but Comm 3 cannot be counted on. NTR provides terrestrial and satellite diversity and this will be lost post Space Shuttle. Can options be explored to retain this diversity?

NISN MISSION OPERATIONS STATUS

Ms. Claudette Wiley provided a NISN mission operations status (refer to the presentation, *NASA Communications Status*). NISN is transitioning to the NetworX contract. The mission network transition is scheduled to be complete September 30, 2011. Complete transitions are the 121 backbone and tail circuits and 145 Junipers, RADs, and IP Muxs. The backbone transition was not a physical transition, but a billing change only. The Junipers, RADs, and IP Muxes are now NISN owned. Ongoing transitions include the Guam DS3s, Santiago (AGO) RAD channel bank, and Channel Service Unit (CSU) upgrades (27 sites). NISN is replacing the existing Digital Matrix Switch (DMS). In addition, a redundant switch has been procured and installed in Building 32 and is being tested. The UNITEs contract is transitioning to the NICS contract. NICS combines the networking portion of the existing UNITEs contract, the Local Area Network (LAN) portion of the Outsourcing Desktop Initiative for NASA (ODIN) contract, and Task Order (TO) 16 of the MOMS contract. The Voice Switching System (VSS) and VDS have been replaced by MOVE. All VDS keysets have been removed and shutdown is complete. NISN has implemented a NASCOM Emergency Control Center (NECC) in Building 32. NISN has developed a Shelter-in-Place capability, which was put in place after the STS-130 lessons learned. The NISN personnel who supported during the STS-130 mission have received a Space Flight Awareness Award (SFA) for their efforts during the snow storm.

EXPEDITION 27 and 28

Mr. Aaron Frith provided an ISS activities overview (refer to the presentation, *Expedition 27 and 28*). Expedition 27 and 28 time frame starts from when the crew arrives in March and ends in September. The expedition is characterized by a lot of VVs, logistics, and transfer of supplies to and from various vehicles. VVs consist of two Soyuz: 26S which arrives with the remainder of the Expedition 27 crew in April and 27S which will bring the rest of the Expedition 28 crew in June. Other VVs are two Progress resupply vehicles, the ATV, the HTV, and the last two space shuttle mission. Mr. Frith reviewed the ISS Crew Expedition 27 and 28 and Soyuz 26/27 Crew Exchange crew members. Mr. Frith reviewed the Expedition 27 and 28 patch histories. Mr. Frith reviewed the 2011 significant events.

MOVE

Mr. Dan Duffy provided a MOVE status (refer to the presentation, *Mission Operations Voice Enhancement*). The MOVE contract is in the 5th year of a 5-year base contract. By the end of the year all the sites listed on the MOVE Site Status page will be complete. GSFC and MSFC are complete and the systems are Prime. JSC Switch installation is complete and some keysets are deployed for non-critical users. JSC continues to work with the vendor to resolve issues preventing keyset deployment to the flight control rooms. STGT is complete and the system is Prime. WSGT is on MOVE Prime and GRGT is not yet complete. WGS is complete and the

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system is Prime. The Range is complete and operating in dual ops. KSC is the last site on the base contract and Site A acceptance Tests (SAT) are scheduled for September 2011. Mr. Duffy reviewed the new features which were discussed in detail at the MOVE splinter meeting.

NACAIT

Mr. Mike Fanders gave a Network and Communications Analysis and Integration Team (NACAIT) status (refer to the presentation, *NACAIT Status*). The Canadian Space Agency (CSA) is in full-up Space Station Remote Manipulator System (SSRMS) support. Four channel ISS video is operational; however, freezing video issues are being tracked. New decoders are being evaluated. The Japan Aerospace Exploration Agency (JAXA) gateway upgrades are scheduled for regression testing. The earthquake impacted Japanese Experiment Module (JEM)/HTV support; however, full operations were restored with 10 days. HTV-3 launch is scheduled for January 20, 2012. The European Space Agency (ESA) Columbus lab is in full operation. ATV-2 was launched and docked and there is discussion that the undocking may be moved to June 20 or 21 vice June 10. ATV-3 is scheduled for launch on February 29, 2012. The Agenzia Spaziale Italiana (ASI) gateway is running full IP with 24 hours operations. The gateway is the prime command telemetry path for SWIFT. The gateway is being modified for NuSTAR. The NuSTAR launch is NET February 2012. The Russian Space Agency (RSA) Houston Support Room (HSR) restructuring is complete. A mission services redesign is in work. The SpaceX C-1 mission was a success. Combining C-2 and C-3 is being evaluated by the Agency. Cygnus RF compatibility testing is scheduled for July 2011. The launch is NET December 2011. The NPRD Annex B, Revision A is being finalized. Future requirements are MCC-21, OTF-1, MPCV, and commercial crew vehicles.

FDf ARCHITECTURE MODERNIZATION

Mr. Warren Mitchell provided an overview of the FDF architecture upgrades (refer to the presentation, *FDf Architecture Modernization*). FDF Modernization is the new architecture and system components that will be used within the GSFC FDF to ingest, process, store, and deliver FDF services and products to customers. The system architecture is a Goddard Mission Services Evolution Center (GMSEC) based architecture. The modernization effort includes upgrade and redesign on internal communications and data processing applications to fit into the GMSEC architecture. The new system is separate from the current system. Space Shuttle support is not part of the modernization effort. No testing is required with the Space Shuttle, but testing is required with the ISS. There is no change to Product Server access. Customers who receive products directly from the FDF will see no impact. Some testing for verification of FDF configuration for delivery will be necessary and the FDF will work with each customer to schedule interface testing. Customers who deliver data via FTP to the FDF should see no or minimal impact depending on how customer is doing the FTP. The FDF will be contacting each customer individually in the next 2-3 months to discuss change and schedule testing. Customers who deliver data in real-time via Closed IONet will see no impact. FDF will be conducting ETE testing with each customer to verify FDF configurations and set-up as part of the final operations testing. Final operations testing is scheduled to begin in mid-July and go through late September of 2011. An Operational Readiness Review (ORR) scheduled for September 27. Transition to

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the new system for operations begins October 2011. Transition is expected to take approximately 4 – 5 weeks. The old system will run in parallel for a period of time. Mr. Bob Marriott asked if there will be changes to the JSC/TOPO interface and Mr. Mitchell stated that there would not be. Mr. Marriott asked if testing can be performed in parallel with the old system and Mr. Mitchell stated that it can be.

ITT SCNS TRANSITION STATUS

Mr. Ronna Kirchoff provided an ITT SCNS transition status (refer to the presentation, *Space Communications Network Services Transition Status*). Ms. Kirchoff reviewed a Scope of the SCNS Contract diagram which provided a pictorial view of the Near Earth Network (NEN), commercial ground sites, Satellite Laser Ranging (SLR)-Very Long Baseline Interferometry (VLBI), and other SCNS assets. ITT has been supporting NASA for over 25 years. ITT has four business centers and SCNS is under Information Systems joined with Mission Systems. Ms. Kirchoff reviewed the organization chart. Mr. Susan Chang is the SCNS Program Manager. Ms. Kirchoff and Mr. Jack Wallick are the Deputy Program Managers. Ms. Kirchoff will focus on the SN and technical side. Mr. Wallick will focus on business side. Ms. Kirchoff reviewed the SCNS team members. SCNS cutover will occur on April 9, 2011. There has been full capture of the GSFC HSF Team and JSC E STL. There has been almost full capture of the MILA/PDL team. There has been capture of key incumbents at WFF. There has been a 93 percent capture rate at WSC. The SCNS team will be located at Walker Drive facility in Greenbelt, MD. The SCNS ORR was successfully completed on March 25, 2011. Mr. Aquino asked if there are any issues in that the transition is 10 days prior to the launch of STS-134. (Editor's Note: the launch was subsequently rescheduled to April 29.) Ms. Kirchoff stated that the personnel are in place.

HTSI NENS PHASE OUT

Mr. Rob Manley provided a Honeywell Technology Solutions Inc (HTSI) NENS phase out status (refer to the presentation, *NENS Phase Out*). HTSI SN, NEN, Engineering Development and the functional area managers are on the transition team. A Phase Out Plan was developed. HTSI met with NASA on the transition approach. The Contract Close Out is also in progress. Phase Out Work Packages and checklists were developed. These are 100 percent complete. The initial dump of Maximo has been provided and successfully ingested by ITT with a final dump planned for April 8. All property will be transferred on April 8. An initial EDIMS export to EMS has been accomplished. A Delta export is planned for April 8. Most material Purchase Orders (PO) have been novated to ITT with the majority planned to be completed prior to April 8. Training is being provided on a daily basis. All Phase-Out Work Packages have been delivered. HTSI continues to provide documentation and report samples as requested. Mr. Manley provided a status of the subcontract novations, a summary of the CBAs, and a list of technical assistance agreements.

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SSP KNOWLEDGE CAPTURE

Mr. Mike March provided an SSP knowledge capture status (refer to the presentation, *Shuttle Knowledge Capture*). The purpose of this effort is to archive Space Shuttle unique processes, procedures, and other products describing what we do in preparation for, during, and after a Space Shuttle flight, and why we do it. This is a JSC Mission Operations Directorate (MOD) project, archiving data in a system that will allow only MOD personnel to retrieve the documents. Unless a document has been reviewed and officially signed off as “Not Containing ITAR/Export Controlled Data” by an Export Control Officer (ECO), all documents will be designated as “Not Yet Reviewed by ECO” when uploading into the database. This will require any user retrieving these documents in the future to take precautions before releasing the data to the public or in a forum with foreign national participation. Mr. Marsh stated that we have identified 25 Integrated Networks documents (65 MB) to be archived and have received 102 STS mission notebooks (4.4 GB) from GSFC of which approximately 10 – 15 will be archived in this database. Mr. Marsh stated that the Launch and Landing counts are significant. He stated that he is looking for data from the first 51 flights. He would also like records on how personnel prepared for a mission. Mr. Blizzard stated that GSFC can provide project schedules.

NSG ACTION ITEM WRAP UP

No action items were assigned at the March 31, 2011, Main Forum of the NSG.

CLOSING REMARKS

Mr. Bangerter thanked the attendees for their participation at the March 2011 NSG. The next NSG will be focused on the VV. There are approximately 11 launches/trips to the ISS scheduled annually. The network will be actively involved in supporting ATV, HTV, Soyuz, SpaceX, and Orbital. The next NSG is tentatively scheduled for the September 2011 time frame.

Network Support Group Acronyms and Abbreviations

ACD	Architecture Control Document
ACU	Antenna Control Unit
ADPE	Automatic Data Processing Equipment
AFSCN	Air Force Satellite Control Network
A/G	Air-to-Ground
AGO	Santiago
AI	Action Item
AMS	Alpha Magnetic Spectrometer
ASI	Agenzia Spaziale Italiana
ATF	Aeronautical Tracking Facility
ATV	Automated Transfer Vehicle
BCC	Backup Control Center
CCB	Configuration Control Board
CDP	Communications Data Processor
COTS	Commercial Orbital Transportation System
CSA	Canadian Space Agency
CSU	Channel Service Unit
CTL	Compatibility Test Laboratory
DCN	Documentation Change Notice
DFRC	Dryden Flight Research Center
DLM	Depot Level Maintenance
DMS	Digital Matrix Switch
DOY	Day of Year
DR	Discrepancy Report
ECO	Export Control Officer
ELC	ExPRESS Logistics Carrier
ESA	European Space Agency
ESTL	Electronic Systems Test Laboratory
ET	External Tank
ETE	End-to-end
EVA	Extra Vehicular Activity
FDF	Flight Dynamics Facility
FY	Fiscal Year
GDIS-R	Guam Data Interface System Replacement
GMSEC	Goddard Mission Services Evolution Center
GMT	Greenwich Mean Time
GN	Ground Network

Network Support Group Acronyms and Abbreviations

GNOM	Ground Network Operations Manager
GRGT	Guam Remote Ground Terminal
GSFC	Goddard Space Flight Center
HOSC	Huntsville Operations Support Center
HSF	Human Spaceflight
HSFC	Human Spaceflight Comm
HSR	Houston Support Room
HTSI	Honeywell Technology Solutions Inc.
HTV	H-II Transfer Vehicle
ICD	Interface Control Document
IFA	In Flight Anomaly
IIGoR	ISS IP Ground Routed Network
IIRV	Improved Interrange Vectror
INP	Internet Predict
ISS	International Space Station
JAXA	Japan Aerospace Exploration Agency
JEM	Japanese Experiment Module
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
KSA	K-band Single Access
KSC	Kennedy Space Center
LAN	Local Area Network
LRO	Long Range Optics
MA	Multiple Access
MCC	Mission Control Center
MDS	Multi-conference Digital Switch
MET	Mission Elapsed Time
MFR	Multi-function Receiver
MILA	Merritt Island Launch Annex
MOD	Mission Operations Directorate
MOVE	Mission Operations Voice Enhancement
MPCV	Multi Purpose Crew Vehicle
MPEG	Moving Picture Experts Group
MPLM	Multipurpose Logistics Module
MSFC	Marshall Space Flight Center
NACAIT	Network and Communications Analysis and Integration

Network Support Group Acronyms and Abbreviations

NAM	Team
NASA	Network Advisory Message
NCCDS	National Aeronautics and Space Administration
NECC	Network Control Center Data System
NEN	NASCOM Emergency Control Center
NENS	Near Earth Network
NICS	Near Earth Networks Services
NISN	NASA Integrated Communications Services contract
NOSP	NASA Integrated Services Network
NRRP	Network Operations Support Plan
NSG	Nortel Router Replacement Project
NSR	Network Support Group
	NISN Service Request
ODAR	Obsolescence-Driven Avionics Redesign
ODIN	Outsourcing Desktop Initiative for NASA
OE	Operator Error
ORR	Operational Readiness Review
OSC	Orbital Sciences Corporation
OTF	Orion Test Flight
PDL	Ponce de Leon
POC	Point-of-contact
PO	Purchase Order
PRD	Program Requirements Document
RAIL	Rolling Action Item List
RCCA	Root Cause and Corrective Action
RF	Radio Frequency
RIPS	Radar Information Processing System
ROC	Range Operations Contract
RRM	Robotics Refueling Mission
RSA	Russian Space Agency
RTS	Remote Tracking Site
SA	Single Access
SAT	Site Acceptance Test
SCNS	Space Communications Network Services
SFA	Spaceflight Awareness Award
SGL	Space-to-Ground Link
SGLT	Space-to-Ground Link Terminal
SGSS	SN Ground Segment Sustainment
SLE	Space Link Extension

Network Support Group Acronyms and Abbreviations

SLR	Satellite Laser Ranging
SMM	Spaceflight Mission Managers
SMTF	Software Maintenance and Test Facility
SN	Space Network
SOC	Simulation Operations Center
SPA	Shuttle Processing Area
SSC	Subsystem Controller
SSP	Space Shuttle Program
SSRMS	Space Station Remote Manipulator System
STA	Shuttle Training Aircraft
STORMM	Sensor Test for Orion Rel-NAV Risk Mitigation
STGT	Second TDRSS Ground Terminal
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
TLE	Two Line Element
TNOSP	TDRSS NOSP
TO	Task Order
TOPO	Trajectory Operations Officer
TT&C	Tracking, Telemetry and Control
TWTA	Traveling Wave Tube Amplifier
UHF	Ultra High Frequency
VDS	Voice Distribution System
VHF	Very High Frequency
VLBI	Very Long Baseline Interferometry
VoIP	Voice over IP
VSS	Voice Switching System
VV	Visiting Vehicle
WADAT	Wallops Acquisition Data Archive Transfer
WG	Working Group
WGS	Wallops Ground Station
WOTRS	Wallops Orbital Tracking Resource Scheduler
WSC	White Sands Complex
WSGT	White Sands Ground Terminal
WSMR	White Sands Missile Range