Soyuz-33/Expedition 34
Increment 34
Mission Operations Readiness Review (MORR)

October 03, 2012

BASELINE 10/16/12

Presented to:

NASA/Goddard Space Flight Center (GSFC)
Networks Integration Management Office (NIMO), Code 450.1

Agenda

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Review Board

- **Jean-Marie Denis, Chairperson, GSFC, Code 301, Systems Review Office**
- **Scott A. Greatorex, GSFC, Code 450.1, Chief, Networks Integration Management Office**
- **Susan L. Hoge, GSFC, Code 595, Navigation and Mission Design Branch**
- **Bradford Butts, GSFC, Code 761, Systems Management Branch**
- **Joseph M. Aquino, JSC, Code DD43, Space Communications Integration Lead**
- **Stephen F. Currier, GSFC, Code 453, Ground Network Project**
- **Daniel J. Hein, GSFC, Code 452, Space Network Project**
- **Michael E. Yettaw, DFRC Range Technical Monitor, Western Aeronautical Test Range**
- **James A. Bangerter, GSFC, Code 450.1, Human Spaceflight Network Director**

Review Schedule

• **Goddard Space Flight Center (GSFC) Mission Operations Readiness Review (MORR)**	**10/03/12**
• **Johnson Space Center (JSC) Mission Operations Directorate (MOD) Flight Readiness Review (FRR)**	**10/15/12**
• **NASA Stage Operations Readiness Review (SORR)**	**TBD**

Mission Overview

F. Pifer/Space Communications Network Services (SCNS)

Mission Profile

• **Vehicle:**	**Russian Soyuz**
• **Launch Date – Time:**	**12/19/12 – To Be Determined (TBD) GMT**
• **ISS Docking:**	**12/21/12**
• **Length of Time Docked:**	**6 months (becomes the Russian Crew Return Vehicle)**
• **Station Element:**	**Soyuz**
• **Orbit:**	**146 nautical miles**
• **Inclination:**	**51.6 degrees**
• **Payload:**	**Crew, Logistics, and Supplies**

ISS Supply Sequence

Date	Flight	Launch Vehicle/Elements	
07/15/12	31S Russian Soyuz (Expedition 32)	Crew Transport, Logistics, and Re-supply	ISS Increment 32
07/21/12	HTV 3	Logistics and Re-supply	
08/01/12	48P Russian Progress	Logistics and Re-supply	
10/08/12	SpaceX CRS-1	Logistics and Re-supply	
10/23/12	32S Russian Soyuz (Expedition 33)	Crew Transport, Logistics, and Re-supply	ISS Increment 33
11/01/12	49P Russian Progress	Logistics and Re-supply	
12/19/12	33S Russian Soyuz (Expedition 34)	Crew Transport, Logistics, and Re-supply	ISS Increment 34
2012	Antares Cygnus 1 Demo-1	Test flight to the International Space Station (ISS)	
NET 01/18/13	SpaceX CRS-2	Logistics and Re-supply	
02/12/13	50P Russian Progress	Logistics and Re-supply	
03/28/13	34S Russian Soyuz (Expedition 35)	Crew Transport, Logistics, and Re-supply	ISS Increment 35
04/17/13	ATV 4	Logistics and Re-supply	
05/29/13	35S Russian Soyuz (Expedition 36)	Crew Transport, Logistics, and Re-supply	ISS Increment 36
06/10/13	HTV 4	Logistics and Re-supply	

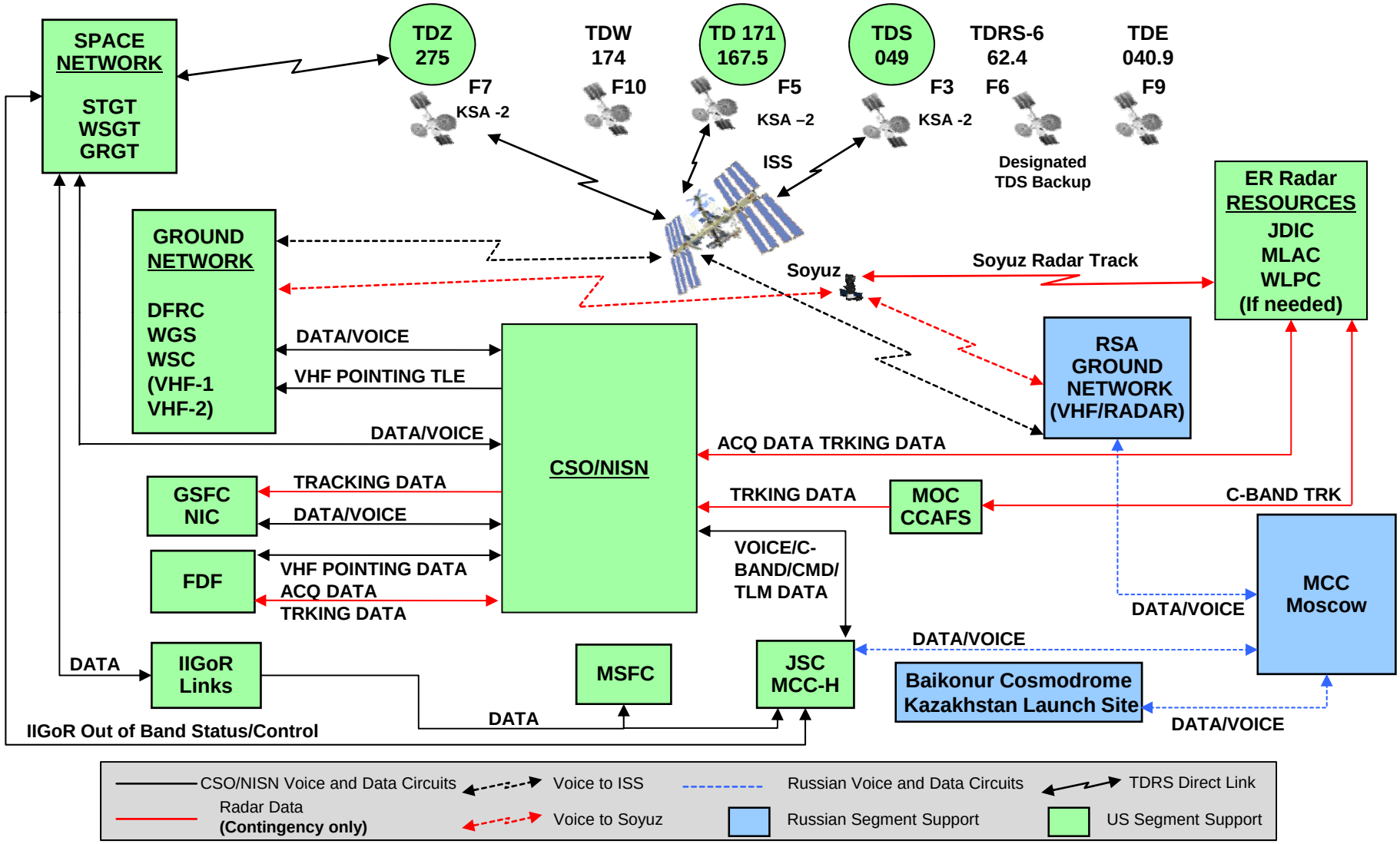
Red Date = Launch Planned

Gray Date = Completed Missions

IN Overview

F. Pifer/SCNS

ISS/Soyuz IN Overview Chart



Documentation

Document Title	Status	Published Date
TDRSS Network Operations Support Plan for the International Space Station, 450-TNOSP-ISS	Revision 1	01/10/12
ISS Program Requirements Document (PRD)	Volume II	Active Database
Very High Frequency Voice Communications Support Annex to the TDRSS Network Operations Support Plan for International Space Station, 450-TNOSP-ISS, VHF Annex	Original DCN 001	09/2006 02/2009
Interim Support Instruction (ISI) – Change to the GSFC FDF Soyuz Satellite Identification (0516)	Complete	03/08/11
Configuration Management Freeze Policy for Integrated Networks and Supporting Elements, 450-CMFP-HSF/ELV	Original	06/2007
NASA Integrated Services Network Standard Operating Procedures, NISN SOP-0002	Revision C	11/2007
Soyuz/Progress/ISS Joint Flight Rules, Vol D, NSTS-12820	Final	04/10/12
ISI – Mission Status	In Process	Launch minus 30 (11/05/12)
ISI – Mission Configuration Freeze for Soyuz 31 Undocking	In Process	Undocking minus 7 (11/05/12)
ISI – Mission Termination (Soyuz 31)	In Process	At conclusion of mission (11/12//12)
ISI – C-band Emergency Call-up Procedure	In Process	Launch minus 10 (11/25/12)
ISI – Mission Support (Soyuz-33 Early Orbit Support)	In Process	Launch minus 5 (11/30/12)
ISI – Mission Configuration Freeze for Soyuz 33 Docking	In Process	Docking minus 7 (11/28/12)

Requirement Changes

- **Program Requirements Document (PRD) changes**
  - **ISS VOL-I PRD**
    - **The requirement for Private VHF communications has been deleted from the PRD as of 07/24/12**
    - **Added GSFC Orbit Determination Facility Coordination (ODF COORD) voice loop on 08/14/12**
  - **ISS Utilization VOL-II PRD**
    - **Added "MSFC Operations Controller (OC)" access to voice loop "ISS Pointing 1 (PTG 1)" in section I. JSC-to-MSFC Real-Time Support**
    - **Added "MSFC OC" access to voice loop "ISS PTG 2" in section II. JSC-to-MSFC Simulation & Test Support**

Operational/Network Changes

- **WSC Upgrades (open work)**
  - **Reconfiguration of the 500 watt High Power Amplifiers (HPA) to 350 watts is in progress**
    - **Currently WSC has four 350 watt HPA's and two 500 watt HPA's**
    - **The two 500 watt HPA's will be reset to 350 watts by the vendor**
  - **Installation of the Remote Switching and Remote Keying is on-going**
  - **Minor reconfiguration and clean-up of VHF-2 equipment racks and camera installation – 12/2012**

Network Verification Test

- **VHF Emergency Communication Verification Passes**
  - **VHF-1 two-way voice checks performed with ISS; good quality with no issues reported**
    - **WGS on 12/26/11**
    - **DFRC on 02/23/12**
    - **WSC on 06/25/12**
  - **Future checks to be coordinated by ISS GC to accommodate busy ISS crew schedule**
    - **Next pass expected prior to Soyuz 33S launch**

Network VHF Proficiency Simulations

- **Simulations scheduled to ensure proficiency and provide training**
  - **Completed with DFRC & WGS 05/01/12; DFRC & WSC 08/27/12**
    - **Exercised pre-pass and post-pass interface procedures**
    - **No uplinks permitted; no ISS crew participation**
    - **Tone checks performed**
      - **Stations to JSC and MCC-H/MCC-M**
    - **Stations submitted Pass Summary Reports**
  - **Next Proficiency Simulation planned prior to Soyuz 32S launch**
    - **Launch date is 10/23/12**

IN Element Status

GSFC Network Integration Center (NIC)

E. Mount/SCNS

IN Element Status – NIC

- **Operational Changes since the Soyuz 32 MORR**

Type	System	Significant Changes
Software	None	• None
Hardware	None	• None

- **Open Discrepancy Reports (DR): None**
- **Freeze Exemption Requests (FER):**

Item	Status	Comments
GSFC Steam Restoration	Approved through 10/31/12	Excavation, removal, and replacement of site steam and condensation distribution pipe
B32 Cable maintenance	Approved though 10/31/12	Remove unused cabling in B32 room S009
B32 PDU connection	Approved though 11/30/12	Connect PDU's in B32
Note : Any FER's that are issued following this MORR will be submitted to the Network Director (ND) for review and approval		

IN Element Status – NIC (cont'd)

- **Open Work: None**
- **Projected Changes: None**
- **NIC Facility Status:**

Item	Status	Comments
Commercial Power	G	
Uninterruptible Power Supply (UPS)	G	
Heating, Ventilating and Air Conditioning (HVAC)	G	

IN Element Status – NIC (cont'd)

- **Staffing, Training, and Certification**
  - **Staffing is sufficient to meet all requirements**
- **Documentation Status**
  - **Documentation is up to date**
- **Summary and Readiness Assessment**
  - **NIC is ready to support the Soyuz 33/Expedition 34 and ISS Increment 34**

Space Network (SN)
White Sands Complex (WSC)

S. Traversy/SCNS

IN Element Status – SN

- **SN Operational Changes since the Soyuz 32 MORR**

Type	System	Significant Changes
Software	None	• None
Hardware	MOVE	• WSC has 261 keysets, as of 07/10/12 202 keysets have been retrofitted

- **Open DRs: None**
- **Open Work: None**

IN Element Status – SN

- **Projected Changes:**
  - **Software**
    - **09/26/12 – SW-HST001 delivered to SGLT-1, -3 USS/EXEC ADPE and Workstations**
    - **10/03/12 – SW-HST001 delivered to SGLT-4, -5, -6 USS/EXEC ADPE and Workstations**
  - **Hardware**
    - **11/13/12 – USS-CR SGLT-5 SA-1 Equipment installation**
    - **02/06/13 – USS-CR SGLT-5 SA-2 Equipment installation**
    - **03/22/13 – USS-CR SGLT-4 SA-1 Equipment installation**

IN Element Status – SN (cont'd)

- **Staffing, Training and Certification**
  - **Staffing is sufficient to meet all requirements**
- **Documentation Status**
  - **Documentation is up to date**
- **Summary and Readiness Assessment**
  - **SN is ready to support the Soyuz 33/Expedition 34 and ISS Increment 34**

IN Element Status – WSC VHF

- **WSC VHF Operational Changes since the Soyuz 32 MORR**

Type	System	Significant Changes
Software	None	None
Hardware	None	None

- **Open DRs: None**

IN Element Status – WSC VHF (cont'd)

- **Open Work**

Type	System	Significant Changes
Software	None	None
Hardware	VHF-1 and -2	Antenna camera installation
	VHF-1	Remote switching and keying for Power Amplifiers (PA)
	VHF-1 and -2	Uplink and downlink audio recording separation
	VHF-2	Minor reconfiguration and clean-up of VHF-2 equipment racks
	VHF	Reconfigure spare High Power Amplifiers (HPA) from 500 Watts to 350 Watts

- **Antenna camera installation is TBD pending EC approval**
- **VHF-1 RF pattern testing and masking surveys are currently in work**

IN Element Status – WSC VHF (cont'd)

- **Staffing, Training and Certification**
  - **Staffing is sufficient to meet all requirements**
- **Documentation Status**
  - **Documentation is up to date**
- **Summary and Readiness Assessment**
  - **WSC VHF is ready to support the Soyuz 33/Expedition 34 and ISS Increment 34**

Wallops Ground Station (WGS)

M. Harris/SCNS

IN Element Status – WGS

- **Operational Changes since the Soyuz 32 MORR**

Type	System	Significant Changes
Software	None	None
Hardware	None	None

- **Open DRs: None**
- **Open Work: None**
- **Projected Changes: None**

IN Element Status – WGS (cont'd)

- **Staffing, Training and Certification**
  - **Staffing is sufficient to meet all requirements**
- **Documentation Status**
  - **Documentation is up to date**
- **Summary and Readiness Assessment**
  - **WGS is ready to support the Soyuz 33/Expedition 34 and ISS Increment 34**

Dryden Flight Research Center (DFRC)

J. Thomas/Arcata Associates

IN Element Status – DFRC

- **Operational Changes since the Soyuz 32 MORR**

Type	System	Significant Changes
Software	None	None
Hardware	None	None

- **Open DRs: None**
- **Open Work: None**
- **Projected Changes: None**

IN Element Status – DFRC (cont'd)

- **Staffing, Training and Certification**
  - **Staffing is sufficient to meet all requirements**
- **Documentation Status**
  - **Documentation is up to date**
- **Summary and Readiness Assessment**
  - **DFRC is ready to support the Soyuz 33/Expedition 34 and ISS Increment 34**

NASA/DoD C-bands Eastern Range (ER)

M. Gawel/ER

C-band Radar Contingency

- **ISS Visiting Vehicles (VV) are not routinely supported by the Department of Defense (DoD) C-band Radars. If a contingency is declared by the ISS GC during a VV mission, the ranges have agreed C-band radars will provide VV contingency support within agreed upon call-up times for Nominal and Off-duty hours. Support will be provided on a best-obtainable basis**
- **ISI for C-band Radar Contingency Call-up Procedures will be published prior to mission**
- **Prior to L-10 ER will send any updates for Points of Contacts (POC) for ISI**
- **ER will provide radar status prior to the mission to the Human Spaceflight (HSF) Network Director (ND) and Spaceflight Mission Manager (SMM)**

C-band Radar Contingency (cont'd)

- **Procedure**
  - **ISS GC will declare a VV contingency**
  - **ISS GC will announce whether C-band radar support is needed**
  - **All declared VV contingencies will be confirmed via E-mail, facsimile or memorandum from ISS GC to DoD Track**
  - **DoD Track will schedule C-band radar support**
    - **DoD Track has normal and off operating hours and points of contact for supporting radar sites identified in ISI**
  - **Following termination of contingency conditions, the ISS GC will verbally notify SMM and/or DoD Track to release C-band radar sites from support**
  - **ISS GC will also release confirmation message as soon as possible**

Flight Dynamics Facility (FDF)

W. Mitchell/FDSS

IN Element Status – FDF

- **Operational Changes since Soyuz 32 MORR**

Type	System	Significant Changes
Software	None	None
Hardware	None	None

- **Open DRs: None**
- **Open Work**

Type	System	Significant Changes
Software	None	None
Hardware	Two-Line Elements (TLE)	Verify receipt/processing of Soyuz 33 TLE by VHF sites

- **Projected Changes: None**

IN Element Status – FDF (cont'd)

- **Staffing, Training and Certification**
  - **Staffing is sufficient to meet all requirements**
- **Documentation Status**
  - **Soyuz 33 Mission Support Plan (MSP) will be delivered by 11/21/12**
- **Summary and Readiness Assessment**
  - **FDF is ready to support the Soyuz 33/Expedition 34 and ISS Increment 34**

Communications Service Office (CSO)

R. Honeycutt/NICS

IN Element Status – CSO

- **Operational Changes since Soyuz 32 MORR**

Type	System	Significant Changes
Software	None	• None
Hardware	None	• None

- **Marshall Space Flight Center (MSFC) Russian Services:**
  - New Mission Voice System at Mission Control Center-Moscow (MCC-M)
  - New DICES VoIP system installed at MCC-M
  - New Digital Touch Screen Keysets with Wireless Headsets installed at all NASA consoles
  - New Channel Bank and Gateways installed with interfaces to the Russian side
  - All operating nominal for 1 month with the exception of a failed Gateway device (using backup now)

IN Element Status – CSO (cont'd)

- **Open NICS Information Technology Service Management (NITSM) Tickets: None**

- **Open Work**

Type	System	Significant Changes
Software	None	• None
Hardware	Nortel Router Project Upgrade	• Current Network routers are obsolete and not supported by vendor • All equipment has been delivered to sites and in different stages of installation by Host Centers • No new routers have been connected to the Operational Network • Test Readiness Review (TRR) was completed on 03/04/12 • Project completion date currently scheduled for April or May timeframe 2013

- **Projected Changes: None**

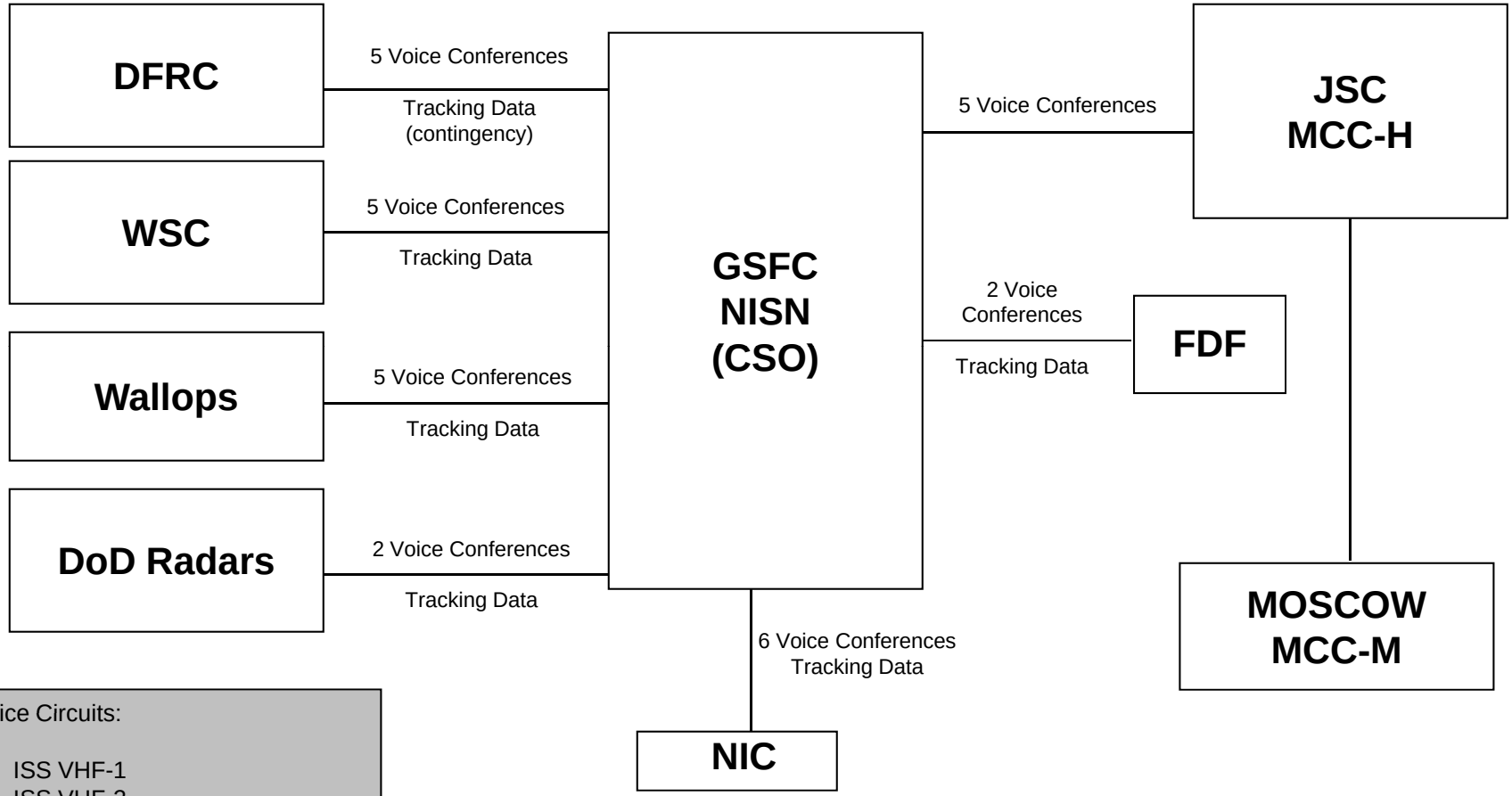
IN Element Status – CSO (cont'd)

- **Staffing, Training and Certification**
  - **Staffing is sufficient to meet all requirements**
- **Documentation Status**
  - **Documentation is up to date**
- **Summary and Readiness Assessment**
  - **CSO will process all FER during mission in accordance with NISN SOP-002, published 10/2009**
  - **CSO is ready to support the Soyuz 33/Expedition 34 and ISS Increment 34**

CSO
Backup Charts

(Most current; updated 09/17/12)

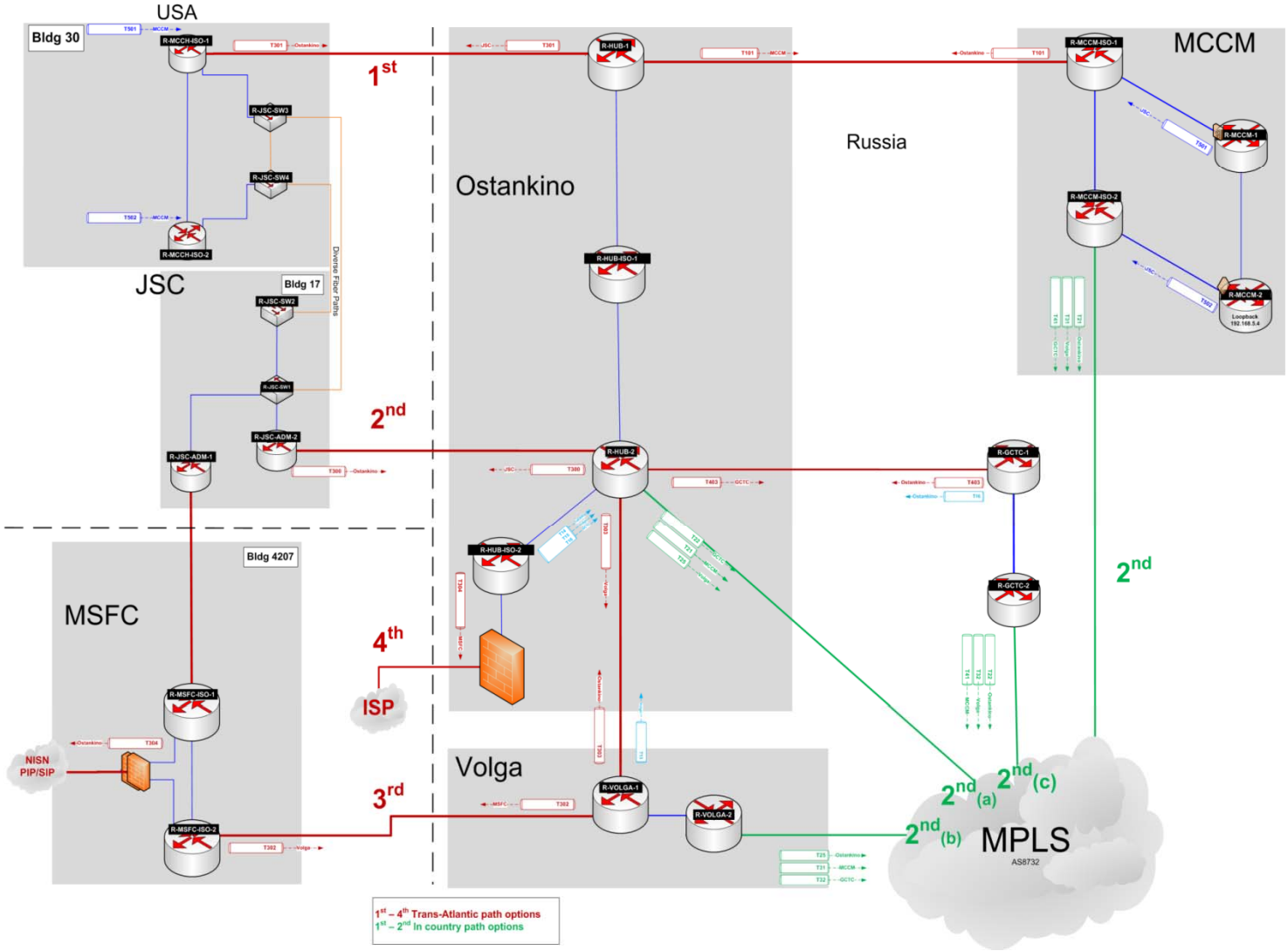
Soyuz IN Voice and Data Circuits



Voice Circuits:

- ISS VHF-1
- ISS VHF-2
- ISS SITE COORD
- IP/GC-1
- TRACK COORD
- LEAD RANGE COORD

Russian Mission Network Backbone



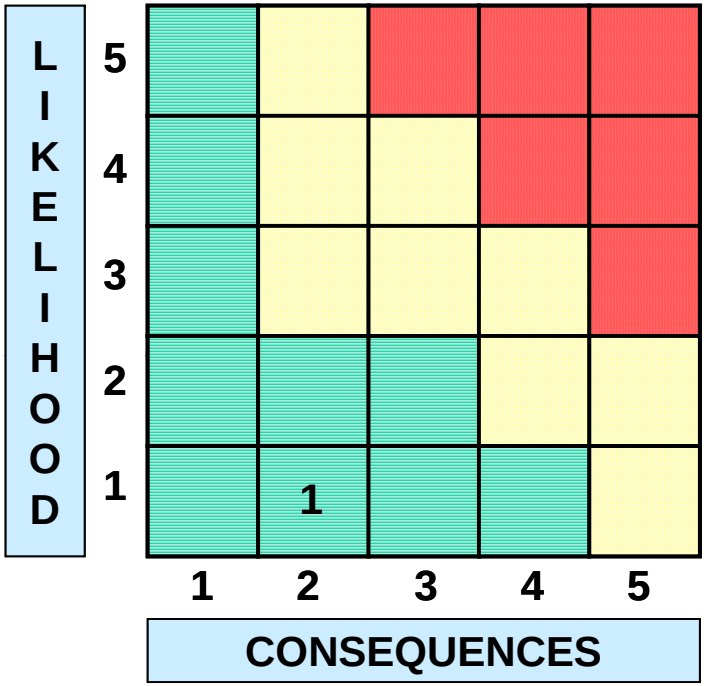
IN Summary

F. Pifer/SCNS

Requirements/Test Matrix

Network Resource	Requirement	Verification Method	Verification Complete
SN	• ISS S-band Forward/Return • ISS K-band Forward/Return	Operational	Operational
White Sands VHF-1 VHF-2	• Contingency communications support to ISS • Soyuz contingency communications support during selected view periods from early orbit through ISS docking	Emergency Comm Verification Passes (VHF-1)	06/25/12
Wallops VHF-1 VHF-2	• Contingency communications support to ISS • Soyuz contingency communications support during selected view periods from early orbit through ISS docking	Emergency Comm Verification Passes (VHF-1)	12/26/11
Dryden VHF-1 VHF-2	• Contingency communications support to ISS • Soyuz contingency communications support during selected view periods from early orbit through ISS docking	Emergency Comm Verification Passes (VHF-1)	02/23/12
VHF Proficiency Simulations	• Insure VHF station operator proficiency for configuring communications support to ISS	Pre-pass and Post-pass interface procedures performed per documented procedures	DFRC & WGS 05/01/12 DFRC & WSC 07/28/12
ER	• C-band metric data support, tracking of Soyuz for VHF-2, and C-band slaving at DFRC for emergency support only	Operational – contingency support only	Operational
CSO	• Voice/Data Communications	Operational	Operational
FDF	• Provide Tracking and Data Relay Satellite System (TDRSS) vectors for ISS support • Perform ISS orbit determination for acquisition data and planning products • Provide TLEs for VHF tracking	Operational Operational Simulated Orbital Support	Operational Operational

Risks



LxC Trend	Rank	Approach	Risk Title
⬇	1	M	VHF-2

Criticality	L x C Trend	Approach
High	⬇ Decreasing (Improving)	M – Mitigate
Med	⬆ Increasing (Worsening)	W – Watch
Low	➡ Unchanged	A – Accept
	* New since last mission	R – Research

VHF-2 Risk

Rank	Risk Statement	Approach & Plan	Comments
1 L	If the VHF-2 system is not periodically End-to-End (ETE) tested including Radio Frequency (RF) transmission, then the system's readiness to support cannot be validated	Mitigate • U.S. Airways is reviewing the request for testing and an approval letter was sent from the airline • Test plan has been completed. Plans are to establish quarterly ETE test • Testing of the VHF-2 emergency voice interfaces via DFRC/WSC/WGS has been placed on hold. The use of the U.S. restricted frequencies is being revisited by JSC Spectrum Management	VHF-2 Systems at DFRC, WSC, and WGS are utilized to support emergency voice communications with Soyuz capsules. CONUS use of the VHF-2 frequency is restricted by FCC, as it is allocated commercially Systems readiness tests are conducted monthly to verify the system, minus the RF transmission, which is restricted VHF-2 would be used in contingency situations on Soyuz; should the Astronauts have to evacuate the ISS to the Soyuz capsule Note: The FAA has refused to allow the use of the restricted frequency for periodic VHF-2 system validation The last VHF-2 ETE Comm check was performed in September 2004

Risk Criticality	H	M	L

Action Item Summary

S. Testoff/PAAC

Readiness Assessment

CoFR Signature Sheet

Exploration and Space Communications Projects Division

Certificate of Flight Projects Directorate Networks Readiness

This is to certify that with successful completion of flight readiness preparations and closure of associated action items, all integrated network elements are ready to support the Soyuz-33/Expedition 34 mission

10/3/2012

Jean-Marie Denis, Chairperson, Code 301, GSFC, Systems Review Office — **Date**

10/03/12

Bradford Butts, Code 761 GSFC, Systems Management Branch — **Date**

10/03/12

Scott A. Greatorex, Code 450.1 GSFC, Chief, Networks Integration Management Office — **Date**

10/03/12

Joseph M. Aquino, JSC, Code DD13 Manager, Space Communications Integration Office — **Date**

10/03/12

Susan L. Hoge, Code 595 GSFC, Navigation and Mission Design Branch — **Date**

Stephen F. Currier, Code 453 GSFC, Ground Network Project — **Date**

Exploration and Space Communications Projects Division

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_____ 10/03/12
Daniel J. Hein, Code 452 **Date**
GSFC, Space Network Project

_____ 10/03/12
James A. Bangerter, Code 450.1 **Date**
GSFC, Human Spaceflight Network Director

FOR Russell W James 11 Oct 2012
Michael E. Yettaw **Date**
Range Technical Monitor, Western Aeronautical Test Range (WATR)

Abbreviations and Acronyms

Abbreviations and Acronyms

A/G	Air to Ground
AI	Action Item
ARC	Ames Research Center
CoFR	Certificate of Flight Readiness
CCB	Configuration Control Board
CSA	Canadian Space Agency
CSO	Communications Service Office
DoD	Department of Defense
DCN	Document Control Number
DFRC	Dryden Flight Research Center
DR	Discrepancy Report
ER	Eastern Range
ETE	End-to-End
FDF	Flight Dynamics Facility
FER	Freeze Exemption Requests
FRR	Flight Readiness Review
GC	Ground Controller
GMT	Greenwich Mean Time
GRC	Glenn Research Center
GSFC	Goddard Space Flight Center
H/W	Hardware
HOSC	Huntsville Operations Support Center
HSF	Human Space Flight
HVAC	Heating, Ventilating and Air Conditioning
IN	Integrated Network
ISI	Interim Support Instruction
ISS	International Space Station
JSC	Johnson Space Center
KSC	Kennedy Space Center
MCC	Mission Control Center
MOC	Morrell Operations Center (formerly ROCC)
MOD	Mission Operations Directorate
MORR	Mission Operations Readiness Review
MOVE	Mission Operations Voice Enhancement
MSFC	Marshall Space Flight Center
MSP	Mission Support Plan
NASA	National Aeronautics and Space Administration
NCCDS	Network Control Center Data System
ND	Network Director
NIC	Network Integration Center
NIMO	Networks Integration Management Office
NITSM	NICS Information Technology Service Management
NISN	NASA Integrated Services Network
ORR	Operational Readiness Review
PA	Power Amplifiers
PMDS	Problem Management Dispatch System
POC	Point of Contact
PRD	Program Requirements Document
RF	Radio Frequency
RPI	Remote Principal Investigator
SCNS	Space Communications Network Services
SMM	Spaceflight Mission Manager
SN	Space Network
SORR	Stage Operations Readiness Review
S/W	Software
TBD	To Be Determined
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
TLE	Two-Line Elements
TRR	Test Readiness Review
TSC	Telescience Support Center
UPS	Uninterruptible Power Supply
VHF	Very High Frequency
VV	Visiting Vehicle
WGS	Wallops Ground Station
WSC	White Sands Complex