NNG06CA56B/
NNG06CA56D

MOVE

CONTRACT

9/27/06

SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS
OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, & 30

1. REQUISITION NO.	PAGE 1 OF 111

2. CONTRACT NO.	3. AWARD/EFFECTIVE DATE	4. ORDER NO.	5. SOLICITATION NO.	6. SOLICITATION ISSUE DATE
NNG06CA56B	9/27/06	NNG06CA56D	NNG05096022R	July 28, 2005

7. FOR SOLICITATION INFORMATION CALL ▶	a. NAME	b. TELEPHONE NO. (No collect calls)	8. OFFER DUE DATE/LOCAL TIME
	Nipa N. Shah, Nipa.Shah-1@nasa.gov	301-286-1892	11:00 am, May 23, 2006

9. ISSUED BY: CODE 210
NASA Goddard Space Flight Center
Mission Enabling Procurement Office
Code 210.M
8800 Greenbelt Road
Greenbelt, MD 20771

10. THIS ACQUISITION IS
☐ UNRESTRICTED
☒ SET ASIDE: 100% FOR
☒ SMALL BUSINESS
☐ SMALL DISADV. BUSINESS
☐ 8(A)
NAICS: 334210
SIZE STD: 1,000 employees

11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED
☐ SEE SCHEDULE

12. DISCOUNT TERMS

☒ 13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)

13b. RATING
DO-A7

14. METHOD OF SOLICITATION
☐ RFQ ☐ IFB ☒ RFO

15. DELIVER TO CODE
As specified in Clause I.A.22 or applicable Task Order

16. ADMINISTERED BY CODE 210
NASA GSFC

17a. CONTRACTOR/ OFFEROR CODE FACILITY CODE
Frequentis USA, Inc.
12530 Parklawn Dr, Suite 360
Rockville, Maryland 20852-1702

18a. PAYMENT WILL BE MADE BY CODE 155
Basic Requirement: Cost and Commercial Accounts Department
NASA Goddard Space Flight Center
Greenbelt, MD 20771
Task Orders: To be specified in each Task Order

☐ 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER

18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a UNLESS BLOCK BELOW IS CHECKED ☒ SEE ADDENDUM

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	The Contractor shall provide Mission Operations Voice Enhancement supplies and services, as specified in the Statement of Work and individual task orders. *(Attach Additional Sheets as Necessary)*				

25. ACCOUNTING AND APPROPRIATION DATA
TBD 4200179265
$2,184,783, P. Grp: GID PPC: GF

26. TOTAL AWARD AMOUNT *(For Govt. Use Only)*
Basic Requirement: $16,813,014
IDIQ Minimum: $500,000
IDIQ Maximum: $66,000,000

☒ 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4. FAR 52.212-3 AND 52.212-5 ARE ATTACHED. ADDENDA ☒ ARE ☐ ARE NOT ATTACHED.
☒ 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4 FAR 52.212-5 IS ATTACHED. ADDENDA ☒ ARE ☐ ARE NOT ATTACHED.

28. ☐ CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN 3 COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED HEREIN.

29. ☐ AWARD OF CONTRACT: REFERENCE _____ OFFER DATED _____. YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:

30a. SIGNATURE OF OFFEROR/CONTRACTOR	31a. UNITED STATES OF AMERICA *(SIGNATURE OF CONTRACTING OFFICER)*
R. Nitsch	Nipa Shah
30b. NAME AND TITLE OF SIGNER *(TYPE OR PRINT)*: Robert Nitsch, President	30c. DATE SIGNED: May 23, 2006
	31b. NAME OF CONTRACTING OFFICER *(TYPE OR PRINT)*: Nipa N. Shah
	31c. DATE SIGNED: 9/27/06

32a. QUANTITY IN COLUMN 21 HAS BEEN	33. SHIP NUMBER	34. VOUCHER NUMBER	35. AMOUNT VERIFIED CORRECT FOR
☐ RECEIVED ☐ INSPECTED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED	☐ PARTIAL		
	36. PAYMENT ☐ COMPLETE ☐ PARTIAL ☐		37. CHECK NUMBER
32b. SIGNATURE OF AUTHORIZED GOVT REPRESENTATIVE	32c. DATE	38. S/R ACCOUNT NO.	39. S/R VOUCHER NO.
			40. PAID BY
41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT		42a. RECEIVED BY *(Print)*	
41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER	41c. DATE	42b. RECEIVED AT *(Location)*	
		42c. DATE REC'D *(YY/MM/DD)*	42d. TOTAL CONTAINERS

FILE COPY

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This contract shall be a Commercial Firm Fixed Price Hybrid contract with a Basic Requirement portion and an Indefinite Delivery Indefinite Quantity (IDIQ) portion.

Mr. Dan Duffy, Code 290, is the designated Contracting Officer Technical Representative (COTR) for this contract. Mr. Duffy's phone number is 301-286-5011. The COTR leads the MOVE Project Team, which includes representatives from each MOVE location.

I. CONTRACT TERMS AND CONDITIONS--COMMERCIAL ITEMS (52.212-4) (OCT 2003)

(a) Inspection/Acceptance. The Contractor shall only tender for acceptance those items that conform to the requirements of this contract. The Government reserves the right to inspect or test any supplies or services that have been tendered for acceptance. The Government may require repair or replacement of nonconforming supplies or reperformance of nonconforming services at no increase in contract price. The Government must exercise its post-acceptance rights--
(1) Within a reasonable time after the defect was discovered or should have been discovered; and
(2) Before any substantial change occurs in the condition of the item, unless the change is due to the defect in the item.

(b) Assignment. The Contractor or its assignee may assign rights to receive payment due as a result of performance of this contract to a bank, trust company, or other financing institution, including any Federal lending agency in accordance with the Assignment of Claims Act (31 U.S.C. 3727). However, when a third party makes payment (e.g., use of the Government-wide commercial purchase card), the contractor may not assign its rights to receive payment under this contract.

(c) Changes. Changes in the terms and conditions of this contract may be made only by written agreement of the parties. Administrative changes to task orders and incremental funding changes may be made unilaterally by the Contracting Officer.

(d) Disputes. This contract is subject to the Contract Disputes Act of 1978, as amended (41 U.S.C. 601-613). Failure of the parties to this contract to reach agreement on any request for equitable adjustment, claim, appeal or action arising under or relating to this contract shall be a dispute to be resolved in accordance with the clause at FAR 52.233-1, Disputes, which is incorporated herein by reference. The Contractor shall proceed diligently with performance of this contract, pending final resolution of any dispute arising under the contract.

(e) Definitions. The clause at FAR 52.202-1, Definitions, is incorporated herein by reference.

(f) Excusable delays. The Contractor shall be liable for default unless nonperformance is caused by an occurrence beyond the reasonable control of the Contractor and without its fault or negligence such as, acts of God or the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, unusually severe weather, and delays of common carriers. The Contractor shall notify the Contracting Officer in writing as soon as it is reasonably possible after the commencement of

any excusable delay, setting forth the full particulars in connection therewith, shall remedy such occurrence with all reasonable dispatch, and shall promptly give written notice to the Contracting Officer of the cessation of such occurrence.

(g) Invoice. (1) The Contractor shall submit an original invoice and three copies (or electronic invoice, if authorized,) to the address designated in the contract to receive invoices. An invoice must include--
(i) Name and address of the Contractor;
(ii) Invoice date and number;
(iii) Contract number, contract line item number and, if applicable, the order number;
(iv) Description, quantity, unit of measure, unit price and extended price of the items delivered;
(v) Shipping number and date of shipment including the bill of lading number and weight of shipment if shipped on Government bill of lading;
(vi) Terms of any discount for prompt payment offered;
(vii) Name and address of official to whom payment is to be sent;
(viii) Name, title, and phone number of person to be notified in event of defective invoice; and
(ix) Taxpayer Identification Number (TIN). The Contractor shall include its TIN on the invoice only if required elsewhere in the contract.
(x) Electronic funds transfer (EFT) banking information.

(A) The Contractor shall include EFT banking information on the invoice only if required elsewhere in this contract.

(B) If EFT banking information is not required to be on the invoice, in order for the invoice to be a proper invoice, the Contractor shall have submitted correct EFT banking information in accordance with the applicable solicitation provision, contract clause (e.g., 52.232-33, Payment of Electronic Funds Transfer--Central Contract Registration, or 52.232-34, Payment by Electronic Funds Transfer--Other Than Central Contractor Registration), or applicable agency procedures.

(C) EFT banking information is not required if the Government waived the requirement to pay by EFT.
(2) Invoices will be handled in accordance with the Prompt Payment Act (31 U.S.C. 3903) and Office of Management and Budget (OMB) prompt payment regulations at 5 CFR part 1315.

(h) Patent indemnity. The Contractor shall indemnify the Government and its officers, employees and agents against liability, including costs, for actual or alleged direct or contributory infringement of, or inducement to infringe, any United States or foreign patent, trademark or copyright, arising out of the performance of this contract, provided the Contractor is reasonably notified of such claims and proceedings.

(i) Payment--(1) Items accepted. Payment shall be made for items accepted by the Government that have been delivered to the delivery destinations set forth in this contract.
(2) Prompt payment. The Government will make payment in accordance with the Prompt Payment Act (31 U.S.C. 3903) and prompt payment regulations at 5 CFR 1315.
(3) Electronic Funds Transfer (EFT). If the Government makes payment by EFT, see 52.212-5(b) for the appropriate EFT clause.
(4) Discount. In connection with any discount offered for early payment, time shall be computed from the date of the invoice. For the purpose of computing the discount earned, payment shall

be considered to have been made on the date which appears on the payment check or the specified payment date if an electronic funds transfer payment is made.
(5) Overpayments. If the Contractor becomes aware of a duplicate contract financing or invoice payment or that the Government has otherwise overpaid on a contract financing or invoice payment, the Contractor shall immediately notify the Contracting Officer and request instructions for disposition of the overpayment.

(j) Risk of loss. Unless the contract specifically provides otherwise, risk of loss or damage to the supplies provided under this contract shall remain with the Contractor until, and shall pass to the Government upon:
(1) Delivery of the supplies to a carrier, if transportation is f.o.b. origin; or
(2) Delivery of the supplies to the Government at the destination specified in the contract, if transportation is f.o.b. destination.

(k) Taxes. The contract price includes all applicable Federal, State, and local taxes and duties.

(l) Termination for the Government's convenience. The Government reserves the right to terminate this contract, or any part hereof, for its sole convenience. In the event of such termination, the Contractor shall immediately stop all work hereunder and shall immediately cause any and all of its suppliers and subcontractors to cease work. Subject to the terms of this contract, the Contractor shall be paid a percentage of the contract price reflecting the percentage of the work performed prior to the notice of termination, plus reasonable charges the Contractor can demonstrate to the satisfaction of the Government using its standard record keeping system, have resulted from the termination. The Contractor shall not be required to comply with the cost accounting standards or contract cost principles for this purpose. This paragraph does not give the Government any right to audit the Contractor's records. The Contractor shall not be paid for any work performed or costs incurred which reasonably could have been avoided.

(m) Termination for cause. The Government may terminate this contract, or any part hereof, for cause in the event of any default by the Contractor, or if the Contractor fails to comply with any contract terms and conditions, or fails to provide the Government, upon request, with adequate assurances of future performance. In the event of termination for cause, the Government shall not be liable to the Contractor for any amount for supplies or services not accepted, and the Contractor shall be liable to the Government for any and all rights and remedies provided by law. If it is determined that the Government improperly terminated this contract for default, such termination shall be deemed a termination for convenience.

(n) Title. Unless specified elsewhere in this contract, title to items furnished under this contract shall pass to the Government upon acceptance, regardless of when or where the Government takes physical possession.

(o) Warranty. The Contractor warrants and implies that the items delivered hereunder are merchantable and fit for use for the particular purpose described in this contract.

(p) Limitation of liability. Except as otherwise provided by an express warranty, the Contractor will not be liable to the Government for consequential damages resulting from any defect or deficiencies in accepted items.

(q) Other compliances. The Contractor shall comply with all applicable Federal, State and local laws, executive orders, rules and regulations applicable to its performance under this contract.

(r) Compliance with laws unique to Government contracts. The Contractor agrees to comply with 31 U.S.C. 1352 relating to limitations on the use of appropriated funds to influence certain Federal contracts; 18 U.S.C. 431 relating to officials not to benefit; 40 U.S.C 327, et seq., Contract Work Hours and Safety Standards Act; 41 U.S.C. 51-58, Anti-Kickback Act of 1986; 41 U.S.C. 265 and 10 U.S.C. 2409 relating to whistle blower protections; 49 U.S.C 40118, Fly American; and 41 U.S.C. 423 relating to procurement integrity.

(s) Order of precedence. Any inconsistencies in this solicitation or contract shall be resolved by giving precedence in the following order:
(1) The schedule of supplies/services;
(2) The Assignments, Disputes, Payments, Invoice, Other Compliances, and Compliance with Laws Unique to Government Contracts paragraphs of this clause;
(3) The clause at 52.212-5;
(4) Addenda to this solicitation or contract, including any license agreements for computer software;
(5) Solicitation provisions if this is a solicitation;
(6) Other paragraphs of this clause;
(7) The Standard Form 1449;
(8) Other documents, exhibits, and attachments; and
(9) The specification.

(t) Central Contractor Registration (CCR). (1) Unless exempted by an addendum to this contract, the Contractor is responsible during performance and through final payment of any contract for the accuracy and completeness of the data within the CCR database, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to review and update on an annual basis from the date of initial registration or subsequent updates its information in the CCR database to ensure it is current, accurate and complete. Updating information in the CCR does not alter the terms and conditions of this contract and is not a substitute for a properly executed contractual document.
(2)(i) If a Contractor has legally changed its business name, "doing business as" name, or division name (whichever is shown on the contract), or has transferred the assets used in performing the contract, but has not completed the necessary requirements regarding novation and change-of-name agreements in FAR Subpart 42.12, the Contractor shall provide the responsible Contracting Officer a minimum of one business day's written notification of its intention to (A) change the name in the CCR database; (B) comply with the requirements of Subpart 42.12; and (C) agree in writing to the timeline and procedures specified by the responsible Contracting Officer. The Contractor must provide with the notification sufficient documentation to support the legally changed name.

(ii) If the Contractor fails to comply with the requirements of paragraph (t)(2)(i) of this clause, or fails to perform the agreement at paragraph (t)(2)(i)(C) of this clause, and, in the absence of a properly executed novation or change-of-name agreement, the CCR information that shows the Contractor to be other than the Contractor indicated in the contract will be considered to be incorrect information within the meaning of the "Suspension of Payment" paragraph of the electronic funds transfer (EFT) clause of this contract.
(3) The Contractor shall not change the name or address for EFT payments or manual payments, as appropriate, in the CCR record to reflect an assignee for the purpose of assignment of claims (see Subpart 32.8, Assignment of Claims). Assignees shall be separately registered in the CCR database. Information provided to the Contractor's CCR record that indicates payments, including those made by EFT, to an ultimate recipient other than that Contractor will be considered to be incorrect information within the meaning of the "Suspension of payment" paragraph of the EFT clause of this contract.
(4) Offerors and Contractors may obtain information on registration and annual confirmation requirements via the internet at http://www.ccr.gov or by calling 1-888-227-2423 or 269-961-5757.

(End of clause)

ADDENDUM 1
ADDITIONAL TERMS AND CONDITIONS

The following clauses apply to the Basic Requirement and Exercised Options only:

I.A.1 DELIVERABLE REQUIREMENTS (GSFC 52.211-90) (OCT 1988)

The Contractor shall provide the supplies and services to NASA's Goddard Space Flight Center, Marshall Space Flight Center, Johnson Space Center and the exercised option sites as described in the Statement of Work and System Requirements Document of this contract and shall provide the following deliverables:

DELIVERABLES					
Project-Level – Basic Requirement					
Item	**References**	**Description**	**Qty**	**Unit**	**Shipping Class**
1a	SOW 3.2	Project Management Support	1	Each	NA
1b	SOW 3.4	Project Start-up Support including Technical Interchange Meeting (TIM)	1	Each	NA
1c	DRD-P04	Vendor-Provided Spare Parts List	Per SOW Appendix C		NA
1d	DRD-P01	Project Activity Reports (PARs)	Per SOW Appendix C		NA
2	DRD-P02	System Design Review Package	Per SOW Appendix C		NA
3	DRD-P03	Project-level Critical Design Review Package	Per SOW Appendix C		NA
4	SOW 3.4.1	Checkpoint - Prototype	1	Each Item	NA
5	DRD-P05	Acceptance Test Plan	Per SOW Appendix C		NA
6	SOW 3.5	First Article Delivery of all developed items	1	Each Item	NA
7	DRD-P06	Project-level Installation Documentation	Per SOW Appendix C		NA
8	DRD-P07	Management Plan	Per SOW Appendix C		NA
9	Clause I.A.29	Escrow Agreement	1	Each	NA

DELIVERABLES					
Site-Level – Basic Requirement					
Item	**References**	**Description**	**Qty**	**Unit**	**Shipping Class**
SITE 1 - GODDARD SPACE FLIGHT CENTER (GSFC)					
S1-1	**Programmatic Deliverables**				
a	SOW 3.4.2	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
b	SOW 3.4.2	Final Site Survey	1	Each	NA
c	SOW 3.4.2	System Architecture Review (SAR)	1	Each	IV
SITE 1 DELIVERY 1					
S1-2	**Site Deliverables Delivery 1**				
a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1 ID/Opt A	1	Each	II
b	SRD 4.2	Switch Subsystem per SRD Table 4.2.1 ID/Opt B	1	Each	II
c	SRD 4.3	LSA Subsystems	7	Each	II
d	SRD 4.4	Type C – Virtual Keyset (VoIP)	16	Each	II
e	SRD 4.4	Type D – Desktop (Local)	40	Each	II
f	SRD 4.4	Type D – Desktop (Remote)	10	Each	II
g	SRD 4.4	Type D – Rackmount 4U (Local)	75	Each	II
h	SRD 4.4	Type D – Rackmount 4U (Remote)	10	Each	II
i	SRD 4.4	Type E – Rackmount 2U (Local)	19	Each	II
S1-3	**Spares**				
a	SOW 3.7.3	Vendor-Provided Spares	1/2 VPSPL		II
S1-4	**Support**				
a	SOW 3.5.4	Delivery #1 FAT Test Review	1	Each	IV
b	SOW 3.5.4	Delivery #1 SAT Test Review	1	Each	IV
SITE 1 DELIVERY 2					
S1-5	**Site Deliverables Delivery 2**				
a	SRD 4.4	Type D – Desktop (Local)	40	Each	II
b	SRD 4.4	Type D – Desktop (Remote)	18	Each	II
c	SRD 4.4	Type D – Rackmount 4U (Local)	70	Each	II
d	SRD 4.4	Type D – Rackmount 4U (Remote)	10	Each	II
S1-6	**Spares**				
a	SOW 3.7.3	Vendor-Provided Spares	1/2 VPSPL		II
S1-7	**Site Level Documentation**				
a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV

DELIVERABLES					
Site-Level – Basic Requirement					
Item	**References**	**Description**	**Qty**	**Unit**	**Shipping Class**
c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
e	DRD-S05	Training Material	Per SOW Appendix C		IV
f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
S1-8	**Training**				
a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
S1-9	**Maintenance**				
a	SOW 3.7.4	Equipment Maintenance	10	Year	II
SITE 2 - MARSHALL SPACE FLIGHT CENTER (MSFC)					
S2-1	**Programmatic Deliverables**				
a	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
b	SOW 3.4.2.2	Final Site Survey	1	Each	NA
c	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
S2-2	**Site Deliverables**				
a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
b	SRD 4.3	LSA Subsystems	5	Each	II
c	SRD 4.4	Type C – Virtual Keyset (VoIP)	10	Each	II
d	SRD 4.4	Type D – Desktop (Local)	45	Each	II
e	SRD 4.4	Type D – Desktop (Remote)	5	Each	II
f	SRD 4.4	Type D – Rackmount 4U (Local)	120	Each	II
g	SRD 4.4	Type D – Rackmount 4U (Remote)	30	Each	II
S2-3	**Spares**				
a	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
S2-4	**Support**				
a	SOW 3.5.4	FAT Test Review	1	Each	IV
b	SOW 3.5.4	SAT Test Review	1	Each	IV
S2-5	**Site-Level Documentation**				

DELIVERABLES					
Site-Level – Basic Requirement					
Item	**References**	**Description**	**Qty**	**Unit**	**Shipping Class**
a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
e	DRD-S05	Training Material	Per SOW Appendix C		IV
f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
S2-6	**Training**				
a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
S2-7	**Maintenance**				
a	SOW 3.7.4	Equipment Maintenance	10	Year	II
SITE 3 - JOHNSON SPACE CENTER (JSC)					
S3-1	**Programmatic Deliverables**				
a	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
b	SOW 3.4.2.2	Final Site Survey	1	Each	NA
c	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
SITE 3 DELIVERY 1					
S3-2	**Site Deliverables Delivery 1**				
a	SRD 4.2	MCCP Switch Subsystem per SRD Table 4.2.1	1	Each	II
b	SRD 4.2	MCCB Switch Subsystem per SRD Table 4.2.1	1	Each	II
c	SRD 4.3	LSA Subsystems	12	Each	II
d	SRD 4.4	Type D – Desktop (Local)	80	Each	II
e	SRD 4.4	Type D – Rackmount 4U (Local)	20	Each	II
f	SRD 4.4	Type D – Vertical Console (Local)	130	Each	II
S3-3	**Spares**				
a	SOW 3.7.3	Vendor-Provided Spares	1/3 VPSPL		II

DELIVERABLES					
Site-Level – Basic Requirement					
Item	**References**	**Description**	**Qty**	**Unit**	**Shipping Class**
S3-4	**Support**				
a	SOW 3.5.4	Delivery #1 FAT Test Review	1	Each	IV
b	SOW 3.5.4	SAT Test Review	1	Each	IV
SITE 3 DELIVERY 2					
S3-5	**Site Deliverables Delivery 2**				
a	SRD 4.4	Type D – Desktop (Local)	100	Each	II
b	SRD 4.4	Type D – Rackmount 4U (Local)	25	Each	II
c	SRD 4.4	Type D – Vertical Console (Local)	180	Each	II
S3-6	**Spares**				
a	SOW 3.7.3	Vendor-Provided Spares	1/3 VPSPL		II
SITE 3 DELIVERY 3					
S3-7	**Site Deliverables Delivery 3**				
a	SRD 4.4	Type C – Virtual Keyset (VoIP)	10	Each	II
b	SRD 4.4	Type D – Desktop (Local)	99	Each	II
c	SRD 4.4	Type D – Desktop (Remote)	8	Each	II
d	SRD 4.4	Type D – Rackmount 4U (Local)	31	Each	II
e	SRD 4.4	Type D – Vertical Console (Local)	181	Each	II
S3-8	**Spares**				
a	SOW 3.7.3	Vendor-Provided Spares	1/3 VPSPL		II
S3-9	**Site-Level Documentation**				
a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
e	DRD-S05	Training Material	Per SOW Appendix C		IV
f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
S3-10	**Training**				
a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
S3-11	**Maintenance**				
a	SOW 3.7.4	Equipment Maintenance	10	Year	II

DELIVERABLES					
Item	**References**	**Description**	**Qty**	**Unit**	**Shipping Class**
Option 101 – Jet Propulsion Laboratory (JPL)					
	Programmatic Deliverables				
1	SOW 3.4.1	Checkpoint/Prototype	1	Each	NA
2	SOW 3.5.1	First Article Test – AGC and/or Mute Groups	1	Each	NA
3	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
4	SOW 3.4.2.2	Final Site Survey	1	Each	NA
5	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
6a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
6b	SRD 4.3	LSA Subsystems	2	Each	II
6c	SRD 4.4	Type D – Desktop (VoIP)	300	Each	II
6d	SRD 4.4	Type E – Rackmount 2U (VoIP)	30	Each	II
	Spares				
6e	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
7a	SOW 3.5.4	FAT Test Review	1	Each	IV
7b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
8a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
8b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
8c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
8d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
8e	DRD-S05	Training Material	Per SOW Appendix C		IV
8f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
9a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
9b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
9c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
10	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 102 – White Sands Complex (WSC) White Sands Ground Terminal (WSGT)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	2	Each	II
4c	SRD 4.4	Type C – Virtual	5	Each	II
4d	SRD 4.4	Type D – Desktop (Local)	55	Each	II
4e	SRD 4.4	Type D – Rackmount 4U (Local)	70	Each	II
4f	SRD 4.4	Type E – Rackmount 2U (Local)	10	Each	II
	Spares				
4g	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions		Each	IV
7b	SOW 3.7.5	Operations Training Sessions		Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions		Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 103 – White Sands Complex (WSC) Second TDRSS Ground Terminal (STGT)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	2	Each	II
4c	SRD 4.4	Type C – Virtual	5	Each	II
4d	SRD 4.4	Type D – Desktop (Local)	57	Each	II
4e	SRD 4.4	Type D – Rackmount 4U (Local)	78	Each	II
4f	SRD 4.4	Type E – Rackmount 2U (Local)	10	Each	II
	Spares				
4g	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 104 – Guam Remote Ground Terminal (GRGT)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	2	Each	II
4c	SRD 4.4	Type E – Rackmount 2U (Local)	30	Each	II
	Spares				
4d	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 105 – Mission Control Center Moscow (MCC-M)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem 240VAC per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems (240VAC)	2	Each	II
4c	SRD 4.4	Type D – Desktop (Local)	18	Each	II
4d	SRD 4.4	Type D – Rackmount 4U (Local)	3	Each	II
4e	SRD 4.4	Type D – Vertical Console (Local)	9	Each	II
	Spares				
4f	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	0	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	0	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	0	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 106 – Goldstone Deep Space Comm Complex (GDSCC)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	2	Each	II
4c	SRD 4.4	Type D – Desktop (VoIP)	3	Each	II
4d	SRD 4.4	Type E – Rackmount 2U (VoIP)	37	Each	II
	Spares				
4e	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 107 – Merritt Island Launch Annex (MILA)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	2	Each	II
4c	SRD 4.4	Type D – Desktop (Local)	21	Each	II
4d	SRD 4.4	Type D – Rackmount 4U (Local)	19	Each	II
	Spares				
4e	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 108 – Canberra Deep Space Comm Complex (CDSCC)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	2	Each	II
4c	SRD 4.4	Type D – Desktop (VoIP)	3	Each	II
4d	SRD 4.4	Type E – Rackmount 2U (VoIP)	30	Each	II
	Spares				
4e	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 109 – Wallops Flight Facility (WFF)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	3	Each	II
4c	SRD 4.4	Type C – Virtual	10	Each	II
4d	SRD 4.4	Type D – Desktop (Local)	28	Each	II
4e	SRD 4.4	Type D – Rackmount 4U (Local)	55	Each	II
4f	SRD 4.4	Type E – Rackmount 2U (Local)	88	Each	II
4g	SRD 4.4	Type E – Rackmount 2U (Remote)	158	Each	II
	Spares				
4h	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 110 – Madrid Deep Space Comm Complex (MDSCC)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	2	Each	II
4c	SRD 4.4	Type D – Desktop (VoIP)	3	Each	II
4d	SRD 4.4	Type E – Rackmount 2U (VoIP)	30	Each	II
	Spares				
4e	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 111 – Dryden Flight Research Center (DFRC)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per 48VDC SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	2	Each	II
4c	SRD 4.4	Type C – Virtual (VoIP)	40	Each	II
4d	SRD 4.4	Type E – Rackmount 2U (Local)	25	Each	II
4e	SRD 4.4	Type E – Rackmount 2U (Remote)	125	Each	II
	Spares				
4f	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 112 – Hangar AE (HAE)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	3	Each	II
4c	SRD 4.4	Type C – Virtual	137	Each	II
4d	SRD 4.4	Type D – Desktop (VoIP)	29	Each	II
4e	SRD 4.4	Type E – Rackmount 2U (VoIP)	30	Each	II
	Spares				
4f	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 113 – Vandenberg Air Force Base (VAFB)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	3	Each	II
4c	SRD 4.4	Type C – Virtual	131	Each	II
4d	SRD 4.4	Type D – Desktop (VoIP)	29	Each	II
4e	SRD 4.4	Type E – Rackmount 2U (VoIP)	30	Each	II
	Spares				
4f	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	2	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	2	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	2	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

Option 114 – Dryden Shuttle Processing Areas (DSPA)					
	Programmatic Deliverables				
1	SOW 3.4.2.1	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
2	SOW 3.4.2.2	Final Site Survey	1	Each	NA
3	SOW 3.4.2.3	System Architecture Review (SAR)	1	Each	IV
	Site Deliverables				
4a	SRD 4.2	Switch Subsystem 48VDC per SRD Table 4.2.1	1	Each	II
4b	SRD 4.3	LSA Subsystems	2	Each	II
4c	SRD 4.4	Type A – Outdoor (Local)	40	Each	II
4d	SRD 4.4	Type E – Rackmount 2U (Local)	20	Each	II
	Spares				
4e	SOW 3.7.3	Vendor-Provided Spares	Per VPSPL		II
	Support				
5a	SOW 3.5.4	FAT Test Review	1	Each	IV
5b	SOW 3.5.4	SAT Test Review	1	Each	IV
	Site-Level Documentation				
6a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
6b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
6c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
6d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
6e	DRD-S05	Training Material	Per SOW Appendix C		IV
6f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
	Training				
7a	SOW 3.7.5	Maintenance Training Sessions	1	Each	IV
7b	SOW 3.7.5	Operations Training Sessions	1	Each	IV
7c	SOW 3.7.5	Keyset User Training Sessions	1	Each	IV
	Maintenance				
8	SOW 3.7.4	Equipment Maintenance	10	Year	II

DELIVERABLES					
Item	**References**	**Description**	**Qty**	**Unit**	**Shipping Class**
Option 115 – Kennedy Space Center (KSC)					
	Programmatic Deliverables				
1	SOW 3.2 SOW 3.4.1	Project Level TIM for Type A Keyset, Type B Keyset	1	Each	NA
2	DRD-P03	Project-level CDR Package	1	Each	IV
3	SOW 3.4.1	Checkpoint/Prototype	1	Each	NA
4	DRD-PO5	Acceptance Test Plan	1	Each	NA
5	SOW 3.4.2	Site-level Technical Interchange Meeting (TIM)	1	Each	NA
6	SOW 3.4.2	Final Site Survey	1	Each	NA
7	SOW 3.4.2	System Architecture Review (SAR)	1	Each	IV
8	SOW 3.5	First Article Verification	1	Each	NA
9	SOW 3.5	First Article Test Review	1	Each	NA
	Site Deliverables				
15-1	**Delivery 1**				
a	SRD 4.2	Switch Subsystem 48VDC per SRD Table 4.2.1 Opt/ID 15a	1	Each	II
b	SRD 4.2	Switch Subsystem 48VDC per SRD Table 4.2.1 Opt/ID 15b	1	Each	II
c	SRD 4.3	LSA Subsystems	10	Each	II
d	SRD 4.4	Type A – Outdoor (Local)	20	Each	II
e	SRD 4.4	Type A – Outdoor (Remote)	80	Each	II
f	SRD 4.4	Type B - Hazardous Environment (Local)	20	Each	II
g	SRD 4.4	Type B - Hazardous Environment (Remote)	180	Each	II
h	SRD 4.4	Type D – Desktop (Local)	15	Each	II
i	SRD 4.4	Type D – Desktop (Remote)	5	Each	II
j	SRD 4.4	Type D - Rackmount 4U (Local)	40	Each	II
k	SRD 4.4	Type E - Rackmount 2U (Local)	160	Each	II
	Spares				
l	SOW 3.7.3	Vendor-Provided Spares	20% VPSPL		II
	Support				
m	SOW 3.5.4	Delivery #1 FAT Test Review	1	Each	IV
n	SOW 3.5.4	Delivery #1 SAT Test Review	1	Each	IV
15-2	**Delivery 2**				
a	SRD 4.4	Type A – Outdoor (Remote)	100	Each	II
b	SRD 4.4	Type B - Hazardous Environment (Remote)	200	Each	II
c	SRD 4.4	Type D – Desktop (Local)	20	Each	II

DELIVERABLES					
Item	**References**	**Description**	**Qty**	**Unit**	**Shipping Class**
d	SRD 4.4	Type D - Rackmount 4U (Local)	40	Each	II
e	SRD 4.4	Type E - Rackmount 2U (Local)	150	Each	II
f	SRD 4.4	Type E - Rackmount 2U (Remote)	10	Each	II
	Spares				
g	SOW 3.7.3	Vendor-Provided Spares	20% VPSPL		II
15-3	**Delivery 3**				
a	SRD 4.4	Type A – Outdoor (Remote)	100	Each	II
b	SRD 4.4	Type B - Hazardous Environment (Remote)	200	Each	II
c	SRD 4.4	Type D – Desktop (Local)	15	Each	II
d	SRD 4.4	Type D – Desktop (Remote)	5	Each	II
e	SRD 4.4	Type D - Rackmount 4U (Local)	30	Each	II
f	SRD 4.4	Type D - Rackmount 4U (Remote)	10	Each	II
g	SRD 4.4	Type E - Rackmount 2U (Local)	150	Each	II
h	SRD 4.4	Type E - Rackmount 2U (Remote)	10	Each	II
	Spares				
i	SOW 3.7.3	Vendor-Provided Spares	20% VPSPL		II
15-4	**Delivery 4**				
a	SRD 4.4	Type A – Outdoor (Local)	20	Each	II
b	SRD 4.4	Type A – Outdoor (Remote)	80	Each	II
c	SRD 4.4	Type B - Hazardous Environment (Remote)	200	Each	II
d	SRD 4.4	Type D – Desktop (Local)	10	Each	II
e	SRD 4.4	Type D – Desktop (Remote)	10	Each	II
f	SRD 4.4	Type D - Rackmount 4U (Local)	40	Each	II
g	SRD 4.4	Type E - Rackmount 2U (Local)	160	Each	II
	Spares				
h	SOW 3.7.3	Vendor-Provided Spares	20% VPSPL		II
15-5	**Delivery 5**				
a	SRD 4.4	Type A – Outdoor (Local)	20	Each	II
b	SRD 4.4	Type A – Outdoor (Remote)	80	Each	II
c	SRD 4.4	Type B - Hazardous Environment (Local)	20	Each	II
d	SRD 4.4	Type B - Hazardous Environment (Remote)	180	Each	II
e	SRD 4.4	Type D – Desktop (Local)	15	Each	II
f	SRD 4.4	Type D – Desktop (Remote)	5	Each	II
g	SRD 4.4	Type D - Rackmount 4U (Local)	40	Each	II
h	SRD 4.4	Type E - Rackmount 2U (Local)	160	Each	II
	Spares				
i	SOW 3.7.3	Vendor-Provided Spares	20% VPSPL		II

DELIVERABLES					
Item	**References**	**Description**	**Qty**	**Unit**	**Shipping Class**
15-6	**Site-Level Documentation**				
a	DRD-S01	System Architecture Review Package	Per SOW Appendix C		IV
b	DRD-S02	Acceptance Test Procedures	Per SOW Appendix C		IV
c	DRD-S03	Acceptance Test Report	Per SOW Appendix C		IV
d	DRD-S04	Technical System Documentation	Per SOW Appendix C		IV
e	DRD-S05	Training Material	Per SOW Appendix C		IV
f	DRD-S06	Installation Documentation	Per SOW Appendix C		IV
15-7	**Training**				
a	SOW 3.7.5	Maintenance Training Sessions	3	Each	IV
b	SOW 3.7.5	Operations Training Sessions	3	Each	IV
c	SOW 3.7.5	Keyset User Training Sessions	4	Each	IV
15-8	**Maintenance**				
a	SOW 3.7.4	Equipment Maintenance	10	Year	II

(End of clause)

I.A.2 FIRM FIXED PRICE (1852.216-78) (DEC 1988) (Basic Requirement)

The total firm fixed price of this contract is $16,813,014.

(End of clause)

I.A.3 OPTION FOR INCREASED QUANTITY – SEPARATELY PRICED LINE ITEM

The Government may require the delivery of the numbered line item, identified in the Schedule as an option item, in the quantity and at the price stated below. The Contracting Officer may exercise the option by written notice to the Contractor at least 60 days prior to the Start Date.

Option	Location	Start Date	Price
101	Jet Propulsion Laboratory	10/1/2006	$2,300,390
102	White Sands Complex (WSC) WSGT	1/28/2008	$1,186,780
103	White Sands Complex (WSC) STGT	2/2/2008	$1,238,639
104	Guam Remote Ground Terminal (GRGT)	4/24/2008	$624,730

105	Mission Control Center Moscow (MCC-M)	6/2/2008	$594,622
106	Goldstone Deep Space Comm Complex (GDSCC)	9/19/2008	$816,970
107	Merritt Island Launch Annex (MILA)	11/17/2008	$758,427
108	Canberra Deep Space Comm Complex (CDSCC)	2//19/2009	$807,760
109	Wallops Flight Facility (WFF)	4/20/2009	$2,286,716
110	Madrid Deep Space Comm Complex (MDSCC)	6/15/2009	$779,981
111	Dryden Flight Research Center (DFRC)	8/17/2009	$1,626,044
112	Hangar AE (HAE)	9/21/2009	$1,445,398
113	NASA/Vandenberg AFB (VAFB)	11/16/2009	$1,437,812
114	Dryden Shuttle Processing Areas (DSPA)	1/25/2010	$946,095
115	Kennedy Space Center (KSC)	10/1/2009	$13,343,981

(End of text)

I.A.4 DELIVERY AND PAYMENT SCHEDULES

SCHEDULE AND PAYMENT MILESTONES					
Basic Requirement					
Item	**Description**	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Development Phase		7/1/2006	3/8/2007	NSP	NSP
1a	Project Management Support		As req'd	NSP	NSP
1b	Technical Interchange Meeting (TIM)		7/14/2006	NSP	NSP
1c	Vendor-Provided Spares List		As req'd	NSP	NSP
1d	Project Activity Reports		As req'd	NSP	NSP
2	System Design Review (SDR)		8/30/2006	NSP	NSP
3	Critical Design Review (CDR)		10/9/2006	NSP	NSP
4	Checkpoint – Prototype		2/15/2007	$840,650.70	2/15/07
5	Acceptance Test Plan Complete		8/11/2006	NSP	NSP
6	First Article Test and Verification Complete		5/9/2007	$672,520.56	5/9/2007
7	Project Documentation		4/23/2007	$168,130.14	4/23/2007
8	Management Plan		8/18/2006	NSP	NSP
9	Escrow Agreement		CA + 30 days	NSP	NSP
Start-up Phase		10/10/2006	2/13/2007	NSP	NSP
S1-1a	GSFC Technical Interchange Meeting		11/6/2006	NSP	NSP
S1-1b	GSFC Final Site Survey		11/6/2006	NSP	NSP
S1-1c	GSFC System Architecture Review		11/17/2006	$168,130.14	11/17/2006
S2-1a	MSFC Technical Interchange Meeting		1/22/2007	NSP	NSP
S2-1b	MSFC Final Site Survey		1/22/2007	NSP	NSP
S2-1c	MSFC System Architecture Review		3/9/2007	$168,130.14	3/9/2007
S3-1a	JSC Technical Interchange Meeting		1/31/2007	NSP	NSP
S3-1b	JSC Final Site Survey		1/31/2007	NSP	NSP
S3-1c	JSC System Architecture Review		2/13/2007	$168,130.14	2/13/2007

Item	Description	Start Date	Complete Date	Payable Amount^	Payable Date
Production Phase		7/1/2006	7/27/2007	NSP	NSP
S1-4a	GSFC Delivery 1 Factory Acceptance Test (FAT)		5/9/2007	NSP	NSP
S2-4a	MSFC FAT		5/21/2007	$504,390.42	5/21/2007
S3-4a	JSC Delivery 1 FAT		7/27/2007	$504,390.42	7/27/2007
Delivery and Installation Phase		6/14/2007	6/5/2008	NSP	NSP
S1-2, S1-3	GSFC Delivery 1 On-Dock		6/14/2007	NSP	NSP
S1-4b	GSFC Delivery 1 Site Acceptance Test (SAT)		7/10/2007	$1,345,041.12	7/10/2007
S1-7	Delivery of Site-Level Documentation		4/6/2007	NSP	NSP
S1-8	Training Complete		8/7/2007	$168,130.14	8/7/2007
S1-5	GSFC Delivery 2 On-Dock		7/26/2007	NSP	NSP
S1-5, S1-6	GSFC Delivery 2 Site Acceptance		8/30/2007	$1,681,301.40	8/30/2007
S2-2, S2-3	MSFC Delivery On-Dock		7/7/2007	NSP	NSP
S2-4b	MSFC SAT		9/10/2007	$1,681,301.40	9/10/2007
S2-5	Delivery of Site-Level Documentation		6/22/2007	NSP	NSP
S2-6	Training Complete		10/24/2007	$168,130.14	10/24/2007
S3-2, S3-3	JSC Delivery 1 On-Dock		9/13/2007	NSP	NSP
S3-4b	JSC Delivery 1 SAT		11/28/2007	$1,681,301.40	11/28/2007
S3-9	Delivery of Site-Level Documentation		9/14/2007	NSP	NSP
S3-10	Training Complete		10/31/2007	$168,130.14	10/31/2007
S3-5, S3-6	JSC Delivery 2 On-Dock		10/25/2007	NSP	NSP
S3-5, S3-6	JSC Delivery 2 SA		3/26/2008	$1,681,301.40	3/26/2008
S3-7, S3-8	JSC Delivery 3 On-Dock		1/20/2008	NSP	NSP
S3-7, S3-8	JSC Delivery 3 SA		6/5/2008	$1,681,301.40	6/5/2008
Maintenance Phase		7/10/2007	11/28/2018	NSP	NSP
S1-9, S2-7	Maintenance Year 1		7/10/2008	$168,130.14	7/10/2007
S1-9, S2-7, S3-11	Maintenance Year 2		7/10/2009	$336,260.28	7/10/2008
S1-9, S2-7, S3-11	Maintenance Year 3		7/10/2010	$336,260.28	7/10/2009
S1-9, S2-7, S3-11	Maintenance Year 4		7/10/2011	$336,260.28	7/10/2010
S1-9, S2-7, S3-11	Maintenance Year 5		7/10/2012	$336,260.28	7/10/2011
S1-9, S2-7, S3-11	Maintenance Year 6		7/10/2013	$336,260.28	7/10/2012
S1-9, S2-7, S3-11	Maintenance Year 7		7/10/2014	$336,260.28	7/10/2013
S1-9, S2-7, S3-11	Maintenance Year 8		7/10/2015	$336,260.28	7/10/2014
S1-9, S2-7, S3-11	Maintenance Year 9		7/10/2016	$336,260.28	7/10/2015
S1-9, S2-7, S3-11	Maintenance Year 10		7/10/2017	$336,260.28	7/10/2016
S3-11	Maintenance Year 11		7/10/2018	$168,130.14	7/10/2017

SCHEDULE AND PAYMENT MILESTONES					
Site Option 101 – Jet Propulsion Laboratory (JPL)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Development Phase		12/7/2006	8/27/2007	NSP	NSP
101-3	Technical Interchange Meeting (TIM)		10/27/2006	NSP	NSP
101-1	Checkpoint - Prototype		1/11/2007	$138,023.40	NSP
101-2	First Article Test and Verification Complete		10/24/2007	NSP	NSP
7 Add. 1	Update Project Documentation		2/13/2007	$138,023.40	2/13/2007
Start-Up Phase		12/7/2006	2/13/2007	NSP	NSP
101-4	Final Site Survey		1/9/2007	NSP	NSP
101-5	System Architecture Review (SAR)		2/13/2007	NSP	NSP
Production Delivery and Installation		11/14/2007	1/20/2008	NSP	NSP
101-6	Site Deliverables and Spares		11/14/2007	NSP	NSP
101-7a	Production Phase – FAT		10/24/2007	$736,124.80	10/24/2007
101-7b	Delivery and Installation Phase - SAT		12/21/2007	$736,124.80	12/21/2007
101-8	Delivery of Site-Level Documentation		4/16/2007	NSP	NSP
101-9	Training Complete		1/20/2008	$92,015.60	1/20/2008
Maintenance Phase		12/21/2007	12/21/2017	NSP	NSP
101-10	Maintenance Year 1		12/21/2008	$46,007.80	12/21/2007
101-10	Maintenance Year 2		12/21/2009	$46,007.80	12/21/2008
101-10	Maintenance Year 3		12/21/2010	$46,007.80	12/21/2009
101-10	Maintenance Year 4		12/21/2011	$46,007.80	12/21/2010
101-10	Maintenance Year 5		12/21/2012	$46,007.80	12/21/2011
101-10	Maintenance Year 6		12/21/2013	$46,007.80	12/21/2012
101-10	Maintenance Year 7		12/21/2014	$46,007.80	12/21/2013
101-10	Maintenance Year 8		12/21/2015	$46,007.80	12/21/2014
101-10	Maintenance Year 9		12/21/2016	$46,007.80	12/21/2015
101-10	Maintenance Year 10		12/21/2017	$46,007.80	12/21/2016

SCHEDULE AND PAYMENT MILESTONES					
Site Option 102 - White Sands Complex (WSC) WSGT					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		2/22/2008	2/29/2008		
102-1	Technical Interchange Meeting (TIM)		2/22/2008	NSP	NSP
102-2	Final Site Survey		2/22/2008	NSP	NSP
102-3	System Architecture Review (SAR)		2/29/2008	NSP	NSP
Production Delivery and Installation		1/28/2008	7/31/2008	NSP	NSP
102-4	Site Deliverables and Spares		6/30/2008	NSP	NSP
102-5a	Production Phase – FAT		5/23/2008	$439,108.60	5/23/2008
102-5b	Delivery and Installation Phase - SAT		7/11/2008	$439,108.60	7/11/2008
102-6	Delivery of Site-Level Documentation		5/2/2008	NSP	NSP
102-7	Training Complete		7/31/2008	$71,206.80	7/31/2008
Maintenance Phase		7/11/2008	7/11/2018	NSP	NSP
102-8	Maintenance Year 1		7/11/2009	$23,735.60	7/11/2008
102-8	Maintenance Year 2		7/11/2010	$23,735.60	7/11/2009
102-8	Maintenance Year 3		7/11/2011	$23,735.60	7/11/2010
102-8	Maintenance Year 4		7/11/2012	$23,735.60	7/11/2011
102-8	Maintenance Year 5		7/11/2013	$23,735.60	7/11/2012
102-8	Maintenance Year 6		7/11/2014	$23,735.60	7/11/2013
102-8	Maintenance Year 7		7/11/2015	$23,735.60	7/11/2014
102-8	Maintenance Year 8		7/11/2016	$23,735.60	7/11/2015
102-8	Maintenance Year 9		7/11/2017	$23,735.60	7/11/2016
102-8	Maintenance Year 10		7/11/2018	$23,735.60	7/11/2017

SCHEDULE AND PAYMENT MILESTONES					
Site Option 103 - White Sands Complex (WSC) STGT					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		3/21/2008	3/28/2008		
103-1	Technical Interchange Meeting (TIM)		3/21/2008	NSP	NSP
103-2	Final Site Survey		3/21/2008	NSP	NSP
103-3	System Architecture Review (SAR)		3/28/2008	NSP	NSP
Production Delivery and Installation		2/25/2008	6/23/2008	NSP	NSP
103-4	Site Deliverables and Spares		7/7/2008	NSP	NSP
103-5a	Production Phase - FAT		6/20/2008	$458,296.43	6/20/2008
103-5b	Delivery and Installation Phase - SAT		8/8/2008	$458,296.43	8/8/2008
103-6	Delivery of Site-Level Documentation		5/30/2008	NSP	NSP
103-7	Training Complete		6/23/2008	$74,318.34	6/23/2008
Maintenance Phase		8/8/2008	8/8/2018	NSP	NSP
103-8	Maintenance Year 1		8/8/2009	$24,772.78	8/8/2008
103-8	Maintenance Year 2		8/8/2010	$24,772.78	8/8/2009
103-8	Maintenance Year 3		8/8/2011	$24,772.78	8/8/2010
103-8	Maintenance Year 4		8/8/2012	$24,772.78	8/8/2011
103-8	Maintenance Year 5		8/8/2013	$24,772.78	8/8/2012
103-8	Maintenance Year 6		8/8/2014	$24,772.78	8/8/2013
103-8	Maintenance Year 7		8/8/2015	$24,772.78	8/8/2014
103-8	Maintenance Year 8		8/8/2016	$24,772.78	8/8/2015
103-8	Maintenance Year 9		8/8/2017	$24,772.78	8/8/2016
103-8	Maintenance Year 10		8/8/2018	$24,772.78	8/8/2017

SCHEDULE AND PAYMENT MILESTONES					
Site Option 104 - Guam Remote Ground Terminal (GRGT)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		5/21/2008	5/28/2008		
104-1	Technical Interchange Meeting (TIM)		5/21/2008	NSP	NSP
104-2	Final Site Survey		5/21/2008	NSP	NSP
104-3	System Architecture Review (SAR)		5/28/2008	NSP	NSP
Production Delivery and Installation		7/31/2008	10/29/2008	NSP	NSP
104-4	Site Deliverables and Spares		9/5/2008	NSP	NSP
104-5a	Production Phase - FAT		8/21/2008	$231,150.10	8/21/2008
104-5b	Delivery and Installation Phase - SAT		10/9/2008	$231,150.10	10/9/2008
104-6	Delivery of Site-Level Documentation		7/31/2008	NSP	NSP
104-7	Training Complete		10/29/2008	$37,483.80	10/29/2008
Maintenance Phase		10/9/2008	10/9/2018	NSP	NSP
104-8	Maintenance Year 1		10/9/2009	$12,494.60	10/9/2008
104-8	Maintenance Year 2		10/9/2010	$12,494.60	10/9/2009
104-8	Maintenance Year 3		10/9/2011	$12,494.60	10/9/2010
104-8	Maintenance Year 4		10/9/2012	$12,494.60	10/9/2011
104-8	Maintenance Year 5		10/9/2013	$12,494.60	10/9/2012
104-8	Maintenance Year 6		10/9/2014	$12,494.60	10/9/2013
104-8	Maintenance Year 7		10/9/2015	$12,494.60	10/9/2014
104-8	Maintenance Year 8		10/9/2016	$12,494.60	10/9/2015
104-8	Maintenance Year 9		10/9/2017	$12,494.60	10/9/2016
104-8	Maintenance Year 10		10/9/2018	$12,494.60	10/9/2017

SCHEDULE AND PAYMENT MILESTONES					
Site Option 105 – Mission Control Center – Moscow (MCC-M)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		6/27/2008	7/7/2008		
105-1	Technical Interchange Meeting (TIM)		6/27/2008	NSP	NSP
105-2	Final Site Survey		6/27/2008	NSP	NSP
105-3	System Architecture Review (SAR)		7/7/2008	NSP	NSP
Production Delivery and Installation		6/2/2008	12/23/2008	NSP	NSP
105-4	Site Deliverables and Spares		10/28/2008	NSP	NSP
105-5a	Production Phase - FAT		9/30/2008	$220,010.14	9/30/2008
105-5b	Delivery and Installation Phase - SAT		12/3/2008	$220,010.14	12/3/2008
105-6	Delivery of Site-Level Documentation		9/9/2008	NSP	NSP
105-7	Training Complete		12/23/2008	$35,677.32	12/23/2008
Maintenance Phase		12/3/2008	12/3/2018	NSP	NSP
105-8	Maintenance Year 1		12/3/2009	$11,892.44	12/3/2008
105-8	Maintenance Year 2		12/3/2010	$11,892.44	12/3/2009
105-8	Maintenance Year 3		12/3/2011	$11,892.44	12/3/2010
105-8	Maintenance Year 4		12/3/2012	$11,892.44	12/3/2011
105-8	Maintenance Year 5		12/3/2013	$11,892.44	12/3/2012
105-8	Maintenance Year 6		12/3/2014	$11,892.44	12/3/2013
105-8	Maintenance Year 7		12/3/2015	$11,892.44	12/3/2014
105-8	Maintenance Year 8		12/3/2016	$11,892.44	12/3/2015
105-8	Maintenance Year 9		12/3/2017	$11,892.44	12/3/2016
105-8	Maintenance Year 10		12/3/2018	$11,892.44	12/3/2017

SCHEDULE AND PAYMENT MILESTONES					
Site Option 106 - Goldstone Deep Space Comm Complex (GDSCC)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		10/16/2008	10/23/2008		
106-1	Technical Interchange Meeting (TIM)		10/16/2008	NSP	NSP
106-2	Final Site Survey		10/16/2008	NSP	NSP
106-3	System Architecture Review (SAR)		10/23/2008	NSP	NSP
Production Delivery and Installation		9/19/2008	4/10/2009	NSP	NSP
106-4	Site Deliverables and Spares		2/6/2009	NSP	NSP
106-5a	Production Phase - FAT		1/23/2009	$302,278.90	1/23/2009
106-5b	Delivery and Installation Phase - SAT		3/12/2009	$302,278.90	3/12/2009
106-6	Delivery of Site-Level Documentation		12/31/2008	NSP	NSP
106-7	Training Complete		4/1/2009	$49,018.20	4/1/2009
Maintenance Phase		3/12/2009	3/12/2019	NSP	NSP
106-8	Maintenance Year 1		3/12/2010	$16,339.40	3/12/2009
106-8	Maintenance Year 2		3/12/2011	$16,339.40	3/12/2010
106-8	Maintenance Year 3		3/12/2012	$16,339.40	3/12/2011
106-8	Maintenance Year 4		3/12/2013	$16,339.40	3/12/2012
106-8	Maintenance Year 5		3/12/2014	$16,339.40	3/12/2013
106-8	Maintenance Year 6		3/12/2015	$16,339.40	3/12/2014
106-8	Maintenance Year 7		3/12/2016	$16,339.40	3/12/2015
106-8	Maintenance Year 8		3/12/2017	$16,339.40	3/12/2016
106-8	Maintenance Year 9		3/12/2018	$16,339.40	3/12/2017
106-8	Maintenance Year 10		3/12/2019	$16,339.40	3/12/2018

SCHEDULE AND PAYMENT MILESTONES					
Site Option 107 - Merritt Island Launch Annex (MILA)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		12/16/2008	12/23/2008		
107-1	Technical Interchange Meeting (TIM)		12/16/2008	NSP	NSP
107-2	Final Site Survey		12/16/2008	NSP	NSP
107-3	System Architecture Review (SAR)		12/23/2008	NSP	NSP
Production Delivery and Installation		11/17/2008	5/28/2009	NSP	NSP
107-4	Site Deliverables and Spares		4/6/2009	NSP	NSP
107-5a	Production Phase - FAT		3/23/2009	$280,617.99	3/23/2009
107-5b	Delivery and Installation Phase - SAT		5/8/2009	$280,617.99	5/8/2009
107-6	Delivery of Site-Level Documentation		3/2/2009	NSP	NSP
107-7	Training Complete		5/28/2009	$45,505.62	5/28/2009
Maintenance Phase		5/8/2009	5/8/2019	NSP	NSP
107-8	Maintenance Year 1		5/8/2010	$15,168.54	5/8/2009
107-8	Maintenance Year 2		5/8/2011	$15,168.54	5/8/2010
107-8	Maintenance Year 3		5/8/2012	$15,168.54	5/8/2011
107-8	Maintenance Year 4		5/8/2013	$15,168.54	5/8/2012
107-8	Maintenance Year 5		5/8/2014	$15,168.54	5/8/2013
107-8	Maintenance Year 6		5/8/2015	$15,168.54	5/8/2014
107-8	Maintenance Year 7		5/8/2016	$15,168.54	5/8/2015
107-8	Maintenance Year 8		5/8/2017	$15,168.54	5/8/2016
107-8	Maintenance Year 9		5/8/2018	$15,168.54	5/8/2017
107-8	Maintenance Year 10		5/8/2019	$15,168.54	5/8/2018

SCHEDULE AND PAYMENT MILESTONES					
Site Option 108 - Canberra Deep Space Comm Complex (CDSCC)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		3/6/2009	3/13/2009		
108-1	Technical Interchange Meeting (TIM)		3/6/2009	NSP	NSP
108-2	Final Site Survey		3/6/2009	NSP	NSP
108-3	System Architecture Review (SAR)		3/13/2009	NSP	NSP
Production Delivery and Installation		2/9/2009	8/27/2009	NSP	NSP
108-4	Site Deliverables and Spares		7/3/2009	NSP	NSP
108-5a	Production Phase - FAT		6/5/2009	$298,871.20	6/5/2009
108-5b	Delivery and Installation Phase - SAT		8/7/2009	$298,871.20	8/7/2009
108-6	Delivery of Site-Level Documentation		5/15/2009	NSP	NSP
108-7	Training Complete		8/27/2009	$48,465.60	8/27/2009
Maintenance Phase		8/7/2009	8/7/2019	NSP	NSP
108-8	Maintenance Year 1		8/7/2010	$16,155.20	8/7/2009
108-8	Maintenance Year 2		8/7/2011	$16,155.20	8/7/2010
108-8	Maintenance Year 3		8/7/2012	$16,155.20	8/7/2011
108-8	Maintenance Year 4		8/7/2013	$16,155.20	8/7/2012
108-8	Maintenance Year 5		8/7/2014	$16,155.20	8/7/2013
108-8	Maintenance Year 6		8/7/2015	$16,155.20	8/7/2014
108-8	Maintenance Year 7		8/7/2016	$16,155.20	8/7/2015
108-8	Maintenance Year 8		8/7/2017	$16,155.20	8/7/2016
108-8	Maintenance Year 9		8/7/2018	$16,155.20	8/7/2017
108-8	Maintenance Year 10		8/7/2019	$16,155.20	8/7/2018

SCHEDULE AND PAYMENT MILESTONES					
Site Option 109 - Wallops Flight Facility (WFF)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		5/15/2009	5/22/2009		
109-1	Technical Interchange Meeting (TIM)		5/15/2009	NSP	NSP
109-2	Final Site Survey		5/15/2009	NSP	NSP
109-3	System Architecture Review (SAR)		5/22/2009	NSP	NSP
Production Delivery and Installation		4/20/2009	10/23/2009	NSP	NSP
109-4	Site Deliverables and Spares		8/31/2009	NSP	NSP
109-5a	Production Phase - FAT		8/17/2009	$846,084.92	8/17/2009
109-5b	Delivery and Installation Phase - SAT		10/5/2009	$846,084.92	10/5/2009
109-6	Delivery of Site-Level Documentation		7/27/2009	NSP	NSP
109-7	Training Complete		10/23/2009	$137,202.96	10/23/2009
Maintenance Phase		10/5/2009	10/5/2019	NSP	NSP
109-8	Maintenance Year 1		10/5/2010	$45,734.32	10/5/2009
109-8	Maintenance Year 2		10/5/2011	$45,734.32	10/5/2010
109-8	Maintenance Year 3		10/5/2012	$45,734.32	10/5/2011
109-8	Maintenance Year 4		10/5/2013	$45,734.32	10/5/2012
109-8	Maintenance Year 5		10/5/2014	$45,734.32	10/5/2013
109-8	Maintenance Year 6		10/5/2015	$45,734.32	10/5/2014
109-8	Maintenance Year 7		10/5/2016	$45,734.32	10/5/2015
109-8	Maintenance Year 8		10/5/2017	$45,734.32	10/5/2016
109-8	Maintenance Year 9		10/5/2018	$45,734.32	10/5/2017
109-8	Maintenance Year 10		10/5/2019	$45,734.32	10/5/2018

SCHEDULE AND PAYMENT MILESTONES					
Site Option 110 - Madrid Deep Space Comm Complex (CDSCC)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		7/13/2009	7/20/2009		
110-1	Technical Interchange Meeting (TIM)		7/13/2009	NSP	NSP
110-2	Final Site Survey		7/13/2009	NSP	NSP
110-3	System Architecture Review (SAR)		7/20/2009	NSP	NSP
Production Delivery and Installation		6/15/2009	12/22/2009	NSP	NSP
110-4	Site Deliverables and Spares		10/27/2009	NSP	NSP
110-5a	Production Phase - FAT		10/13/2009	$288,592.97	10/13/2009
110-5b	Delivery and Installation Phase - SAT		12/2/2009	$288,592.97	12/2/2009
110-6	Delivery of Site-Level Documentation		9/22/2009	NSP	NSP
110-7	Training Complete		12/22/2009	$46,798.86	12/22/2009
Maintenance Phase		12/2/2009	12/2/2019	NSP	NSP
110-8	Maintenance Year 1		12/2/2010	$15,599.62	12/2/2009
110-8	Maintenance Year 2		12/2/2011	$15,599.62	12/2/2010
110-8	Maintenance Year 3		12/2/2012	$15,599.62	12/2/2011
110-8	Maintenance Year 4		12/2/2013	$15,599.62	12/2/2012
110-8	Maintenance Year 5		12/2/2014	$15,599.62	12/2/2013
110-8	Maintenance Year 6		12/2/2015	$15,599.62	12/2/2014
110-8	Maintenance Year 7		12/2/2016	$15,599.62	12/2/2015
110-8	Maintenance Year 8		12/2/2017	$15,599.62	12/2/2016
110-8	Maintenance Year 9		12/2/2018	$15,599.62	12/2/2017
110-8	Maintenance Year 10		12/2/2019	$15,599.62	12/2/2018

SCHEDULE AND PAYMENT MILESTONES					
Site Option 111 - Dryden Flight Research Center (DFRC)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		9/14/2009	9/21/2009		
111-1	Technical Interchange Meeting (TIM)		9/14/2009	NSP	NSP
111-2	Final Site Survey		9/14/2009	NSP	NSP
111-3	System Architecture Review (SAR)		9/21/2009	NSP	NSP
Production Delivery and Installation		8/17/2009	2/26/2010	NSP	NSP
111-4	Site Deliverables and Spares		1/4/2010	NSP	NSP
111-5a	Production Phase - FAT		12/16/2009	$601,636.28	12/16/2009
111-5b	Delivery and Installation Phase - SAT		2/8/2010	$601,636.28	2/8/2010
111-6	Delivery of Site-Level Documentation		11/23/20009	NSP	NSP
111-7	Training Complete		2/26/2010	$97,562.64	2/26/2010
Maintenance Phase		2/8/2010	2/8/2020	NSP	NSP
111-8	Maintenance Year 1		2/8/2011	$32,520.88	2/8/2010
111-8	Maintenance Year 2		2/8/2012	$32,520.88	2/8/2011
111-8	Maintenance Year 3		2/8/2013	$32,520.88	2/8/2012
111-8	Maintenance Year 4		2/8/2014	$32,520.88	2/8/2013
111-8	Maintenance Year 5		2/8/2015	$32,520.88	2/8/2014
111-8	Maintenance Year 6		2/8/2016	$32,520.88	2/8/2015
111-8	Maintenance Year 7		2/8/2017	$32,520.88	2/8/2016
111-8	Maintenance Year 8		2/8/2018	$32,520.88	2/8/2017
111-8	Maintenance Year 9		2/8/2019	$32,520.88	2/8/2018
111-8	Maintenance Year 10		2/8/2020	$32,520.88	2/8/2019

SCHEDULE AND PAYMENT MILESTONES					
Site Option 112 - Hangar AE (HAE)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		10/16/2009	10/23/2009		
112-1	Technical Interchange Meeting (TIM)		10/16/2009	NSP	NSP
112-2	Final Site Survey		10/16/2009	NSP	NSP
112-3	System Architecture Review (SAR)		10/23/2009	NSP	NSP
Production Delivery and Installation		9/21/2009	4/1/2010	NSP	NSP
112-4	Site Deliverables and Spares		2/8/2010	NSP	NSP
112-5a	Production Phase – FAT		1/25/2010	$534,797.26	1/25/2010
112-5b	Delivery and Installation Phase - SAT		3/12/2010	$534,797.26	3/12/2010
112-6	Delivery of Site-Level Documentation		12/31/2009	NSP	NSP
112-7	Training Complete		4/1/2010	$86,723.88	4/1/2010
Maintenance Phase		3/12/2010	3/12/2020	NSP	NSP
112-8	Maintenance Year 1		3/12/2011	$28,907.96	3/12/2010
112-8	Maintenance Year 2		3/12/2012	$28,907.96	3/12/2011
112-8	Maintenance Year 3		3/12/2013	$28,907.96	3/12/2012
112-8	Maintenance Year 4		3/12/2014	$28,907.96	3/12/2013
112-8	Maintenance Year 5		3/12/2015	$28,907.96	3/12/2014
112-8	Maintenance Year 6		3/12/2016	$28,907.96	3/12/2015
112-8	Maintenance Year 7		3/12/2017	$28,907.96	3/12/2016
112-8	Maintenance Year 8		3/12/2018	$28,907.96	3/12/2017
112-8	Maintenance Year 9		3/12/2019	$28,907.96	3/12/2018
112-8	Maintenance Year 10		3/12/2020	$28,907.96	3/12/2019

SCHEDULE AND PAYMENT MILESTONES					
Site Option 113 - NASA/Vandenberg AFB (VAFB)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		12/15/2009	12/22/2009		
113-1	Technical Interchange Meeting (TIM)		12/15/2009	NSP	NSP
113-2	Final Site Survey		12/15/2009	NSP	NSP
113-3	System Architecture Review (SAR)		12/22/2009	NSP	NSP
Production Delivery and Installation		11/16/2009	5/22/2010	NSP	NSP
113-4	Site Deliverables and Spares		4/5/2010	NSP	NSP
113-5a	Production Phase - FAT		3/22/2010	$531,990.44	3/22/2010
113-5b	Delivery and Installation Phase - SAT		5/7/2010	$531,990.44	5/7/2010
113-6	Delivery of Site-Level Documentation		3/1/2010	NSP	NSP
113-7	Training Complete		5/27/2010	$86,268.72	5/27/2010
Maintenance Phase		5/7/2010	5/7/2020	NSP	NSP
113-8	Maintenance Year 1		5/7/2011	$28,756.24	5/7/2010
113-8	Maintenance Year 2		5/7/2012	$28,756.24	5/7/2011
113-8	Maintenance Year 3		5/7/2013	$28,756.24	5/7/2012
113-8	Maintenance Year 4		5/7/2014	$28,756.24	5/7/2013
113-8	Maintenance Year 5		5/7/2015	$28,756.24	5/7/2014
113-8	Maintenance Year 6		5/7/2016	$28,756.24	5/7/2015
113-8	Maintenance Year 7		5/7/2017	$28,756.24	5/7/2016
113-8	Maintenance Year 8		5/7/2018	$28,756.24	5/7/2017
113-8	Maintenance Year 9		5/7/2019	$28,756.24	5/7/2018
113-8	Maintenance Year 10		5/7/2020	$28,756.24	5/7/2019

SCHEDULE AND PAYMENT MILESTONES					
Site Option 114 - Dryden Shuttle Processing Areas (DSPA)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Start-Up Phase		2/19/2010	2/26/2010		
114-1	Technical Interchange Meeting (TIM)		2/19/2010	NSP	NSP
114-2	Final Site Survey		2/19/2010	NSP	NSP
114-3	System Architecture Review (SAR)		2/26/2010	NSP	NSP
Production Delivery and Installation		1/25/2010	7/30/2010	NSP	NSP
114-4	Site Deliverables and Spares		6/7/2010	NSP	NSP
114-5a	Production Phase – FAT		5/21/2010	$350,055.15	5/21/2010
114-5b	Delivery and Installation Phase - SAT		7/12/2010	$350,055.15	7/12/2010
114-6	Delivery of Site-Level Documentation		4/30/2010	NSP	NSP
114-7	Training Complete		7/30/2010	$56,765.70	7/30/2010
Maintenance Phase		7/12/2010	7/12/2020	NSP	NSP
114-8	Maintenance Year 1		7/12/2011	$18,921.90	7/12/2010
114-8	Maintenance Year 2		7/12/2012	$18,921.90	7/12/2011
114-8	Maintenance Year 3		7/12/2013	$18,921.90	7/12/2012
114-8	Maintenance Year 4		7/12/2014	$18,921.90	7/12/2013
114-8	Maintenance Year 5		7/12/2015	$18,921.90	7/12/2014
114-8	Maintenance Year 6		7/12/2016	$18,921.90	7/12/2015
114-8	Maintenance Year 7		7/12/2017	$18,921.90	7/12/2016
114-8	Maintenance Year 8		7/12/2018	$18,921.90	7/12/2017
114-8	Maintenance Year 9		7/12/2019	$18,921.90	7/12/2018
114-8	Maintenance Year 10		7/12/2020	$18,921.90	7/12/2019

SCHEDULE AND PAYMENT MILESTONES					
Site Option 115 - Kennedy Space Center (KSC)					
	Description	**Start Date**	**Complete Date**	**Payable Amount^**	**Payable Date**
Development Phase		10/22/2009	12/23/2010	NSP	NSP
115-1, 115-5	Technical Interchange Meeting (TIM)		10/28/2009	NSP	NSP
2 Add 1	KSC System Design Review (SDR)		12/2/2009	NSP	NSP
115-2	KSC Critical Design Review (CDR)		12/7/2009	NSP	NSP
115-3	Checkpoint - Prototype		3/10/2010	$1,334,398.10	3/10/2010
115-4	Acceptance Test Plan Complete		2/1/2010	NSP	NSP
115-8, 115-9	First Article Test and Verification Complete		8/4/2010	$533,759.24	8/4/2010
7 Add. 2	Update Project Documentation		12/23/2010	$133,439.81	12/23/2010
Start-Up Phase		12/8/2009	2/12/2010	NSP	NSP
115-6	Final Site Survey		1/8/2010	NSP	NSP
115-7	System Architecture Review (SAR)		2/12/2010	NSP	NSP
Production Phase		1/21/2010	8/11/2010	NSP	NSP
15-1m	KSC Delivery 1 Factory Acceptance Test (FAT)		12/13/2010	$2,268,476.77	12/13/2010
Delivery and Installation Phase		9/1/2010	12/13/2010	NSP	NSP
15-1 a - l	KSC Delivery 1 On-Dock		9/1/2010	NSP	NSP
15-1n	KSC Delivery 1 Site Acceptance Test (SAT)		10/14/2010	$2,401,916.58	10/14/2010
15-6	Delivery of Site-Level Documentation		4/16/2010	NSP	NSP
15-7	Training Complete		11/11/2010	$266,879.62	11/11/2010
15-2	KSC Delivery 2 On-Dock		9/1/2010	NSP	NSP
15-2	KSC Delivery 2 SA		10/21/2010	$934,078.67	10/21/2010
15-3	KSC Delivery 3 On-Dock		9/1/2010	NSP	NSP
15-3	KSC Delivery 3 SA		10/28/2010	$934,078.67	10/28/2010
15-4	KSC Delivery 4 On-Dock		9/1/2010	NSP	NSP
15-4	KSC Delivery 4 SA		11/18/2010	$934,078.67	11/18/2010
15-5	KSC Delivery 5 On-Dock		9/1/2010	NSP	NSP
15-5	KSC Delivery 5 SA		12/13/2010	$934,078.67	12/13/2010
Maintenance Phase		10/14/2010	10/14/2020	NSP	NSP
15-8	Maintenance Year 1		10/14/2011	$266,879.62	10/14/2010
15-8	Maintenance Year 2		10/14/2012	$266,879.62	10/14/2011
15-8	Maintenance Year 3		10/14/2013	$266,879.62	10/14/2012
15-8	Maintenance Year 4		10/14/2014	$266,879.62	10/14/2013
15-8	Maintenance Year 5		10/14/2015	$266,879.62	10/14/2014
15-8	Maintenance Year 6		10/14/2016	$266,879.62	10/14/2015
15-8	Maintenance Year 7		10/14/2017	$266,879.62	10/14/2016
15-8	Maintenance Year 8		10/14/2018	$266,879.62	10/14/2017
15-8	Maintenance Year 9		10/14/2019	$266,879.62	10/14/2018
15-8	Maintenance Year 10		10/14/2020	$266,879.62	10/14/2019

^ CV = Contract Value ^ OV = Option Value

(End of clause)

I.A.5 PERIOD OF PERFORMANCE

The period of performance of this contract shall be fifteen years from the effective date of this contract.

(End of text)

I.A.6 INVOICES - SUBMISSION OF

Invoices shall be prepared in accordance with the Prompt Payment terms of this contract and submitted to the Cost and Commercial Accounts Department, Code 155, NASA/Goddard Space Flight Center, Greenbelt, MD 20771. For purposes of the Prompt Payment Act, the above office is considered to be the "Designated Billing Office" and the "Designated Payment Office". (See Clause I.A.15 for IDIQ invoicing)

(End of text)

The following clauses apply to the Indefinite Delivery Indefinite Quantity (IDIQ) portion of this contract only:

I.A.7 MINIMUM/MAXIMUM AMOUNT OF SERVICES

The Government guarantees to issue one or more task orders for an amount not less than $500,000 under this contract. There will be no further obligation on the part of the Government to issue additional orders thereafter. The maximum quantity ordered under this contract shall not exceed $66,000,000. All orders placed under this contract will be applied to the guaranteed minimum and maximum.

(End of clause)

I.A.8 ORDERING (52.216-18) (OCT 1995) (DEVIATION)

(a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from the award date of this contract through a fifteen year period afterwards (the effective ordering period).

(b) All delivery orders or task orders are subject to the terms and conditions of this contract. In the event of conflict between a delivery order or task order and this contract, the contract shall control.

(c) If mailed, a delivery order or task order is considered "issued" when the Government deposits the order in the mail. Orders may be issued orally, by facsimile, or by electronic commerce methods only if authorized in the Schedule.

(End of clause)

I.A.9 ORDER LIMITATIONS (52.216-19) (OCT 1995)

(a) Minimum order. When the Government requires supplies or services covered by this contract in an amount of less than $100, the Government is not obligated to purchase, nor is the Contractor obligated to furnish, those supplies or services under the contract.

(b) Maximum order. The Contractor is not obligated to honor--

(1) Any order for a single item in excess of $2,000,000;

(2) Any order for a combination of items in excess of $2,000,000

(3) A series of orders from the same ordering office within 30 days that together call for quantities exceeding the limitation in subparagraph (1) or (2) above.

(c) If this is a requirements contract (i.e., includes the Requirements clause at subsection 52.216-21 of the Federal Acquisition Regulation (FAR)), the Government is not required to order a part of any one requirement from the Contractor if that requirement exceeds the maximum-order limitations in paragraph (b) above.

(d) Notwithstanding paragraphs (b) and (c) above, the Contractor shall honor any order exceeding the maximum order limitations in paragraph (b), unless that order (or orders) is returned to the ordering office within 7 days after issuance, with written notice stating the Contractor's intent not to ship the item (or items) called for and the reasons. Upon receiving this notice, the Government may acquire the supplies or services from another source.

(End of clause)

I.A.10 INDEFINITE QUANTITY (52.216-22) (OCT 1995)

(a) This is an indefinite-quantity contract for the supplies or services specified, and effective for the period stated, in the Schedule. The quantities of supplies and services specified in the Schedule are estimates only and are not purchased by this contract.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with the Ordering clause. The Contractor shall furnish to the Government, when and if ordered, the supplies or services specified in the Schedule up to and including the quantity designated in the Schedule as the "maximum. The Government shall order at least the quantity of supplies or services designated in the Schedule as the "minimum."

(c) Except for any limitations on quantities in the Order Limitations clause or in the Schedule, there is no limit on the number of orders that may be issued. The Government may issue orders requiring delivery to multiple destinations or performance at multiple locations.

(d) Any order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract shall govern the Contractor's and Government's rights and obligations with respect to that order to the same extent as if the order were completed during the contract's effective period; provided, that the Contractor shall not be required to make any deliveries under this contract after the contract effective ordering period.

(End of clause)

I.A.11 TASK ORDERING PROCEDURE (1852.216-80) (OCTOBER 1996)-- ALTERNATE I (1996)

(a) Only the Contracting Officer may issue task orders to the Contractor, providing specific authorization or direction to perform work within the scope of the contract and as specified in the

schedule. The Contractor may incur costs under this contract in performance of task orders and task order modifications issued in accordance with this clause. No other costs are authorized unless otherwise specified in the contract or expressly authorized by the Contracting Officer.

(b) Prior to issuing a task order, the Contracting Officer shall provide the Contractor with the following data:

(1) A functional description of the work identifying the objectives or results desired from the contemplated task order.
(2) Proposed performance standards to be used as criteria for determining whether the work requirements have been met.
(3) A request for a task plan from the Contractor to include the technical approach, period of performance, appropriate cost information, and any other information required to determine the reasonableness of the Contractor's proposal.

(c) Within 5 calendar days after receipt of the Contracting Officer's request, the Contractor shall submit a task plan conforming to the request.

(d) After review and any necessary discussions, the Contracting Officer may issue a task order to the Contractor containing, as a minimum, the following:
(1) Date of the order.
(2) Contract number and order number.
(3) Functional description of the work identifying the objectives or results desired from the task order, including special instructions or other information necessary for performance of the task.
(4) Performance standards, and where appropriate, quality assurance standards.
(5) Maximum dollar amount authorized (cost and fee or price). This includes allocation of award fee among award fee periods, if applicable.
(6) Any other resources (travel, materials, equipment, facilities, etc.) authorized.
(7) Delivery/performance schedule including start and end dates.
(8) If contract funding is by individual task order, accounting and appropriation data.

(e) The Contractor shall provide acknowledgment of receipt to the Contracting Officer within 3 calendar days after receipt of the task order.

(f) If time constraints do not permit issuance of a fully defined task order in accordance with the procedures described in paragraphs (a) through (d), a task order which includes a ceiling price may be issued.

(g) The Contracting Officer may amend tasks in the same manner in which they were issued.

(h) In the event of a conflict between the requirements of the task order and the Contractor's approved task plan, the task order shall prevail.

(i) Contractor shall submit monthly task order progress reports. As a minimum, the reports shall contain the following information:
(1) Contract number, task order number, and date of the order.

(2) Task ceiling price.
(3) Cost and hours incurred to date for each issued task.
(4) Costs and hours estimated to complete each issued task.
(5) Significant issues/problems associated with a task.
(6) Cost summary of the status of all tasks issued under the contract.

(End of clause)

I.A.12 SUPPLEMENTAL TASK ORDERING PROCEDURES

(a) Task orders will be issued for delivery of end item supplies and services.

(b) When the Government issues a request for a task plan to the Contractor in accordance with the Clause entitled "Task Ordering Procedure" of this contract for services, the Contractor shall prepare its estimate of the labor hours and labor categories required to perform the task order requirements. The Contractor shall use the labor categories, labor rates, and supplies prices listed in Attachment C to calculate the proposed price to perform the task order requirements.

(c) Each task order will specify the exact destination for shipment.

(d) The delivery turn-around times for select items will be as follows:

1. All Keyset types
    a. 30 day delivery turn-around for orders with a quantity of 1 through 25
    b. 120 day delivery turn-around for orders with a quantity of 26 – 125
2. All Switch Interface Cards
    a. 30 day delivery turn-around for orders with a quantity of 1 through 25
    b. 120 day delivery turn-around for orders with a quantity of 26 - 125

(e) The maximum turn-around time for any IDIQ supplies is 6 months from date of order.

(f) All task orders are subject to the terms and conditions of this contract. In the event of conflict between a task order and this contract, the contract shall control.

(g) Task orders may be unilaterally modified by the Contracting Officer in accordance with 52.212-4 (c).

(h) The firm-fixed price for each task order may not be increased except when authorized by a modification to the task order.

(i) The Contractor is not obligated to honor an order issued under I.A.12(d)(1)(a) within 30 days of another order issued under I.A.12(d)(1)(a).

(j) The Contractor is not obligated to honor an order issued under I.A.12(d)(2)(a) within 30 days of another order issued under I.A.12(d)(2)(a).

(k) Maintenance will be ordered for a specified amount of time. The price for maintenance for partial years will be pro-rated based on the annual maintenance price in the IDIQ Price List.

(End of text)

I.A.13 INDIVIDUALS AUTHORIZED TO ISSUE TASK ORDERS

The following personnel are considered Contracting Officers for purposes on I.A.11 and are authorized to issue task orders under this contract. All designated personnel are employed by the Government:

Name	Location
Contracting Officer	Goddard Space Flight Center
Contracting Officer	Johnson Space Center
Contracting Officer	Marshall Space Flight Center
Contracting Officer	NASA Management Office for Jet Propulsion Laboratory
Contracting Officer	Dryden Flight Research Center
Contracting Officer	Kennedy Space Center
Contracting Officer	Hangar AE

(End of text)

I.A.14 EFFECTIVE ORDERING PERIOD

The effective ordering period of this contract shall be for fifteen years after the effective date of the contract.

(End of clause)

I.A.15 IDIQ INVOICES - SUBMISSION OF

Invoices shall be prepared in accordance with the Prompt Payment terms of this contract and submitted to the invoice submission office designated on each task order. For purposes of the Prompt Payment Act, the listed office is considered to be the "Designated Billing Office" and the "Designated Payment Office".

A separate voucher shall be submitted for each task order.

(End of text)

The following clauses apply to the Basic Requirement, Exercised Options and Indefinite Delivery Indefinite Quantity portions:

I.A.16 SCOPE OF WORK (GSFC 52.211-91) (FEB 1991)

The Contractor shall provide all resources (except as may be expressly stated in the contract and all issued task orders as furnished by the Government) necessary to perform the work specified in the SOW, Attachment A, SRD, Attachment B, and task orders issued hereunder.

(End of clause)

I.A.17 PACKAGING, HANDLING, AND TRANSPORTATION (1852.211-70) (NOV 2004)

(a) The Contractor shall comply with NPR 6000.1F, "Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components", dated April 26, 1999, as may be supplemented by the statement of work or specifications of this contract, for all items designated as Class I, II, or III.

(b) The Contractor's packaging, handling, and transportation procedures may be used, in whole or in part, subject to the written approval of the Contracting Officer, provided--
(1) The Contractor's procedures are not in conflict with any requirements of this contract, and
(2) The requirements of this contract shall take precedence in the event of any conflict with the Contractor's procedures.

(c) The Contractor must place the requirements of this clause in all subcontracts for items that will become components of deliverable Class I, II, or III items.

(End of clause)

I.A.18 ACCEPTANCE--MULTIPLE LOCATIONS

The Contracting Officer or authorized representative will accomplish acceptance at the following location(s):

Item	Location	Authorized Representative
S1	Goddard Space Flight Center	Kathleen Poole
S2	Marshall Space Flight Center	Doug Fooshee
S3	Johnson Space Center	William Wylie
101	Jet Propulsion Laboratory	Jerry Humphrey
102	White Sands Complex/WSGT	Harold Brockelsby
103	White Sands Complex/STGT	Harold Brockelsby
104	Guam Remote Ground Terminal	Kathleen Poole
105	Mission Control Center-Moscow	William Wylie
106	Goldstone Deep Space Communications Complex	Jerry Humphrey
107	Merritt Island Launch Annex	Gary A. Morse

108	Canberra Deep Space Communications Complex	Jerry Humphrey
109	Wallops Flight Facility	James Brady
110	Madrid Deep Space Communications Complex	Jerry Humphrey
111	Dryden Flight Research Center	Michael Yettaw
112	Hangar AE	Tuan Doan
113	NASA-Vandenberg, AFB	Tuan Doan
114	DSPA	Tim Springstroh
115	Kennedy Space Center	Tim Springstroh

The Contracting Officer reserves the right to designate other Government agents as authorized representatives. The Contractor will be notified by a written notice or by a copy of the delegation letter if other agents are authorized.

(End of text)

I.A.19 MATERIAL INSPECTION AND RECEIVING REPORT NOT REQUIRED (GSFC 52.246-94) (APR 1989)

NASA FAR Supplement clause 18-52.246-72 of this contract requires the furnishing of a Material Inspection and Receiving Report (MIRR) (DD Form 250 series) at the time of each delivery under this contract. However, a MIRR is not required for the following deliverable items:

Item No.	Reference No.	Description
1d	DRD-P01	Project Activity Reports
2	DRD-P02	System Design Review (SDR) Package
3, 115-2	DRD-P03	Project-Level Critical Design Review (CDR) Packages
5, 115-4	DRD-P05	Acceptance Test Plan
1c	DRD-P04	Vendor Provided Spare Parts List
7	DRD-P06	Project-level Installation Documentation
8	DRD-P07	Management Plan
9	n/a	Escrow Agreement
S1-7, S2-5, S3-9, 101-8, 102-6, 103-6, 104-6, 105-6, 106-6, 107-6, 108-6, 109-6, 110-6, 111-6, 112-6, 113-6, 114-6, 15-6	DRD-S02 – DRD-S06	Site-Level Documentation

(End of clause)

I.A.20 MATERIAL INSPECTION AND RECEIVING REPORT (1852.246-72) (AUG 2003)

(a) At the time of each delivery to the Government under this contract, the Contractor shall furnish a Material Inspection and Receiving Report (DD Form 250 series) prepared in an original copy and sufficient other copies to accomplish the following distribution:

(1) Via mail and marked "Advance Copy", one copy each to the Contracting Officer, the Contracting Officer's Technical Representative (if designated in the contract), and to the cognizant Administrative Contracting Officer, if any.

(2) Via mail, the original and 1 copy (unfolded) to the shipment address (delivery point) specified in Clause I.A.22 of this contract. Mark the exterior of the envelope "CONTAINS DD FORM 250". This must arrive prior to the shipment.

(3) With shipment in waterproof envelope (one copy) for the consignee.

(4) If the shipment address is not directly to the Goddard Space Flight Center (Greenbelt) or Goddard Space Flight Center (Wallops) central receiving areas, then one copy of the DD Form 250 must be provided (via mail) to the following address:

Receiving and Inspection (Code 239), Goddard Space Flight Center, Greenbelt, MD 20771.

(b) The Contractor shall prepare the DD Form 250 in accordance with NASA FAR Supplement 18-46.6. The Contractor shall enclose the copies of the DD Form 250 in the package or seal them in a waterproof envelope, which shall be securely attached to the exterior of the package in the most protected location.

(c) When more than one package is involved in a shipment, the Contractor shall list on the DD Form 250, as additional information, the quantity of packages and the package numbers. The Contractor shall forward the DD Form 250 with the lowest numbered package of the shipment and print the words "CONTAINS DD FORM 250" on the package.

(End of clause)

I.A.21 PLACE OF PERFORMANCE

The services specified by this contract shall be performed at the Contractor's facility, at such other locations as specified in the task orders, or at any of the following installations, as required:

Canberra Deep Space Communications Complex, Canberra, Australia
Dryden Flight Research Center, Lancaster, CA
Dryden Shuttle Processing Areas, Lancaster, CA
Goldstone Deep Space Communications Complex, Goldstone Barstow, CA
Goddard Space Flight Center, Greenbelt, MD
Guam Remote Ground Terminal, Dededo, Guam
Hangar AE, Cape Canaveral, FL
Jet Propulsion Laboratory, Pasadena, CA
Johnson Space Center, Houston, TX

Kennedy Space Center, Kennedy Space Center, FL
Marshall Space Flight Center, Marshall Space Flight Center, AL
Mission Control Center-Moscow, Russia
Madrid Deep Space Communications Complex, Spain
Merritt Island Launch Annex, Merritt Island, FL
NASA-Vandenberg, AFB, Lompoc, CA
Wallops Flight Facility, Wallops Island, VA
White Sands Test Facility, Las Cruces, NM

(End of text)

I.A.22 SHIPPING INSTRUCTIONS--NON-CENTRAL RECEIVING (GSFC 52.247-95) (OCT 1988)

Shipment of the items required under this contract shall be to:

Item	Address	Marked For
Site 1 all items	**Goddard Space Flight Center** Building 14, Room S181 8800 Greenbelt Road Greenbelt, MD 20771	Attn: Katie Poole/Code 291
Site 2 all items	**Marshall Space Flight Center** COLSA CORP Building 4471/Receiving Marshall Space Flight Center Huntsville, AL 35812	Attn: Becky Brown
Site 3 all items	**Johnson Space Center** Building 30M, Room 112 2101 NASA Parkway Houston, TX 77058	Attn: Al Wylie/DV/x34738
Option 101 all items	**Jet Propulsion Laboratory** 4800 Oak Grove Dr Pasadena, CA 91109	Attn: Gerhard Stiebel
Option 102 all items	**White Sands Complex (WSGT)** White Sands Complex 12600 NASA Road Las Cruces, New Mexico 88012	Attn: Harold Brockelsby
Option	**White Sands Complex (STGT)**	Attn: Harold Brockelsby

103 all items	White Sands Complex 12600 NASA Road Las Cruces, New Mexico 88012	
Option 104 all items	**Guam Remote Ground Terminal** NASA GRGT Bldg 150 Room 106 Bullard Road Dededo, Guam 96912	Attn: Dennis Grogman
Option 105 all items	**MCC-Moscow** NASA Johnson Space Center Building 30M, Room 112 2101 NASA Parkway Houston, TX 77058	Attn: Al Wylie/DV/x34738
Option 106 all items	**GDSCC** ITT, Inc 850 East Main St Barstow, CA 92311	For trans-ship to; Goldstone Deep Space Communications Complex Attn: James Harris, DSCC-09, Mars Site
Option 107 all items	**MILA STDN Tracking Station** Building M5-1494 Kennedy Space Center, FL 32899	Attn: John Stevenson
Option 108 all items	**CDSCC** Canberra Deep Space Communications Complex CSIRO Bldg 9, Banks Street Yarralumla ACT 2600 Australia	Attn: Ewen Hopkins
Option 109 all items	**Wallops Flight Facility** Bldg. N162 Rm. 105 Wallops Island, VA 23337	Attn.: James E. Brady III
Option 110 all items	**MDSCC-Madrid** Madrid Deep Space Comm.Complex Paseo del Pintor Rosales, 34 – bajo, 28008 Madrid, Spain	Attn: Manuel Lopez de Ayala ext 7105
Option 111 all items	**Dryden Flight Research Center** Warehouse 6, Building 4876 Edwards, CA 93523	Attn: Michael Yettaw
Option	**Hangar AE**	Attn: Tuan Doan /VA-E1

112	Shipping/Receiving	
all	Building # M6-744	
items	Kennedy Space Center, FL 32899	
Option	**NASA-Vandenberg AFB**	Attn: Tuan Doan/VA-E1
113	Shipping/Receiving	
all	Building # 839	
items	Vandenberg Air Force Base (South), CA 93437	
Option	**Dryden Shuttle Processing Areas**	Attn: Joe D'Agastino
114	NASA Dryden Flight Research Center	
all	Warehouse 7, Bldg 4876	
items	Edwards, CA 93523	
Option	**Kennedy Space Center**	Attn: Tim Springstroh
115	Central Supply Facility	
all	Bldg: M6-0744	
items	Kennedy Space Center, FL 32899-0001	

Compliance with this clause is necessary to assure verification of delivery and acceptance and prompt payment.

If any of the above shipping addresses are to the Goddard Space Flight Center at Greenbelt, MD., delivery personnel must first stop at Receiving (Building 16W) to provide a copy of the receiving report (DD 250) to Receiving personnel before making delivery to the on-site location(s) specified above. If this is a fixed price type contract, failure to provide the DD 250 to Receiving (Building 16W) may result in reduction or non-payment by the Government of any interest penalty under the Prompt Payment Act.

(End of clause)

I.A.23 ADVANCE NOTICE OF SHIPMENT (1852.247-72) (OCT 1988)

Fourteen work days prior to shipping each Site Delivery, the Contractor shall furnish the anticipated shipment date, bill of lading number (if applicable), and carrier identity to authorized representatives noted in Clause I.A.18, Contracting Specialist and to the Contracting Officer.

(End of clause)

I.A.24 NOTICE OF INSTALLATION (GSFC 52.245-95) (OCT 1988)

The Contractor will, upon installation of the system, issue a letter to the Contracting Officer identifying the model number, serial number, and date and location of installation of delivered

devices. Additional devices which are physically separable, such as major assemblies or components, or cabinets which are not specifically itemized in this contract should be identified in the letter.

(End of clause)

I.A.25 RELEASE OF SENSITIVE INFORMATION (1852.237-73) (JUNE 2005)

(a) As used in this clause, "sensitive information" refers to information, not currently in the public domain, that the Contractor has developed at private expense, that may embody trade secrets or commercial or financial information, and that may be sensitive or privileged.

(b) In accomplishing management activities and administrative functions, NASA relies heavily on the support of various service providers. To support NASA activities and functions, these service providers, as well as their subcontractors and their individual employees, may need access to sensitive information submitted by the Contractor under this contract. By submitting this proposal or performing this contract, the Contractor agrees that NASA may release to its service providers, their subcontractors, and their individual employees, sensitive information submitted during the course of this procurement, subject to the enumerated protections mandated by the clause at 1852.237-72, Access to Sensitive Information.

(c)(1) The Contractor shall identify any sensitive information submitted in support of this proposal or in performing this contract. For purposes of identifying sensitive information, the Contractor may, in addition to any other notice or legend otherwise required, use a notice similar to the following:

Mark the title page with the following legend:

This proposal or document includes sensitive information that NASA shall not disclose outside the Agency and its service providers that support management activities and administrative functions. To gain access to this sensitive information, a service provider's contract must contain the clause at NFS 1852.237-72, Access to Sensitive Information. Consistent with this clause, the service provider shall not duplicate, use, or disclose the information in whole or in part for any purpose other than to perform the services specified in its contract. This restriction does not limit the Government's right to use this information if it is obtained from another source without restriction. The information subject to this restriction is contained in pages [insert page numbers or other identification of pages].

Mark each page of sensitive information the Contractor wishes to restrict with the following legend:

Use or disclosure of sensitive information contained on this page is subject to the restriction on the title page of this proposal or document.

(2) The Contracting Officer shall evaluate the facts supporting any claim that particular information is "sensitive." This evaluation shall consider the time and resources necessary to

protect the information in accordance with the detailed safeguards mandated by the clause at 1852.237-72, Access to Sensitive
Information. However, unless the Contracting Officer decides, with the advice of Center counsel, that reasonable grounds exist to challenge the Contractor's claim that particular information is sensitive, NASA and its service providers and their employees shall comply with all of the safeguards contained in paragraph (d) of this clause.

(d) To receive access to sensitive information needed to assist NASA in accomplishing management activities and administrative functions, the service provider must be operating under a contract that contains the clause at 1852.237-72, Access to Sensitive Information. This clause obligates the service provider to do the following:

(1) Comply with all specified procedures and obligations, including the Organizational Conflicts of Interest Avoidance Plan, which the contract has incorporated as a compliance document.

(2) Utilize any sensitive information coming into its possession only for the purpose of performing the services specified in its contract.

(3) Safeguard sensitive information coming into its possession from unauthorized use and disclosure.

(4) Allow access to sensitive information only to those employees that need it to perform services under its contract.

(5) Preclude access and disclosure of sensitive information to persons and entities outside of the service provider's organization.

(6) Train employees who may require access to sensitive information about their obligations to utilize it only to perform the services specified in its contract and to safeguard it from unauthorized use and disclosure.

(7) Obtain a written affirmation from each employee that he/she has received and will comply with training on the authorized uses and mandatory protections of sensitive information needed in performing this contract.

(8) Administer a monitoring process to ensure that employees comply with all reasonable security procedures, report any breaches to the Contracting Officer, and implement any necessary corrective actions.

(e) When the service provider will have primary responsibility for operating an information technology system for NASA that contains sensitive information, the service provider's contract shall include the clause at 1852.204-76, Security Requirements for Unclassified Information Technology Resources. The Security Requirements clause requires the service provider to implement an Information Technology Security Plan to protect information processed, stored, or transmitted from unauthorized access, alteration, disclosure, or use. Service provider personnel requiring privileged access or limited privileged access to these information technology systems are subject to screening using the standard National Agency Check (NAC) forms appropriate to the level of risk for adverse impact to NASA missions. The Contracting Officer may allow the service provider to conduct its own screening, provided the service provider employs substantially equivalent screening procedures.

(f) This clause does not affect NASA's responsibilities under the Freedom of Information Act.

(g) The Contractor shall insert this clause, including this paragraph (g), suitably modified to reflect the relationship of the parties, in all subcontracts that may require the furnishing of sensitive information.

(End of clause)

I.A.26 PROGRAM DELAYS

When a Government caused delay occurs, the Contractor shall submit within 30 days of the end of the delay, its proposal, if any, for an increase in the firm fixed price and/or delivery schedule adjustment. Such proposal shall cite the specific Government caused delay and shall be submitted to the Contracting Officer. In the event that delivery schedules in this contract are affected by Government caused delays for a period of 30 days or less per incident, the Contractor agrees to continue performance under the contract without a corresponding adjustment to the contract value. Adjustments to the firm fixed price of the contract will be negotiated for any Government caused delays exceeding 30 days per incident.

(End of text)

I.A.27 EXPORT LICENSES (1852.225-70) (FEB 2000)

(a) The Contractor shall comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data, and software, or for the provision of technical assistance.

(b) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at any Government installation, where the foreign person will have access to export-controlled technical data or software.

(c) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(d) The Contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.

(End of clause)

I.A.28 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT) (1852.232-77) (MAR 1989)

(a) Of the total price of the Basic Requirement and, if needed, the minimum amount of the IDIQ portion, the sum of $2,184,783 is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the contract in accordance with the following schedule, until the total price of said item is allotted:

SCHEDULE FOR ALLOTMENT OF FUNDS

Date	Amounts	Date	Amounts
4/1/2007	$8,040,722	6/1/2013	$336,260
2/1/2008	$3,698,865	6/1/2014	$336,260
6/1/2009	$336,260	6/1/2015	$336,260
6/1/2010	$336,260	6/1/2016	$336,260
6/1/2011	$336,260	6/1/2017	$168,130
6/1/2012	$336,260		

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) above up to the point at which, if this contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) if that clause would, in the exercise of reasonable judgment by the Contractor, approximate the total amount at the time allotted to the contract. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in the Termination for Convenience of the Government clause notwithstanding.

(c) (1) It is contemplated that funds presently allotted to this contract will cover the work to be performed until April 23, 2007.

(2) If funds allotted are considered by the Contractor to be inadequate to cover the work to be performed until that date, or an agreed date substituted for it, the Contractor shall notify the Contracting Officer in writing when within the next 60 days the work will reach a point at which, if the contract is terminated pursuant to the Termination for Convenience of the Government clause of this contract, the total amount payable by the Government (including amounts payable for subcontracts and settlement costs) pursuant to paragraphs (f) and (g) of that clause will approximate 75 percent of the total amount then allotted to the contract.

(3) (i) The notice shall state the estimated date when the point referred to in subparagraph (2) above will be reached and the estimated amount of additional funds required to continue performance to the date specified in subparagraph (1) above, or an agreed date substituted for it.

(ii) The Contractor shall, 60 days in advance of the date specified in subparagraph (1) above, or an agreed date substituted for it, advise the Contracting Officer in

writing as to the estimated amount of additional funds required for the timely performance of the contract for a further period as may be specified in the contract or otherwise agreed to by the parties.

(4) If, after the notification referred to in subdivision (3)(ii) above, additional funds are not allotted by the date specified in subparagraph (1) above, or an agreed date substituted for it, the Contracting Officer shall, upon the Contractor's written request, terminate this contract on that date or on the date set forth in the request, whichever is later, pursuant to the Termination for Convenience of the Government clause.

(d) When additional funds are allotted from time to time for continued performance of the work under this contract, the parties shall agree on the applicable period of contract performance to be covered by these funds. The provisions of paragraphs (b) and (c) above shall apply to these additional allotted funds and substituted date pertaining to them, and the contract shall be modified accordingly.

(e) If, solely by reason of the Government's failure to allot additional funds in amounts sufficient for the timely performance of this contract, the Contractor incurs additional costs or is delayed in the performance of the work under this contract, and if additional funds are allotted, an equitable adjustment shall be made in the price or prices (including appropriate target, billing, and ceiling prices where applicable) of the items to be delivered, or in the time of delivery or both.

(f) The Government may at any time before termination, and, with the consent of the Contractor, after notice of termination, allot additional funds for this contract.

(g) The provisions of this clause with respect to termination shall in no way be deemed to limit the rights of the Government under clause 52.212-4(m) of this contract. The provisions of this Limitation of Funds clause are limited to the work on and allotment of funds for the items set forth in paragraph (a) above. This clause shall become inoperative upon the allotment of funds for the total price of said work except for rights and obligations then existing under this clause.

(h) Nothing in this clause shall affect the right of the Government to terminate this contract pursuant to the Termination for Convenience of the Government clause of this contract.

(End of clause)

I.A.29 ESCROW AGREEMENT

The Contractor shall secure a third-party trustee to maintain an escrow account for technical information. This escrow account shall contain the following:

1. Hardware information for all MOVE deliverable products:
   - Hardware Engineering Documentation:
     - System Performance Design Specification (typically documents theory of operation for each assembly type and system level operations)

- Assembly drawing documentation for each unique assembly type:
  - Mechanical assembly diagrams
  - Parts list information (component piece-parts) for each assembly type and at a minimum to include:
    - Name of manufacturer
    - Manufacturer part number
    - Quantity used for each assembly type
  - Printed circuit board (artwork) documentation in sufficient detail to allow outsourcing
- Cabinet interconnect wiring diagrams (e.g., cabinet wire lists, backplane wire lists)
- Schematics/logic diagrams for each electronic/electrical assembly, detailed to the component level
- Electronic copies of source code for embedded processors/programmable devices (e.g., Microprocessors, Digital Signal Processors, Field Programmable Gate Arrays, Logic Cell Arrays, Programmable Array Logic)
- Design documentation for all embedded processors/programmable devices (e.g., data flow diagrams, logic equations)
- Compile instructions for all source code in sufficient detail to allow rebuild of embedded executables

❑ Maintenance Documentation:

- Preventative Maintenance Instructions (PMIs) and schedule for PMI execution
- Depot repair documentation for each assembly type (e.g., troubleshooting procedures, tips/guidelines)

2. Software information for each version of all software products used on MOVE:

❑ Software Engineering Documentation:

- General theory of operation/functional description for each software application
- Design documentation for all software modules (e.g., data flow diagrams)
- Electronic copies of source code for all application software
- Compile instructions for all source code in sufficient detail to allow rebuild of application software

3. Miscellaneous information:

- Electronic copies of all manuals
- Electronic copies of all design review material presented to NASA
- Documentation for Third-party systems required to support MOVE products

Within 30 days after contract award, the contractor shall submit for NASA approval an Escrow Agreement.

The Vendor shall ensure that the escrow account semi-annually reflects the most current version of the technical information supporting the products currently in use by any MOVE site.

The information stored in the escrow account shall be accessible to NASA in the event of a Termination for Cause under Clause 52.212-4(m).

(End of text)

I.A.30 ACCIDENT PREVENTION (52.236-13) (NOV 1991)

(a) The Contractor shall provide and maintain work environments and procedures which will (1) safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to Contractor operations and activities; (2) avoid interruptions of Government operations and delays in project completion dates; and (3) control costs in the performance of this contract.

(b) For these purposes on contracts for construction or dismantling, demolition, or removal of improvements, the Contractor shall--

(1) Provide appropriate safety barricades, signs, and signal lights;

(2) Comply with the standards issued by the Secretary of Labor at 29 CFR part 1926 and 29 CFR part 1910; and

(3) Ensure that any additional measures the Contracting Officer determines to be reasonably necessary for the purposes are taken.

(c) If this contract is for construction or dismantling, demolition or removal of improvements with any Department of Defense agency or component, the Contractor shall comply with all pertinent provisions of the latest version of U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, in effect on the date of the solicitation.

(d) Whenever the Contracting Officer becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or Government personnel, the Contracting Officer shall notify the Contractor orally, with written confirmation, and request immediate initiation of corrective action. This notice, when delivered to the Contractor or the Contractor's representative at the work site, shall be deemed sufficient notice of the noncompliance and that corrective action is required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to promptly take corrective action, the Contacting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any stop work order issued under this clause.

(e) The Contractor shall insert this clause, including this paragraph (e), with appropriate changes in the designation of the parties, in subcontracts.

(End of clause)

I.A.31 SAFETY AND HEALTH--ADDITIONAL REQUIREMENTS (GSFC 52.223-91) (OCT 2002)

(a) Other safety and health requirements. In addition to compliance with all Federal, state, and

local laws as required by paragraph (b) of NFS clause 1852.223-70, the Contractor shall comply with the following:

Quarterly health and safety report specifying incidents, disabling injuries, lost work days incident rate, property damage cost, manhours worked/month, and total employees. Template available at http://safety1st.gsfc.nasa.gov under Contractor Safety.

(b) Reporting. The immediate notification and prompt reporting required by paragraph (d) of NFS clause 1852.223-70 shall be to the to the Goddard Space Flight Center Safety and Environmental Branch, Code 205.2, Tel 301-286-2281 and to the Contracting Officer. This should be a verbal notification and confirmed by FAX or E-Mail. This notification is also required for any unsafe or environmentally hazardous condition associated with Government-owned property that is provided or made available for the performance of the contract.

(End of clause)

I.A.32 CONTRACTOR-PROPOSED ENHANCEMENTS

The Contractor shall provide the enhancements that are described in Clause I.A.34, Attachment E. The Contractor in the proposal submitted in response to the Mission Operations Voice Enhancement Request for Offer proposed these enhancements, which are over and above the requirements required by the contract terms and conditions and Mission Operations Voice Enhancement Statement of Work and System Requirements Document. The incorporation of these enhancements does not relieve the Contractor from the responsibilities of meeting all other contract terms and conditions, the Mission Operations Voice Enhancement Statement of Work and System Requirements Document. The Contractor shall perform these enhancements on all work performed, unless specifically waived by the Contracting Officer in writing.

(End of clause)

I.A.33 CLAUSES INCORPORATED BY REFERENCE (52.252-2) (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

Federal Acquisition Regulation (FAR) clauses:

http://www.arnet.gov/far/

NASA FAR Supplement (NFS) clauses:

http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm

The following clauses are incorporated by reference:

(52.245-2) GOVERNMENT PROPERT (FIXED-PRICE CONTRACTS) (MAY 2004) --ALTERNATE I (APR 1984) (DEVIATION) (PIC 99-15) (SEP 1999)(g)(6) shall read as follows: "The contractor shall notify the contracting officer upon loss or destruction of, or damage to, Government property provided under this contract, with the exception of low value property for which loss, damage, or destruction is reported at contract termination, completion, or when needed for continued contract performance. The Contractor shall take all reasonable action to protect the Government property from further damage, separate the damaged and undamaged Government property, put all the affected Government property in the best possible order, and furnish to the Contracting Officer a statement of-- (i) The lost, destroyed, or damaged Government property: (ii) The time and origin of the loss, destruction, or damage; (iii) All known interests in commingled property of which the Government property is a part; and (iv) The insurance, if any, covering any part of or interest in such commingled property.

(52.247-34) F.O.B. DESTINATION (NOV 1991)
(1852.214-72) FULL QUANTITIES (DEC 1988)
(1852.215-84) OMBUDSMAN (OCT 2003)—ALTERNATE I (JUNE 2000) The installation Ombudsman is Ms. Dorothy Perkins, Goddard Space Flight Center, Mailstop 100, Greenbelt, MD 20771, Business Phone: 301 286-5066, Fax: 301-286-1714, E-mail address: Dorothy.C.Perkins@nasa.gov
(1852.219-76) NASA 8 PERCENT GOAL (JULY 1997)
(1852.223-70) SAFETY AND HEALTH (APR 2002)
(1852.223-75) MAJOR BREACH OF SAFETY AND SECURITY (FEB 2002)

(End of clause)

I.A.34 LIST OF ATTACHMENTS (GSFC 52.211-101) (OCT 1988)

The following attachments constitute part of this contract:

Attachment	Description	Date	No. of Pages
A	Statement of Work (SOW)	July 2005	80
B	System Requirements Document (SRD)	August 2005	67
C	IDIQ Price List	May 2005	3
D	Safety & Health Plan	April 2006	46
E	Contractor Proposed Enhancements	n/a	n/a
F	JSC ICD for Serial Audible Alarm	September 1993	44

(End of clause)

II. CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS-COMMERCIAL ITEMS (52.212-5) (JUL 2005)

(a) The Contractor shall comply with the following Federal Acquisition Regulation (FAR) clauses, which are incorporated in this contract by reference, to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

(1) 52.233-3, Protest After Award (AUG 1996) (31 U.S.C. 3553).

(2) 52.233-4, Applicable Law for Breach of Contract Claim (OCT 2004) (Pub. L. 108-77, 108-78).

(b) The Contractor shall comply with the FAR clauses in this paragraph (b) that the contracting officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

[Contracting Officer shall check as appropriate.]

X (1) 52.203-6, Restrictions on Subcontractor Sales to the Government (Jul 1995), with Alternate I (Oct 1995)(41 U.S.C. 253g and 10 U.S.C. 2402).

___ (2) 52.219-3, Notice of Total HUBZone Set-Aside (Jan 1999)(15 U.S.C. 657a).

___ (3) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (Jul 2005) (if the offeror elects to waive the preference, it shall so indicate in its offer)(15 U.S.C. 657a).

___ (4) (i) 52.219-5, Very Small Business Set-Aside (June 2003)(Pub. L. 103-403, section 304, Small Business Reauthorization and Amendments Act of 1994).

___ (ii) Alternate I (Mar 1999) of 52.219-5.

___ (iii) Alternate II (June 2003) of 52.219-5.

X (5) (i) 52.219-6, Notice of Total Small Business Aside (June 2003) (15 U.S.C. 644).

___ (ii) Alternate I (Oct 1995) of 52.219-6.

___ (iii) Alternate II (Mar 2004) of 52.219-6.

___ (6) (i) 52.219-7, Notice of Partial Small Business Set-Aside (June 2003)(15 U.S.C. 644).

___ (ii) Alternate I (Oct 1995) of 52.219-7.

___ (iii) Alternate II (Mar 2004) of 52.219-7.

X (7) 52.219-8, Utilization of Small Business Concerns (May 2004) (15 U.S.C. 637(d)(2) and (3)).

___ (8) (i) 52.219-9, Small Business Subcontracting Plan (Jan 2002)(15 U.S.C. 637 (d)(4)).

___ (ii) Alternate I (Oct 2001) of 52.219-9.

___ (iii) Alternate II (Oct 2001) of 52.219-9.

X (9) 52.219-14, Limitations on Subcontracting (Dec 1996)(15 U.S.C. 637(a)(14)).

___ (10) (i) 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns (Jul 2005)(Pub. L. 103-355, section 7102, and 10 U.S.C. 2323) (if the offeror elects to waive the adjustment, it shall so indicate in its offer).

___ (ii) Alternate I (June 2003) of 52.219-23.

___ (11) 52.219-25, Small Disadvantaged Business Participation Program—Disadvantaged Status and Reporting (Oct 1999)(Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).

___ (12) 52.219-26, Small Disadvantaged Business Participation Program—Incentive Subcontracting (Oct 2000)(Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).

___ (13) 52.219-27, Notice of Total Service-Disabled Veteran-Owned Small Business Set-Aside (May 2004).

X (14) 52.222-3, Convict Labor (June 2003)(E.O. 11755).

X (15) 52.222-19, Child Labor—Cooperation with Authorities and Remedies (June 2004) (E.O. 13126).

X (16) 52.222-21, Prohibition of Segregated Facilities (Feb 1999).

X (17) 52.222-26, Equal Opportunity (Apr 2002)(E.O. 11246).

X (18) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (Dec 2001)(38 U.S.C. 4212).

X (19) 52.222-36, Affirmative Action for Workers with Disabilities (Jun 1998)(29 U.S.C. 793).

X (20) 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (Dec 2001)(38 U.S.C. 4212).

X (21) 52.222-39, Notification of Employee Rights Concerning Payment of Union Dues or Fees (Dec 2004) (E.O. 13201).

___ (22) (i) 52.223-9, Estimate of Percentage of Recovered Material Content for EPA-Designated Products (Aug 2000)(42 U.S.C. 6962(c)(3)(A)(ii)).

___ (ii) Alternate I (Aug 2000) of 52.223-9 (42 U.S.C. 6962(i)(2)(C)).

_X_ (23) 52.225-1, Buy American Act--Supplies (June 2003)(41 U.S.C. 10a-10d).

___ (24) (i) 52.225-3, Buy American Act –Free Trade Agreements – Israeli Trade Act (Jan 2005)(41 U.S.C. 10a-10d, 19 U.S.C. 3301 note, 19 U.S.C. 2112 note, Pub. L. 108-77, 108-78, 108-286).

___ (ii) Alternate I (Jan 2004) of 52.225-3.

___ (iii) Alternate II (Jan 2004) of 52.225-3.

___ (25) 52.225-5, Trade Agreements (Jan 2005)(19 U.S.C. 2501, *et seq.*, 19 U.S.C. 3301 note).

___ (26) 52.225-13, Restrictions on Certain Foreign Purchases (Mar 2005) (E.o.s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of the Treasury).

___ (27) 52.225-15, Sanctioned European Union Country End Products (Feb 2000)(E.O. 12849).

___ (28) 52.225-16, Sanctioned European Union Country Services (Feb 2000)(E.O. 12849).

___ (29) 52.232-29, Terms for Financing of Purchases of Commercial Items (Feb 2002)(41 U.S.C. 255(f), 10 U.S.C. 2307(f)).

___ (30) 52.232.30, Installment Payments for Commercial Items (Oct 1995)(41 U.S.C. 255(f), 10 U.S.C. 2307(f)).

___ (31) 52.232-33, Payment by Electronic Funds Transfer—Central Contractor Registration (Oct. 2003)(31 U.S.C. 3332).

X (32) 52.232-34, Payment by Electronic Funds Transfer—Other Than Central Contractor Registration (May 1999)(31 U.S.C. 3332).

___ (33) 52.232-36, Payment by Third Party (May 1999)(31 U.S.C. 3332).

___ (34) 52.239-1, Privacy or Security Safeguards (Aug 1996)(5 U.S.C. 552a).

___ (35) (i) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (Apr 2003)(46 U.S.C. 1241 and 10 U.S.C. 2631).

___ (ii) Alternate I (Apr 2003) of 52.247-64.

(c) The Contractor shall comply with the FAR clauses in this paragraph (c), applicable to commercial services, that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or executive orders applicable to acquisitions of commercial items:

[*Contracting Officer check as appropriate.*]

___ (1) 52.222-41, Service Contract Act of 1965, as Amended (May 1989)(41 U.S.C. 351, *et seq.*).

___ (2) 52.222-42, Statement of Equivalent Rates for Federal Hires (May 1989)(29 U.S.C. 206 and 41 U.S.C. 351, *et seq.*).

__ (3) 52.222-43, Fair Labor Standards Act and Service Contract Act -- Price Adjustment (Multiple Year and Option Contracts) (May 1989)(29 U.S.C.206 and 41 U.S.C. 351, *et seq.*).

___ (4) 52.222-44, Fair Labor Standards Act and Service Contract Act -- Price Adjustment (Feb 2002)(29 U.S.C. 206 and 41 U.S.C. 351, *et seq.*).

___ (5) 52.222-47, SCA Minimum Wages and Fringe Benefits Applicable to Successor Contract Pursuant to Predecessor Contractor Collective Bargaining Agreements (CBA) (May 1989)(41 U.S.C. 351, *et seq.*).

(d) *Comptroller General Examination of Record.* The Contractor shall comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, and does not contain the clause at 52.215-2, Audit and Records -- Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR Subpart 4.7, Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e) (1) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c) and (d) of this clause, the Contractor is not required to flow down any FAR clause, other than those in paragraphs (i) through (vii) of this paragraph in a subcontract for commercial items. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause--

(i) 52.219-8, Utilization of Small Business Concerns (May 2004)(15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds $500,000 ($1,000,000 for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(ii) 52.222-26, Equal Opportunity (Apr 2002)(E.O. 11246).

(iii) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (Dec 2001)(38 U.S.C. 4212).

(iv) 52.222-36, Affirmative Action for Workers with Disabilities (June 1998)(29 U.S.C. 793).

(v) 52.222-39, Notification of Employee rights Concerning Payment of Union Dues or Fees (Dec 2004) (E.O. 13201).

(vi) 52.222-41, Service Contract Act of 1965, as Amended (May 1989), flow down required for all subcontracts subject to the Service Contract Act of 1965 (41 U.S.C. 351, *et seq.*)

(vii) 52.247-64, Preference for Privately-Owned U.S. Flag Commercial Vessels (Apr 2003)(46 U.S.C. Appx 1241 and 10 U.S.C. 2631). Flow down required in accordance with paragraph (d) of FAR clause 52.247-64,

(2) While not required, the contractor may include in its subcontracts for commercial items a minimal number of additional clauses necessary to satisfy its contractual obligations.

(End of Clause)

Attachment A
SOW

Attachment A
NNG06CA50D
Document No.: MOVE--003

National Aeronautics and Space Administration

Mission Operations Voice Enhancement (MOVE)
Statement of Work (SOW)

September 27, 2006

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Preface

This document is controlled through the Documentation Change Notice (DCN) process. This document will be changed by DCN or complete revision. Proposed changes to this document must be submitted through the DCN process once base lined along with supportive material justifying the proposed change. Comments or questions concerning this document and proposed changes shall be addressed:

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1. Overview

1.1 Introduction

This Statement of Work (SOW) describes the functions to be performed under contract to the National Aeronautics and Space Administration (hereafter referred to as NASA) for delivery of specified products and support for the Mission Operations Voice Enhancement (MOVE) project. The MOVE will replace existing voice systems presently in use with a suite of products from a single vendor.

Within this SOW, the term "Vendor" is used to refer to the prime vendor selected as a result of the MOVE Project Request for Proposal (RFP) process for contract award for delivery of the MOVE Project equipment. The Vendor will be responsible for meeting the equipment and support requirements within the MOVE SOW (MOVE-003) and the MOVE System Requirements Document (SRD) (MOVE-002).

Additionally, the term "NASA" is used throughout this document to refer to NASA and its contractor support personnel at each MOVE location.

1.2 Statement of Problem

Many of the existing NASA voice systems are either custom designed and/or are technologically antiquated and nearing the end of their life cycle. Annual costs associated with maintaining aging equipment are increasing and provisioning of spares is becoming more difficult. Some sites have reached or are near the maximum capacity of their voice system and cannot accommodate expanding needs. Lack of standardization adds to daily operations costs related to manpower, documentation, training and inability to manage multiple systems NASA-wide. This document and the associated MOVE SRD will specify the programmatic and technical requirements for replacement voice processing equipment at NASA designated facilities.

1.3 Scope

This SOW documents the project management and technical/engineering support requirements for the development and delivery of the MOVE systems. This also includes requirements for consultation and other engineering support services, when authorized by NASA in support of equipment, configuration, integration, and verification of the MOVE equipment.

In general, the Vendor will be required to provide for the design, acquisition, development, integration, test, delivery and maintenance of all hardware, firmware, and software components, which comprise the MOVE system configurations to be delivered for each MOVE site. The Vendor will also be responsible for the shipment and delivery of the MOVE

equipment to NASA designated facilities. At each MOVE site, the Vendor will perform or assist in the installation and checkout of the MOVE equipment, with the exception of the keysets. NASA will perform installation and checkout of the MOVE keysets at each site.

1.4 Objectives

The objectives of the contract are for the Vendor to provide COTS-based solutions to the functional and performance requirements specified in the MOVE SRD and a commitment to long-term (10-year) product support and maintenance.

To the maximum extent possible, the hardware, firmware, and software components supplied within the scope of the contract should be COTS as defined in the Glossary of this SOW.

1.5 Areas of Responsibility

The Vendor will be responsible for performing the following management and technical functions as necessary to fulfill the requirements of this SOW and the MOVE SRD:

Management support will include the following:

- Project-Level Management
- Configuration and Data Management
- Design/Development/Implementation
- Verification
- Installation/Acceptance
- System/Product Support
- Additional System Support

The Vendor will be required to establish and maintain technical and managerial interfaces (project-level and site-level) with NASA sufficient to provide for MOVE project management accountability and technical performance.

1.6 Document Organization

This Statement of Work is organized into the following major sections/appendices:

- Section 1 – provides an overview of the scope and intent of this SOW
- Section 2 – provides a high-level overview of the MOVE Project
- Section 3 – describes the functions to be performed by the Vendor
- Appendix A – provides a list of acronyms and abbreviations and a glossary of terms
- Appendix B – defines the Data Requirements List (DRL) for the documentation to be provided by the Vendor

- Appendix C – defines the Data Requirements Descriptions (DRD) for the documentation to be provided by the Vendor
- Appendix D – defines the performance requirement terms (Mean Time Between Critical Failures (MTBCF), Mean Time Between Failures (MTBF), Mean Time to Service Restore (MTSR), and Availability) and the calculation methods for each

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2. MOVE Project Overview

2.1 Terminology

Two (2) categories of support are required: Management support and Technical support. Within each of these categories, two (2) levels of support are required: Project-Level and Site-Level. Project-Level support includes all functions that affect the MOVE project as a whole and are not site-specific in nature. Site-level support includes all functions that affect a specific MOVE site or location only. Note: Within this document, the terms "site" and "location" are synonymous and will be used interchangeably.

2.2 MOVE Locations

The purpose of the MOVE project is to provide mission voice intercommunication services at several NASA MOVE locations. The following MOVE sites will be implemented as part of the basic requirements of the MOVE contract:

a. Goddard Space Flight Center (GSFC), Greenbelt, MD
b. Johnson Space Center (JSC), Houston, TX
c. Marshall Space Flight Center (MSFC), Huntsville, AL

The following MOVE sites may be implemented as separate options under the MOVE contract:

a. Canberra Deep Space Communications Complex (CDSCC), Canberra, Australia
b. Dryden Flight Research Center (DFRC), Edwards, CA
c. Dryden Shuttle Processing Area (DSPA), Edwards, CA
d. Goldstone Deep Space Communications Complex (GDSCC), Goldstone, CA
e. Guam Remote Ground Terminal (GRGT), Guam, USA
f. Hangar AE (HAE), Cape Canaveral, FL
g. Jet Propulsion Laboratory (JPL), Pasadena, CA
h. Kennedy Space Center (KSC), Cape Canaveral, FL
i. Madrid Deep Space Communications Complex (MDSCC), Madrid, Spain
j. Merritt Island Launch Annex (MILA), Cape Canaveral, FL
k. Mission Control Center-Moscow (MCC-M), Moscow, Russia
l. Vandenberg Air Force Base (VAFB), Vandenberg, CA
m. Wallops Flight Facility (WFF), Wallops, VA
n. White Sands Complex (WSC)-STGT, Las Cruces, NM

o. White Sands Complex (WSC)-WSGT, Las Cruces, NM

In addition, the following sites will be implemented using the Indefinite Delivery/Indefinite Quantity (ID/IQ) provisions of the MOVE contract:

a. Ames Research Center (ARC), Moffett Field, CA

b. Glenn Research Center (GRC), Cleveland, OH

c. Johns Hopkins University (JHU), Baltimore, MD

d. NASA Headquarters (NHQ), Washington D.C.

Each MOVE site can be identified as a switch site or a remote site. Switch sites will be implemented as a full voice system comprised of one or more switch subsystem(s), multiple LSA subsystems, and keysets. GSFC, JSC, and KSC include two voice systems, as defined in the MOVE System Requirements Document (SRD). Remote sites consist of keysets and may include vendor-provided equipment, as required, to interface to a switch site. Remote sites and their associated switch site are shown in Table 2-1. Note that some of the remote keysets are installed at locations other than the MOVE sites identified above.

Table 2-1 Remote Sites and associated Switch Sites

Remote Site	Switch Site
JHU	GSFC
NHQ	GSFC
ARC	MSFC
GRC	MSFC

Project-Level support requirements apply to the MOVE project as a whole regardless of the number of actual site implementations. All Site-Level support requirements apply to each MOVE site, whether defined as a basic requirement or an option, and whether a switch site or a remote site.

3. Work Statement

3.1 Overview

The Vendor shall provide for the design, selection, acquisition, development, integration, test, and delivery of the MOVE systems on schedule and in compliance with the contract requirements. The Vendor shall also support NASA for the installation and checkout of each delivery at each MOVE site.

Additionally, the Vendor shall provide consultation and engineering services, on an as-needed basis, when authorized by NASA via contract options. These services shall be provided in support of installation of the MOVE systems, for the integration of the MOVE systems within the architecture of each MOVE site, the system/subsystem testing, and the subsequent sustaining/maintenance support as needed.

The vendor support requirements for the MOVE project include the following areas, which are presented in subsequent sections:

- Project Management
- Configuration and Data Management
- Design/Development/Implementation
- Verification
- Site Installation/Acceptance
- System/Product Support
- Additional System Support

Vendor responsibilities have been separated in Project-level and Site-specific categories, where applicable. Project-level responsibilities are those activities that apply to the success of the overall MOVE project goals. Site-level responsibilities are those activities that focus on the implementation of the MOVE system at each site.

The Vendor shall provide storage for all non-delivered equipment and any spares in excess of those stated in the Vendor Provided Spare Parts List (VPSPL).

The NASA MOVE Contracting Officer (CO) is the NASA authority for determining and providing the approval for the Vendor to proceed with subsequent steps wherever NASA Authorization to Proceed (ATP) is required. All reference to NASA ATP or NASA Authorization in the following sections is to be interpreted as requiring written authorization from the NASA MOVE CO.

3.2 Project Management

The Vendor shall establish and maintain management processes and controls required to deliver the contract items on schedule and in compliance with the contract requirements. The

Vendor shall establish and maintain an integrated management approach to ensure implementation and delivery of the MOVE project-level products as defined in the MOVE contract Deliverables tables. The project management process shall ensure a disciplined and authoritative approach to the assessment and control of risks, project schedule, and technical performance. The primary functions of this project management interface are to provide timely and accurate project status, risk management, schedule management and export control compliance.

The Vendor shall assign a prime and alternate point of contact (POC) to NASA on matters pertaining to the contract. The POC shall have resources and authority to ensure efficient and timely project execution.

3.2.1 Management Plan (MP)

The Vendor shall prepare, deliver, and maintain a Management Plan (MP). The MP shall serve as the authoritative document providing the management procedures for all activities necessary to meet the requirements of the SRD and SOW. The MP shall describe the following at a minimum:

- Vendor's organization and internal lines of communication
- Assignment of management and engineering responsibilities and duties
- Project management structure, policies, and procedures
- Resources plan for contract implementation
- Decision making processes
- Plan for accommodating system upgrades and version changes

The Vendor's project management procedures shall describe the use, characteristics, and function of any automated or manual management systems to be used on this project, including, as a minimum, schedule management, resources allocation and management, configuration and data management systems, quality assurance systems, and subcontract management systems (if required).

The MP shall be prepared and delivered in accordance with DRD-P07.

3.2.2 Management Reporting

The purpose of management reporting is to provide insight to NASA regular status reviews and written reports.

3.2.2.1 Status Reviews

The Vendor shall support weekly status reviews with the NASA MOVE project team. Vendor support of the status reviews can be via teleconference. The status reviews will start immediately after contract award and continue until the final acceptance of all MOVE equipment. The status reviews shall address project risks and mitigation plans, progress against the established schedule, courses of action to correct schedule departures and problems, and near-term project plans.

In addition, the Vendor shall support supplementary status reviews as designated by NASA. Such reviews shall be limited to discussion of discovered MOVE project problems, which NASA considers to pose potential jeopardy to the project deliveries and/or schedule.

3.2.2.2 Project Activity Reports

The Vendor shall be responsible for preparing and submitting bi-weekly (every two weeks) Project Activity Reports (PAR) for the support/services provided under this contract. The PAR shall address implementation status, risk management and schedule management. The PARs shall be prepared in accordance with DRD-P01.

The PAR shall include quantitative descriptions of overall technical and administrative progress, and status of significant activities relating to the accomplishments of the contract objectives including projected activities. Supporting data in the form of charts, graphs, etc. may be included as appropriate.

3.2.3 Risk Management

The Vendor shall identify programmatic, schedule and technical risks and describe how they will effectively manage/mitigate these risks on an ongoing basis throughout contract performance. The Vendor shall quantify risks with respect to the impact on development, production, integration, testing, performance, delivery, and schedule. The Vendor shall assign a priority to identified risks and develop risk mitigation plans for risks considered medium or high priority. The Vendor shall provide the status and risk mitigation plans in the PAR (DRD-P01).

3.2.4 Schedule Management

The Vendor shall provide their plans and approach for the development and delivery of the MOVE products complying with the major schedule milestones at the MOVE project and site level for each MOVE site.

Vendor project-level schedule shall be provided in either Microsoft Project format or a format compatible with Microsoft Project. The Vendor shall identify any issues, questions, and/or concerns with meeting these project-level milestones in the PAR (DRD-P01).

3.2.5 Foreign/OCONUS MOVE Site Coordination

Shipping control and planning to all MOVE foreign and Outside Continental United States (OCONUS) sites shall be coordinated with the NASA-designated point-of-contact Continental United States (CONUS) site. Table 3-1 identifies the responsible NASA sites for each foreign/OCONUS MOVE site.

Table 3-1 Foreign/OCONUS MOVE Sites and Responsible NASA Sites

Foreign/OCONUS MOVE Site	Responsible NASA CONUS Site
Canberra Deep Space Communications Complex (CDSCC), Canberra, Australia	Jet Propulsion Laboratory (JPL), Pasadena, CA
Madrid Deep Space Communications Complex (MDSCC), Madrid, Spain	Jet Propulsion Laboratory (JPL), Pasadena, CA
Mission Control Center-Moscow (MCC-M), Moscow, Russia	Johnson Space Center (JSC), Houston TX
Guam Remote Ground Terminal (GRGT), Guam, USA	White Sands Complex (WSC), Las Cruces, NM

3.2.5.1 Export/Import Control and Planning for Foreign Sites

Export/import control and planning is required for those MOVE systems to be delivered and installed at locations outside the United States. NASA will perform all of the export planning, paperwork, and shipping as required for relocating the equipment to the designated MOVE foreign site.

3.2.5.2 Shipping to Foreign/OCONUS MOVE Sites

In general, the Vendor shall ship all equipment destined for foreign/OCONUS sites to the designated responsible NASA CONUS site to perform all of the export planning, paperwork, and shipping as required for relocating the equipment to the designated MOVE foreign/OCONUS site. In some cases, NASA may desire to have the equipment shipped directly from the Vendor's facility to the foreign/OCONUS site. In these cases, NASA will provide personnel to inspect and tag the equipment at the Vendor's facility prior to the Vendor's final packaging for shipment. The vendor is not responsible for shipping costs to any OCONUS MOVE site.

For repair/replacement of failed LRUs at foreign/OCONUS sites, the responsible NASA CONUS site associated with the foreign/OCONUS site will handle return of any failed element to the CONUS site first and then coordinate with the Vendor for repair/replacement. The CONUS site will also handle all shipments of repaired/replaced elements to its associated foreign/OCONUS site.

3.3 Configuration and Data Management

3.3.1 Project-Level Configuration and Data Management

The Vendor shall establish and implement a Configuration Management (CM) process and baseline for all deliverable MOVE equipment. The Vendor shall manage the configuration of all deliverable MOVE items, including those purchased under IDIQ, throughout the life of the

contract. The CM process shall ensure that the configurations of hardware, firmware, software, and documentation are in conformance with the contract baselines and specifications for both project-level and site-level deliverables.

The Vendor shall prepare the project-level documentation in accordance with the DRLs in Appendix B of this SOW, and in accordance with the format and content requirements stated in the accompanying DRDs in Appendix C of this SOW. Documentation shall be delivered on the dates/timeframes and in the quantities specified within the DRL. All documentation shall be delivered in the quantities and format (i.e., electronic or printed) as identified in the DRL in Appendix B. The Vendor shall allow NASA to copy/reproduce any deliverable documentation as required in support of the MOVE project at each site.

The Vendor shall manage and control data/documentation items associated with MOVE elements and configurations as they progress through the design, implementation, integration, test, delivery, and maintenance cycles. The data management shall ensure accurate control and delivery of the following at a minimum at the project-level:

a. Presentation Material (DRD-P02 and DRD-P03)

b. Deliverable Documentation (DRD-P04 through DRD-P07)

c. Test and Verification Data (DRD-P05)

Reference Table 3-2 for a summary of the deliverable project-level documentation and the relative time frame for each.

Table 3-2 MOVE Project-Level Documentation Summary

Contract Award (CA)	
Project Activity Report (DRD-P01)	[Start bi-weekly (every 2 weeks) submissions]
System Design Review (SDR)	
SDR Package (DRD-P02)	[at SDR]
Initial Acceptance Test (AT) Plan (DRD-P05)	[at SDR]
Initial Project-Level Installation Documentation (DRD-P06)	[at SDR]
Final Management Plan (MP) (DRD-P07)	[at SDR]
NASA CO System Design Acceptance	[15 working days after SDR]
Project-Level Critical Design Review (CDR)	
Review Copy of Acceptance Test (AT) Plan (DRD-P05)	[30 working days prior to CDR]
CDR Package (DRD-P03)	[at CDR = 30 working days after SDR]
Vendor Provided Spare Parts List (VPSPL) (DRD-P04)	[at CDR]
Final Acceptance Test (AT) Plan (DRD-P05)	[at CDR]
Final Project-Level Installation Documentation (DRD-P06)	[at CDR]
NASA CO Critical Design Acceptance	[15 working days after CDR]

3.3.2 Site-Level Configuration and Data Management

As a part of the overall Vendor CM process, the Vendor shall include configuration management of all MOVE equipment delivered to each MOVE site. The Vendor shall manage

the configuration and develop a baseline of all site deliverable MOVE items throughout the life of the contract. The CM process shall ensure that the configurations of hardware, firmware, software, and documentation are in conformance with the contract baselines and specifications for each MOVE site.

The Vendor shall manage the configuration of all MOVE deliverables and ensure that all like elements are of the same configuration level at all times, and/or ensure that any configuration discrepancies are fully documented and approved by NASA. The Vendor shall maintain configuration control of the hardware to the Line Replaceable Unit (LRU) level and software/firmware to the version level. The Vendor shall ensure that the CM of any MOVE system is not compromised by any depot maintenance activities.

The Vendor shall prepare all site-level documentation in accordance with the DRLs in Appendix B of this SOW, and in accordance with the format and content requirements stated in the accompanying DRDs in Appendix C of this SOW. Documentation shall be delivered on the dates/timeframes and in the quantities specified within the DRL. All documentation shall be delivered in the quantities and format (i.e., electronic or printed) as identified in the DRL in Appendix B. The Vendor shall allow NASA to copy/reproduce any deliverable documentation as required in support of the MOVE project at each site.

The Vendor shall manage and control data/documentation items associated with MOVE elements and configurations as they progress through the implementation, integration, test, delivery, and maintenance cycles for each MOVE site. The data management shall ensure accurate control and delivery of the following at a minimum at a site-level:

a. Presentation Material (DRD-S01)
b. Deliverable Documentation (DRD-S02 through DRD-S06)
c. Test and Verification Data (DRD-S02 and DRD-S03)

Reference Table 3-3 for a summary of the deliverable site-level documentation and the relative time frame for each per site.

Table 3-3 MOVE Site-Level Documentation Summary

Site-Specific System Architecture Review (SAR)

Initial SAR Package (DRD-S01) ..... [10 working days prior to SAR]
Initial Training Package (DRD-S05) ..... [10 working days prior to SAR]
Initial Site-Specific Installation Documentation (DRD-S06) ..... [10 working days prior to SAR]
Final SAR Package (DRD-S01) ..... [at SAR]
NASA CO Authorization to proceed to FA/FAT ..... [15 working days after SAR]
Final Site-Specific Installation Documentation (DRD-S06) ..... [20 working days after SAR]

Site Delivery #1

First Article/Factory Acceptance Test

(First site does FA – Project-level; subsequent sites do FAT - Site-level)
Initial FA/FAT Procedures (DRD-S02) ..... [45 working days prior to FA/FAT]
Final FA/FAT Procedures (DRD-S02) ..... [10 working days prior to FA/FAT]
*FA/FAT Review ..... [10 working days after FA/FAT]
FA/FAT Report (DRD-S03) ..... [5 working days after FA/FAT]
NASA CO FA/FAT Acceptance & Authorization to Ship ..... [10 working days after FA/FAT]
Delivery #1 Equipment On-dock ..... [10 working days after NASA CO FA/FAT
(e.g., Switch(es), LSA(s), x# Keysets (Qty site defined)) Acceptance & Authorization to Ship]
Technical System Documentation (DRD-S04) ..... [with Delivery #1 On-dock]
Final Training Package (DRD-S05) ..... [with Delivery #1 On-dock]

Install/Checkout

Install/Checkout Delivery #1 On-dock equipment ..... [after Delivery #1 On-dock]
Start of Site Training ..... [Start after Delivery #1 Checkout Complete]

Site Acceptance Test (SAT)

Initial SAT Procedures (DRD-S02) ..... [30 working days prior to SAT]
Final SAT Procedures (DRD-S02) ..... [5 working days prior to SAT]
SAT Review ..... [10 working days after SAT]
SAT Report (DRD-S03) ..... [5 working days after SAT]
NASA CO SAT Acceptance ..... [10 working days after SAT]

Site Integration/Transition (NASA) ..... [Site Defined]

***Site Delivery #x** (2 through n) ..... [repeat as required for site]
*Final FAT Procedures (DRD-S02) ..... [10 working days prior to FAT]
*FAT Review ..... [10 working days after FAT]
*FAT Report (DRD-S03) ..... [5 working days after FAT]
*NASA CO FAT Acceptance & Authorization to Ship ..... [10 working days after FA/FAT]
*Delivery #x Equipment On-dock ..... [Site Defined]
(x# Keysets (Qty site defined))
*Install/Checkout Delivery #x equipment ..... [after Delivery #x On-dock]

Transition Complete ..... [Site Defined]

Note: Those items marked with an asterisk (*) may not be required for every MOVE site.

3.4 Design/Development/Implementation

3.4.1 Project-level Design

3.4.1.1 Project-Level Technical Interchange Meeting (TIM)

The Vendor shall support a Project-Level Technical Interchange Meeting (TIM) between NASA technical personnel and Vendor personnel. The project-level TIM shall be conducted at the Vendor facility within two (2) weeks of the Contract Award (CA). The primary purpose of the project-level TIM shall be to review and resolve plans/issues concerning the development and delivery of the Vendor products from a MOVE project perspective. This TIM will serve as the kick-off of the design/development activities as well as the initial review of Vendor plans for meeting the MOVE requirements and delivery schedule.

3.4.1.2 Project-Level Design Reviews

The Vendor shall be responsible for planning, scheduling, and conducting project-level design reviews in support of the proposed MOVE design/development. The Vendor shall prepare and conduct the following project-level reviews:

- System Design Review (SDR)
- Project-Level Critical Design Reviews (CDRs)

3.4.1.2.1 System Design Review (SDR)

The purpose of the System Design Review (SDR) is to demonstrate to NASA that all requirements of the MOVE SRD have been met and mapped into the Vendor's proposed system design and architecture.

The design proposed by the Vendor in response to the RFP shall constitute the MOVE preliminary design. Following contract award, the Vendor shall be required to refine and advance this design to develop a system-level view of the overall MOVE project including system architecture/design and implementation/delivery plans. The Vendor shall conduct a single SDR for the MOVE project as a whole, presenting the overall system design and architecture (including all COTS elements). The SDR shall include the following:

- Detailed/critical level design information for all existing COTS elements to be delivered for MOVE
- Preliminary level design information for all development elements to be delivered for MOVE

The Vendor shall prepare and deliver a SDR Package and present the package at a NASA designated facility. The SDR Package shall be prepared in accordance with DRD-P02.

The SDR milestone shall be the means by which the Vendor obtains NASA CO written concurrence to proceed with the development and implementation of the MOVE project. The

written authorization to proceed will be provided by the NASA CO following the completion of the SDR and after resolution of any outstanding issues.

In support of the SDR, the Vendor shall provide the necessary documentation associated with the SDR as identified in the DRL/DRD information in Appendix B and Appendix C of this SOW and summarized in Table 3-3. The SDR and/or associated documentation shall include information on system safety.

3.4.1.2.2 Project-Level Critical Design Reviews (CDRs)

The purpose of the Critical Design Reviews (CDRs) are to present the design for all development items and demonstrate to NASA that all requirements of the MOVE SRD have been met and mapped into the Vendor's proposed system design and architecture. Each CDR shall include detailed/critical level design information for all development MOVE elements.

The following CDRs shall be required at a minimum:

1. Basic Requirement, includes detailed design for any development required for the following:
   a. Switch Subsystem
   b. LSA Subsystem
   c. Keyset Types:
      i) Type C
      ii) Type D (all configurations)
      iii) Type E
2. KSC Option 15 (if exercised), includes detailed design for any development required for the following:
   a. Keyset Type A
   b. Keyset Type B

Reference the MOVE System Requirements Document (SRD) for requirements on each subsystem and keyset type. Note the CDR for Basic Requirements, includes the design for Automatic Gain Control (AGC) and Mute Groups even though these functions are site-specific deliverables required only for JPL and its satellites (CDSCC, GDSCC, and MDSCC).

The Vendor shall prepare and deliver a CDR Package and present the package at a NASA designated facility for each required CDR. Each CDR Package shall be prepared in accordance with DRD-P03. In support of each CDR, the Vendor shall provide the necessary documentation associated with the project-level CDR as identified in the DRL/DRD information in Appendix B and Appendix C of this SOW.

Each CDR milestone shall be the means by which the Vendor obtains NASA CO written concurrence to proceed with the implementation of the individual sites within the MOVE project requiring the associated development item(s). Authorization to proceed with the site

implementations shall be contingent upon NASA CO written concurrence with the proposed system design. The authorization to proceed will be provided by NASA following the completion of each CDR and after resolution of any outstanding issues.

3.4.1.2.3 Design/Development Checkpoints

The Vendor shall identify periodic "checkpoints" (see glossary) for on-going status and verification that all development efforts (new capabilities, modified capabilities) are on-track and meeting the intent of the MOVE SRD requirements. Where possible these checkpoints should include the use of prototypes (see glossary) and/or demonstrations to present the new/modified capabilities. The intent of these checkpoints is for the vendor to provide NASA advance assessments of elements of the MOVE design that require development (i.e., new capabilities and/or COTS modifications) over the Vendor's current product capabilities.

3.4.2 Site-Level Implementation

3.4.2.1 Site-Level TIMs

A separate site-level TIM shall be conducted at each MOVE site with NASA technical personnel. Each site TIM shall be conducted within two (2) weeks after the Site Start-up date. The start-up TIM for each site implementation will be a face-to-face meeting at a NASA designated location for each site.

The primary purpose of the site-specific TIMs shall be to review and resolve plans/issues concerning the architecture and delivery of the MOVE products for each MOVE site. The site-specific TIM may be conducted at the same time as the site's Final Site Survey.

3.4.2.2 Final Site Survey

The Vendor shall support a final site survey with NASA personnel at each required MOVE site after the Site Start-up date for that site. The Vendor shall participate in each final site survey in order to obtain any/all site-specific information. The Vendor will use the information obtained from the final site survey in the implementation of the site-specific architecture and the System Architecture Review (SAR) for each MOVE site. Gathered data will include but not be limited to the following:

- Facility Considerations – location, floor space, power and ground, HVAC, connectivity, storage areas, etc.
- Physical Attributes – connector definitions, cable types, adapter cables required, cable run lengths, keyset mounting, cabinet/enclosure information, etc.
- Special Considerations – security, transition, test equipment, etc.

Each site survey will be scheduled for approximately one-week elapsed time and may occur at the same time as the site-specific TIM.

3.4.2.3 Site-specific System Architecture Reviews (SAR)

The purpose of each site-specific System Architecture Review (SAR) is to identify to NASA the site-specific architecture/configuration(s) to be provided for the specified MOVE site. The Vendor shall conduct separate site-specific SARs for the architecture (including all COTS) of the deliverable system for each NASA designated MOVE site.

Each site-specific SAR shall present the architecture to be delivered to the identified MOVE site, including any site-specific capabilities. The SAR shall also provide the Vendor's delivery, installation, checkout, and support approach for the specific site. The Vendor shall participate in the resolution of issues that may arise during each review. Authorization to complete the implementation phase and proceed to FA/FAT for each MOVE site shall be contingent upon NASA CO written approval of each SAR. The NASA CO will provide this approval following the completion of the SAR and contingent upon closure of all identified action items.

The Vendor shall prepare and deliver a SAR Package and present the package at the SAR held at a NASA designated facility for each MOVE site. The site-specific SAR Package shall be prepared in accordance with DRD-S01. In support of each site-specific SAR, the Vendor shall provide the necessary documentation associated with a SAR as identified in the DRL/DRD information in Appendix B and Appendix C of this SOW.

The SAR milestone shall be the means by which the Vendor obtains NASA CO written concurrence to proceed to the next planned phase of implementation for the specific site. Authorization to proceed with the implementation steps for the associated site(s) shall be contingent upon NASA CO written concurrence with the proposed architecture. The authorization to proceed will be provided by NASA following the completion of each SAR and after resolution of any outstanding issues.

3.5 Verification

3.5.1 Verification Overview

The Vendor shall perform requirements verification for each MOVE system element to be delivered under this contract. This verification shall confirm compliance of the hardware, firmware, and software to the requirements within the MOVE SRD. Unless written concurrence is received from the NASA CO, the Vendor shall be required to perform a live test/demonstration of each requirement in the MOVE SRD.

The Vendor shall support the following three (3) levels/phases of verification:

- First Article (FA) Test(s)
- Factory Acceptance Test(s) (FAT)
- Site Acceptance Test(s) (SAT)

FA verification shall be performed on the first production of each MOVE element (e.g., switch, LSA subsystem, each keyset type). As with the plan for multiple CDRs, multiple FA Tests will

be conducted and will generally be associated with the first MOVE site requiring the specific equipment. The following separate FA Test sessions shall be included at a minimum:

1. Basic Requirement, including verification of the following:
   a. Switch Subsystem
   b. LSA Subsystem
   c. Keyset Types:
      i) Type C
      ii) Type D (all configurations)
      iii) Type E
2. JPL Option 101 (if exercised), including verification of the following:
   a. Automatic Gain Control (AGC) capabilities
   b. Mute Group capabilities
3. KSC Option 115 (if exercised), including verification of the following:
   a. Keyset Type: Type A (Antenna)
   b. Keyset Type: Type B

FA verification shall be conducted by the Vendor at the Vendor's facility and will be witnessed by NASA personnel.

FAT verification shall be a subset of the scope of the FA verification and shall be performed on all deliverable MOVE elements on a site-by-site basis. FAT verification shall be conducted by the Vendor at the Vendor's facility and may be witnessed by NASA personnel.

The Vendor shall perform SAT verification with NASA support after installation of each initial MOVE system delivery at each MOVE site. The SAT is expected to be a subset of the tests demonstrated at the FAT. The Vendor and NASA shall jointly conduct the SAT verification at the MOVE installation site.

3.5.2 Verification Planning

The Vendor shall develop and deliver a single Acceptance Test (AT) Plan for the MOVE project as a whole in accordance with the DRL/DRD requirements for DRD-P05 in Appendix B and Appendix C. The AT Plan shall describe the methodology for verifying, evaluating, and accepting each production MOVE system. The AT Plan shall include plans for each of the three (3) levels/phases of verification: FA, FAT, and SAT.

The AT Plan shall identify how all MOVE requirements in the MOVE SRD will be verified during the FA testing and identify the subset of the verification that will be performed for the FAT and SAT for each site. A Requirements Verification Matrix (RVM) that depicts each MOVE requirement, the associated verification methodology (e.g., Test, Demonstration, Analysis, Inspection) for each requirement, and where each requirement is verified (i.e., FA, FAT, SAT or combinations) shall be provided as part of the AT Plan.

Updates to the AT Plan shall be provided prior to each project-level CDR as required. NASA shall approve the AT Plan prior to the start of any formal verification.

3.5.3 Verification Procedures

The Vendor shall develop and deliver Acceptance Test (AT) Procedures in accordance with the DRL/DRD requirements for DRD-S02 in Appendix B and Appendix C. Separate AT Procedures documents shall be provided for each of the levels/phases of verification (i.e., FA, FAT, and SAT) for each MOVE site and for each site delivery. The test procedures shall provide detailed procedures/steps required to adequately demonstrate the verification of all requirements as specified in the AT Plan (DRD-P05) for the associated verification level/phase.

Each AT Procedures document shall include an updated version of the Requirement Verification Matrix (RVM) from the AT Plan. The updated RVM shall delineate traceability of each specific requirement of the MOVE SRD to the test procedure and verification step within the AT Procedures document. The RVM shall, at a minimum, include SRD requirements paragraph references and the following for each requirement entry: the associated verification level (FA, FAT, SAT, or combinations), the verification method(s), and identification of the specific test procedure section and verification step. NASA shall approve each AT Procedures document prior to the start of any verification sessions.

3.5.4 Verification Sessions

3.5.4.1 Overview

The Vendor shall perform FA testing on the first production of each element, verifying all requirements from the MOVE SRD. The Vendor shall perform FA testing in the Vendor's facility. FA testing shall be conducted per the approved AT Plan (DRD-P05) and FA Test Procedures (DRD-S02).

The Vendor shall perform FAT on all subsequent MOVE elements prior to shipping to NASA facilities. The Vendor shall perform FAT testing, in the Vendor's facility, for each MOVE system and system element to be delivered to NASA. FAT testing shall be conducted per the approved AT Plan (DRD-P05) and FAT Test Procedures (DRD-S02).

The SAT shall be planned and conducted in accordance with NASA based on site-specific resource availability. The Vendor and NASA shall jointly conduct SAT testing after installation at the MOVE implementation site. SAT testing shall be conducted per the approved AT Plan (DRD-P05) and SAT Test Procedures (DRD-S02).

The Vendor shall inform NASA of the schedule and plans for each testing session a minimum of ten (10) working days prior to each session. NASA attendance at the testing sessions will be coordinated in advance with the Vendor. The Vendor shall conduct all of the above

identified test sessions on a per site basis regardless of NASA attendance unless specifically waived by the NASA CO in writing.

3.5.4.2 Certifications

For deliverable equipment requiring independent certification (e.g., Type B keyset certified for use in a National Electric Code (NEC) Class 1 Division 2 environment), a copy of the certificate shall be provided to NASA at the FA session. All certifications shall be provided by an Occupational Safety & Health Administration (OSHA) designated Nationally Recognized Testing Laboratory (NRTL).

For Speech Intelligibility and Speech Acceptability (Diagnostic Rhyme Test (DRT) and Diagnostic Acceptability Measure (DAM)) of T1 ports and a Type D keyset, the Vendor shall provide verification via an independent laboratory. The Vendor shall provide copies of all test results and certifications to NASA at the FA session.

3.5.4.3 Test Equipment

The Vendor shall provide all test equipment (e.g., voltmeter, T1 Test Set, oscilloscope, etc.) used as a part of formal verification during FA, FAT, and SAT. All test equipment shall be calibrated. Each piece of test equipment shall either have a certification or a calibration tag physically on the unit showing current calibration information. Calibration certification and tagging shall be performed by one of the following:

- A recognized calibration laboratory
- The Vendor with appropriate documentation identifying compliance with approved calibration procedures

3.5.5 Verification Reporting

Following successful completion of each of the verification phases (FA, FAT, and SAT) for each MOVE site and each site delivery, the Vendor shall prepare and present a Test Review to NASA with the results of the verification. The Vendor shall conduct the Test Review within ten (10) working days of completion of each formal verification/test session. This test review can be conducted via telecon. NASA CO written concurrence with each Test Review will constitute successful completion of the associated verification level/phase and the authority to proceed to the next step (i.e., shipping following FA or FAT, initial system acceptance following SAT). Each test review shall include, but not be limited to the following information:

- Identification of the test session completed
- Overview of the verification/test methodology and procedures performed
- Overall results of the verification/test
- Identification of any open items/issues with target dates for closure

The Vendor shall also provide Acceptance Test Report documents following the completion of each site-specific verification level/phase and delivery. The Test Report shall be developed

and delivered in accordance with the DRL/DRD requirements for DRD-S03 as defined in Appendix B and Appendix C.

3.6 Site-Level Installation/Acceptance

At the successful completion of each site-specific FA and/or FAT testing, the Vendor shall ship the MOVE systems to the NASA designated facility. There may be multiple shipments/deliveries to some MOVE sites.

The Vendor shall provide on-site technical support to NASA for the installation and checkout of the delivered MOVE systems. NASA personnel at each MOVE site will coordinate the MOVE installation and checkout, which will be scheduled, based on on-going facilities operations support and the availability of required personnel.

3.6.1 Equipment Installation and Checkout Support

The Vendor shall support the unpacking, installation and checkout for all of the switch and LSA deliverables at each MOVE site, including OCONUS MOVE sites. NASA will oversee and coordinate all on-site activities by the Vendor. NASA will perform the installation and checkout of the keysets at each MOVE site.

All sites will include an initial delivery (i.e., Delivery #1). For most sites, the initial delivery will contain the switch equipment, LSA equipment, and at least a partial set of the keysets. Some sites will be architected as remote connections to another site and in this case the initial delivery will only contain keysets. Additionally some sites will require subsequent equipment deliveries for equipment not included in the initial delivery, such as required for multiple keyset drops. After completion of the initial delivery installation and checkout, the Vendor shall jointly conduct the SAT with NASA. Sites receiving keysets only will not require a SAT.

The installation and checkout for each site equipment delivery shall be in accordance with the site-specific schedules for each MOVE site per the contract Deliverables tables.

The following sections define the required tasks for each of the major areas of equipment installation and checkout. The Vendor shall work in conjunction with NASA to perform all required installation and checkout tasks.

3.6.1.1 Switch Installation and Checkout

The Vendor shall support the NASA-led installation, configuration, and checkout of the switch equipment, including the following at a minimum:

a. **Switch Cabinets**:
   - Unpacking of all delivered equipment,
   - Placement of the cabinets per site-specific plans,
   - Securing cabinets to the floor as required,
   - Connecting power to each cabinet as required (power cables are vendor supplied),

- Any other setup required making the cabinets operational.

b. **Switch Interconnectivity**:
   - Providing all cables required for the switch equipment interconnectivity,
   - Installing the interconnection cables between all required switch cabinets,
   - Connecting all interconnectivity cables within the switch cabinets.

   Where required, cable length information will be determined at the Final Site Survey.

c. **Switch Configuration and Checkout**:
   - Power-up of each switch cabinet,
   - Configuration of the switch equipment as required in preparation for checkout (e.g., initial Automatic Gain Control (AGC) settings, etc.),
   - Checkout of the interconnectivity of all switch cabinets to support as a system,
   - Documentation and resolution of any problems identified.

3.6.1.2 LSA Installation and Checkout

The Vendor shall support the NASA-led installation, configuration, and checkout of the LSA subsystem equipment, including the following at a minimum:

a. **LSA Station(s) Installation**:
   - Unpacking of all delivered equipment,
   - Placement of the LSA stations per site-specific plans,
   - Installing and connecting station elements (e.g., display/monitor, keyboard, mouse, etc.),
   - Providing and installing all cables required to connect station elements (e.g., display/monitor, keyboard, mouse, etc.),
   - Connecting power to each station as required (power cables are vendor supplied),
   - Configuring each station for testing,
   - Any other setup required making the LSA stations operational.

b. **LSA-to-Switch Connectivity**:
   - Connecting the cables between all LSA stations and switch cabinets.

   Cabling to connect the LSA equipment to the switch will be NASA-provided, per Vendor-provided specifications in DRD-P06 and DRD-S06.

c. **LSA Checkout**:
   - Power-up of each LSA station,
   - Configuration of the LSA equipment as required in preparation for checkout,
   - Checkout of each LSA station element (e.g., display/monitor, keyboard, mouse, etc.),
   - Checkout of the interconnectivity of all LSA stations to the switch,
   - Documentation and resolution of any problems identified.

3.6.1.3 Keyset Installation and Checkout

NASA will perform the installation and checkout of the keysets for the initial equipment delivery and any subsequent equipment deliveries at each MOVE site. The Vendor shall provide support, if required, under the standard maintenance program. Cabling to connect the keysets

to the switch will be NASA-provided, per Vendor-provided specifications in DRD-P06 and DRD-S06.

3.6.2 SAT Support

Following the installation and checkout of the Delivery #1 equipment, the Vendor shall jointly with NASA, conduct the Site Acceptance Test (SAT) as identified in section 3.5.4. As noted earlier, no SAT support is required for sites only receiving keysets. The SAT support shall include the following at a minimum:

a. **System Configuration/Setup for SAT**:
   - Configuration of the switches, LSA subsystems, and keysets, in preparation for SAT,
   - Configuration of a nominal set of switch resources (e.g., conferences, keyset users, LSA users, etc.),
   - Backup of the system configuration once completed.

b. **Checkout/SAT Dry Run**:
   - Informal execution of the approved SAT Test Procedures,
   - Documentation and resolution of any problems identified.

c. **SAT Session**:
   - Formal execution of the approved SAT Test Procedures,
   - Documentation and resolution of any problems identified.

d. **SAT Review** – The Vendor shall provide NASA with a formal test/verification review of the SAT.

3.6.3 Final Acceptance

After the delivery of MOVE products for each MOVE site, the Vendor shall continue to provide development/delivery support until completion of Final Acceptance by NASA for that site. This support shall include, but will not be limited to, the following:

- Providing a primary technical interface for NASA to the Vendor
- Providing status as required by NASA
- Providing support to continue efforts to resolve any open hardware, firmware, and/or software discrepancies identified during formal verification (FA, FAT, and SAT) and deemed essential by NASA
- Providing support under the maintenance for equipment purchased on this contract

Final Acceptance of the MOVE equipment for each site shall be defined for each equipment delivery. All sites will include an initial delivery, which will culminate with the SAT at the specific MOVE site. Additionally some sites will require subsequent equipment deliveries for equipment not included in the initial delivery, such as required for multiple keyset drops, etc. As defined in the verification requirements, the initial delivery will include a FA/FAT and a SAT; subsequent deliveries for the same site system will also require a separate FA/FAT on the additional equipment. Final Acceptance shall be defined as follows for each of these delivery types:

- Initial Delivery – Final Acceptance is considered complete after successful completion of the SAT and resolution of all requirement-related issues/discrepancies identified during the FA/FAT and SAT verifications. For sites receiving only keyset equipment, Final Acceptance will be the same as identified for "Subsequent Deliveries" in the following item.
- Subsequent Deliveries – Final Acceptance is considered completed after the later of either of the following:
  - Resolution of all requirement-related issues/discrepancies identified during the FA/FAT verification
  - Thirty (30) days after receipt of the delivery on-dock at the NASA site (to allow for NASA testing of the additional equipment delivered after the SAT).

The list of requirement-related discrepancies will be identified during the Test Review for each of the FA, FAT, and SAT cycles.

3.7 System/Product Support

3.7.1 Overview

The Vendor shall be responsible for providing Software Licenses, Spares and Parts Repair, Maintenance Programs, Training, Documentation, and optional Additional System Support.

Vendor software licenses, and hardware, firmware, and software maintenance agreements acquired by NASA with the MOVE products shall contain provisions for optional reassignment or transferability to NASA designated support contractors at no additional cost.

3.7.2 Software Licensing

The Vendor shall provide software licensing agreements for each element of the MOVE deliverables (i.e., MOVE switches, keysets, LSA subsystems), as applicable, purchased in this contract. These agreements shall license all deliverable software separately and cover all MOVE systems purchased under the contract on a site-by-site basis. The Vendor shall ensure that licenses for all COTS products are properly passed from the Vendor to NASA with the delivery of the MOVE systems. Each agreement shall be provided as a "one-time fee" license and commence with the receipt on-dock of the MOVE system for each NASA site. The Vendor shall support the transition, if necessary, of all licenses and support agreements from NASA to NASA-designated support contractors if required during the lifetime of the contract.

In addition to the required number of software licenses for each MOVE site, the Vendor shall provide four (4) physical copies (separate media) of each software package to each MOVE site. The software media shall be provided with the initial equipment delivery at each MOVE site. The software media shall be in a format compatible with the MOVE equipment installation capabilities.

3.7.3 Logistics Spares and Repair Parts

3.7.3.1 Vendor Provided Spares Parts List (VPSPL)

The Vendor shall provide a Vendor Provided Spares Parts List (VPSPL), DRD-P04, for the MOVE project as a whole taking into account the planned methodology for local and depot maintenance support of the delivered equipment and the performance requirements specified in the MOVE SRD. The VPSPL shall provide the following data for each LRU:

1. LRU part number
2. LRU nomenclature
3. LRU Mean Time Between Failures (MTBF)
4. LRU Mean Time To Service Restore (MTSR)
5. Quantity of operational LRUs on a per site basis (i.e., quantity of each LRU within the delivered system)
6. Quantity of vendor provided spares for each LRU on a per site basis

An LRU shall be defined as identified in the Glossary of this SOW. The Vendor shall provide a complete list of all major elements in the MOVE deliverables (e.g., MOVE switch, keysets, LSA equipment, etc.) for each site and identify the LRUs for each element. For the MOVE keysets, an LRU may be either a complete keyset unit or a modular subassembly therein. LSA workstations, monitors, keyboards, mouse devices, etc. shall each be viewed as single LRU entities.

MTBF and MTSR estimates shall be provided for each LRU. The LRU MTBF estimates shall be derived from operational history or by a standards-based methodology typically used by the vendor. The MTSR shall be determined as the time for trained maintenance personnel to restore operational capabilities assuming availability of on-site replacement LRUs. Reference Appendix D for the definition and calculation information for the MTBF, MTSR, and Availability values. NASA personnel trained by the Vendor for LRU level troubleshooting and replacement will provide the on-site maintenance.

The Vendor shall provide the methodology/analysis approach used to develop the vendor provided spares quantities, as well as the LRU MTBF and MTSR estimates. The quantity of vendor provided spares shall be sufficient to support the required Availability requirements in the SRD for each system element (switch, LSA, and keyset), assuming the worse-case spare repair/replacement turnaround time (see Section 3.7.4.2) and under the maintenance approach of site-resident trained NASA personnel performing the LRU level troubleshooting and replacement.

The VPSPL shall be delivered in accordance with the submission criteria identified in DRL-P04 and the document content requirements defined for DRD-P04. The Vendor shall be responsible for tracking any/all baseline configuration updates for any MOVE site and provide

an updated VPSPL in the event that any site baseline configuration update affects the quantity of spares required to maintain the system.

3.7.3.2 Substitution of Equipment

If the Vendor intends to discontinue the manufacture of any MOVE equipment (systems and/or system elements) during the life of this contract, the Vendor shall so notify NASA. The Vendor shall provide NASA, with such notice, a description of any substitute equipment to be considered by NASA as a substitute for the discontinued equipment.

For each item of equipment offered as a substitute, the Vendor shall certify and provide documentation to support the following:

a. The functionality of the substitute equipment is equal to or better than the equipment for which the substitute is offered, and that the equipment meets all of the requirements of the MOVE SRD and this SOW.

b. The price for the substitute equipment is no greater than the price of the equipment for which the substitute is offered.

c. The maintenance costs to NASA shall be no greater than the maintenance price of the equipment for which the substitution is offered.

d. All support costs which will be borne by NASA, shall be no greater than the support costs for which the substitute is offered.

3.7.4 Maintenance Program

3.7.4.1 Maintenance Program Overview

The Vendor shall provide a Maintenance Program for support of all deliverables at each MOVE site. The maintenance program shall provide coverage for all hardware, firmware, and software delivered on a per site basis. This shall include all deliverable equipment, including the voice switch subsystem equipment, the LSA subsystem equipment, all keysets (including additional keysets procured under contract options), all spares (initial procurement and additional procurements under contract options), all deliverable miscellaneous equipment (e.g., equipment enclosures, etc.), and all deliverable software (application software, utility software, and operating system software).

The Vendor shall continue to manage the configuration of all MOVE deliverables under the Maintenance Program. The Vendor shall ensure that all like elements are of the same configuration level at all times, and/or ensure that any configuration discrepancies are fully documented and approved by NASA. The Vendor shall maintain configuration control of the hardware to the LRU level and software/firmware to the version level. The Vendor shall ensure that the CM of any MOVE system is not compromised by any depot maintenance activities.

The Maintenance Program shall provide coverage for ten (10) years for each MOVE site commencing with completion of successful initial site acceptance. The Maintenance Program shall be transferable from NASA to a NASA designated support contractor if required.

If the Vendor declares End of Life (EOL) or fails to provide required support for a delivered product, NASA shall have access to the Vendor-provided escrow account information as defined in the MOVE contract.

3.7.4.2 Hardware Maintenance

The Vendor shall provide depot level maintenance support during the Maintenance Program time frames. The Vendor shall be responsible for providing initial spares (as defined in the VPSPL) and replenishing spares as required on a per site basis. The spares shall be properly packaged and marked for use at each MOVE site.

Under this program, each NASA site will manage the on-site spares based on the VPSPL. NASA Logistics personnel will receive, store, and inventory the MOVE spares for each site. NASA maintenance personnel will identify, remove and replace a defective LRU. When an on-site maintenance action is completed, NASA maintenance personnel will package and ship the defective LRU to the Vendor's designated depot.

The Vendor shall repair or replace all broken, malfunctioning, or defective LRUs and any LRUs that otherwise fail to perform in accordance with the specifications, regardless of cause, and ship the repaired/replacement spares back to the NASA designated site. The repaired/replacement spare shall arrive at the NASA designated site within ten (10) calendar days of the initial notification from NASA of the failure. The Vendor shall pay for all shipping costs to return the replacement or repaired spare to the NASA designated site. The Vendor shall provide 24x7 (24 hours/day, 7 days/week (Monday-Sunday)) support for NASA to notify the Vendor of a failure requiring repair/replacement.

The Vendor shall verify and ensure to NASA that replacement parts are equal to or better than the original parts and compatible with current system configurations, such that no degradation in performance or quality will result from maintenance services performed. The Vendor shall obtain NASA CO written approval in advance for any hardware upgrades or fixes which change the overall configuration level of the equipment (i.e., revision updates for changes other than specified discrepancy fixes).

3.7.4.3 Software Maintenance

The Vendor shall provide software maintenance support for each MOVE site as a part of the overall Maintenance Program. This support shall include software and firmware upgrades, revisions, updates, patches and revised documentation at a minimum. The Vendor shall obtain NASA CO written approval in advance for any software upgrades or fixes which change the overall configuration level of the software base (i.e., revision updates for changes other than specified discrepancy fixes).

The Vendor shall provide four (4) physical copies (separate media) of each software release to each MOVE site. The software media shall be in a format compatible with the MOVE equipment installation capabilities.

The Vendor shall provide an automatic notification, via email or phone, to the designated NASA Point of Contact (POC) or designated appointee for each MOVE site, when a software or firmware upgrade, revision, update or patch is released.

3.7.4.4 Answer-Line Support

NASA shall have an open line of communications with the Vendor (and subcontractors, if required) technical personnel for the purposes of answering questions concerning vendor supplied hardware, firmware, and software.

This service shall be available 24x7 (24 hours/day, 7 days/week (Monday-Sunday)). This service shall provide access to the personnel required to assist in resolving reported problems or answering technical questions within eight (8) hours of first notification.

The Vendor shall provide a method for "escalation" of a problem to the next level of technical support if the problem has not been resolved within 24 hours or if requested by NASA. The escalation process shall provide the capability to "step up" the required support to resolve a problem, up to and including the Vendor providing on-site support if necessary. The Vendor shall track every problem reported and provide status as requested by NASA until the problem is resolved.

3.7.4.5 Field Change Orders and Engineering Change Orders

Modifications resulting from manufacturer recommended Field Change Orders (FCOs) and/or Engineering Change Orders (ECOs) to enhance performance or correct problems shall be implemented only with NASA CO written concurrence. This shall include any "technology refresh" (hardware, firmware, or software) upgrades recommended by the Vendor. The Vendor shall provide an automatic notification (within five (5) days of issue) to the designated NASA POC or designated appointee for each MOVE site. The Vendor shall verify and ensure to NASA that replacement parts are compatible with current system configurations and equal to or better than the original parts, such that no degradation in performance or quality will result from maintenance services performed as a result of any FCOs or ECOs.

3.7.5 Training

The Vendor shall develop and provide operator, maintainer, and user training to NASA designated personnel. The training documentation shall be provided in accordance with DRL-S05 and DRD-S05 information contained in Appendix B and Appendix C of this SOW. As a part of each site-specific SAR, the Vendor shall provide a brief description of the planned training course(s) for engineering, operations, and maintenance personnel.

The Vendor shall provide separate training sessions for each MOVE site, which is to include each of the following courses:

- Maintenance Training Course – MOVE equipment (MOVE switches, keysets, LSA workstations, etc.) maintenance training including troubleshooting techniques and LRU replacement.
- MOVE System Operations Training Course – MOVE system operations training including configuration, reconfiguration, control, statusing, and system administration functions.
- User Keyset Operations Training Course – Site-specific MOVE keyset operations training including general operations, configuration, and reconfiguration functions for each keyset type utilized at that site.

The quantities of each training course to be provided will be defined on a site-by-site basis in the contract Deliverables tables. Each training course shall be conducted at a NASA designated location for each MOVE site. The training courses shall be scheduled in advance by the Vendor with each NASA MOVE site and will be based on the availability of the NASA designated personnel to receive the training as well as the availability of adequate facilities/resources.

Each course shall be able to support up to Ten (10) attendees. The vendor shall provide additional training, as required, for fixes/patches, upgrades, enhancements, and/or modifications as a part of the Maintenance Program.

Per DRD-S05, the Vendor shall provide a course package for each training course, which includes the following:

- Student Guide
- Instructor Lesson Plan
- Course Media

All course package material shall be provided in a format that is reproducible (e.g., printed or electronic) such that NASA personnel can provide equivalent training to additional users for "self training" as necessary. Due to the potentially large number of keyset users, it is NASA's intent to have a small number of vendor-trained keyset users at each site and subsequently utilize the trained personnel along with the reproducible training material to perform in-house training for the remaining users at each site and/or as additional training is deemed necessary.

The Vendor shall provide all the necessary equipment (over and above the site installed MOVE equipment) required for each of the training sessions. This may include, but is not limited to, test data driver/simulator, MOVE elements, connectivity hardware (cables, etc.) and any associated training documentation. The Vendor shall be responsible for shipping the necessary equipment to each MOVE site in advance of the training and coordinate with NASA as required.

3.7.6 Documentation

The Vendor shall prepare and deliver documentation in accordance with the description, format, content, and frequency of submission requirements stated in the accompanying Data Requirements Descriptions (DRDs) in Appendix C of this SOW. All documentation shall consist of the quantities and be delivered on the time frames specified within the DRL in Appendix B for each MOVE site.

NASA or the NASA designated personnel shall have the right to copy vendor-provided documentation for the sole limited use of this contract.

3.7.6.1 Project-Level Documentation

Per the Appendices DRL/DRD definitions, the following project-level documentation shall be provided at a minimum:

- DRD-P01 – Project Activity Reports
- DRD-P02 – System Design Review (SDR) Package
- DRD-P03 – Project-Level Critical Design Review (CDR) Packages
- DRD-P04 – Vendor Provided Spare Parts List (VPSPL)
- DRD-P05 – Acceptance Test Plan
- DRD-P06 – Project-Level Installation Documentation
- DRD-P07 –Management Plan (MP)

3.7.6.2 Site-Level Documentation

Per the Appendices DRL/DRD definitions, the following site-level documentation shall be provided at a minimum:

- DRD-S01 – Site-Specific System Architecture Review (SAR) Packages
- DRD-S02 – Acceptance Test Procedures
- DRD-S03 – Acceptance Test Reports
- DRD-S04 – Technical System Documentation
- DRD-S05 – Training Package
- DRD-S06 – Site-Specific Installation Documentation

The Vendor shall provide all modifications and updates, including changes due to FCOs and ECOs, to the original sets of Technical System Documentation (see DRD-S04) through the end of the contract, at no additional cost to NASA.

3.8 Additional System Support

The Vendor shall provide additional system support to NASA, when ordered on an IDIQ basis, in support of project-level and site-level tasks outside the scope of the fixed contract

deliverables. The support effort shall provide engineering and/or technician assistance and consultation to NASA and consultation liaison to sources of the COTS hardware, firmware, and software products.

This support may encompass Design/Development, Installation, Test, Integration, and Training support, as required. The support may require the Vendor to provide on-site support. Support for the following skill categories shall be provided:

- Skill Category #1 – Senior Engineer
- Skill Category #2 – Junior Engineering
- Skill Category #3 – Field Engineer
- Skill Category #4 – Software Engineer

The labor category descriptions follow for each of the four skill levels:

- **Senior Engineer** – Minimum of six (6) years of experience in the voice systems field (systems engineering, systems architecture, and networking/telecommunications processing). Minimum of Master's Degree in Electrical/Electronic engineering, Math, Physics, or equivalent; or one year's additional experience for every year of degree deficiency.
- **Junior Engineer** – Minimum of three (3) years of experience in the voice systems field (systems engineering, systems architecture, and networking/telecommunications processing). Minimum of Bachelor's Degree in Electrical/Electronic engineering, Math, Physics, or equivalent, or one year's additional experience for every year of degree deficiency.
- **Field Engineer** – Minimum of three (3) years of experience in installation, testing, troubleshooting, and making field repairs on voice systems equipment. Minimum of Associate in Arts or Associate in Science Degree in Electronics, or completion of an Electronics school.
- **Software Engineer** – Minimum of six (6) years of programming experience in the voice systems field, including networking and telecommunications software and firmware. Minimum of Bachelor's Degree in Electrical/Electronic engineering, Math, Computer Science, or equivalent, or one year's additional experience for every year of degree deficiency.

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Appendix A. Acronyms/Abbreviations/Glossary

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A.1 Acronyms/Abbreviations

A	
AGC	Automatic Gain Control
AL	Alabama
ARC	Ames Research Center
AT	Acceptance Test
ATP	Authority To Proceed

B	
BXA	Bureau of Export Administration

C	
CA	Contract Award
CDR	Critical Design Review
CDSCC	Canberra Deep Space Communications Complex
CFR	Code of Federal Regulations
CM	Configuration Management
CO	Contracting Officer
COTS	Commercial-Off-The-Shelf
CXC	Chandra X-ray Center
CONUS	Continental United States

D	
DAM	Diagnostic Acceptability Measure
DCN	Document Change Notice
DFRC	Dryden Flight Research Center
DRD	Data Requirements Description
DRL	Data Requirements List
DRLI	Data Requirements List Item
DRT	Diagnostic Rhyme Test
DSPA	Dryden Shuttle Processing Area

E	
e.g.	Exempli Gratia (Latin: For Example)
EAR	Export Administration Regulations
ECO	Engineering Change Order
EOL	End Of Life

F	
FA	First Article
FAR	Federal Acquisition Regulations
FAT	Factory Acceptance Test
FCO	Field Change Order
FY	Fiscal Year

G	
GDSCC	Goldstone Deep Space Communications Complex
GRGT	Guam Remote Ground Terminal
GSFC	Goddard Space Flight Center

H	
HVAC	Heating, Ventilation, & Air Conditioning

I	
i.e.	Id Est (Latin: That Is)

J	
JHU	Johns Hopkins University
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center

K	
KSC	Kennedy Space Center

L	
LRU	Line Replaceable Unit
LSA	Local Site Administrator

M

MAF	Michoud Assembly Facility
MCCB	Mission Control Center Backup (Houston)
MCC-M	Mission Control Center – Moscow
MCCP	Mission Control Center Prime (Houston)
MD	Maryland
MDSCC	Madrid Deep Space Communications Complex
MILA	Merritt Island Launch Annex
MOVE	Mission Operations Voice Enhancement
MP	Management Plan
MSFC	Marshall Space Flight Center
MTBCF	Mean Time Between Critical Failures
MTBF	Mean Time Between Failures
MTSR	Mean Time to Service Restore

N

N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NEC	National Electric Code
NHQ	NASA Headquarters
NRTL	Nationally Recognized Testing Laboratory
NSP	Not Separately Priced

O

OS	Operating System
OSHA	Occupational Safety & Health Administration
OCONUS	Outside Continental United States

P

PAR	Project Activity Report
POC	Point of Contact

Q

R

RFP	Request for Proposal
RSP	Recommended Spare Parts
RVM	Requirements Verification Matrix

S

SAR	System Architecture Review
SAT	Site Acceptance Test
SDR	System Design Review
SOW	Statement of Work
SPA	Shuttle Processing Area
SRD	System Requirements Document
SS	Site Start-up
STGT	Second TDRSS Ground Terminal

T

TBD	To Be Determined
TDRSS	Tracking and Data Relay Satellite System
TIM	Technical Interchange Meeting

U

V

VAFB	Vandenberg Air Force Base
VPSPL	Vendor Provided Recommended Spare Parts List

W

WFF	Wallops Flight Facility
WSC	White Sands Complex
WSGT	White Sands Ground Terminal

X Y Z

A.2 Glossary

As-Needed Support – As-needed (or as-required) support pertains to optional vendor support that NASA may call upon for assistance with MOVE implementation activities. This support will be requested by NASA in writing, as the exercising of pre-defined options, and may be called upon at any time throughout the life of the contract.

Checkpoint – A point within the development cycle of a new or modified capability where the progress to date is verified via a prototype or demonstration in order to provide early assurance of the development progress and ensure the development is meeting requirements.

Commercial-Off-The-Shelf (COTS) Equipment – COTS equipment is defined as field proven, unmodified hardware produced by an established commercial manufacturer and sold during the course of conducting normal business operations. The COTS equipment is considered field proven, if the like equipment has been installed in at least three (3) installations and has been fully operational for a minimum of three (3) months. Quantities are considered substantial only when the quantities sold are sufficient to constitute a real commercial market.

COTS Software – COTS software is computer software, which is sold, licensed, or leased in quantities at established market or catalog prices.

Custom Hardware – Custom hardware is defined as that equipment developed for a specific application and is not commercially available.

Custom Software – Custom software is defined as that software developed for a specific application and is not commercially available.

Export – Any of the following:

- Any shipment, transfer, or transmission of commodities, technology, or software out of the United States;
- Any transfer to any person – either within or outside of the United States – of commodities, technology, or software, by physical, electronic, oral, or visual means, with the knowledge or intent that the items will be shipped, transferred, or transmitted outside of the United States;
- Disclosure of technical data to a foreign national, by physical, electronic, oral, or visual means, within or outside of the United States (disclosures to U.S. nationals representing foreign interests are not exports unless there is knowledge or reason to know that the technical data will be further disclosed to a foreign party);
- Any transfer to a foreign embassy or affiliate; and
- Transfer of control over a satellite or instruments on-orbit.

Factory Acceptance Test (FAT) – Factory Acceptance Tests (FAT) are a series of tests performed by the Vendor at the Vendor's facility on each production MOVE system delivery, prior to shipment to NASA. FAT is a subset of the scope of the FA testing, but still verifies the functionality and/or performance of each MOVE deliverable unit.

Final Acceptance – Final Acceptance of the product is defined as the time frame when all deliverable products for each MOVE site independently have been successfully tested, shipped, received, inspected, and all open issues/discrepancies resolved.

First Article (FA) Test – First Article (FA) testing is a series of tests performed by the Vendor at the Vendor's facility on the first production of each MOVE element, prior to shipment to NASA. FA testing verifies the functionality and/or performance of each MOVE deliverable unit against all of the requirements and standards identified in the MOVE SRD.

Integrated COTS Equipment and Software – Integrated COTS equipment and software is defined as the incorporation of different fully COTS components into the final deliverable product. While the delivered product is therefore a combination of several COTS elements, the Vendor treats the final product as one COTS product to the customer.

Line Replaceable Unit (LRU) – An LRU is the smallest field replaceable module, assembly, subassembly, or part in which a malfunction can be identified, and can be economically spared and stored. Malfunctioning LRUs are isolated, removed, and replaced within corrective maintenance time requirements as defined by the MTSR for that LRU.

NASA – The term "NASA" is used throughout this document to refer to NASA and its contractor support personnel at each MOVE site.

MTBCF – Mean Time Between Critical Failures – The average time a device will function before any non-redundant (i.e., critical) element failing. Reference the Appendix D for further definition and algorithms for computation.

MTBF – Mean Time Between Failures – The average time a device will function before failing. Reference the Appendix D for further definition and algorithms for computation.

MTSR – Mean Time to Service Restore – The mean time to restore service following system failures that result in a service outage. *Note:* The time to restore includes all time from the occurrence of the failure until the restoral of service (i.e., includes the time to isolate a failure to the defective replaceable module and the time to access, remove, and replace the defective module with an operational spare). Reference Appendix D for further definition and algorithms for computation.

Prototype – An easily modified and extensible model (i.e., representation, simulation, or demonstration) of a planned deliverable, including its interfaces and input/output functionality. For the MOVE project, prototype/demonstration checkpoints are to be provided for all development efforts (i.e., new and modified capabilities).

Site Startup – Start date for a specific site's implementation schedule. This milestone will serve as the NASA date at which the implementation schedule for a specific site starts. Vendor parts procurement, site architecture planning, production planning, etc. may occur prior to this milestone if desired, however the status for a specific site implementation schedule will be gauged against the documented Site Start-up date.

Technical Interchange Meeting (TIM) – A Technical Interchange Meeting (TIM) is a face-to-face meeting with technical personnel from NASA and the Vendor (and any subcontractors if necessary) to review and resolve plans/issues concerning the development and delivery of the MOVE products. During a TIM, the participants will discuss specific technical activities, including studies, test plans, design issues, technical decisions, and implementation concerns to ensure the proper level of visibility into the technical progress of the contract.

Vendor – The prime vendor selected for delivery of the MOVE Project equipment as a result of the evaluation of vendor-submitted proposals in response to the MOVE Project RFP.

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Appendix B. Data Requirements List (DRL)

DRL Table Description

DRL Item	DRL Item Name	Description
a	Project	Self-explanatory
b	Contract No.	Self-explanatory
c	DRL Date	Date DRL last modified
1	Line Item no.	Reference number used in document and DRD
2	DRD Title	Product title
3	Frequency	How often this product is to be delivered
4	As-of-Date	Self-explanatory
5	1st submission data	Initial target date for first submission
6	Data Type	(1) Written approval: NASA CO written approval of this product is required prior to continuing to next step. (2) Mandatory Submittal: Submission of this product as stated by the DRL and DRD is required. (3) Submitted upon request: The NASA CO will specifically request delivery of this product.
7	Number of copies	Note: Electronic copies are to be distributed via electronic mail (email) and CDROMs as noted. Number of copies for email is As Required (AR).
8	Distribution	Self-explanatory
9	Remarks	Self-explanatory

B.1 Project-Level DRLs

a. Title of Contract, Project, SOW, etc.			b. Contract/RFP No.	c. DRL Date/Mod Date	
Mission Operations Voice Enhancement (MOVE)			**NNG05096022R**	**07/21/05**	
1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
P01	**Project Activity Reports**	**Biweekly (every 2 weeks)**		**See block 9**	**See block 8**
7. Data type:	☐ (1) Written approval	☒ (2) Mandatory Submittal	☐ (3) Submitted upon request		
8. Distribution *(Continue on a blank sheet if needed)*		9. Remarks			
Electronic copies to be distributed to NASA provided email distribution list.		**Initial submission – one week after contract award; weekly through completion of site acceptance of the final site system delivery.**			
1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
P02	**System Design Review (SDR) Package**	**Final only**		**See block 9**	**Printed – 30 Electronic – AR CDROM – 10**
7. Data type:	☒ (1) Written approval	☐ (2) Mandatory Submittal	☐ (3) Submitted upon request		
8. Distribution *(Continue on a blank sheet if needed)*		9. Remarks			
Printed copies to be provided at the SDR presentation. CDROM to be provided at the SDR presentation to be distributed to NASA provided distribution list. Electronic copies to be distributed to NASA provided email distribution list.		**Final submission – as presented at the System Design Review (SDR)**			
1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
P03	**Project-Level Critical Design Review (CDR) Packages**	**Final only** (per CDR)		**See block 9**	**Printed – 30 Electronic – AR CDROM - 10**
7. Data type:	☒ (1) Written approval	☐ (2) Mandatory Submittal	☐ (3) Submitted upon request		
8. Distribution *(Continue on a blank sheet if needed)*		9. Remarks			
Printed copies to be provided at each CDR presentation. CDROM to be provided at the CDR presentation. Electronic copies to be distributed to NASA provided email distribution list.		**Final submission – as presented at each Project-Level CDR**			

a. Title of Contract, Project, SOW, etc.	b. Contract/RFP No.	c. DRL Date/Mod Date
Mission Operations Voice Enhancement (MOVE)	**NNG05096022R**	**07/21/05**

1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
P04	**Vendor Provided Spare Parts List (VPSPL)**	**As required.**		**See block 9**	**Printed – 10** **Electronic – AR**

7. Data type: ☐ (1) Written approval ☒ (2) Mandatory Submittal ☐ (3) Submitted upon request

8. Distribution *(Continue on a blank sheet if needed*	9. Remarks
Printed copies to be distributed to NASA provided distribution list. **Electronic copies to be distributed to NASA provided email distribution list.**	**Initial version – at the initial Project-level CDR** **Updated versions – 30 working days after identification of any MOVE site baseline configuration update affecting spares quantities**

1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
P05	**Acceptance Test Plan**	**Initial & Updates**		**See block 9**	**Printed – 10** **Electronic – AR**

7. Data type: ☒ (1) Written approval ☐ (2) Mandatory Submittal ☐ (3) Submitted upon request

8. Distribution *(Continue on a blank sheet if needed)*	9. Remarks
Printed copies to be distributed to NASA provided distribution list. **Electronic copies to be distributed to NASA provided email distribution list.**	**Initial version – at the System Design Review (SDR)** **Review Versions – 30 working days prior to each Project-Level CDR** **Updated versions – at each Project-Level CDR**

1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
P06	**Project-Level Installation Documentation**	**Initial & Updates**		**See block 9**	**Printed – 10** **Electronic – AR** **CDROM – 10**

7. Data type: ☐ (1) Written approval ☒ (2) Mandatory Submittal ☐ (3) Submitted upon request

8. Distribution *(Continue on a blank sheet if needed)*	9. Remarks
Printed copies (final only) to be distributed to NASA provided distribution list. **CDROM to be delivered (final only) to be distributed to NASA provided distribution list.** **Electronic copies (initial and final) to be distributed to NASA provided email distribution list.**	**Initial version – at the System Design Review (SDR)** **Updated versions – at each Project-Level CDR**

a. Title of Contract, Project, SOW, etc.			b. Contract/RFP No.	c. DRL Date/Mod Date	
Mission Operations Voice Enhancement (MOVE)			**NNG05096022R**	**07/21/05**	
1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
P07	**Management Plan (MP)**	**Final**		**See block 9**	**Printed – 10** **Electronic – AR** **CDROM – 10**

7. Data type: ☐ (1) Written approval ☒ (2) Mandatory Submittal ☐ (3) Submitted upon request

8. Distribution *(Continue on a blank sheet if needed)*	9. Remarks
Printed copies to be distributed to NASA provided distribution list. **CDROM to be delivered to be distributed to NASA provided distribution list.** **Electronic copies to be distributed to NASA provided email distribution list.**	**Final version – at the System Design Review (SDR)**

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B.2 Site-Level DRLs

a. Title of Contract, Project, SOW, etc.			b. Contract/RFP No.	c. DRL Date/Mod Date	
Mission Operations Voice Enhancement (MOVE)			**NNG05096022R**	**07/21/05**	
1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
S01	**Site-Specific System Architecture Review (SAR) Package**	**Initial & Final (per site)**		**See block 9**	**Printed – 30 Electronic – AR CDROM – 5**
7. Data type:	[X] (1) Written approval	[ ] (2) Mandatory Submittal	[ ] (3) Submitted upon request		
8. Distribution *(Continue on a blank sheet if needed)*		9. Remarks			
Printed copies to be provided at the SAR presentation. Electronic copies to be distributed to NASA provided email distribution list. CDROM to be provided at the SAR presentation to NASA provided distribution list.		**Initial submission – 10 working days prior to each site-specific SAR Final submission – as presented at each site-specific SAR**			
1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
S02	**Acceptance Test Procedures**	**Initial & Final (per each FA/FAT and SAT per site)**		**See block 9**	**Printed – 5 Electronic – AR**
7. Data type:	[X] (1) Written approval	[ ] (2) Mandatory Submittal	[ ] (3) Submitted upon request		
8. Distribution *(Continue on a blank sheet if needed)*		9. Remarks			
Printed copies (final only) to be distributed to NASA provided distribution list. Electronic copies (initial and final) to be distributed to NASA provided email distribution list.		**Initial version – 45 working days prior to each site-specific FA/FAT – 30 working days prior to each site-specific SAT Final version – 10 working days prior to each site-specific FA/FAT – 5 working days prior to each site-specific SAT**			
1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
S03	**Acceptance Test Report**	**Once per FA/FAT and SAT (per site)**		**See block 9**	**Printed – 5 Electronic – AR CDROM – 5**
7. Data type:	[ ] (1) Written approval	[X] (2) Mandatory Submittal	[ ] (3) Submitted upon request		
8. Distribution *(Continue on a blank sheet if needed)*		9. Remarks			
Printed copies to be distributed to NASA provided distribution list. Electronic copies to be distributed to NASA provided email distribution list. CDROM to be delivered to NASA provided distribution list.		**10 working days after completion of each site-specific FA/FAT and SAT test**			

a. Title of Contract, Project, SOW, etc.	b. Contract/RFP No.	c. DRL Date/Mod Date
Mission Operations Voice Enhancement (MOVE)	**NNG05096022R**	**07/21/05**

1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
S04	**Technical System Documentation**	**Once Per Delivery (per site)**		**See block 9**	**Printed – 5 Electronic – AR CDROM – 5**

7. Data type: ☐ (1) Written approval ☒ (2) Mandatory Submittal ☐ (3) Submitted upon request

8. Distribution *(Continue on a blank sheet if needed)*	9. Remarks
Printed copies to be distributed to each MOVE delivery site with MOVE equipment delivery. Electronic copies to be distributed to NASA provided email distribution list. CDROM to be distributed to each MOVE delivery site with MOVE equipment.	**Coincident with each equipment delivery for each MOVE site**

1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
S05	**Training Package**	**Initial & Final (per site)**		**See block 9**	**Printed – 1 per student Electronic – AR CDROM – 5**

7. Data type: ☐ (1) Written approval ☒ (2) Mandatory Submittal ☐ (3) Submitted upon request

8. Distribution *(Continue on a blank sheet if needed)*	9. Remarks
Printed copies (final only) to be distributed at each site training session. Electronic copies (initial and final) to be distributed to NASA provided email distribution list. CDROM to be distributed to each MOVE delivery site with MOVE equipment (final only)	**Initial submission – 10 working days prior to each site-specific SAR or 20 working days after Site-Start-up for sites without a SAR (requires only the training plan portion of package) Final submission – coincident with each MOVE equipment delivery for each site (includes final training plan and course package(s))**

1. Line item no.	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st submission date	6. Number of Copies
S06	**Site-Specific Installation Documentation**	**Initial & Final (per site)**		**See block 9**	**Printed – 5 Electronic – AR CDROM – 5**

7. Data type: ☐ (1) Written approval ☒ (2) Mandatory Submittal ☐ (3) Submitted upon request

8. Distribution *(Continue on a blank sheet if needed)*	9. Remarks
Printed copies (final only) to be distributed to NASA provided dist. list. Electronic copies (initial and final) to be distributed to NASA provided email distribution list. CDROM to be distributed to each MOVE delivery site with MOVE equipment delivery (final only).	**Initial version – 10 working days prior to each site-specific SAR or 20 working days after Site-Start-up for sites without a SAR Final version – 20 working days after each site-specific SAR or 45 working days after Site Start-up for sites without a SAR**

Appendix C. Data Requirements Descriptions (DRD)

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C.1 Project-Level DRDs

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** P01 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** P01
3. **DATA TYPE:** 2 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Project Activity Reports
7. **DESCRIPTION/USE:** Provides information necessary for project insight to NASA.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** One week after contract award
10. **SUBMISSION FREQUENCY:** Biweekly (every two weeks) through final acceptance of the final site system delivery.
11. **REMARKS:** Biweekly (every two weeks)
12. **INTERRELATIONSHIP:** SOW 3.2.1.2, 3.2.2, 3.2.3
13. **DATA PREPARATION INFORMATION:**

13.1 SCOPE: This DRD establishes the activity reporting for the Vendor's progress and accomplishments.

13.2 APPLICABLE DOCUMENTS: None

13.3 CONTENTS: The Project Activity Reports shall include quantitative descriptions of overall technical and administrative progress and status of significant activities relating to the accomplishments of the contractual objectives. Progress against baseline schedule shall be reported with any deviations identified. Risks to the accomplishment of contractual objectives shall also be identified along with risk mitigation plans and status for the implementation of these plans. All reports shall be of sufficient depth and clarity to permit understanding and evaluation of progress made. Supporting data such as charts, graphs, etc. may be included as appropriate.

The Project Activity Report should define all significant accomplishments, plans for the forthcoming period, and open issues. This report shall also provide insight into the product (hardware, firmware, and software) development and production status. The report should summarize status on new development activities, the quantity of units under production, progress on those units through stages of production and test, the number of units ready for shipment, etc.

The frequency of these reports will be on a bi-weekly basis with the initial submission at the end of the first reporting period following contract award and bi-weekly thereafter through final acceptance of the final MOVE system.

13.4 FORMAT: Vendor format is acceptable.

13.5 MAINTENANCE: N/A

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** P02 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** P02
3. **DATA TYPE:** 1 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 2
6. **TITLE:** System Design Review (SDR) Package
7. **DESCRIPTION/USE:** Demonstrates to NASA that all requirements of the MOVE SRD have been met and mapped into the Vendor's proposed design and architecture. Allows the review team to ascertain that technical problems and design anomalies have been resolved at a system level. Ensures that the design maturity justifies the decision to initiate individual site implementations. This presentation is to include Critical/Detailed Design level information for all existing COTS capabilities to be provided and Preliminary Design level information for all new/modified capabilities.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Final -- as presented at the System Design Review.
10. **SUBMISSION FREQUENCY:** Final only.
11. **REMARKS:**
12. **INTERRELATIONSHIP:** SOW 3.4.1.2.1
13. **DATA PREPARATION INFORMATION:**

13.1 **SCOPE:** This DRD addresses all Vendor related inputs to the system design review and approval process.

13.2 **APPLICABLE DOCUMENTS:** None

13.3 **CONTENTS:** The following data is required at a minimum:

a. System Architecture
b. Assumptions and Constraints
c. COTS Product Description/Characteristics
d. Detailed Design for Existing COTS
e. Preliminary Design for New/Modified Capabilities
f. System Level Performance Characteristics
g. Operations Concepts
h. Configuration Management Plans and Methodology
i. Security Engineering Considerations
j. System Safety Considerations – Identification of credible potential safety hazards and associated hazard mitigation consistent with the following:
    1. Design for minimum risk.
    2. Incorporation of safety devices without degrading functional performance, and with provisions for periodic functional checks of safety devices when applicable.
    3. Incorporation of caution and warning devices, including signals and placards/labels as applicable.
    4. Documented special maintenance and/or operating procedures.
    5. Special safety training.
    6. Hardware assets that are UL (or equivalent) compliant.

7. Installation design for safe installation of MOVE equipment in NASA facilities

k. Recommended Verification/Test Methodology including FA, FAT, and SAT
l. Specialized Installation Facility Requirements
m. Maintenance Concepts
n. Training Plans
o. Project Schedule

13.4 FORMAT: Vendor format is acceptable.

13.5 MAINTENANCE: N/A

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** P03 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** P03
3. **DATA TYPE:** 1 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Project-Level Critical Design Review (CDR) Package
7. **DESCRIPTION/USE:** Discloses the complete system design for the deliverable equipment in full detail for a specific MOVE site. Allows the review team to ascertain that technical problems and design anomalies have been resolved. Ensures that the design maturity justifies the decision to initiate fabrication/manufacturing. This presentation is to include all detailed design for the new/modified capabilities to be provided as a part of MOVE.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Final – as presented at each Project-Level Critical Design Review (CDR).
10. **SUBMISSION FREQUENCY:** Final only.
11. **REMARKS:** Final -- as presented at each Project-Level CDR.
12. **INTERRELATIONSHIP:** SOW 3.4.1.2.2
13. **DATA PREPARATION INFORMATION:**

13.1 **SCOPE:** This DRD addresses all Vendor related inputs to the design review and approval process for each new/modified MOVE element.

13.2 **APPLICABLE DOCUMENTS:** None

13.3 **CONTENTS:** The following data is required at a minimum:

a. System Operations
b. System Architecture
c. Assumptions and Constraints
d. COTS Product Description/Characteristics
e. Detailed Design for New/Modified Capabilities
f. Site Specific Considerations
g. Performance Characteristics
h. Security Engineering Considerations
i. Planned Verification/Test Methodology including FA, FAT, and SAT
j. General Installation Facility Requirements
k. Maintenance Concepts
l. Training Plans
m. Production/Delivery Schedule

13.4 **FORMAT:** Vendor format is acceptable.

13.5 **MAINTENANCE:** N/A

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** P04 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** P04
3. **DATA TYPE:** 2 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Vendor Provided Spare Parts List (VPSPL)
7. **DESCRIPTION/USE:** Allows NASA to evaluate the number of line replaceable units (LRUs) and quantity of spares (per site) provided by the Vendor and provides the basis for the onsite logistics space needed to support the delivered system.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Initial at first Project-Level CDR.
10. **SUBMISSION FREQUENCY:** Initial & Updates.
11. **REMARKS:** Updates 30 working days after identification of any MOVE site baseline configuration update affecting spares quantities.
12. **INTERRELATIONSHIP:** SOW 3.7.4.1
13. **DATA PREPARATION INFORMATION:**

13.1 SCOPE: This DRD defines the spare parts to be housed at each MOVE site and drawn from by the site organizational maintenance personnel in order to meet the required Availability for each system element (switch, LSA, keyset).

13.2 APPLICABLE DOCUMENTS: None

13.3 CONTENTS: The Vendor Provided Spare Parts List (VPSPL) shall define the replaceable components within the delivered system for each site. The VPSPL shall identify the quantity of the vendor-provided spares to be delivered onsite per MOVE site based on their individual failure rates, total system utilization and performance requirements specified in the MOVE SRD. The VPSPL table shall include the following at a minimum for each LRU:

a. LRU Part Number
b. LRU Nomenclature
c. LRU MTBF
d. LRU MTSR
e. Quantity of operational LRUs on a per site basis (i.e., quantity of each LRU within the delivered system)
f. Quantity of vendor provide spares for each LRU on a per site basis

13.4 FORMAT: Vendor format is acceptable

13.5 MAINTENANCE: At the Vendor's discretion, document changes may be incorporated by revision bars or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** P05 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** P05
3. **DATA TYPE:** 1 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Acceptance Test Plan
7. **DESCRIPTION/USE:** Allows NASA to evaluate the Vendor's verification philosophy & structure, and provides the baseline for all verification related to the acceptance of the MOVE products.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Initial version provided at the SDR.
10. **SUBMISSION FREQUENCY:** Initial & Updates.
11. **REMARKS:** Updated versions at each Project-Level CDR.
12. **INTERRELATIONSHIP:** SOW 3.5.2, 3.5.3, 3.5.4.1
13. **DATA PREPARATION INFORMATION:**

13.1 SCOPE: This DRD establishes the content, format, and maintenance requirements for the acceptance test plans. It provides a detailed description of the verification methodology to be used by the Vendor to perform acceptance testing for the MOVE equipment and describes how the Vendor will verify meeting the requirements of the MOVE SRD. This DRD shall address the First Article (FA), Factory Acceptance Test (FAT), and Site Acceptance Test (SAT). Reference SOW section 3.5 for the definitions of each of these verification levels/phases.

13.2 APPLICABLE DOCUMENTS: DRD-S02, Acceptance Test Procedures; DRD-S03, Acceptance Test Report

13.3 CONTENTS: The AT Plan shall consist of two parts: test portion & verification portion.

a. The Test portion of AT Plan shall include the following at a minimum:
   1. Statement of scope & purpose, including overall test philosophy.
   2. Identification of hardware, firmware, and software covered by the plan.
   3. Organizational responsibility for preparing test procedures, executing tests, reporting results, & maintaining test data.
   4. Criteria for successful completion.
   5. Description of documentation required.
   6. Definition of test development & objectives, constraints, & evaluation criteria.
   7. Identification of test support requirements.
   8. Definition of test environment & resources, including facilities for each verification level/phase.

b. The Verification portion of AT Plan shall include following at a minimum:
   1. Methodology and/or techniques for verifying design integrity, functionality, achievability, commonality, & interfaces (e.g., Test, Demonstration, Analysis, Inspection, etc.).
   2. Verification responsibilities, locales, & methods for each verification level/phase.
   3. Initial Requirements Verification Matrix (RVM) that depicts each requirement item to be verified, the verification methodology and where it is verified (FA, FAT, SAT or combinations).

13.4 FORMAT: Vendor format is acceptable.

13.5 MAINTENANCE: At the Vendor's discretion, document changes may be incorporated by revision bars or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** P06 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** P06
3. **DATA TYPE:** 2 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Project-Level Installation Documentation
7. **DESCRIPTION/USE:** Provides formal documentation of the project-level (i.e., non site-specific) information required for the successful installation and integration of the MOVE equipment. This document will be used to ensure that facility related information is adequately identified and documented to allow NASA to proceed with facility preparation, cable and connector procurement, etc.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Initial version at the System Design Review (SDR)
10. **SUBMISSION FREQUENCY:** Initial & Updates.
11. **REMARKS:** Updated documents at each Project-Level CDR.
12. **INTERRELATIONSHIP:** SOW 3.6.1.2, 3.6.1.3
13. **DATA PREPARATION INFORMATION:**

13.1 **SCOPE:** This DRD defines the common, project-level information required for installation and interconnection of the MOVE equipment in an operational facility. The information identified under Contents below is to be provided for each of the major MOVE subsystems. Note DRD-S06 (Site-Specific Installation Documentation) provides similar information; however that document is detailed to the specific architecture for the specified site. This DRD is to provide general, project-level information for each type of equipment subsystem, without any site-specific information such as number of cabinets, number of interfaces, etc. Information in this DRD may be referenced or duplicated in DRD-S06 as required.

13.2 **APPLICABLE DOCUMENTS:** DRD-S05, Site-Specific Installation Documentation

13.3 **CONTENTS:** This document shall describe all of the common, project-level (i.e., non site-specific) information for installation and operation of the MOVE deliverable equipment. This document shall contain the following for each deliverable at a minimum:

c. General Power Requirements – characteristics, grounding requirements, etc.
d. General HVAC Requirements
e. General Equipment Floor Space and Clearance Requirements
f. Cable and Connector Requirements – cable types, connector types, special pin-out designations, etc.
g. System Interconnect Requirements – MOVE switch to LSA WS interconnect, MOVE switch to keysets interconnects, etc.
h. Equipment Mounting Requirements
i. Special Facility or Operating Requirements

13.4 **FORMAT:** Vendor format is acceptable

13.5 **MAINTENANCE:** At the Vendor's discretion, document changes may be incorporated by revision bars or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** P07 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** P07
3. **DATA TYPE:** 2 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 2
6. **TITLE:** Management Plan (MP)
7. **DESCRIPTION/USE:** The Management Plan (MP) describes the Vendor's management organization, including interrelationships between the prime contractor and any subcontractors (if required). The MP provides NASA with a basis for reviewing and evaluating performance and for determining contractual compliance.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Final version at the System Design Review (SDR)
10. **SUBMISSION FREQUENCY:** Final only
11. **REMARKS:**
12. **INTERRELATIONSHIP:** SOW 3.2.1
13. **DATA PREPARATION INFORMATION:**

13.2 **SCOPE:** The MP provides details of the specific techniques, tasks, and procedures to be used for monitoring contract management, technical performance, configuration control, production, etc.

13.2 **APPLICABLE DOCUMENTS:** None

13.4 **CONTENTS:** The MP shall describe the vendor's organization, assignment of duties and responsibilities, management structure and procedures, and resource plan for conduct of contractually imposed tasks. The document shall include the following at a minimum:

a. Purpose – describe the purpose of the MP in terms of its relationship to the management of the project, and performing the contract tasks outlined in the SOW.
b. Management Structure – information on the vendor's management organization, internal management policies and procedures, relationships with NASA personnel, and roles and responsibilities of management entities within the organization. Provide information describing how the Vendor shall fully integrate the management of all elements of the project.
c. Policies and Procedures – describe internal policies and procedures to be used in managing the project.
d. Management Systems:
    1. Schedule Management – provide a detailed description of how the Vendor will implement a fully integrated, defined, planning and control system; including interrelationship of tasks and tracking criticality of tasks.
    2. Resource Allocation – provide a detailed description of how the vendor will allocate resources to meet the delivery requirements of the project.
    3. Production Management – discuss methods and procedures for employing facilities, tooling, and manpower resources to optimize the production and delivery of systems/equipment.
    4. Risk Management – describe the internal approach and method for the identification, assessment, and mitigation of project risks. This should include approaches for identifying risk areas, assessing risk factors, assigning appropriate resources to reduce risk factors, identifying and analyzing alternative actions available, identifying the most promising alternatives, and planning for implementation of risk reduction.

5. Quality Assurance – provide a detailed description of quality assurance policies and requirements to be implemented; including approaches for reporting, auditing, and evaluating progress at all levels to ensure that a check and balance is provided.

e. Special Boards, Teams, and Working Groups – discuss the purpose and responsibilities of all special groups to be used by the Vendor.

13.4 FORMAT: Vendor format is acceptable

13.5 MAINTENANCE: At the Vendor's discretion, document changes may be incorporated by revision bars or complete reissue.

C.2 Site-Level DRDs

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** S01 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** S01
3. **DATA TYPE:** 1 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Site-Specific System Architecture Review (SAR) Package
7. **DESCRIPTION/USE:** Discloses the complete system architecture for the deliverable equipment in full detail for a specific MOVE site. Allows the review team to ascertain that technical problems and design anomalies have been resolved. Ensures that the architecture maturity justifies the decision to complete implementation and proceed to FA/FAT.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Ten (10) working days prior to each site-specific System Architecture Review (SAR).
10. **SUBMISSION FREQUENCY:** Initial & Final per site.
11. **REMARKS:** Final – as presented at each site-specific SAR.
12. **INTERRELATIONSHIP:** SOW 3.4.2.3
13. **DATA PREPARATION INFORMATION:**

13.1 SCOPE: This DRD addresses all Vendor related inputs to the architecture review and approval process for each MOVE site.

13.2 APPLICABLE DOCUMENTS:

13.3 CONTENTS: The following data is required at a minimum:

a. System Architecture
b. Assumptions and Constraints
c. COTS Product Description/Characteristics
d. Site Specific Considerations
e. Performance Characteristics
f. Security Engineering Considerations
g. Planned Verification/Test Methodology including FA, FAT, and SAT
h. Installation Facility Requirements:
    1. Power
    2. HVAC
    3. Floor space and clearances
    4. All system interconnect/cable run information (e.g., Cabling between the MOVE switch, keysets, and LSA Workstations, other cabling between system elements, etc.)
i. Maintenance Concepts
j. Training Plans
k. Production/Delivery Schedule

13.4 FORMAT: Vendor format is acceptable.

13.5 MAINTENANCE: N/A.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** S02 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** S02
3. **DATA TYPE:** 1 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Acceptance Test Procedures
7. **DESCRIPTION/USE:** Allows NASA to evaluate the Vendor's verification approach for full coverage of acceptance requirements.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** For FA/FAT, due forty-five (45) working days prior to each site-specific test session; for SAT, due thirty (30) working days prior to each site-specific test session.
10. **SUBMISSION FREQUENCY:** Initial & Final per FA/FAT and SAT per site.
11. **REMARKS:** For FA/FAT, final due ten (10) working days prior to each site-specific test session; for SAT, final due five (5) working days prior to each site-specific test session.
12. **INTERRELATIONSHIP:** SOW 3.5.4.1, 3.5.3
13. **DATA PREPARATION INFORMATION:**

13.1 SCOPE: This DRD establishes the content, format, and maintenance requirements for system acceptance test procedures. The procedures shall provide detailed documentation of all verification required to verify that the MOVE equipment is in compliance with the MOVE SRD requirements. Separate releases of this DRD shall address the First Article (FA), Factory Acceptance Test (FAT), and Site Acceptance Test (SAT) for a specific MOVE site. Reference SOW section 3.5 for the definitions of each of these verification levels/phases.

13.2 APPLICABLE DOCUMENTS: DRD-P05, Acceptance Test Plan; DRD-S02, Acceptance Test Report

13.3 CONTENTS: Provides detailed procedures checkout and/or inspections to be accomplished by the Vendor, for satisfaction of the Acceptance Tests to be accomplished by the Vendor. Each procedure shall contain at least the following:

a. Identification & description of subsystem to be tested.
b. Test objectives, including assumptions & constraints.
c. Resources (hardware, software, test tools, personnel, & test data) to be used in test.
d. Step-by-step procedures for accomplishing test.
e. Criteria for passing or failing test.
f. Environment required for performance of each test function.
g. Updated RVM from the AT Plan including correlation between test procedure step & requirement.

The updated RVM provides traceability of each requirement of the MOVE SRD to the test procedure and verification step within the AT Procedures document for the associated verification level/phase (FA, FAT, SAT). The RVM is to include SRD requirements paragraph references and the following for each requirement entry: the associated verification level (FA, FAT, SAT, or combinations), the verification method(s) (e.g., Test, Demonstration, Analysis, Inspection), and identification of the test procedure section and verification step.

13.4 FORMAT: The Vendor's format is acceptable.

13.5 MAINTENANCE: At the Vendor's discretion, document changes may be incorporated by revision bars or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** S03 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** S03
3. **DATA TYPE:** 2 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Acceptance Test Report
7. **DESCRIPTION/USE:** Documents the results of the Acceptance Tests for each deliverable MOVE system and for each required modification action.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Due ten (10) working days after completion of each site-specific test session (FA/FAT and SAT).
10. **SUBMISSION FREQUENCY:** Once per FA/FAT and SAT per site.
11. **REMARKS:**
12. **INTERRELATIONSHIP:** SOW 3.5.5, 3.5.6
13. **DATA PREPARATION INFORMATION:**

13.1 **SCOPE:** This DRD establishes the content, format, and maintenance requirements for documenting the results of the acceptance test procedures. Separate releases of this DRD shall address the First Article (FA), Factory Acceptance Test (FAT), and Site Acceptance Test (SAT) for a specific MOVE site. Reference SOW section 3.5 for the definitions of each of these verification levels/phases.

13.2 **APPLICABLE DOCUMENTS:** DRD-P05, Acceptance Test Plan; DRD-S02, Acceptance Test Procedures

13.3 **CONTENTS:** Provides detailed results of the Acceptance Tests performed by the Vendor for each verification level/phase (i.e., FA/FAT and SAT) for each MOVE deliverable system per site. The report shall contain at least the following:

a. Identification & description of the subsystem tested and the capabilities demonstrated.
b. Identification of the test procedures and test cases run and the status of each.
c. Test results including special equipment used and workarounds.
d. A statement quantifying the successful execution of the test function and verification of requirements.
e. Any deviations from the approved AT Plans and/or AT Procedures with appropriate approvals.
f. The potential impact of any deviations.
g. Identification of any open discrepancies and operational limitations.

13.4 **FORMAT:** The Vendor's format is acceptable.

13.5 **MAINTENANCE:** At the Vendor's discretion, document changes may be incorporated by revision bars or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** S04 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** S04
3. **DATA TYPE:** 2 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Technical System Documentation
7. **DESCRIPTION/USE:** Used as the basis for revising mission procedures, as an input for personnel training plans and for operations and maintenance reference.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Due coincident with the initial MOVE equipment delivery on-dock for each MOVE site.
10. **SUBMISSION FREQUENCY:** Once per site.
11. **REMARKS:**
12. **INTERRELATIONSHIP:** SOW 3.7.6.2
13. **DATA PREPARATION INFORMATION:**

13.1 **SCOPE:** This DRD provides detailed descriptions of the user interfaces, features, and procedures of the MOVE systems and targets all MOVE users including the system administrators, local and remote controllers, system maintainers, and keyset users.

13.2 **APPLICABLE DOCUMENTS:** None

13.3 **CONTENTS:** This DRD shall include all technical and maintenance manuals, OS and application software manuals, user guides, and any other documentation available for the MOVE systems and associated elements. User's guides shall provide procedural descriptions of how the user will interface with and use the system. The documents shall include information describing all operations and maintenance features of the system including:

a. The operational and maintenance characteristics of the system, organization, overview, intended uses, and capabilities
b. Supervisory controls that can be implemented to manage the system.
c. Initiating/stopping a session procedures for beginning and ending work, including any options available.
d. System operations which describe and give options and examples, as applicable, of menus, graphical icons, data entry forms, user inputs, outputs, diagnostic/error messages or alarms, and help facilities.
e. Data backup procedures that describe creating and retaining backup data that can be used to replace primary copies of data in event of errors, defects, malfunctions, or accidents.
f. Recovery from errors, malfunctions, and emergencies which present detailed procedures for restart or recovery from errors or malfunctions occurring during processing and for ensuring continuity of operations in the event of emergencies.
g. Error messages, diagnostic messages, and information messages that can occur while accomplishing any of the system's functions. The meaning of each message and the action that should be taken after each such message shall be identified and described.

13.4 **FORMAT:** Vendor format is acceptable.

13.5 **MAINTENANCE:** At the Vendor's discretion, document changes may be incorporated by revision bars or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** S05 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** S05
3. **DATA TYPE:** 2 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Training Package
7. **DESCRIPTION/USE:** Used by both the instructors and students during system operations, system maintenance, and user keyset operations training courses.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Preliminary training plan due ten (10) working days prior to each site-specific SAR; twenty (20) working days after Site Start-up if the site does not require a SAR (note the initial submission requires only the training plan portion of the package).
10. **SUBMISSION FREQUENCY:** Initial & Final per site.
11. **REMARKS:** Final training plan and course package coincident with the initial MOVE equipment delivery for each MOVE site.
12. **INTERRELATIONSHIP:** SOW 3.7.5
13. **DATA PREPARATION INFORMATION:**

13.1 **SCOPE:** This DRD provides the instructor lesson plans, course media and student guides used during training.

13.2 **APPLICABLE DOCUMENTS:** None

13.3 **CONTENTS:** The training package shall contain both an overall training plan and individual course documents. The training plan shall provide a summary of the training course titles, system resources required, training time required, prerequisite conditions and targeted students.

Each course package shall be composed of a student guide, instructor lesson plan and course media.

a. The student guide shall describe each course by listing the course modules and providing the module duration, the module objective, the lesson composition, the references to Product Manuals and O&M Manuals, and the lab exercises (if any).
b. The instructor lesson plan shall supplement the student guide with the addition of an outline of instructor actions, instructor remarks/comments and the course exam.
c. The course media shall be any additional slide presentation, video, audio or software used within the conduct of the course.

All course package material shall be provided in a format that is reproducible (e.g., printed and/or electronic) such that NASA personnel can repeat the training without the need to schedule additional vendor training sessions.

13.4 **FORMAT:** Vendor format is acceptable.

13.5 **MAINTENANCE:** At the Vendor's discretion, document changes may be incorporated by revision bars or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRD NO.:** S06 **ISSUE:** Contract 2. **DRL LINE ITEM NO.:** S06
3. **DATA TYPE:** 2 4. **DATE REVISED:** 07/21/05
5. **PAGE:** 1 of 1
6. **TITLE:** Site-Specific Installation Documentation
7. **DESCRIPTION/USE:** Provides formal documentation of all information required for the successful installation and integration of the MOVE equipment at each site. This document will be used to ensure that all facility related information is adequately identified and documented to allow NASA to complete with facility preparation, cable and connector procurement, etc.
8. **DISTRIBUTION:** As defined in the DRL for this document.
9. **INITIAL SUBMISSION:** Initial version ten (10) working days before each site-specific SAR; twenty (20) working days after Site Start-up if the site does not require a SAR.
10. **SUBMISSION FREQUENCY:** Initial & Final per site.
11. **REMARKS:** Final document twenty (20) working days after each site-specific SAR; forty-five (45) working days after Site Start-up if the site does not require a SAR.
12. **INTERRELATIONSHIP:** SOW 3.6.1
13. **DATA PREPARATION INFORMATION:**

13.1 SCOPE: This DRD defines the information required for installation and interconnection of the MOVE equipment in the operational facility.

13.2 APPLICABLE DOCUMENTS: DRD-P06, Project-Level Installation Documentation

13.3 CONTENTS: This document shall describe all of the necessary information for installation and operation of the MOVE deliverable equipment. This document shall contain the following for each deliverable at a minimum:

a. Power Requirements – characteristics, plug type(s), grounding requirements, etc.
b. HVAC Requirements
c. Floor Space and Clearance Requirements
d. Cable and Connector Requirements – cable types, connector types, special pin-out designations, etc.
e. System Interconnect Requirements – MOVE switch to LSA WS interconnect, MOVE switch to keysets interconnects, etc.
f. Size and Weight of each element/enclosure
g. Equipment Mounting Requirements
h. Special Facility or Operating Requirements

13.4 FORMAT: Vendor format is acceptable

13.5 MAINTENANCE: At the Vendor's discretion, document changes may be incorporated by revision bars or complete reissue.

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Appendix D. Performance Measurement Definitions

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D.1 Mean Time Between Critical Failure (MTBCF) Calculations

An MTBCF prediction for the voice switch subsystem shall be calculated for each MOVE system in order to verify compliance with SRD MTBCF requirements. For a switch subsystem, the MTBCF is to be calculated per the formula provided below, however in calculating the total failure rate (sum of failure rates of all applicable LRUs), the applicable LRUs should include all LRUs within the total population of the switch subsystem, with the exception of all T1 and keyset interface LRUs and any redundant LRUs. Note that the MTBCF calculation will be different on a site-by-site basis due to switch sizing differences. Each switch system, regardless of site, must meet the MTBCF requirement specified in the SRD (see 4.10.b.1).

MTBCF predictions shall be derived according to the following expression:

$$\mathbf{MTBCF} = \lambda_T^{-1}$$

Where λ_T is the total failure rate in failures per hour for relevant hardware subsystems/elements, and where,

$$\lambda_T = \sum_{i=1}^{i=n} \lambda_i$$

- λ_i is the failure rate for LRU #i, and
- **i** ranges from 1 to n for the non-redundant LRUs (LRU #1 through LRU #n) making up the system element being measured (i.e., switch subsystem).

D.2 Mean Time Between Failure (MTBF) Calculations

An MTBF prediction for each LRU shall be provided for each MOVE system. MTBF predictions shall be derived according to the following expression:

$$\mathbf{MTBF} = \lambda_i^{-1}$$

Where λ_i is the total failure rate in failures per hour for LRU #i. Failure rates for each LRU shall be derived from either of the following sources in order of preference:

- Operational history
- Standards-based methodology typically used by the vendor.

Where operational history is used to derive hardware element failure rates, the failure rates shall reflect a Chi-square 90% upper bound statistical confidence interval.

D.3 Mean Time to Service Restore (MTSR) Calculation

An MTSR prediction for the voice switch subsystem shall be calculated for each MOVE system in order to verify compliance with SRD MTSR requirements.

The following approach shall be used in developing the MTSR predictions:

$$\mathbf{MTSR} = \frac{\sum_{i=1}^{i=n} \lambda_i \mathbf{R}_i}{\sum_{i=1}^{i=n} \lambda_i}$$

- λ_i is the failure rate of LRU #i,
- $\mathbf{R}_i$ is the time required to perform all on-equipment corrective maintenance actions requisite for isolating a failure to an LRU, removing the failed LRU, replacing the failed LRU with an operational spare, and returning the affected hardware to an operational state, and
- **i** ranges from 1 to n for the non-redundant LRUs (LRU #1 through LRU #n) making up the system element being measured (i.e., switch subsystem).

D.4 Availability Calculation

Availability is calculated as the ratio of the total time a functional unit is capable of being used during a given interval to the length of the interval. Based on the previous definitions of MTBF and MTSR, the availability of any MOVE element shall be calculated as follows:

$$\mathbf{Availability} = \frac{\mathbf{MTBCF}}{(\mathbf{MTBCF} + \mathbf{MTSR})}$$

Attachment B
SRD

Attachment B
NNG06CA50D
MOVE - 002

National Aeronautics and Space Administration

Mission Operations Voice Enhancement (MOVE) System Requirements Document

October 2006

Preface

This document is controlled through the Documentation Change Notice (DCN) process. This document will be changed by DCN or complete revision. Proposed changes to this document must be submitted through the DCN process once base-lined along with supportive material justifying the proposed change. Comments or questions concerning this document and proposed changes shall be addressed to:

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1 Scope

This System Requirements Document (SRD) specifies the technical requirements for the Mission Operations Voice Enhancement (MOVE) system for specified National Aeronautics and Space Administration (NASA) and associated sites. A major objective of NASA is to reduce cost of operations without increasing risk to space operations. The MOVE project will replace existing voice systems utilizing a standardized Commercial-Off-The-Shelf (COTS) approach.

This document establishes the basic operational parameters, functional criteria, and design objectives that will govern the design and packaging so that the MOVE will be able to provide mission voice services at participating NASA locations.

All references to MOVE herein constitute the replacement voice system equipment for NASA.

2 Related Documents

Document	Document Title
ANSI S3.2-1989	American National Standard Method for Measuring the Intelligibility of Speech over Communications
EIA-310-E	Cabinets, Racks, Panels, and Associated Equipment
IEEE 802.1	Internetworking and Link Security
IEEE 802.3	CSMA/CD (ETHERNET) Standards
ITU-T G.703 (11/2001)	Physical/Electrical characteristics of Hierarchical Digital Interfaces
ITU-T G.704 (10/1998)	Synchronous Frame Structures used at 1544, 6312, 8448, and 44736 kbit/s Hierarchical Levels
ITU-T G.711	Pulse Code Modulation (PCM) of Voice Frequencies
JSC-13365	Control Center Complex Digital Voice Intercommunications Subsystem to Data Distribution and Workstation/Server Platforms Subsystem Interface Control Document (ICD), September 1993
MIL-STD-810F	Environmental Engineering Considerations and Laboratory Tests
UL 60950-1	UL Standard for Safety of Information Technology Equipment, 1st Edition, April 2003

3 MOVE System Overview

The MOVE project includes replacing the mission voice switches, the Local Site Administrator (LSA) subsystem(s) and the mission voice keysets at various NASA MOVE locations. The MOVE system architecture will be standardized at each NASA MOVE location and configured in accordance with requirements as defined in this document.

3.1 MOVE System Topology Overview

The MOVE System Topology Overview depicted in Figure 3-1 identifies the NASA locations that are a part of the MOVE project. Carrier Services provide interfaces for distributing voice services between mission voice systems and other locations.

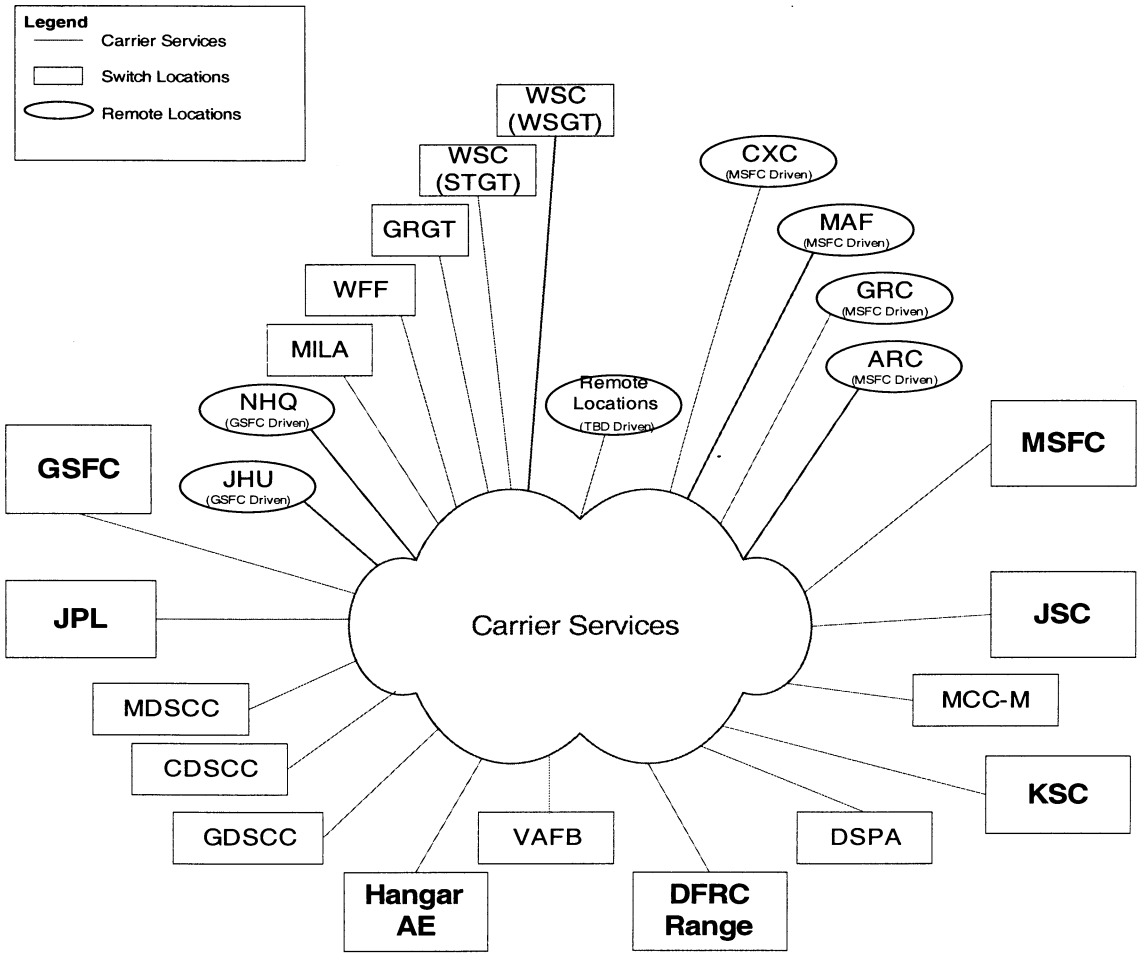

Figure 3-1 MOVE System Topology Overview

3.2 Generic Site Architecture Overview

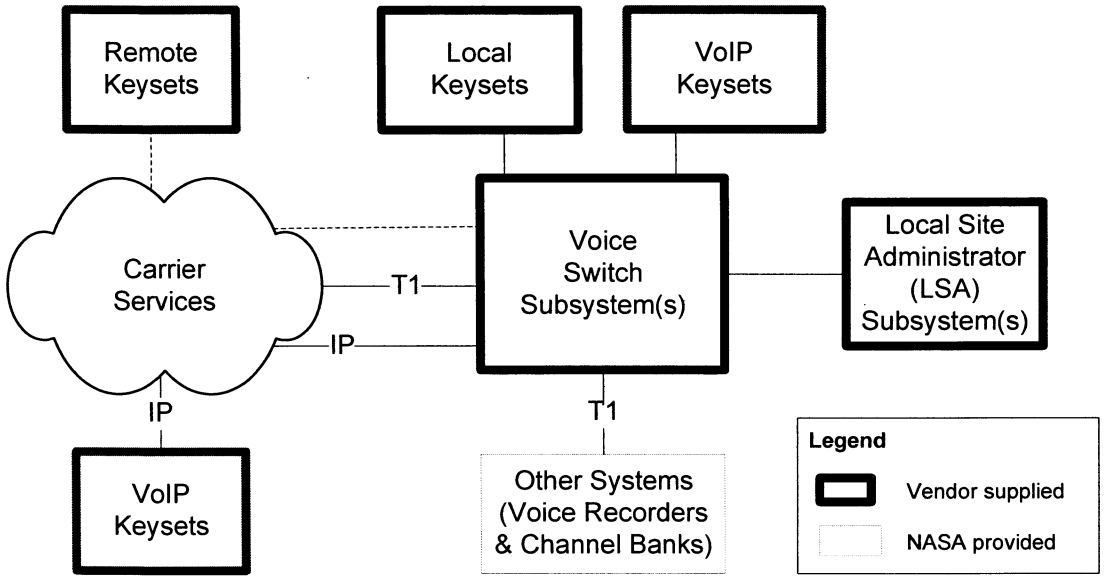

Figure 3-2 Generic Site Architecture Overview

MOVE locations can be defined as either a switch location or a remote location. Switch locations include a voice switch subsystem(s), LSA subsystems and keysets. Remote locations include MOVE keysets driven by a voice switch at another MOVE location. The Generic Site Architecture Overview, depicted in Figure 3-2, represents a MOVE switch location.

The MOVE System architecture includes a voice switch subsystem(s), Local Site Administrator subsystems, and keysets. The voice switch subsystem provides a system for voice conferencing and internal/external voice distribution. The LSA subsystem provides the capability to configure voice conferences, add and remove users, and control user privileges. Keysets are the end instruments that meet the user requirements for mission voice. Local keysets are defined as those that have a direct connection to the voice switch subsystem. Remote keysets are defined as those that require external, site-provided, equipment to extend the interface signals. For both local and remote keysets, the interface to the voice switch subsystem is copper. The interface between the voice switch subsystem and the Voice over IP (VoIP) keysets uses an Ethernet transport for the audio and control streams. The VoIP keysets can be connected to site-provided IP networks including LANs and WANs.

Industry standard T1s are used to interface the voice switch subsystem; with carrier services to transport mission voice conferences between locations, with site administrative telephone systems (PABXs) to provide POTS extensions, and with site-provided voice recorder systems.

4 Core Requirements

This section presents the detailed requirements for a MOVE system. Multiple MOVE systems will be procured and installed at designated NASA MOVE locations. Requirements identified with a "***shall***" constitute those requirements that are essential to meeting project goals. Requirements identified with a "***should***" constitute highly desirable approaches to meeting a stated requirement.

4.1 System Design Requirements

a. The MOVE system ***shall*** contain a Voice Switch subsystem, Local Site Administrator (LSA) subsystem(s) and keyset instruments.

b. The MOVE system ***shall*** support multiple LSA subsystems that can be operated concurrently on a single voice switch subsystem.

c. The MOVE system ***shall*** have a system design life expectancy of at least 10 years.

d. The MOVE system ***shall*** be designed to operate with a duty-cycle of 24-hours per day, 7 days per week throughout the system life.

e. The MOVE system ***shall*** be comprised of COTS hardware, software, and firmware.

f. The MOVE system ***shall*** be comprised of EnergyStar compliant products where applicable.

g. The MOVE system ***shall*** support side tone (see glossary).

h. The MOVE system ***shall*** provide the capability to control and monitor operations both:

   1. Locally (same site, directly connected)
   2. Remotely (same or different site, remotely (e.g., network or dial-up) connected)

i. The MOVE system ***shall*** have the following performance characteristics from end-user instrument to end-user instrument inclusive:

   1. Frequency Response – Minimum bandwidth of 300 to 3400 Hz -3 dB at the "roll-off points" (see glossary)
   2. Total Harmonic Distortion – Less than 2% between 300 and 3400 Hz at 0 dBm
   3. 12db/decade minimum attenuation for frequencies over 3500 Hz
   4. -60 dB minimum cross talk isolation
   5. A minimum of -30 dB Signal, Noise, and Distortion (SINAD) C-Msg weighting
   6. -50dB minimum Idle Channel Noise
   7. ITU-T G.711 compatible voice encoding/decoding for all user ports (keysets, T1, etc.) at a minimum

j. The MOVE System ***shall*** include an external interface for remote switch subsystem alarms as follows:

   1. Two sets of Form C Dry Contact closures
      i) The contact relay ***shall*** be energized in response to significant error classes (e.g., Catastrophic or Major per 4.3.8.c)
      ii) The contact relay ***shall*** be de-energized (cleared) once an alarm condition has been cleared by the LSA (reference 4.3.8.h)
   2. Rated for the following at a minimum:
      i) 100 milliamp
      ii) 240 VAC
      iii) 48 VDC

k. The MOVE system ***shall*** include all cabling required for the following connectivity:

   1. Intra-switch equipment connections
   2. Intra-LSA subsystem(s) connections
   3. All power cables

l. The MOVE System ***shall*** maintain conference isolation for all active conferences including those configured for multi-talk access.

m. Conference Access Time (see glossary) ***shall*** not exceed 100 milliseconds for the following:

1. For Local Keysets, the time starts when the user presses a conference line key.
2. For Remote Keysets, the time starts when the conference request is received at its voice switch keyset port.
3. For VoIP keysets, the time starts when the conference request is received at its voice switch keyset port.
4. For T1 DS0s, the time starts when command is issued from the LSA workstation, exclusive of delays induced by site-provided network infrastructure.

n. The 100-millisecond conference access connect time ***shall*** be maintained independently of the number of simultaneous requests.

o. The MOVE systems ***shall*** meet minimum voice quality levels based on the following:

1. Speech Intelligibility via the Diagnostic Rhyme Test (DRT) in accordance with ANSI S3.2-1989
2. Speech Acceptability via a Diagnostic Acceptability Measure (DAM) methodology

p. Speech Intelligibility ***shall*** achieve a minimum DRT score of 90 for the following:

1. Each unique user port type defined in Table 4.2.1
2. Each unique keyset type

q. Speech Acceptability ***shall*** achieve a minimum DAM mean score of 70 for the following:

1. Each unique user port type defined in Table 4.2.1
2. Each unique keyset type

r. All encryption/decryption elements (hardware, software, or firmware) included in any MOVE system to be installed outside the U.S. ***shall*** be removable.

4.2 Voice Switch Subsystem Requirements

4.2.1 General Requirements

a. For each MOVE Site system, a single switch architecture ***shall*** be provided that includes the following in accordance with the quantities in Table 4.2.1.

1. **Local Keyset Ports**
   i) *Populated* (see glossary) is the number of local keysets that the switch sub-system must actively support upon delivery.
   ii) *Additional Wired-for* (see glossary) represents a future number of local keysets the switch must accommodate without any additional wiring to the switch sub-system hardware allowing for future purchases of additional interface cards.
2. **Remote Keyset Ports**
   i) *Populated* (see glossary) is the number of remote keysets that the switch sub-system must actively support upon delivery.
   ii) *Additional Wired-for* (see glossary) represents a future number of remote keysets the switch must accommodate without any additional wiring to the switch sub-system hardware allowing for future purchases of additional interface cards.
3. **VoIP Keyset Users**
   i) *Initial* is the minimum number of VoIP keysets that the switch sub-system must actively support upon delivery.
   ii) *Additional Growth* represents the number of future VoIP keysets that the switch must accommodate without additional wiring to switch hardware; may require purchase of additional interface cards.
4. **T1 ports**
   i) *Populated* (see glossary) is the number of T1 interfaces that the switch sub-system must actively support upon delivery.
   ii) *Additional Wired-for* (see glossary) represents a future number of T1 interfaces the switch must accommodate without any additional wiring to the switch sub-system hardware allowing for future purchases of additional interface cards.
5. Total number of **Conferences** that the switch is to be configured to support upon delivery (i.e., maximum number of simultaneously active conferences to be supported). (see glossary for conference definition)
6. **LSA Subsystem I/Fs Connected** (local and remote)
   i) *Populated* (see glossary) is the number of LSA consoles that the switch must actively support upon delivery.
   ii) *Additional Wired-for* (see glossary) allows an additional number of LSA consoles to be added at a future date without additional wiring to switch hardware; may require purchase of additional interface cards.
7. **Switch Power** Specifications
8. **Power & Signal Cabling** designates bottom or top routing of Power and signal cabling to/from switch enclosures (i.e., cabinets)

Table 4.2.1 Voice Switch Subsystem Interfaces

ID/ Opt	Site	(1) Local Keyset Ports		(2) Remote Keyset Ports		(3) VoIP Keyset Users		(4) T1 Ports		(5) Conferences	(6) LSA Subsystem I/Fs Connected		(7) Switch Power	(8) Power & Signal Cabling
		Populated	Additional Wired-for	Populated	Additional Wired-for	Initial	Additional Growth	Populated	Additional Wired-for		Populated	Additional Wired-for		
A	GSFC-1	319	206	56	78	20	55	66	0	1900	7	3	120 VAC 60 Hz	Bottom
B	GSFC-2	118	165	28	51	0	0	8	30	1900	7	3	120 VAC 60 Hz	Bottom
C	MSFC	180	120	40	14	11	69	60	6	800	5	1	120 VAC 60 Hz	Bottom
D	JSC MCCP	865	60	10	5	10	5	89	6	1600	12	0	120 VAC 60 Hz	Bottom
E	JSC MCCB	235	30	0	0	5	5	23	2	1000	12	0	120 VAC 60 Hz	Bottom
1	JPL	0	0	0	0	363	79	43	15	480	2	1	120 VAC 60 Hz	Bottom/T
2	WSC (STGT)	160	51	0	0	6	18	10	5	150	2	2	120 VAC 60 Hz	Bottom
3	WSC (WSGT)	160	51	0	0	6	18	10	5	150	2	2	120 VAC 60 Hz	Bottom
4	GRGT	33	19	0	0	0	0	4	4	50	2	1	120 VAC 60 Hz	Bottom
5	MCC-M	33	10	0	0	0	0	5	2	300	2	1	200-240 VAC 50 Hz	Bottom
6	GDSCC	0	0	0	0	44	21	25	10	250	2	1	120 VAC 60 Hz	Top
7	MILA	42	8	0	10	0	0	11	4	100	2	1	120 VAC 60 Hz	Bottom
8	CDSCC	0	0	0	0	37	28	25	10	250	2	1	120 VAC 60 Hz	Bottom
9	WFF	188	30	174	30	11	10	12	5	360	3	1	120 VAC 60 Hz	Top
10	MDSCC	0	0	0	0	37	28	25	10	250	2	1	120 VAC 60 Hz	Bottom
11	DFRC	25	5	125	25	40	10	56	50	600	2	1	48 VDC	Top
12	H-AE	0	0	0	0	216	25	36	8	1200	3	1	120 VAC 60 Hz	Bottom/T
13	VAFB	0	0	0	0	216	25	36	8	1200	3	1	120 VAC 60 Hz	Top
14	DSPA	65	25	0	0	0	0	6	4	80	2	1	48 VDC	Bottom
15a	KSC-1	90	10	700	50	5	1	122	13	900	5	1	48 VDC	Bottom
15b	KSC-2	1500	150	550	50	5	1	40	5	900	5	1	48 VDC	Bottom
IDIQ	Any	100	120	0	0	10	12	10	12	200	2	3	120 VAC 60 Hz	Bottom

b. The MOVE Voice Switch Subsystem ***shall*** be capable of supporting the capacity of all items in Table 4.2.1 simultaneously on a per site basis.

c. The MOVE Voice Switch ***shall*** accept up to two input power sources of the same type to ensure continued voice service if any input power source is unavailable.

d. The Voice Switch Subsystem architecture ***shall*** be capable of 50% growth.

e. The MOVE Voice Switch Subsystem ***shall*** include a "wired for" configuration as identified in Table 4.2.1 which includes all equipment cabinets, card cages, control/voice distribution cards and internal MOVE wiring/cabling (i.e., everything except T1 and keyset interface cards).

f. The MOVE Voice Switch Subsystem ***shall*** utilize 100% digital non-blocking design for all conference voice switching.

g. The MOVE Voice Switch Subsystem ***shall*** provide individual talk-listen and monitor voice communications for each "User Port."

h. The MOVE Voice Switch Subsystem ***shall*** have an insertion loss of 0 dB at 1 kHz through the switching matrix.

i. The MOVE Voice Switch Subsystem ***shall*** be configurable to support either of the following timing sources:

   1. Site-provided external source
   2. T1 carrier-provided source

j. **For JPL and its satellite sites (GDSCC, MDSCC, and CDSCC) only**, the MOVE Voice Subsystem ***shall*** provide an Automatic Gain Control (AGC) function to each input to the switch to ensure that all conferees will be heard on the conference at the same nominal level.

   1. The AGC gain curve and dynamic response parameters ***shall*** be programmable.
   2. The AGC ***shall*** provide programmable input thresholding adjustment.
   3. The AGC control function ***shall*** be a feature that can be enabled and disabled.

k. For non JPL sites, the MOVE Voice Switch Subsystem ***shall*** provide real-time configurable level controls on all T1 ports at the DS0 level (inputs and outputs).

l. The MOVE Voice Switch Subsystem ***shall*** provide the capability to place a PABX call into a conference.

m. Latency, as measured from the time voice is inserted at one user port to the time it is received on a different user port on the same switch subsystem, ***shall*** not exceed the following:

   1. 15 milliseconds on each non-VoIP port
   2. 100 milliseconds on each VoIP port

n. MOVE Voice Switch Subsystem user port interfaces ***shall*** support full-duplex voice communications.

o. The MOVE Voice Switch Subsystem ***shall*** allow the keyset login to be configurable (enabled/disabled).

p. The MOVE Voice Switch Subsystem ***shall*** limit a user ID to one keyset login at any given time.

q. The MOVE Voice Switch Subsystem ***shall*** reject a new sign-on request if that user ID is already signed on at another keyset.

r. The MOVE Voice Switch Subsystem ***shall*** provide the capability to have a configurable "system ID" assigned to be used for system identification in multi-switch configurations.

4.2.2 Voice Switch Subsystem Interface Requirements

4.2.2.1 External Interface Requirements

a. The MOVE Voice Switch Subsystem T1 Port external interfaces (Table 4.2.1, column (4)) ***shall*** support the following:

1. ITU-T G.703 Physical/Electrical characteristics of Hierarchical Digital Interfaces for the following:
   i) Bit Rate (1.544Mbps)
   ii) Line Code Binary Eight Zero Suppression (B8ZS)/ Alternate Mark Inversion (AMI)
2. ITU-T G.704 Synchronous Frame Structures for the following:
   i) Framing (193S, 193E)
   ii) Channel Associated Signaling (CAS) or Common Channel Signaling (CCS)
3. Capability to pre-define individual T1 ports for either of the following:
   i) External conference interface (e.g., The 24 T1 DS0s will be connected to MOVE Switch conferences)
   ii) PABX interface (e.g., The T1 will be connected to a PABX T1 trunk for blocks of PABX service number usage)

b. The MOVE Voice Switch Subsystem ***shall*** provide the capability to interface with an external time code source.
   1. The MOVE Voice Switch Subsystem ***shall*** provide the capability to utilize the external time code source to synchronize the internal system clock(s) for the switch and LSA subsystems.

c. There ***shall*** be no single point of failure for connectivity between the switch and the LSA subsystems.

d. The MOVE Voice Switch Subsystem ***shall*** support connectivity to the LSA Subsystem(s) Interfaces (Table 4.2.1, column (6)) per the following:
   1. Locally (same site, directly connected) at a minimum of 100m from the switch without the use of repeaters or other devices.
   2. Remotely (same or different site, not directly connected) via an interface with telecom carrier equipment

4.2.2.2 Switch-Keyset Interface Requirements

a. The MOVE Voice Switch Subsystem Keyset Interfaces ***shall*** support MOVE keysets as defined in Table 4.4.2 that will be operated by the following:
   1. Users that are locally-connected (same site, directly connected)
   2. Users that are remotely-connected (same or different site, not directly connected) (e.g., extended copper connection)
   3. Users that are network-connected (VoIP) via either of the following:
      i) Dedicated voice traffic only IP network
      ii) Shared existing facility (GFE) provided IP network

b. The MOVE Voice Switch Subsystem Local Keyset Interface (Table 4.2.1, column (1)) ***shall*** provide the following capabilities for locally-connected keyset interfaces:
   1. Capability to connect via copper cabling
   2. Capability of driving signals to a keyset with gauge as small as 24-AWG copper cabling at least 1.8 km, without the use of repeaters or other devices.

c. The MOVE Voice Switch Subsystem Remote Keyset Interface (Table 4.2.1, column (2)) ***shall*** provide the following capabilities for remotely-connected keyset interfaces:
   1. Capability to interface with telecom carrier equipment
   2. Maximum bandwidth utilization of 128 kbps

d. The MOVE Voice Switch Subsystem VoIP Keyset Interface (Table 4.2.1, column (3)) ***shall*** support Voice over IP (VoIP) using industry standards and requiring the following:
   1. Support the following IEEE specifications:
      i) 100 Mbps Fast Ethernet (802.3u, 100Base-TX)
   2. Be configurable to tag the following:

i) All Ethernet packets with appropriate Class of Service (CoS) value (default to 5)

ii) All IP packets with appropriate IP precedence value in Type of Service (ToS) byte (default to 5)

3. Support the IEEE 802.1P & 802.1Q specifications.
4. Limit the total aggregate overall network bandwidth, including all overhead to 192 kbps per client with all conferences active.
5. Utilize Silence Suppression (see glossary).
6. Manual configurability of IP port:

   i) Speed

   ii) Duplex

4.2.3 Conferencing Requirements

The following requirements identify the functional capabilities for handling of "conferences" in the voice system. The term "conference definition" is used to refer to the set of information that defines the participants and the characteristics of a conference, typically pre-defined ahead of time, i.e., not in real time. The activation of a conference definition results in the active real time "conference" which is the joining of system resources to allow group communication. These requirements are intended to relay the required functional capabilities, not to imply a design or design approach.

4.2.3.1 Conference Connections

a. The MOVE Voice Switch Subsystem ***shall*** provide conference connection capability for any User Port (see glossary) in the following modes:

   1. Monitor (listen only participation)
   2. Talk-Listen (simultaneous talk and listen participation)

b. The MOVE Voice Switch Subsystem ***shall*** provide the capability to connect user ports to conference(s) without disruption to other user ports on the same or other conference(s).

c. The MOVE Voice Switch Subsystem ***shall*** provide the capability to disconnect user ports from conference(s) without disruption to other user ports on the same or other conference(s).

d. The MOVE Voice Switch Subsystem ***shall*** support processing of the following conference types:

   1. Pre-defined Conferences -- Conferences defined via pre-defined conference definitions (reference section 4.2.3.2).
   2. Dial-up Conferences -- Conferences created dynamically in real-time (e.g., Plain Old Telephone System (POTS) connections) (reference section 4.2.3.3).

e. The MOVE Voice Switch Subsystem ***shall*** support any number of simultaneous active conferences as defined in Table 4.2.1, column 5 (Conferences).

f. The MOVE Voice Switch Subsystem ***shall*** provide the capability to merge two or more of any active conference types (i.e., participants in one conference can be joined with participants from another conference).

   1. When two or more active conferences are merged, a conference participant's mode (i.e., Talk-Listen or Monitor) ***shall*** automatically, without human intervention, be configured the same as the participant's original conference mode.

g. The MOVE Voice Switch Subsystem ***shall*** provide the capability to return merged conferences to the original (unmerged) state (i.e., return conference participants back to the same state as before the conference merge).

4.2.3.2 Pre-defined Conference Requirements

a. The MOVE Voice Switch Subsystem ***shall*** provide the capability to activate conferences via pre-defined individual Conference Definitions (see glossary).

b. The MOVE Voice Switch Subsystem ***shall*** support activation of pre-defined conference(s) such that each T1 DS0 port defined in the conference definition is activated to the mode as identified for that resource in the conference definition.

c. The MOVE Voice Switch Subsystem ***shall*** support conference de-activation for pre-defined conference definitions such that each T1 DS0 port identified in the conference definition is disconnected from all active participants of the associated conference.

d. The MOVE Voice Switch Subsystem ***shall*** support a minimum of 15,000 simultaneous pre-defined conference definitions.

4.2.3.2.1 Conference Definition Management Requirements

a. The MOVE Voice Switch Subsystem ***shall*** provide support to create a conference definition with the following capabilities at a minimum:
   1. Assign the conference label (per section 4.4.8)
   2. Assign the T1 DS0s to the conference definition
   3. Assign the mode for each assigned conference T1 DS0
      i) Talk-Listen
      ii) Monitor
   4. Assign the signaling type for the conference definition (reference section 4.2.3.4).
   5. Assign the Restricted Talk Conference (RTC) indicator (RTC or non-RTC) (reference section 4.5.1)

b. The MOVE Voice Switch Subsystem ***shall*** support the capability to modify a conference definition as follows:
   1. Active conferences – All parameters, except signaling type, can be modified, without disruption to ongoing conference operations.
   2. Inactive conferences – All parameters can be modified.

c. The MOVE Voice Switch Subsystem ***shall*** support the following conference modification capabilities:
   1. Change the conference label.
   2. Add individual T1 DS0s to an existing conference definition.
   3. Delete individual T1 DS0s from an existing conference definition.
   4. Change the mode for any assigned conference T1 DS0
      i) Talk-Listen
      ii) Monitor
   5. Change the signaling type for the conference definition (reference section 4.2.3.4).
   6. Change the RTC indicator (RTC or non-RTC) (reference section 4.5.1)

d. The MOVE Voice Switch Subsystem ***shall*** support the capability to save a conference definition.

e. The MOVE Voice Switch Subsystem ***shall*** support the capability to delete a conference definition.

f. The MOVE Voice Switch Subsystem ***shall*** support the capability to manage conference definitions by the conference label.

g. The MOVE Voice Switch Subsystem ***shall*** support the capability to display existing conference definition information to the LSA including:
   1. Conference label
   2. Assigned conference T1 DS0
   3. Mode for each assigned conference T1 DS0
   4. Signaling type

5. Conference status (i.e., active or inactive)
6. RTC indicator (RTC or non-RTC) (reference section 4.5.1)

h. The MOVE Voice Switch Subsystem ***shall*** support the capability to activate the following in real-time:
   1. A single conference definition.
   2. A group of conference definitions.

i. The MOVE Voice Switch Subsystem ***shall*** support the capability to deactivate an active conference definition.

4.2.3.3 Dial-up Conferences

a. The MOVE Voice Switch Subsystem ***shall*** support dynamic creation of active conferences for the following:
   1. Incoming POTS calls
   2. Outgoing POTS calls

b. For incoming POTS calls, the MOVE Voice Switch Subsystem ***shall*** provide the following capabilities:
   1. Allow simultaneous independent POTS calls, limited only by the number of configured MOVE Switch Subsystem T1 ports.
   2. Automatically, without user intervention, have an external POTS incoming call routed to one or more keyset users based on line key definitions via the user profile.

c. For outgoing POTS calls, the MOVE Voice Switch Subsystem ***shall*** provide the following capabilities:
   1. Allow simultaneous independent POTS calls, limited only by the number of configured MOVE Switch Subsystem T1 ports.
   2. Allow "telephone" calls to external POTS equipment to be placed (initiated) from MOVE keyset users with required privileges within their user profile.

d. The MOVE Switch Subsystem ***shall*** provide the manual capability to place POTS calls answered at a keyset into a conference as follows:
   1. Add the external T1 DS0 line to the conference via the LSA.
   2. Disconnect the keyset from the external T1 DS0 line without disconnecting the external line from the conference.
   3. Automatically re-enable the external T1 DS0 line to the keyset and simultaneously delete the line from the conference when the caller hangs up.

4.2.3.4 Conference Signaling

a. The MOVE Voice Switch Subsystem ***shall*** provide support for the following conference signaling types:
   1. Manual Conference Signaling (MCS)
   2. Plain Old Telephone Service (POTS) Signaling
   3. No Signaling (i.e., a conference definition with no signaling attributes)

b. The MOVE Voice Switch Subsystem ***shall*** support the following conference signaling characteristics:
   1. No Signaling (i.e., a conference definition with no signaling characteristics)
   2. Incoming Signaling (i.e., ability to detect/respond to an incoming signal from external MOVE equipment)
   3. Outgoing Signaling (i.e., ability to initiate an outgoing signal to external MOVE equipment)
   4. Internal Signaling (i.e., ability to process signaling internal to the MOVE equipment)

c. The MOVE Voice Switch Subsystem ***shall*** process conference definitions with a signaling type of No Signaling as follows:

1. Ignore (not process) Incoming Signaling received from external MOVE equipment
2. Prevent generation of Outgoing Signaling information to external MOVE equipment as a result of processing voice information.

4.2.3.4.1 Manual Conference Signaling (MCS)

a. The MOVE Voice Switch Subsystem ***shall*** support Manual Conference Signaling (MCS) for the following switch interface port types:

1. T1 (to the DS0 level)
2. Local keyset
3. Remote keyset
4. VoIP keyset

b. The MOVE Voice Switch Subsystem ***shall*** process MCS from external T1 DS0 interfaces (i.e., incoming signals).

c. The MOVE Voice Switch Subsystem ***shall*** process MCS to external T1 DS0 interfaces (i.e., outgoing signals).

d. The MOVE Voice Switch Subsystem ***shall*** process internal MCS (i.e., internal signals) for all keyset port types.

e. The MOVE Voice Switch Subsystem ***shall*** provide MCS processing for T1 DS0 ports through the following signaling protocols:

1. Channel Associated Signaling (CAS) or Common Channel Signaling (CCS)

f. The MOVE Voice Switch Subsystem ***shall*** detect the following MCS states:

1. Active
2. Idle (inactive)

g. The MOVE keysets ***shall*** be able to initiate MCS signals using the following sequence:

1. Keyset user activates the conference line key to Talk-Listen mode for a conference with MCS signaling type
2. Keyset user presses a single button (i.e., ring button/line key) on their keyset

h. The MOVE Voice Switch Subsystem ***shall*** detect an active incoming signal by a T1 DS0 port (via CAS and CCS signaling protocols) defined to a conference with MCS signaling type.

i. When MOVE switch interface ports detect a transition from an MCS idle state to an active state, (i.e., MCS Active state), the Voice Switch Subsystem ***shall*** automatically, without user intervention, signal all other MOVE switch ports on the same MCS conference as follows:

1. For keysets with a line key defined to the same MCS conference but not currently connected, notify the keyset user both audibly and visually.
2. For T1 DS0 ports, process the appropriate CAS and CCS signaling protocols to the Active state.

j. The MOVE Voice Switch Subsystem ***shall*** transition a MCS Active state to an idle state (i.e., MCS Idle state) after a predetermined time period (pulse duration).

k. When MOVE switch interface ports detect a transition to an idle state, the Voice Switch Subsystem ***shall*** automatically, without user intervention, signal all other MOVE switch ports on the same MCS conference as follows:

1. For keyset with a line key actively connected to the same MCS conference, terminate keyset audible and visual indications.
2. For T1 DS0 ports, process the appropriate CAS and CCS signaling protocols to the Idle state.

l. The MOVE Voice Switch Subsystem ***shall*** provide a configurable time period (pulse duration) for active MCS states initiated by MOVE equipment.

4.2.3.4.2 Plain Old Telephone Service (POTS) Signaling

a. The MOVE System ***shall*** support Plain Old Telephone Service (POTS) interface capability between the MOVE switch and external PABX (telephone equipment) system(s).

b. The MOVE Voice Switch Subsystem ***shall*** support the POTS signaling interface capability (i.e., the ability to initiate and receive telephone calls to/from external PABX system(s)) for T1 DS0 ports.

c. The MOVE Voice Switch Subsystem ***shall*** provide the following for user ports interfacing with external PABX equipment, automatically without MOVE user intervention:
   1. Detect a disconnect (on-hook condition) initiated by:
      i) Calling party (distant end)
      ii) MOVE keyset user (near end)
   2. Process a disconnect by:
      i) Releasing the affected MOVE switch interface port(s) from this call
      ii) Re-enabling the affected MOVE switch interface port(s) to receive another (new) call

d. The MOVE Voice Switch Subsystem ***shall*** provide a PABX disconnect:
   1. Automatically after a manufacturer defined period of silence (e.g., between 1 and 5 minutes), below a manufacturer configurable audio trigger level
      i) An enable/disable capability for the automatic disconnect ***shall*** be provided.
   2. Via the LSA
   3. If either participant of the call hangs up, except as noted in 4.2.3.3.d

e. T1 ports ***shall*** support signaling exchange for operations with external PABX equipment.

4.2.4 Voice Switch Port Push-To-Talk Operations

(Note: Keyset Push-To-Talk requirements are provided under Section 4.4.6)

a. The MOVE Voice Switch Subsystem ***shall*** provide switch port Push-To-Talk (PTT) operations for T1 ports (CAS or CCS) as follows:
   1. Switch port PTT operations s***hall*** be used to control the port's ability to participate (talk and/or monitor) on any switch connection (e.g., conferences).
   2. Switch port PTT operations ***shall*** be associated with:
      i) Transmission of voice information from the keyset to the Voice Switch (i.e., switch port output)
      ii) Receipt of voice information into the Voice Switch (i.e., switch port input)
   3. Switch ports defined for PTT operations ***shall*** support transmission PTT operations and receiving PTT operations independently.
   4. Switch port PTT operations ***shall*** be configurable as follows:
      i) When enabled, allow port participation (talk and/or monitor) for the selected connection(s) only when it's associated PTT is active (e.g., ABCD signal bits for T1 DS0 ports).
      ii) When disabled, disregard a port's associated PTT state and allow full participation (talk and/or monitor) for the selected connection(s).
   5. Enable and disable for Switch port PTT operations ***shall*** be configurable by the LSA subsystem

6. The Switch Port PTT Response Time (see glossary) for any connection ***shall*** be less than 200 milliseconds under the following conditions:
   i) Regardless of the number of active switch connections
   ii) Regardless of the number of active connections a user has configured

4.2.5 Configuration Requirements

a. The MOVE Voice Switch Subsystem ***shall*** provide the capability to define user profiles for all keyset users.
b. The MOVE Voice Switch Subsystem ***shall*** support a minimum of 15,000 profiles.
c. The MOVE Voice Switch Subsystem ***shall*** require a user ID and password for all user profiles.
d. The MOVE Voice Switch Subsystem ***shall*** provide the capability to define all user privileges (see section 4.4.10) for each user profile.
e. The MOVE Voice Switch Subsystem ***shall*** allow keyset users to move from position-to-position (follow-me capability) with the same type keyset and retain personalized configuration information.
f. The MOVE Voice Switch Subsystem ***shall*** provide the capability to configure at the following levels:
   1. Button-by-Button
   2. Keyset
   3. System

4.3 Local Site Administrator (LSA) Subsystem Requirements

4.3.1 LSA General Requirements

a. The MOVE LSA Subsystem ***shall*** have the following capabilities:
   1. Maintenance of keyset user accounts (add/delete/modify)
   2. Maintenance of LSA user accounts (add/delete/modify)
   3. Disable the ID & password for the following:
      i) LSA user
      ii) Keyset user
   4. Assign/modify user constraints/privileges (see section 4.4.10) on a user ID basis
   5. Assign/de-assign conferences to end instruments
   6. Maintain circuit and conference configuration information
   7. Produce reports describing the internal MOVE system configuration (see section 4.3.9)
   8. Manually configure conferences at any given time
   9. Remote login of a user to a keyset
   10. Maintenance of Mute Group definitions (see 4.5.4)

b. The MOVE LSA Subsystem ***shall*** provide non-intrusive monitoring of all MOVE system activities.

c. The MOVE LSA Subsystem ***shall*** provide control and monitor of all voice switch capabilities.

d. The MOVE LSA Subsystem ***shall*** provide the capability to identify any physical keyset via a unique keyset ID number.

e. Each MOVE LSA Subsystem ***shall*** have a unique identifier.

f. The MOVE LSA Subsystem ***shall*** provide the capability to direct the following to the printer interface:
   1. Any LSA screen image
   2. Any LSA log file
   3. Any LSA report

g. The MOVE LSA Subsystem ***shall*** be able to execute a Type C (virtual) keyset application concurrently with all LSA applications using the same LSA Display Monitor.

h. The MOVE LSA Subsystem(s) ***shall*** support SNMP to external GFE management systems.

4.3.2 LSA Equipment Requirements

a. Each MOVE LSA subsystem ***shall*** include a single display monitor with the following characteristics at a minimum:
   1. Color, flat LCD display
   2. Minimum of 18-inches when measured diagonally from upper corner of display to opposite lower corner
   3. Pixel Resolution of 1280x1024 at a minimum

b. All video output from a single LSA subsystem ***shall*** be driven simultaneously to the following:
   1. The attached display monitor
   2. An additional video output port (to be connected to a GFE display device)

c. Each MOVE LSA subsystem ***shall*** include the following input devices at a minimum:
   1. Computer mouse
   2. Standard computer keyboard

d. Each MOVE LSA subsystem ***shall*** include both of the following printer interfaces:
   1. USB connection
   2. Network connection

e. Each MOVE LSA subsystem ***shall*** include media device(s) to support backup and restore of system files and MOVE configuration information to removable media.

f. Each MOVE LSA subsystem ***shall*** include sufficient control and monitor subsystem resources (e.g., CPU, memory, local storage) to support the following:
   1. Current MOVE operation and configuration for the required site
   2. A 50% growth over the current system in configuration information (e.g., configuration tables sized to support for growth in number of conferences, number of users, etc.)

g. Each MOVE LSA subsystem ***shall*** accept the following power sources:
   1. 100-120 VAC 60 Hz power source
   2. 200-240 VAC 50 Hz power source

4.3.3 LSA Access Requirements

a. The MOVE LSA Subsystem ***shall*** require the entry of the following for each LSA login:
   1. LSA User ID
   2. LSA User Password

b. The MOVE LSA Subsystem ***shall*** validate each LSA login prior to allowing access to the MOVE system.

c. The MOVE LSA Subsystem ***shall*** provide a visual indication of any login rejection for the following:
   1. LSA user attempts to login with an invalid LSA user ID
   2. LSA user attempts to login with an invalid password for the associated LSA user ID

d. The MOVE LSA Subsystem ***shall*** provide the capability for the LSA user to logout of an LSA subsystem.

e. The MOVE LSA Subsystem ***shall*** support at least three levels of access:
   1. System "Root" Level (e.g., possess complete and unrestricted access to the entire system)
   2. Administrative Level (e.g., posses most of the root level authority with limited restrictions)
   3. Operator Level (e.g., will be limited to running, modifying and monitoring routines with restrictions imposed to prevent accidental or intentional system wide changes)

f. The MOVE LSA Administrator and Root accounts ***shall*** be authorized to Create, Modify, and Delete all other Operator.

g. The MOVE LSA Subsystem ***shall*** support at least five Administrator accounts.

h. The MOVE LSA Subsystem ***shall*** support defining at least 100 individual Operator accounts.

i. The MOVE LSA Subsystem ***shall*** require separate logins to each switch system being accessed.

4.3.4 LSA User Interface Requirements

a. The MOVE LSA Subsystem ***shall*** provide an interactive Graphical User Interface (GUI) for all MOVE system status and control functions.

b. The MOVE LSA Subsystem GUI ***shall*** include a tool for configuration/reconfiguration, including the following capabilities at a minimum: Cut, Past, Copy, Save.

4.3.5 LSA Conference Configuration Requirements

4.3.5.1 Conference Definition Management

a. The MOVE LSA Subsystem ***shall*** provide the capability to create a conference definition, including the following information:
   1. Conference label (per section 4.4.8)
   2. Assigned conference user port(s)
   3. Mode for each assigned conference user port:
      i) Talk-Listen
      ii) Monitor
   4. Signaling type (reference section 4.2.3.4)
   5. Assign the RTC indicator (RTC or non-RTC) (reference section 4.5.1)

b. The MOVE LSA Subsystem ***shall*** provide the capability to manage conference definitions by the conference label.

c. The MOVE LSA Subsystem ***shall*** provide the capability to modify a conference definition whether it is currently active or inactive, including the following capabilities:
   1. Change the conference label.
   2. Add individual user ports to an existing conference definition.
   3. Delete individual user ports from an existing conference definition.
   4. Change the mode for any assigned conference user port:
      i) Talk-Listen
      ii) Monitor
   5. Change the signaling type (reference section 4.2.3.4)
   6. Change the RTC indicator (RTC or non-RTC) (reference section 4.5.1)

d. The MOVE LSA Subsystem ***shall*** provide the capability to save a conference definition.

e. The MOVE LSA Subsystem ***shall*** provide the capability to delete a conference definition.

f. The MOVE LSA Subsystem ***shall*** provide the capability to display the following for any/all existing conference definitions:
   1. Conference label
   2. Assigned conference T1 DS0
   3. Mode for each assigned conference T1 DS0
   4. Signaling type
   5. Conference status (i.e., active or inactive)
   6. RTC indicator (RTC or non-RTC) (reference section 4.5.1)

g. The MOVE LSA Subsystem shall provide the capability to provide groupings of conference definitions.
   1. The MOVE LSA Subsystem ***shall*** not limit the number of conference definitions defined in a group.

h. The MOVE LSA Subsystem ***shall*** support the capability to activate the following in real-time:
   1. A single conference definition
   2. A group of conference definitions via the same method used to invoke a single conference definition

i. The MOVE LSA Subsystem ***shall*** support the capability to deactivate an active conference definition.

j. The MOVE LSA Subsystem ***shall*** provide the capability to display advisories/messages concerning conference definition management.

k. The MOVE LSA Subsystem ***shall*** have the capability to merge two or more conference definitions whether it is currently active or inactive (i.e., participants in one conference can be joined with participants from another conference)

l. The MOVE LSA Subsystem ***shall*** have the capability to return merged conferences to the original (unmerged) state (i.e., return conference participants back to the same state as before the conference merge).

4.3.5.2 Dial-up Conference Processing

a. The MOVE LSA Subsystem ***shall*** provide the capability to display all active dial-up conferences (i.e., POTS incoming and POTS outgoing)

b. The MOVE LSA Subsystem ***shall*** provide the capability to connect a PABX T1 DS0 port with an active incoming POTS call to any active pre-defined conference.

c. The MOVE LSA Subsystem ***shall*** provide the capability to connect a PABX T1 DS0 port with an active outgoing POTS call to any active pre-defined conference.

d. The MOVE LSA Subsystem ***shall*** provide the capability to disconnect a PABX T1 DS0 port from an active pre-defined conference.

4.3.6 LSA Configuration Management Requirements

a. The MOVE LSA Subsystem ***shall*** allow for any LSA position to control and monitor any of the switch subsystems individually (i.e., simultaneous access is not required).

   1. Each LSA display ***shall*** visibly display the switch "system ID" identifying the switch system the LSA is currently logged into.

b. The MOVE LSA ***shall*** have the capability to selectively communicate with and control any MOVE switch.

c. When multiple, concurrent LSA subsystems are in operation on the same MOVE switch, each LSA ***shall*** have the capability to view the same system configuration from the same logical data set information in parallel.

d. Multiple MOVE LSA subsystems ***shall*** have the capability to process the same logical data set.

e. When a MOVE LSA subsystem is actively processing a logical data set, other LSA subsystems ***shall***:

   1. Be locked out from processing (e.g., update, activate, etc.) that same logical data set until the initial LSA processing is complete.

   2. Receive a warning when attempting to access the same logical data set.

4.3.7 LSA Display and Control Requirements

a. Each MOVE LSA subsystem ***shall*** provide a Graphical User Interface (GUI) for each LSA.

b. The MOVE LSA subsystem ***shall*** have the capability to display currently active user/LSA access including the following:

   1. All keyset user IDs actively logged in and the associated keyset ID.

   2. All LSA user IDs actively logged in and the associated LSA subsystem ID.

c. The MOVE LSA Subsystem ***shall*** provide the capability to define the number of simultaneous talk conferences allowed on a keyset user ID basis from zero (no talk) to at least eight.

d. The MOVE LSA Subsystem ***shall*** provide the capability to enable and disable switch ports for PTT operations.

e. The MOVE LSA Subsystem ***shall*** provide the capability to configure the talk capability without affecting monitoring capabilities.

f. The MOVE LSA Subsystem ***shall*** have a means to simultaneously release all parties from a conference.

   1. Execution of the release ***shall*** require positive confirmation by the LSA user.

g. The MOVE LSA Subsystem ***shall*** provide the capability to display the following system information:
   1. Current Active Conference Configuration Information
   2. Current Equipment Status
   3. Alarm Events
   4. Keyset User Profile Data
   5. LSA User Profile Data

h. The MOVE LSA subsystem ***shall*** have the capability to display all active conferences.

i. The MOVE LSA Subsystem ***shall*** have the capability to display existing conference definition information to the LSA including:
   1. Conference label
   2. Connectivity information (i.e., resources)
   3. Connectivity modes for each resource
   4. Signaling support
   5. Conference status (i.e., active or inactive)

j. The MOVE LSA Subsystem ***shall*** provide the capability to view resources via a unique visual indication associated with a specified conference, including but not limited to the following:
   1. User ports connected
   2. Connected keysets and user IDs
   3. Unique visual indication of connect mode per user port (e.g., Talk-Listen, Monitor, etc.)

k. The MOVE LSA Subsystem ***shall*** provide the capability to manage LSA user and keyset user privileges, including the following controls:
   1. Addition of privileges to an existing user profile
   2. Deletion of privileges from an existing user profile
   3. Modification of privileges on an existing user profile

l. The MOVE LSA Subsystem ***shall*** provide the capability to monitor and display Health and Status Information per Section 4.7

m. The MOVE LSA Subsystem ***shall*** provide the capability to perform MOVE Diagnostics (see section 4.6) including the following controls:
   1. Initiate
   2. Monitor
   3. Terminate

n. The MOVE LSA Subsystem ***shall*** provide the following capabilities:
   1. LSA-initiated backup of system files to removable media while indicating progress and status
      i) System backup processing ***shall*** run in real-time, non-intrusive to ongoing system operations.
   2. LSA-initiated restore of system files from removable media while indicating progress and status
   3. Support for automatic backup capability:
      i) Ability to define when an automatic backup is to execute
      ii) Ability to define the resources to be backed up during an automatic backup
      iii) Ability to modify an automatic backup definition

o. For MOVE switch subsystems with AGC capability, the MOVE LSA Subsystem ***shall*** provide the capability to manage the AGC settings as follows:
   1. Enable the level control setting for the input ports on the switch.

2. Disable the level control setting for the input ports on the switch.

p. For MOVE switch subsystems without the AGC capability, the MOVE LSA Subsystem ***shall*** provide the capability to configure level controls on all T1 ports at the DS0 level (inputs and outputs).

q. The MOVE LSA Subsystem ***shall*** have the capability to enable/disable the automatic PABX disconnect (4.2.3.4.3.d.1).

r. The MOVE LSA Subsystem ***shall*** have the capability to disconnect a PABX from an active conference.

4.3.8 LSA Alarm Requirements

a. The MOVE LSA Subsystem ***shall*** provide alarms to indicate system malfunctions from any conditions affecting service.

b. The MOVE LSA Subsystem ***shall*** provide support for all of the following alarm types:

1. Audible alarms
2. Visual alarms

c. The alarms ***shall*** be configurable for different types of classes. (e.g., Major, Minor, and Catastrophic)

d. The different classes of alarms ***shall*** be visually discernible (e.g., Minor alarms are yellow while Catastrophic alarms are red)

e. Each audible alarm ***shall*** be configurable to repeat at defined intervals until cleared.

f. The MOVE LSA Subsystem ***shall*** provide a capability to silence the audible alarm.

g. Silencing an audible alarm ***shall***:

1. Be non-intrusive to future alarms.
2. Be non-intrusive to the visual alarm indicator.

h. The MOVE LSA Subsystem ***shall*** provide the capability to clear alarms.

i. The MOVE LSA Subsystem ***should*** generate an alarm when MOVE resources (e.g., memory, buffer space, etc.) drop to or below a predetermined amount.

4.3.9 LSA Report Generation Requirements

a. The MOVE LSA subsystem ***shall*** provide the capability to generate user-configurable reports with the following output options:

1. Display the report at the requesting LSA subsystem display.
2. Save the report to a user-specified location with user-specified file name.
3. Direct the report output to the LSA subsystem printer interface.

b. The MOVE LSA Subsystem ***shall*** be able to define and save report templates based on content and format definition.

c. The MOVE LSA Subsystem ***shall*** have the capability to generate reports based on selected content from all data elements within the MOVE system.

d. The MOVE LSA Subsystem ***shall*** provide the capability to generate reports based on the following:

1. Real-time data (i.e., current active configuration information)
2. Historical data

e. Historical records ***shall*** be available online within the system database for a minimum of 30 days.

f. The MOVE LSA subsystem reporting capability ***shall*** include, but not be limited to the following:

1. Individual LSA user or groups of users, including but not limited to:

i) LSA User ID

ii) LSA User login time
iii) LSA User logout time
iv) LSA activities including date/time references for the following during user-specified period(s):
(1) File creation
(2) File modification
(3) File deletion
(4) Conference configurations
(5) Switch system configuration changes/updates

2. Individual keyset users or groups of user, including but not limited to:
i) Keyset User ID
ii) Keyset User login time
iii) Keyset User logout time
iv) Keyset user activities including date/time references for the following during user-specified period(s):
(1) Keyset configuration changes
(2) Conference participation
3. System conference activity, including but not limited to the following on a conference basis:
i) Conference definition information (see section 4.2.3.2.1)
ii) Number of participants
iii) User ID of participants
iv) Keyset ID of participants

4.3.10 LSA Event Logging Requirements

a. The MOVE LSA Subsystem ***shall*** provide for system event logging with the following capabilities:
1. The capability to display event logging at any LSA Subsystem display
2. The capability to direct the event-logging information output to the LSA subsystem printer interface
3. The capability to utilize event logging information in LSA reports

b. The MOVE LSA Subsystem ***shall*** provide the capability to maintain event logging information for a minimum of 30 days.

c. Individual events ***shall*** be time stamped with a date and time reference.
1. Time/date stamping ***should*** be in a DDD:HH:MM:SS format.

d. The MOVE LSA Subsystem ***shall*** provide logging of the following LSA initiated actions at a minimum:
1. Switch configuration updates
2. Conference connectivity execution with success/unsuccessful status
3. Keyset user profile updates
4. LSA user profile updates
5. Diagnostics with pass/fail status
6. Conference configuration updates
7. Restricted Talk Conference configuration changes
8. Keyset Monitoring configuration changes
9. Remote keyset login/logout from the LSA

10. Mute Group definition changes (see section 4.5.4)

e. The MOVE LSA Subsystem ***shall*** provide logging of the following unsolicited events at a minimum:
   1. Keyset user sign on (successful and failed attempts)
   2. Keyset user sign off
   3. Health Status events indicating a change in status of individual LRUs
   4. Keyset configuration updates saved by keyset user
   5. Alarm Events

f. The MOVE LSA Subsystem ***shall*** provide logging of the following for each LSA sign on/sign off attempt:
   1. LSA user ID
   2. LSA subsystem identifier
   3. Success or failure of each sign on/sign off attempt

g. The MOVE LSA Subsystem ***shall*** provide logging of the following for each keyset sign on/sign off attempt:
   1. Keyset user ID
   2. Physical (unique) identification of keyset utilized
   3. Success or Failure of sign on/sign off attempt

4.4 Keysets Requirements

The MOVE user end instruments consist of keysets that will reside at both local and remote locations. All other end instruments, such as external speakers and amplifiers, will be site-provided and are not a part of this MOVE procurement.

4.4.1 Keyset General Requirements

a. MOVE keysets ***shall*** be provided in a minimal set of standardized types as provided in Table 4.4.2 to support the keyset features and physical attributes.

b. If a keyset includes multiple Ethernet interfaces, each Ethernet interface ***shall*** be independent of any other Ethernet interface.

c. All VoIP-enabled MOVE keysets ***shall*** support per the following:

1. 100 Mbps Fast Ethernet (IEEE 802.3u, 100Base-TX)
2. Be configurable to tag the following:
   i) All Ethernet packets with appropriate Class of Service (CoS) value (default to 5)
   ii) All IP packets with appropriate IP precedence value in Type of Service (ToS) byte (default to 5)
3. Support the IEEE 802.1P & 802.1Q specifications.
4. Provide capability for configuring an IP address for VoIP communications per the following:
   i) Statically
   ii) Dynamically (DHCP)
5. Provide manual configurability of IP port:
   i) Speed
   ii) Duplex
6. Maximum total aggregate bandwidth utilization of 192 kbps per client with all conferences active.
7. Provide silence suppression (see glossary)

d. All MOVE keyset headset/handset interfaces ***shall*** each support the following:

1. Independent T/L capability
2. Electrical characteristics:
   i) 50-150 ohms transmit (Tx)
   ii) 150-1000 ohms receive (Rx)
   iii) PTT capabilities

e. For all MOVE keysets with an internal speaker, the speaker ***shall*** have a Sound Pressure Level (SPL) rating of at least 80dB at a distance of 1 meter.

f. MOVE keysets ***shall*** have dimensions as described in Figure 4.4.2.a and as specified per Keyset Types in Table 4.4.2.

1. If protrusion forward of the mounting plate or flanges is necessary, (e.g., needed to satisfy depth requirements, or inherent in the COTS design), the protrusion Dimension "B" ***shall*** be within the maximum specified in Table 4.4.2.

g. All rack-mounted MOVE keyset types identified in Table 4.4.2 ***shall*** include provisions for rack-mount applications, compliant with EIA-310-E standard.

h. Rack mounted and console mounted MOVE keysets ***shall***, inclusive of their associated mounting hardware, exactly fit into their respective width (W) and height (H) such that no void spaces are present.

i. Rack mounted and console mounted MOVE keysets ***shall*** include in their Depth (D) dimension all connector protrusions on the keyset.

j. MOVE keyset power cords ***shall*** have an overall length of at least ten (10) feet.

k. Where converters are used to convert facility power to DC power, the adapter and power line ***shall*** be constructed such that the compatible line cord can be plugged in to a standard electrical outlet without obstructing adjacent outlets (i.e., "bricks" with molded prongs are unacceptable).

l. All MOVE Copper Local Keyset interfaces ***shall*** be capable of driving signals to the MOVE Voice Switch with gauge as small as 24-AWG copper cabling at least 1.8 km, without the use of repeaters or other devices.

m. MOVE keyset interfaces with a dual-homed capability (see glossary) as specified in Table 4.4.2 ***shall*** provide the capability to connect one end instrument to two voice switch subsystems with one switch connection active at a time.

n. MOVE keysets with speaker interfaces (internal or external) ***shall*** provide an On/Off capability for each speaker interface.

o. MOVE keysets with speaker interfaces (internal or external) ***shall*** provide the capability to mute each speaker without user intervention when the PTT signal is activated.

p. MOVE keysets with speaker interfaces (internal or external) ***shall*** be provided as follows:

   1. **For GSFC keysets**, have the capability to select conferences to be heard at the headset/handset that are different from conferences simultaneously heard at the speaker.

   2. **For non-GSFC keysets**, have the capability to select conferences to be simultaneously heard at both the headset/handset and the speaker.

4.4.2 Keyset Packaging Requirements

a. MOVE Keysets ***shall*** be available in a **Type A Outdoor Jackbox** Keyset Packaging (For KSC only) with the following requirements:

1. **Type A Outdoor Jackbox** keysets ***shall*** have one Copper interface (local/remote) to the switch.
2. **Type A Outdoor Jackbox** keysets ***shall*** have the following Audio Components:
   i) Four connectors for external headsets and handsets, each with the following characteristics:
      (1) Headset/handset connectors ***shall*** allow for easy user access.
      (2) Headset/handset connectors ***shall*** have U79 connector receptacle.
      (3) Headset/handset connectors ***shall*** include tethered protective caps
3. **Type A Outdoor Jackbox** keysets ***shall*** be capable of being individually powered from a site-provided 48-volt DC power source.
4. **Type A Outdoor Jackbox** keysets ***shall*** have the following User Interfaces:
   i) Volume Control (as specified in section 4.4.7)
   ii) An adjustable read-out/display capability to be viewable under all outside lighting conditions
      (1) 8 configurable line keys minimum
5. **Type A Outdoor Jackbox** keysets ***shall*** have the following specifications:
   i) Allow mounting without obstruction to the keyset interfaces.
   ii) Withstand vibrations of 0.02-inch double amplitude for frequencies between 5Hz and 50Hz for 10 minutes.
   iii) Perform to the following physical and environmental specifications, or equivalent, without degradation to operability and functionality:
      (1) UV resistance and solar loading per MIL-STD-810F Method 505.4
      (2) 60 MPH wind-driven rain per MIL-STD-810F Method 506.4, Procedures I and III
      (3) Humidity conditions per MIL-STD-810F Method 507.4
      (4) Susceptibility to fungal growth per MIL-STD-810F Method 508.5
      (5) High salt concentrations per MIL-STD-810F Method 509.4
      (6) Sand and dust conditions per MIL-STD-810F Method 510.4, Procedures I and II

b. MOVE Keysets ***shall*** be available in a **Type B Hazardous Environment** Keyset Packaging (For KSC only) with the following requirements:

1. **Type B Hazardous Environment** keysets ***shall*** have one Copper interface (local/remote) to the switch.
2. **Type B Hazardous Environment** keysets ***shall*** have the following Audio Components:
   i) Four connectors for external headsets and handsets, each with the following characteristics:
      (1) Headset/handset connectors ***shall*** allow for easy user access.
      (2) Headset/handset connectors ***shall*** have U79 connector receptacle.
      (3) Headset/handset connectors ***shall*** include tethered protective caps
3. **Type B Hazardous Environment** keysets ***shall*** be capable of being individually powered from a site-provided 48-volt DC power source.
4. **Type B Hazardous Environment** keysets ***shall*** have the following User Interfaces:
   i) Volume Control (as specified in section 4.4.7)
   ii) An adjustable read-out/display capability to be viewable under all outside lighting conditions
      (1) 8 configurable line keys minimum
5. **Type B Hazardous Environment** keysets ***shall*** have the following specifications:
   i) Allow mounting without obstruction to the keyset interfaces.
   ii) Be certified to operate in a Class 1 Division 2 hazardous environment to include Atmosphere Groups A, B, C, and D.
   iii) Withstand vibrations of 0.02-inch double amplitude for frequencies between 5Hz and 50Hz for 10 minutes.
   iv) Perform to the following physical and environmental specifications, or equivalent, without degradation to operability and functionality:
      (1) UV resistance and solar loading per MIL-STD-810F Method 505.4
      (2) 60 MPH wind-driven rain per MIL-STD-810F Method 506.4, Procedures I and III
      (3) Humidity conditions per MIL-STD-810F Method 507.4
      (4) Susceptibility to fungal growth per MIL-STD-810F Method 508.5
      (5) High salt concentrations per MIL-STD-810F Method 509.4
      (6) Sand and dust conditions per MIL-STD-810F Method 510.4, Procedures I and II

c. MOVE keysets ***shall*** be available in a **Type C Virtual** Keyset Packaging with the following requirements:

1. **Type C "Virtual Keysets"** (see glossary) Packaging configurations ***shall*** be:
   i) Compatible with Windows 2000/XP at a minimum
   ii) Compatible with MAC OS 10.3.8 at a minimum
2. **Type C Virtual** Keysets ***shall*** have the following capabilities:
   i) GUI-based
   ii) VoIP capability
3. **Type C Virtual** Keysets ***shall*** provide software to support the following User Interfaces capabilities:
   i) 24 configurable Line Keys per page minimum
   ii) 120 Line Keys minimum
   iii) Keyboard/mouse or touchscreen
   iv) Volume Control (as specified in section 4.4.7)
   v) Conference Picklist (see section 4.4.8)

d. MOVE Keysets ***shall*** be available in the following **Type D** Keyset Packages:

1. **Type D** keysets ***shall*** be available in a **Desktop** configuration with the following requirements:
   i) **Type D Desktop** keysets ***shall*** be packaged as one physical assembly.
   ii) **Type D Desktop** keysets ***shall*** support the following Device Interfaces:
      (1) **Type D Desktop** keysets will be used on both VoIP switch interfaces and copper switch interfaces. Type D Desktop keysets ***shall*** support the following switch Interfaces although not required simultaneously:
         (a) An Ethernet interface with VoIP capability
         (b) Two Copper Interfaces (local or remote) to the switch with Dual-homed (see glossary) capability
      (2) **For JSC and MCC-M only**, a Serial Audible Alarm Interface as defined in Section 4.5.3.
      (3) Provide an interface for an external audio input signal to be heard at the user headset. (e.g., audio output from a PC sound board is to be directed to the user headset via physical connection on keyset or external headset wiring, etc.)
   iii) **Type D Desktop** keysets ***shall*** have the following Audio Components:
      (1) An Internal Speaker
      (2) Two user-accessible (e.g., front-mounted) T/L PJ7 headset/handset connectors (dual jacks, 3-conductor per jack)
      (3) A wire-out interface located on the rear of the keyset for the following:
         (a) Connectorized interface(s) on the keyset (e.g., DB25, multiple DB9, etc)
         (b) At least four independent T/L headset/handset connections
         (c) One powered external speaker connection, with either of the following characteristics:
            (i) One 8-ohm analog signal pair and one 48-VDC power pair (preferred) OR
            (ii) One 600-ohm analog signal pair and one 48-VDC power pair (acceptable)
   iv) **Type D Desktop** keysets ***shall*** have the following Power Interfaces:
      (1) Be capable of being individually powered from a site-provided 48-volt DC power source
      (2) Be capable of being individually powered from a site-provided 120-volt AC power source via a NEMA 5-15P compatible power cord.

(3) Be capable of being individually powered from a site-provided 200-240 volt AC 50 Hz power source.

v) **Type D Desktop** keysets ***shall*** have the following User Interfaces:

(1) A rear-mounted power on/off switch (preferred) OR a detachable power cord (acceptable)

(2) Touchscreen that is as large as practical, but not less than 32 square inches of usable area

(a) A minimum character height of 0.11 inches (or 8 pt font) for display

(b) Characters be visible in all office environment light level conditions

(c) 24 configurable line keys per page minimum

(d) 240 Line Keys minimum

(e) DTMF (may be fixed or soft DTMF pad)

(f) Volume Control (as specified in section 4.4.7)

(g) A conference Picklist (see section 4.4.8)

vi) **Type D Desktop** Keysets ***shall*** have the following features:

(1) The housing surface area to be a dark neutral color (e.g., charcoal)

(2) Allow unobstructed access of the keyset user interfaces on a level surface.

(3) Provide an upward-facing (telephone-style) orientation.

(4) Allow a front-facing desktop orientation.

(5) Allow a wall-mount orientation.

2. **Type D** keysets ***shall*** be available in a **Rackmount 4U** configuration with the following requirements:

i) **Type D Rackmount 4U** keysets ***shall*** have the following Device Interfaces:

(1) **Type D Rackmount 4U keysets** will be used on both VoIP switch interfaces and copper switch interfaces. Type D Rackmount 4U keysets ***shall*** support the following switch Interfaces although not required simultaneously:

(a) An Ethernet interface with VoIP capability

(b) Two Copper Interfaces (local or remote) to the switch with Dual-homed (see glossary) capability

(2) **For JSC and MCC-M only**, a Serial Audible Alarm Interface as defined in Section 4.5.3.

(3) An interface for an external audio input signal to be heard at the user headset. (e.g., audio output from a PC sound board is to be directed to the user headset via physical connection on keyset or external headset wiring, etc.)

ii) **Type D Rackmount 4U** keysets ***shall*** have the following Audio Components:

(1) An Internal Speaker

(2) Two user-accessible (e.g., front-mounted) T/L PJ7 headset/handset connectors (dual jacks, 3-conductor per jack)

(3) A wire-out interface located on the rear of the keyset for the following:

(a) Connectorized interface(s) on the keyset (e.g., DB25, multiple DB9, etc)

(b) At least four independent T/L headset/handset connections

(c) One powered external speaker connection, with either of the following characteristics:

(i) One 8-ohm analog signal pair and one 48-VDC power pair (preferred) OR

(ii) One 600-ohm analog signal pair and one 48-VDC power pair (acceptable)

iii) **Type D Rackmount 4U** keysets ***shall*** have the following Power Interfaces:

(1) Be capable of being individually powered from a site-provided 48-volt DC power source

(2) Be capable of being individually powered from a site-provided 120-volt AC power source via a NEMA 5-15P compatible power cord.

(3) Be capable of being individually powered from a site-provided 200-240 volt AC 50 Hz power source.

iv) **Type D Rackmount 4U** keysets ***shall*** have the following User Interfaces:

(1) A rear-mounted power on/off switch (preferred) OR a detachable power cord (acceptable)

(2) Touchscreen that is as large as practical, but not less than 32 square inches of usable area

(a) A minimum character height of 0.11inches (or 8 pt font) for display

(b) Characters be visible in all office environment light level conditions

(c) 24 configurable line keys per page minimum

(d) 240 Line Keys minimum

(e) DTMF (may be fixed or soft DTMF pad)

(f) Volume Control (as specified in section 4.4.7)

(g) A Conference Picklist (see section 4.4.8)

v) **For the Type D Rackmount 4U** keysets, the housing surface area ***shall*** be a dark neutral color (e.g., charcoal)

3. **Type D** keysets ***shall*** be available in a **Vertical Console** configuration with the following requirements:

i) **Type D Vertical Console** keysets ***shall*** have the following Device Interfaces:

(1) **Type D Vertical Console keysets** will be used on both VoIP switch interfaces and copper switch interfaces. Type D Vertical Console keysets ***shall*** support the following switch Interfaces although not required simultaneously:

(a) An Ethernet interface with VoIP capability

(b) Two Copper Interfaces (local or remote) to the switch with Dual-homed (see glossary) capability

(2) **For JSC and MCC-M only**, a Serial Audible Alarm Interface as defined in Section 4.5.3.

(3) An interface for an external audio input signal to be heard at the user headset. (e.g., audio output from a PC sound board is to be directed to the user headset via physical connection on keyset or external headset wiring, etc.)

ii) **Type D Vertical Console** Keysets ***shall*** have the following Audio Components:

(1) An Internal Speaker (Does not have to be front-facing)

(2) A wire-out interface located on the rear of the keyset for the following:

(a) Connectorized interface(s) on the keyset (e.g., DB25, multiple DB9, etc)

(b) At least four independent T/L headset/handset connections

(c) One powered external speaker connection, with either of the following characteristics:

(i) One 8-ohm analog signal pair and one 48-VDC power pair (preferred) OR

(ii) One 600-ohm analog signal pair and one 48-VDC power pair (acceptable)

iii) **Type D Vertical Console** Keysets ***shall*** have the following Power Interfaces:

(1) Be capable of being individually powered from a site-provided 120-volt AC power source via a NEMA 5-15P compatible power cord.

(2) Be capable of being individually powered from a site-provided 200-240 volt AC 50 Hz power source.

iv) **Type D Vertical Console** Keysets ***shall*** have the following User Interfaces:

(1) A rear-mounted power on/off switch (preferred) OR a detachable power cord (acceptable)

(2) Touchscreen that is as large as practical, but not less than 32 square inches of usable area

(a) A minimum character height of 0.11 inches (or 8 pt font) for display

(b) Characters be visible in all office environment light level conditions

(c) 24 configurable line keys per page minimum

(d) 240 Line Keys minimum

(e) DTMF (may be fixed or soft DTMF pad)

(f) Volume Control (as specified in section 4.4.7)

(g) A conference Picklist (see section 4.4.8)

v) **For the Type D Vertical Console** Keysets, the housing surface area ***shall*** be a dark neutral color (e.g., charcoal).

e. MOVE keysets ***shall*** be available in a **Type E Rackmount 2U** Keyset Packaging with the following requirements:

1. **Type E Rackmount 2U** keysets will be used on both VoIP switch interfaces and local copper switch interfaces. **Type E Rackmount 2U** keysets ***shall*** support the following Device Interfaces although not required simultaneously:

i) An Ethernet interface with VoIP capability

ii) A Copper interface (local/remote) to the switch

2. **Type E Rackmount 2U** Keysets ***shall*** have the following Audio Components:

i) An Internal Speaker

ii) Two user-accessible (e.g., front-mounted) T/L PJ7 headset/handset connectors (dual jacks, 3-conductor per jack)

iii) A wire-out interface located on the rear of the keyset for the following:

(1) Connectorized interface(s) on the keyset (e.g., DB25, multiple DB9, etc)

(2) At least four independent T/L headset/handset connections which support individual PTT operation as detailed in section 4.4.6

3. **Type E Rackmount 2U** Keysets ***shall*** have the following Power Interfaces:

i) Be capable of being individually powered from a site-provided 48-volt DC power source

ii) Be capable of being individually powered from a site-provided 120-volt AC power source via a NEMA 5-15P compatible power cord.

4. **Type E Rackmount 2U** Keysets ***shall*** have the following User Interfaces:

i) May be programmable PBI with alphanumeric display/readout

(1) A minimal character height of 0.11 inches (or 8 pt font)

(2) 24 configurable line keys minimum

ii) DTMF (may be fixed or soft DTMF pad)

iii) Volume Control (as specified in section 4.4.7)

Figure 4.4.2.a Keyset Dimension Reference

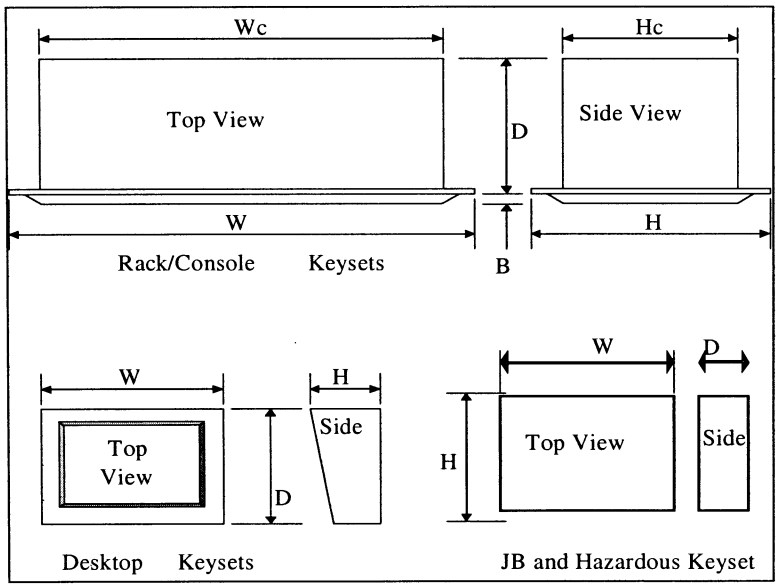

Table 4.4.2 Keyset Packaging Summary

Type	Package	Dimensions	Audio Components	Device Interfaces	Power Interfaces	User Interfaces
A	Outdoor Jackbox	14"W maximum 8"H maximum 9"D maximum	• 4 T/L headset Jacks (U79)	• Copper switch interface (local or remote)	• 48 VDC	• 8 configurable Line Keys minimum • Volume control • Read-out or Display
B	Hazardous Environment	14"W maximum 8"H maximum 9"D maximum	• 4 T/L headset Jacks (U79)	• Copper switch interface (local or remote)	• 48 VDC	• 8 configurable Line Keys minimum • Volume Control • Read-out or Display
C	Virtual Keyset (GUI-based)	N/A	N/A	• Software Workstation Client • Compatible with Windows 2K/XP and MAC 10.3.8 at a minimum • VoIP-Capable	N/A	• Up to 24 configurable Line keys per page minimum • 120 Line Keys minimum • A pick-list capability • Keyboard/mouse interface OR Touchscreen interface • Volume Control

Type	Package	Dimensions	Audio Components	Device Interfaces	Power Interfaces	User Interfaces

D	(1) Desktop	9" W maximum
		5" H maximum
		10" D maximum
			• 2 T/L headset Jacks (front-PJ7)
			• 4 T/L headset (a wire-out Interface) (rear)
			• Internal Speaker
			• Powered Speaker Interface (wire-out)
				• 1 Serial Audible Alarm (JSC and MCC-M only)
				• 1 external interface for an audio input signal
				• Copper switch interface (local or remote)
				  • Dual-homed
				• Ethernet switch Interface
				  • VoIP-Capable
					• 48 VDC
					• 120 VAC
					• 240 VAC
						• 24 configurable Line keys per page minimum
						• 240 Line Keys minimum
						• A pick-list capability
						• Touchscreen
						• DTMF pad (may be soft or fixed)
						• Volume control

	(2) Rackmount 4U	19" W exact
		15.9" Wc maximum
		4U H exact
		6.45" D maximum
		2" B maximum
			• 2 T/L headset Jacks (front-PJ7)
			• 4 T/L headset (a wire-out Interface) (rear)
			• Internal Speaker
			• Powered Speaker Interface (wire-out)
				• 1 Serial Audible Alarm (JSC and MCC-M only)
				• 1 external interface for an audio input signal
				• Copper switch interface (local or remote)
				  • Dual-homed
				• Ethernet switch Interface
				  • VoIP-Capable
					• 48 VDC
					• 120 VAC
					• 240 VAC
						• 24 configurable Line keys per page minimum
						• 240 Line Keys minimum
						• A pick-list capability
						• Touchscreen
						• DTMF pad (may be soft or fixed)
						• Volume control

	(3) Vertical Console	9.5" W exact
		7.7" Wc maximum
		14.0" H exact
		13.9" Hc maximum
		11" D maximum
		2" B maximum
			• 4 T/L headset (a wire-out Interface) (rear)
			• Internal Speaker
			• Powered Speaker Interface (wire-out)
				• 1 Serial Audible Alarm (JSC and MCC-M only)
				• 1 external interface for an audio input signal
				• Copper switch interface (local or remote)
				  • Dual-homed
				• Ethernet switch Interface
				  • VoIP-Capable
					• 120 VAC
					• 240 VAC
						• 24 configurable Line keys per page minimum
						• 240 Line Keys minimum
						• A pick-list capability
						• Touchscreen
						• DTMF pad (may be soft or fixed)
						• Volume control

E	Rackmount 2U	19" W exact 17.5" Wc maximum 2U H exact 11" D maximum 0.5" B maximum	• 2 T/L headset Jacks (front-PJ7) • 4 T/L headset (a wire-out Interface) (rear) • Internal Speaker	• Copper switch interface (local or remote) • Ethernet switch Interface • VoIP-Capable	• 48 VDC • 120 VAC	• 24 configurable Line keys • DTMF pad (may be soft or fixed) • Volume control

4.4.3 Keyset Functional Requirements

a. MOVE keysets ***shall*** display visual indicators when voice activity is present on any active line key.

b. MOVE keysets Types C and D ***shall*** provide the capability to display advisories (e.g., "User is already logged on").

c. MOVE keysets Types C and D ***shall*** be re-configurable by the user in real-time from user privileges and constraints.

d. The MOVE keysets ***shall*** provide a visual and audible indication to the keyset user for all incoming signaling.

e. The MOVE Type D and E keysets ***shall*** include the capability to support PABX interfaces via line key definitions and Plain Old Telephone Service (POTS) emulation.

f. The MOVE keysets ***shall*** support MCS signaling (reference 4.2.3.4.1) as follows:

1. From the initiating keyset:
   - i) The selected conference must be in Talk-Listen mode and defined with MCS signaling type
   - ii) The signal must be initiated via a single button, manual entry
2. To the receiving keyset:
   - i) The keyset provides an indication to the user of signal receipt, including the following:
     - (1) Audible Tone – 400 Hz ± 5%
     - (2) Visual Indication
     - (3) Duration – 3 seconds
   - ii) The keyset outputs the audible tone through the following:
     - (1) Internal speaker
     - (2) External speaker interface
     - (3) All headset/handset interfaces

4.4.4 Keyset User Sign-on/Sign off Requirements

a. MOVE keysets ***shall*** support remote activation. (i.e., allow remote sign-on by the LSA designating a particular user ID to be signed on to a particular keyset).

b. MOVE keysets Types C and D ***shall***:

1. Require a user login.
2. Require a user entry of a user ID and password.
3. Provide a visual indication of the rejection at the keyset for the following:
   - i) If a user attempts to sign-on with a user ID that is currently signed on at another keyset
   - ii) If a user attempts to sign-on with an invalid user ID
   - iii) If a user attempts to sign-on with an invalid password
4. Provide a mechanism to allow a user to sign off of a keyset.
5. Sign-off a user only under the following conditions:
   - i) When a sign-off entry is made at the keyset
   - ii) When a new user signs on to the same keyset
   - iii) When a LSA actively signs off a user

4.4.5 Keyset Talk-Listen/Monitor Requirements

a. MOVE keysets Type A and B ***shall*** allow the following configurable modes for each individual line key as configured by the LSA:
   1. Not Active
   2. Monitor
   3. Talk-Listen
   4. Talk-Listen/Monitor

b. MOVE keysets Type C, D, and E ***shall*** provide the following configurable modes for each individual line key:
   1. Not Active
   2. Monitor
   3. Talk-Listen
   4. Talk-Listen/Monitor

c. MOVE keysets ***shall*** provide no access to the designated conference when the line key is in "Not Active" mode.

d. MOVE keysets ***shall*** provide Listen-only access to the designated conference when the line key is in "Monitor" mode.

e. MOVE keysets ***shall*** provide Talk-Listen access to the designated conference when the line key is in "Talk-Listen" mode.

f. MOVE keysets ***shall*** provide toggle capability between the "Talk-Listen" state and the Monitor state for access to the designated conference when the line key is in "Talk-Listen/Monitor" mode.

g. For "Talk-Listen/Monitor" mode, when in "Talk-Listen" state, the processing ***shall*** be the same as for a line key in "Talk-Listen" mode (see 4.4.5.e).

h. For "Talk-Listen/Monitor" mode, when in "Monitor" state, the processing ***shall*** be the same as for a line key in "Monitor" mode (see 4.4.5.d).

i. MOVE keysets Types C, D and E ***shall*** visually distinguish conference status for all line key modes.

j. MOVE keysets Types C, D, and E ***shall*** provide a Master Monitor Mute function with the following capabilities:
   1. Selection of this function ***shall*** mute the summed audio monitor signal at that keyset for the following:
      i) All headset/handset interfaces
      ii) The internal speaker
      iii) The external speaker interface
   2. A visual indication ***shall*** be provided indicating the following:
      i) The Master Monitor Mute is in effect
      ii) Identification of all line keys affected by the Master Monitor Mute
   3. Deactivation of this function ***shall*** return the monitor circuits to the same status prior to the mute selection.
   4. The Talk-Listen receive audio ***shall*** be unaffected by this button selection

k. MOVE keysets ***shall*** provide support for simultaneous talk on conferences up to the maximum number of conferences defined by the LSA.

4.4.6 Keyset Push-To-Talk Operations

a. MOVE keysets headset/handset interfaces ***shall*** support push-to-talk (PTT) operations.

b. Keyset PTT operations ***shall*** be used to control a keyset user's ability to participate (talk) on any switch connection (e.g., conferences, PABX calls) as follows:

1. When the PTT control on the headset/handset interface is inactive, the keyset user's voice ***shall*** be ignored (not heard) by other switch ports.
2. When the PTT control on the headset/handset interface is active, for any connection in which the keyset user has configured their keyset for talk access mode, the keyset user's voice ***shall*** be heard by other switch port(s) on the same connection(s).

c. Keyset PTT Response Time (see glossary) for any connection ***shall*** be less than 200 milliseconds under the following conditions:
   1. Regardless of the number of active switch connections
   2. Regardless of the number of active keyset connections the user has configured
   3. Regardless of the number of participants on a connection

d. Keyset PTT operations ***shall*** be independent of (not preclude) the keyset's ability to monitor (listen to) any switch connection(s) selected at the keyset.

e. MOVE keyset headset/handset interfaces ***shall*** support independent PTT functionality for keysets with two (2) or more headsets/handsets configured (i.e., each interface is to be "hot" only when the specific user PTT is activated).

4.4.7 Keyset Volume Level Control Requirements

a. MOVE keysets ***shall*** provide independent volume level controls for each of the following:
   1. Headset/handset interface (independent volume control of **each** headset/handset is NOT required)
   2. Internal speaker, if applicable
   3. External speaker interface, if applicable
   4. Keyset Internal ringing level, if applicable
   5. Serial Audible Alarm Interface (see section 4.5.3), if applicable

b. MOVE keysets ***shall*** provide independent volume level controls for each individual line key.

c. MOVE keysets ***shall*** provide visual indicators identifying the current setting for each individual volume control.

4.4.8 Keyset Configurable Features Requirements

a. MOVE keysets ***shall*** have no disruption with the ongoing voice processing within the keyset (i.e., active conferences are not affected) as a result of user reconfiguration at the keyset.

b. MOVE Type C and D keysets ***shall*** provide a searchable pick-list of available conferences via a GUI.
   1. The list of available conferences ***shall*** include, at a minimum, the capability to display all defined conferences up to the maximum capacity of the switch.

c. MOVE keysets ***shall*** allow the user the capability of line key configuration/reconfiguration as controlled by user profile privileges/constraints.

d. MOVE Type A, B, D and E keysets ***shall*** complete line key reconfiguration within 2 seconds exclusive of network delays.

e. MOVE Type D and E keysets ***shall*** provide the following configurable features:
   1. Hold function indicator on PABX circuits
   2. Busy light indicator on PABX circuits

f. MOVE keysets line key indicators ***shall*** be programmable to display the following:
   1. At least two lines of alphanumeric text (three highly desirable)
   2. At least 16 total alphanumeric characters (24 highly desirable)

4.4.9 Keyset Paging Requirements

The keyset paging requirements are levied against all Type C and D keysets, unless specifically identified in the requirement item.

a. The MOVE keyset ***shall*** provide the capability to support line key definitions for multiple pages.

b. The MOVE keyset ***shall*** provide the following methods for the user to change between defined pages:
   1. Page-by-page scrolling forward
   2. Page-by-page scrolling backward
   3. Selection of page-by-page number (i.e., "go to page x")

c. The maximum delay from the time a page change request is entered by the keyset user until the new page is displayed on the MOVE Type D keyset ***shall*** not exceed 500 milliseconds.

d. The page number of the currently displayed configuration ***shall*** be displayed.

e. A user configurable optional label for page identification purposes ***should*** be provided unique to each page.

f. Multiple page capability ***shall*** be provided with two behaviors as controlled by user profile privileges/constraints:
   1. Contiguous Paging (see glossary)
   2. Discrete Paging (see glossary)

g. In a contiguous page configuration:
   1. The keyset ***shall*** support a minimum of 24 active conferences across all defined pages.
   2. Active line keys ***shall*** include the following:
      i) All active keys on the currently displayed page
      ii) All keys left active on any previously displayed page(s)
   3. Line keys that are replicated on multiple pages ***shall*** be linked together such that:
      i) Activation of a line key activates all other appearances of that line key with the same conference configuration (see glossary)
         (1) Activation ***shall*** be to the same Talk-Listen/Monitor mode for all appearances of that line key
         (2) Changing the Talk-Listen/Monitor mode ***shall*** be accomplished only for line keys on the currently displayed page.
      ii) Deactivation of a line key deactivates all other appearances of that line key with the same conference configuration (see glossary)
   4. Upon selecting a different active page, the keyset ***shall*** maintain the same active audio configuration until the keyset user changes the active line key configuration (i.e., activation of a new line key or deactivation of a currently active line key)
   5. The overall audio ***shall*** not be affected by the following:
      i) The total number of active line keys
      ii) The total number of replicated active line keys

h. In a discrete paging configuration:
   1. The line keys on the current active display page ***shall*** be the only active keys.
   2. Upon selecting a different active page, the keyset ***shall***:
      i) Activate only the line keys on the selected page that are defined to the same conference configuration (see glossary) as a line key that was left active on any previously active page.
      ii) Activate line keys to the same Talk-Listen/Monitor mode they had on any previously active page

iii) Deactivate all other line keys on all other pages

i. In all paging behavior configurations, PABX keys ***shall*** be displayed and active regardless of the page selected.

4.4.10 User Constraints/Privileges Requirements

a. The MOVE system ***shall*** provide the capability for enforcing Conference Access Privileges for each conference connection on a user ID basis for the following:
   1. No access
   2. Monitor only access permitted
   3. Talk-Listen/Monitor access

b. The MOVE system ***shall*** provide the capability for enforcing User Functional Privileges on a user ID basis for the following:
   1. Internal Speaker enable/disable
   2. External Speaker enable/disable
   3. Line key reconfiguration enable/disable
   4. Multi-access talk level (see 4.3.7.c)
   5. Talk access to Restricted Talk Conferences
   6. Active Paging Mode – Contiguous/Discrete
   7. Independent Line Key Volume Control enable/disable (without affecting the overall volume control capability)

c. The MOVE system ***shall*** validate change requests made by the keyset user to a line key configuration against any user and resource constraints to verify appropriate privileges prior to the changes actually being implemented.

4.5 Special Processing Requirements

4.5.1 Restricted Talk Conferences Requirements

The capability to define certain conferences with restricted talk access privileges is required. This type of conference is used for voice communications between ground controllers, Shuttle crewmembers and Station crewmembers. Examples include the Shuttle Air-to-Ground conferences (A/G-1 & A/G-2) and the International Space Station Space-to-Ground conferences (S/G-1 & S/G-2). The following items identify the MOVE requirements in support of the restricted talk conferences capability.

a. The MOVE system ***shall*** provide the capability to identify on a conference basis whether the conference is a restricted talk conference (RTC) or not (i.e., RTC or non-RTC).

b. LSA user ID definitions ***shall*** have the following configurable privilege:
   1. Enabled for RTC access
   2. Disabled for RTC access

   (Note: LSA user IDs enabled for RTC access will be referred to as "privileged LSA".)

c. Only privileged LSAs ***shall*** have the following capabilities:
   1. Configure the definition of a conference as a RTC
   2. Control of RTC
   3. Monitor of RTC

d. Keyset users ***shall*** be allowed to connect to a RTC in monitor mode only via keyset line key entry if the keyset user constraints/privileges allow access to the identified conference.

e. No MOVE user port ***shall*** be directly configured to talk mode on RTCs, without first being enabled by a privileged LSA.

f. Privileged LSA control of RTCs ***shall*** include the following at a minimum:
   1. Ability to connect/disconnect an external interface ports (e.g., at the T1 DS0 level) to a RTC
   2. Ability to enable or disable an external interface port for talk mode access on a RTC
   3. Ability to enable or disable a keyset user for talk mode on a RTC

g. The MOVE LSA GUI ***shall*** provide a status display for all RTCs.

h. The LSA RTC status display ***shall*** be displayed only at privileged LSA positions.

i. The LSA RTC status display ***shall*** display real-time status for all RTCs, including the following at a minimum:
   1. MOVE port identity for the following conditions:
      i) When a keyset user with talk privileges for a RTC logs on
      ii) When an external interface port (at the T1 DS0 level) is connected to a RTC
   2. Port enabled/disabled talk status
   3. Port Push-To-Talk (PTT) status (i.e., active or inactive)

j. For keyset users with restricted talk privileges for a RTC, the MOVE ***shall*** provide a visual indication at the keyset conference line key, showing talk access status (i.e., enabled/disabled).

k. A keyset user log off ***shall*** require re-enable of talk access by the privileged LSA at the keyset user's next log on.

4.5.2 Keyset Monitoring Requirements

The keyset monitoring function is a feature to provide the capability to route all the audio from an identified keyset to another output port of the switch for the purpose of recording or outputting to speakers. The keyset monitoring function for each keyset is associated with a Unique Keyset ID (i.e., unique physical keyset identifier). When enabled by the LSA, all audio heard at and generated from a given keyset is "monitored" by another switch port and distributed to external voice equipment (e.g., external speakers or voice recorders). In addition to audio connectivity, the monitoring port automatically (without human intervention) adjusts to monitor volume changes made at the keyset, allowing audio to be heard at the same level as from the originating keyset.

a. The MOVE Voice Switch Subsystem ***shall*** provide support for non-intrusive usage monitoring of the audio associated with any Unique Keyset ID, regardless of user ID signed on.

b. The following controls ***shall*** be provided at the LSA:
   1. Capability to create a keyset monitoring definition consisting of the following at a minimum:
      i) The Unique Keyset ID to be monitored
      ii) A switch output port for re-distribution of the monitored output
   2. Capability to modify any keyset monitoring Definition:
      i) Change the Unique Keyset ID to be monitored
      ii) Change the switch output port for re-distribution of the monitored output
   3. Capability to delete any keyset monitoring definition
   4. Capability to control keyset monitoring for a defined Unique Keyset ID:
      i) Enable monitoring of a Unique keyset ID via a keyset monitoring definition
      ii) Disable monitoring of a Unique keyset ID via a keyset monitoring definition

c. When keyset monitoring is enabled by the LSA for a specific Unique Keyset ID, the MOVE Voice Switch Subsystem ***shall***:
   1. Multiplex all audio heard at the keyset including the following:
      i) Incoming audio (listen)
      ii) Outgoing audio (talk)
   2. Send the multiplexed audio on a single channel to the MOVE port (identified in the keyset monitoring definition) for re-distribution to external equipment

d. The MOVE Voice Switch Subsystem ***shall*** provide support for simultaneous monitoring of a minimum of one hundred-fifty (150) Unique Keyset IDs.

e. Individual line key volume adjustments made by the keyset user ***shall*** automatically (without human intervention) be adjusted at the MOVE switch monitoring port to match the keyset's volume settings for each line key. (Note: Other volume adjustments (i.e., headset/handset, ringer, and speaker) are not to be included in monitoring)

f. Real-time status at the LSA ***shall*** consist of a listing of all defined keyset monitoring definitions, including the following information for each definition:
   1. The Unique Keyset ID to be monitored
   2. The associated output switch port for re-distribution of the monitored output
   3. Enable/Disable status of the monitoring function
   4. Identification of the physical keyset position (location) from which the user is operating

4.5.3 Serial Audible Alarm Requirements

The Serial Audible Alarm is a special purpose application implemented at **JSC and MCC-M only**. This capability audibly alerts flight controllers via their keyset when alarm/limit conditions occur. Application software residing in operations workstations determine alarm condition(s) and when required, send serial message packets to the keyset, requesting an alarm tone. The message traffic between the operations workstation and the keyset is a dedicated hardwired serial interface and consists only of commands sent by the operations workstation to the keyset and responses sent by the keyset to the operations workstation (i.e., no analog or digital tone information traverse the serial interface between the workstation and keyset, only command messages telling the keyset software to activate or de-active the audible alarm).

a. The MOVE keyset Serial Audible Alarm Interface ***shall*** be provided as a wire-out, connectorized interface using the following signals (RS-232 protocol):
   1. Transmit Data
   2. Receive Data
   3. Signal Ground
   4. Data Terminal Ready (DTR)

b. The MOVE keyset Serial Audible Alarm Interface ***shall*** support the control message interface complying with the software/firmware interface as defined in Appendix C of Control Center Complex Digital Voice Intercommunications Subsystem to Data Distribution and Workstation/Server Platforms Subsystem Interface Control Document, JSC-13365, September 1993.

c. Upon receipt of the control message activating output of the audible alarm tone, the MOVE keyset Serial Audible Alarm Interface ***shall*** perform the following:
   1. Generate an alarm tone as follows:
      i) Fixed frequency: 800 Hz
      ii) Fixed level: -16 dBm
      iii) Modulated on and off six times per second
   2. Output the audible alarm tone to all of the following keyset interfaces:
      i) All headset/handset interfaces
      ii) Internal speaker
      iii) External speaker interface
   3. Continue to output the audible alarm until a deactivate control message is received

4.5.4 Mute Groups Requirements

a. **For JPL and its satellite sites (GDSCC, MDSCC, and CDSCC)**, the MOVE system shall have the following capabilities:
   1. The MOVE system ***shall*** have the capability to provide line key speaker muting such that when one keyset in a Mute Group definition is muted via PTT, the speakers for all other keysets identified in the same Mute Group definition are also muted.
   2. The MOVE system ***shall*** provide the capability to support predefined "Mute Group definitions":
      i) Each Mute Group definition ***shall*** have an associated unique identification (i.e., name).
      ii) Mute Group definitions ***shall*** be created/managed via the MOVE LSA Subsystem.
      iii) Each Mute Group definition ***shall*** consist of a list of physical keyset identifiers:
         (1) Minimum of 2 keyset identifiers

(2) Maximum of at least 10 keyset identifiers

3. An individual keyset identifier ***shall*** be restricted to assignment to only one (1) Mute Group definition.
4. The MOVE LSA Subsystem ***shall*** have the capability to create/manage Mute Group definitions, including the following capabilities:
   i) Create a new Mute Group definition:
      (1) Assign a name to the Mute Group definition
      (2) Add new keyset identifier(s) to the Mute Group definition
   ii) Modify an existing Mute Group definition
      (1) Add new keyset identifier(s) to the Mute Group definition
      (2) Delete keyset identifier(s) from the Mute Group definition
   iii) Save a Mute Group definition (after creation or modification)
   iv) Display/View an existing Mute Group definition
   v) Delete an existing Mute Group definition
   vi) Rename an existing Mute Group definition
5. The MOVE system ***shall*** provide the capability to support a minimum of twenty (20) Mute Group definitions.

4.6 Diagnostics Requirements

4.6.1 General Diagnostic Requirements

a. Diagnostics and built-in indicators ***shall*** be provided to allow maintenance personnel the capability to promptly isolate failed elements down to the LRU (including keysets).

b. Diagnostic capabilities ***shall*** be installed and resident on non-volatile media on the MOVE system (e.g., require no removable media in order to execute).

c. The execution of a diagnostic test tool ***shall*** have no interference with real time operational data flow or processing on other interfaces.

d. Failure of any diagnostic or self-test function ***shall not*** degrade other system operational functions.

4.6.2 Power-Up Diagnostic Requirements

a. Each MOVE Subsystem ***shall*** have built-in test equipment to indicate failed elements at power-up.

b. The built-in test equipment ***shall*** include a diagnostic capability, which runs automatically on power-up.

c. The status of the power-up diagnostic capability ***shall*** be displayed in a manner that is independent of major supporting LRUs. Some examples would be dedicated Light Emitting Diode (LED) and Liquid Crystal Display (LCD) indicators.

4.6.3 Operational Diagnostic Requirements

4.6.3.1 General Diagnostic Requirements

a. Each MOVE subsystem ***shall*** provide operational diagnostics in order to isolate hardware faults to the LRU level during MOVE operations.

b. Each MOVE diagnostic test ***shall*** provide the following real-time status information:

1. An indication that the diagnostic test is in progress
2. An ongoing progress status of the diagnostic test (e.g., percentage complete)
3. An indication when the diagnostic test completes
4. PASS/FAIL results for each diagnostic test

c. Detailed status for each individual diagnostic test ***shall*** be provided upon operator request.

4.6.3.2 Switch/LSA Diagnostic Requirements

a. The MOVE ***shall*** provide the following interfaces to perform operational diagnostics:

1. Automated self-test capabilities
2. LSA (local)
3. LSA system remotely

b. The MOVE LSA Subsystem ***shall*** provide the capability to execute diagnostic testing on the following:

1. Switch Subsystem(s)
2. LSA Subsystem(s)
3. Individual keysets

c. The MOVE LSA Subsystem ***shall*** provide an operator interface including the following controls for operational diagnostics:

1. Initiation

2. Monitor
3. Termination

d. Operator initiated MOVE diagnostics ***shall*** include the following capabilities:
   1. Be menu-driven from the LSA Subsystem.
   2. Perform automatically with very little operator intervention once invoked.

e. The switch diagnostics ***shall*** show the circuit path through the switch showing each LRU that it traverses through. (e.g., traceroute)

f. Results of diagnostics (including detailed status) ***shall*** be available for output to the following:
   1. MOVE LSA Subsystem display
   2. MOVE LSA Subsystem printer interface

4.6.3.3 Keyset Diagnostic Requirements

a. The MOVE keyset ***shall*** include the following diagnostic capabilities:
   1. Locally initiated self-diagnostics
   2. Remotely (via LSA) initiated diagnostics

b. The Keyset diagnostics ***shall*** include the following at a minimum:
   1. Testing of all keyset internal capabilities (e.g., speaker, screen interface, colors, ringer, external interfaces (speaker, headset/handset, serial audible alarm), etc.)
   2. Testing of the interface between the keyset and its associated MOVE switch port

c. MOVE Type D keysets ***shall*** have the capability to display the following:
   1. Current active User ID
   2. Current switch connection port number

d. Results of diagnostics (including detailed status) ***shall*** be available for output to the following:
   1. MOVE LSA Subsystem display
   2. MOVE LSA printer interface
   3. At the keyset when diagnostic invoked locally from the keyset

4.7 General Health and Status Requirements

a. The MOVE subsystems ***shall*** provide equipment health and status information to any LSA subsystem(s) and if applicable, to any remote LSA subsystem(s).

b. Health & Status for all MOVE systems ***shall*** be Simple Network Management Protocol (SNMP-latest version) compliant, or equivalent.

c. The MOVE subsystems ***shall*** support the capability to provide equipment health and status information by each of the following methods:
   1. System automatic polling
   2. Receipt via an unsolicited event by individual LRUs
   3. Operator initiated request

d. The execution of the health and status functions ***shall*** have no interference with real time operational data flow or processing on other interfaces.

e. The elapsed time from any LRU failure to the time the failure is reported to MOVE controller position ***shall*** not exceed 2 minutes.

f. The MOVE LSA subsystem ***shall*** include a set of system health and status hierarchical graphical displays, which allow MOVE LSA controllers to:

1. View complete system summary showing all major equipment areas (e.g., control path, voice bus and power status).
2. View detailed equipment displays showing health and status of individual LRU components (including keysets).
3. Determine physical location of individual LRUs (e.g., in terms of cabinet, card cage, card slot number LRU is installed, keyset ID, etc.)
4. Receive audible or visual alarms identifying failure of any LRU.
5. Reset any/all failure alarm status indicators.

g. The MOVE LSA Subsystem reporting capability ***shall*** include, but not be limited to the following:

1. System performance
   i) System loading (e.g., CPU load)
   ii) System memory utilization
   iii) System database sizing
   iv) Free space availability
2. Status of all MOVE elements

4.8 Equipment Enclosure Requirements

4.8.1 General Enclosure Requirements

a. The MOVE Voice Switch Subsystem ***shall*** be packaged in standalone enclosures.

b. Each enclosure ***shall*** comply with EIA-310-E (Enclosures, Racks, Panels, and Associated Equipment) specifications.

c. Each enclosure ***shall*** not exceed 84 inches in height.

d. Each enclosure ***shall*** be a maximum of 36 inches external depth.

e. Each enclosure ***shall*** be provided with the following:

1. Removable end panel(s) as appropriate (i.e., all exposed rack sides)
2. Removable rear door with positive latching device

f. If a front door is provided on any enclosure, each door ***shall*** be of a clear, non-glass type with positive latching device.

g. Enclosure cooling ***shall*** be provided using ambient air source.

h. Each enclosure front ***shall*** be one contiguous surface, i.e., blank panels installed where equipment is not installed.

i. Ventilation exhaust openings ***shall*** be such that exhaust is directed away from personnel and other equipment.

j. Each enclosure ***shall*** allow cables to exit from the top and the bottom of the rack. (See Table 4.2.1, Column (8))

k. Each enclosure ***shall*** provide strain relief support for each card cage level requiring external cable assemblies entering and/or exiting the enclosure.

l. Each enclosure ***shall*** not weigh more than 250 pounds per square foot, when fully populated/configured.

m. Each enclosure ***shall*** not have a single point weight of more than 1000 pounds.

n. Each enclosure ***shall*** be provisioned for bolting of the enclosure to the floor.

o. Best commercial practices ***shall*** be incorporated into the enclosure design.

4.8.2 Enclosure Grounding Requirements

a. Each enclosure accommodating AC power ***shall*** support the following two (2) grounds:

1. Safety Ground
2. AC Power Ground

b. The enclosure Safety Ground ***shall*** provide the capability to terminate to an external electrical ground source.

c. The enclosure Power Ground ***shall*** be provided via the third wire (green wire) in the power-distribution.

4.9 Environmental Requirements

a. The MOVE Voice Switch Subsystem ***shall*** be equipped with circuit protection devices that meet the following:

1. Provide protection from over-current and over-voltage conditions
2. Mounted in an easily accessible area
3. Replacement does not require use of special tools
4. Labeled as to rating and function

b. Externally exposed power switches ***shall*** be protected from inadvertent operation (e.g., flush mount, switch guards, etc.).

c. The MOVE system ***shall*** continuously operate and meet its specifications when voltage applied to its terminals ranges +/- 10 percent of the nominal voltage.

d. The MOVE subsystems equipment and keysets ***shall*** comply with FCC part 15 sub-part B rules, as a class A device. (***Radiated and Conducted Emissions)***

e. The MOVE system ***shall*** operate as expected, in the following temperature and humidity (Ambient) ranges during normal (continuous) operation conditions unless otherwise specified within this SRD:

1. Temperature: 41°F to 104°F
2. Humidity: 5% to 85%

f. The MOVE system ***shall*** be operational after being subjected to the following temperature and humidity ranges for transportation and storage:

1. Temperature: 10°F to 130°F
2. Humidity: 5% to 95%

g. The MOVE subsystems heat dissipation ***shall*** be no more than 3000 watts per each equipment rack.

h. The MOVE keysets heat dissipation ***shall*** be no more than 100 watts per keyset.

i. The audible noise as measured at a distance of 1 meter from the equipment ***shall*** not exceed the following parameters per Table 4.9:

Table 4.9 Audible Noise Limits

Condition	Octave Bands (Hz)							
	20/ 75	75/ 150	150/ 300	300/ 600	600/ 1200	1200/ 2400	2400/ 4800	4800/ 10000
Keyset/LSA	79	68	59	52	48	45	43	42
Switch	100	89	82	76	73	70	68	67
Note: When dB is used in this table, the reference pressure is 2×10^{-5} N/m^2 (0.0002 dynes per square centimeter).								

4.10 Reliability, Maintainability and Availability Requirements

a. All MOVE subsystem elements (i.e., switch, LSA, and keysets) ***shall*** have an MTSR of no more than 30 minutes for 90% of the failures.

b. The MOVE Voice Switch ***shall*** meet the following performance characteristics on a site-by-site basis (For a single switch subsystem):

   1. MTBCF of at least 20,000 hours
   2. Availability of at least 0.999975

c. A single MOVE LSA Subsystem ***shall*** meet an MTBF of at least 20,000 hours.

d. Each MOVE keyset ***shall*** meet an MTBF of at least 25,000 hours.

e. MTBF, MTBCF, MTSR, and Availability calculations ***shall*** be per their definitions in the glossary.

f. The MOVE subsystems ***shall*** house redundant equipment in separate enclosures, where practical.

g. The MOVE LSA subsystems ***shall*** complete a power up within a five (5) minute time period, including establishing connectivity to the switch subsystem and be operationally ready.

h. The MOVE switch subsystem ***shall*** complete a system power up of entire switch within a fifteen (15) minute time period and establish connectivity to all active resources, including LSAs and keysets.

i. The MOVE Type D and E Keysets ***shall*** complete initialization from a powered-down state and be ready for user login within 2 minutes.

j. The MOVE Voice Switch Subsystem and the LSA Subsystem ***shall*** complete a system reset or a reset of any given system component within a five (5) minute time period.

k. For a failure of any single non-redundant LRU, the MOVE Voice Switch subsystem ***shall*** limit the loss of service to the keysets to the larger of four (4) or 1% of the total number of populated keyset ports in a single switch.

l. For a failure of any single non-redundant LRU, the MOVE Voice Switch subsystem ***shall*** limit the loss of T1 ports to the lesser of four (4) or 50% of the populated T1 ports as identified in Table 4.2.1.

m. The MOVE subsystems ***shall*** reload all operating software during a "boot up" (e.g., when power is first applied, or a system cold start. The system when fully booted up would be at a state of readiness for initiating and loading conference or connectivity maps into system).

n. The MOVE Voice Switch subsystem LRUs ***shall*** be "hot swappable" (see glossary).

   1. The Voice Switch LRUs ***shall*** automatically reload all necessary configurations to be "Operational" when either of the following occur:

      i) Removal and replacement

      ii) Card reset via card reset button or via an LSA

o. The MOVE subsystems ***shall*** provide uninterrupted voice communications in the event of a failure of a LSA control and monitor subsystem.

p. The MOVE subsystems ***shall*** provide uninterrupted service in the event of failover to a redundant element.

q. The MOVE subsystems ***shall*** provide the capability to perform corrective and preventive maintenance actions to on-line equipment without impacting on-going operations.

r. The MOVE System ***shall*** be capable of completing user sign-on requests as follows:

   1. Within five (5) seconds for up to ten (10) simultaneous user sign-ons
   2. Within ten (10) seconds for up to fifty (50) simultaneous user sign-ons

   (Note: Completion of the sign-on process is defined as the completion of the download of configuration pages and the availability of the keyset for user input processing.)

4.11 Safety Requirements

a. MOVE subsystems ***shall*** meet:
   1. Communications Equipment Grounding (NEC article 800)
   2. AC Equipment Grounding per NEC, article 250, ANSI/NFPA 70

b. All MOVE AC power supplies and power distribution units ***shall*** be Underwriter Laboratories (UL) approved.

c. For all removable components that weigh in excess of 40 pounds, a warning label ***shall*** be required for those components.

d. Measures to reduce Electric Shock Hazards (e.g., breakdown of user-accessible insulation and touch current (leakage current) flowing from parts at hazardous voltages to accessible part) ***shall*** include:
   1. Labeling with appropriate caution and warning notices to notify maintenance and operations personnel of electrical hazards.
   2. Prevention of user access to parts at hazardous voltages by fixed or locked covers, safety interlocks, etc.
   3. A process for discharging accessible capacitors that are at hazardous voltages,
   4. Provision of electrical insulation and the ability to connect the accessible conductive parts and circuits to earth so that exposure is limited,
   5. Provision of over-current protection to disconnect the parts having low impedance faults within a specified time,
   6. Limitation of the accessibility and area of contact with circuits that contain hazardous voltages, and separating them from unearthed parts to which access is not limited,
   7. Provision of insulation which is accessible to the user, with adequate mechanical and electrical strength to reduce the likelihood of contact with hazardous voltages,
   8. Limitation of touch current to less than 3.5 milliamperes, or provision of high integrity protective grounding connection.

e. Measures to reduce Energy Related Hazards (e.g., burns, arcing, ejection of molten metal) ***shall*** include:
   1. Separation
   2. Shielding
   3. Provision of safety interlocks

f. Measures to reduce Fire Hazards (e.g., excessive temperatures, component failure, loose connections) ***shall*** include:
   1. Provision of over-current protection
   2. Use of constructional materials having appropriate flammability properties for their purpose
   3. Selection of parts, components, and consumable materials to avoid high temperature which might cause ignition (polymeric materials having an oxygen index of 28% or greater and a fire resistance characteristic equivalent to or better than Underwriters Laboratories (UL) standard UL 94 V-1)
   4. Shielding or separating combustible materials from likely ignition sources
   5. Using enclosures or barriers to limit the spread of fire within the equipment

g. Measures to reduce Heat Related Hazards (e.g., burns due to contact with hot accessible parts or degradation of insulation and of safety-critical components) ***shall*** include:
   1. Taking steps to avoid high temperature of accessible parts
   2. Provision of markings to warn users where access to hot parts is unavoidable

h. Measures to reduce Mechanical Hazards (e.g., sharp edges and corners, moving parts) ***shall*** include:
   1. Rounding of sharp edges and corners

2. Guarding
3. Provision of safety interlocks
4. Providing sufficient stability to free-standing equipment
5. Selecting cathode ray tubes and high pressure lamps that are resistant to implosion and explosion respectively
6. Provision of markings to warn where user access is unavoidable

4.12 Security Requirements

a. The MOVE system ***shall*** provide software security controls to prevent unauthorized access to the voice system. These controls may reside on the LSA subsystem(s).

b. The LSA and Type C security controls ***shall*** include the following:
   1. Isolation between security functions and non-security functions
   2. Limit security functions access to the following LSA (or security platform) access levels:
      i) System "Root" level
      ii) Administrator level
   3. Require "strong" passwords as follows:
      i) At least eight characters in length
      ii) Require a combination of two or more of the following character types:
         (1) Alphabetic
         (2) Numeric
         (3) Capitalized
         (4) Special characters
      iii) Provide for automatic expiration of passwords after a configurable length of time
      iv) Automatic disabling of inactive user accounts after a configurable length of time
      v) Provide for automatic disabling of login after a configurable number of consecutive unsuccessful attempts
      vi) Reject password choices that:
         (1) Have been assigned to that user ID in the past 24 months
         (2) Are valid words in an American dictionary
         (3) Use a recognizable pattern (e.g., 12345, abcde)
      vii) Allow disabling of password controls at the security access level(s) only

c. Security controls of the LSA subsystem(s) and Type C Keysets ***shall*** include the following:
   1. The LSA subsystem and Type C Keysets ***shall*** require a password change the first time a user attempts login after password expiration.
   2. The LSA subsystem and Type C Keysets ***shall*** provide an advisory to the user when a password is within 10 days of expiration.
   3. The LSA subsystem and Type C Keysets ***shall*** display a user notification banner prior to login.
      i) The content of the user notification banner ***shall*** be configurable.
      ii) The banner ***shall*** require user intervention (e.g., an "OK" button) before proceeding to login.

d. The LSA subsystem ***shall*** provide the capability to be scanned with appropriate vulnerability scanning tools.

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Appendix A. Abbreviations and Acronyms

Acronym	Definition
A/G	Air to Ground
AC	Alternating Current
AGC	Automatic Gain Control
ANSI	American National Standards Institute
ARC	Ames Research Center
AWG	American Wire Gauge
BXA	Bureau of Export Administration
CAS	Channel Associated Signaling
CB	Channel Bank
CCS	Common Channel Signaling
CDSCC	Canberra Deep Space Communications Complex
CoS	Class of Service
COTS	Commercial-Off-The-Shelf
CPUs	Central Processing Units
CXC	Chandra X-ray Center
D	Depth
D4/AMI	D4 Alternate Mark Inversion
dB	Decibels
dBm	Decibel, Milliwatt; decibel referenced to one Milliwatt into 600 ohms.
DC	Direct Current
DCN	Document Change Notice
DFRC	Dryden Flight Research Center
DHCP	Dynamic Host Configuration Protocol
DS0	Digital Signal 0
DSPA	Dryden Shuttle Processing Area
DTMF	Dual Tone Multi Frequency
DTR	Data Terminal Ready
E&M	Ear & Mouth (signaling)
EAR	Export Administration Regulations
EI	End Instrument
EIA	Electronic Industries Alliance
ESF/B8ZS	Extended Super Frame/Binary Eight Zero Suppression
FD	Flight Directorate
GDSCC	Goldstone Deep Space Communications Complex
GFE	Government Furnished Equipment
GRC	Glenn Research Center
GSFC	Goddard Space Flight Center
GUI	Graphical User Interface
H	Height
Hc	Height (of cavity)

Acronym	Definition
HQ	Headquarters
Hz	Hertz
ICD	Interface Control Document
ID	Identification
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
In^2	Square inches
IP	Internet Protocol
ITU	International Telecommunications Union
JHU	Johns Hopkins University
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
Kbps	Kilo bits per second
kHz	Kilohertz
KSC	Kennedy Space Center
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LRU	Line Replaceable Unit
LSA	Local Site Administrator
MAF	Michoud Assembly Facility
Mbps	Mega bits per second
MCCB	Mission Control Center Backup (JSC)
MCC-M	Mission Control Center - Moscow
MCCP	Mission Control Center Prime (JSC)
MCS	Manual Conference Signaling
MDSCC	Madrid Deep Space Communications Complex
MILA	Merritt Island Launch Annex
MOVE	Mission Operations Voice Enhancement
MSFC	Marshall Space Flight Center
MTBCF	Mean Time Between Critical Failures
MTBF	Mean Time Between Failure
MTSR	Mean Time To Service Restore
mw	Milli-watt
NASA	National Aeronautics Space Administration
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIC	Network Interface Card
NISN	NASA Integrated Services Network
PABX	Private Automatic Branch Exchange
PAYCOM	Payload Command Controller
PBI	Push Button Indicator

Acronym	Definition
PC	Personal Computer
POTS	Plain Old Telephone Service
PTT	Push To Talk
RF	Radio Frequency
RTC	Restricted Talk Conference
S/G	Space to Ground
SINAD	Signal, Noise and Distortion
SPL	Sound Pressure Level
SRD	System Requirements Document
STGT	Second TDRSS Ground Terminal
T/L	Talk/Listen
ToS	Type of Service
UL	Underwriter Laboratories
USB	Universal Serial Bus
UV	Ultraviolet
VAC	Volts Alternating Current
VAFB	Vandenberg Air Force Base
VDC	Volts Direct Current
VGA	Video Graphics Array
VGA	Video Graphics Adapter
VoIP	Voice Over Internet Protocol
W	Width
WAN	Wide Area Network
Wc	Width (of cavity)
WFF	Wallops Flight Facility
WSC	White Sands Complex
WSGT	White Sands Ground Terminal

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Appendix B. Glossary of Terms

Term	Definition
Additional Wired-for	Refers to interface ports (T1 and Keyset) within the switch. Additional Wired-for ports are those ports that are available within the physical switch structure (i.e., does not require addition of any additional cabinets, card cages, control or voice distribution cards, internal wiring/cabling, etc.). Only the actual T1 or Keyset interface card needs to be added to provide full interface capabilities for the wired-for ports.
Analog	A continuously varying signal or wave. It is the traditional method of modulating radio signals so that they can carry information. AM (amplitude modulation) and FM (frequency modulation) are the two most common methods of analog modulation.
Automatic Gain Control (AGC) DB level	The capability of the voice switch to automatically manage and control the volume level on the receive side of the conferences.
Availability	The degree to which a system, subsystem, or equipment element is operable. Availability is generally defined as the ratio of the total time a functional unit is capable of being used during a given interval to the length of the interval. (See the MOVE SOW, Appendix D for further definition and algorithms for computation).
Bandwidth	The amount of frequency allocated for an RF transmission. (i.e., a cellular system requires 30 KHz of frequency per channel to transmit its signal.)
Channel Associated Signaling (CAS)	With this method of signaling, both signaling and voice data share the same transmission path/channel (i.e., in-band signaling). In order to be channel associated, there must be a permanent association with the channel that is carrying the actual voice. Voice data and signaling data travel the same path through the transmission media. The signaling for a particular circuit is permanently associated with that circuit. (Reference ITU G.704 section 3)
Circuit	Connection between two physical interfaces
Common Channel Signaling (CCS)	With this method of signaling each transmission path/channel share a dedicated common signaling channel separate from the voice channel. Common Channel Signaling (CCS) is where the common channel carries data messages, which convey signaling for the circuits. (Reference ITU G.703 section 3.)
Conference	The logical joining of two or more users for the purpose of having a common conversation.
Conference Access Time	The time from when a conference selection is initiated (at a keyset or a switch port) to the time when the requested conference is connected and available at the request point (keyset or switch port).
Conference Configuration	The configuration of a conference line key including the conference definition and the Talk-Listen/Monitor mode definition.
Conference Connection	The logical joining of two or more switch port users (e.g., keyset to keyset, T1 DS0 to keyset, T1 DS0 to T1 DS0) where the users can be connected in talk/listen or monitor mode for the purpose of having a common conversation.

Term	Definition
Conference Definition	A pre-defined set of information used to define the elements included in and the behavior of a conference. For MOVE this includes the conference label, the switch resources (i.e., user ports) to be connected, the connection mode (i.e., talk/listen or monitor), and the conference signaling type. Note that even though keyset ports are connected to a conference, they are not part of the conference definition since the keyset connection is done in real-time by the keyset user and is not pre-defined.
Contiguous Paging	Keyset paging mode where line keys across all defined pages may be simultaneously active regardless of which page is currently displayed. Audio can be heard at the keyset (via headset/handset interfaces or speaker(s)) for line keys that were activated, but not defined on the currently displayed page (i.e., the line key is active, but no longer visible).
Cross talk	Interference from an adjacent channel.
Date/time stamping	The action of appending the date and time to a system status or error message whenever a system event has occurred.
Diagnostic	The capability of the voice switch to provide fault isolation utilities.
Dial-Up Connection	A data communication link that is established when the communication equipment dials a phone number and negotiates a connection with the equipment on the other end of the link.
Digital Signal	A signal that takes on only two values, off or on, typically represented by ""0"" or ""1."" Digital signals require less power but (typically) more bandwidth than analog, and copies of digital signals can be made exactly like the original.
Digital Signal 0 (DS0)	A DS0 signal is a basic digital signaling rate of 64 kb/s, corresponding to the capacity of one voice-frequency-equivalent channel.
Discrete Paging	Keyset paging mode where each page is independent of all other pages and only the currently displayed page is active. Audio can be heard at the keyset (via headset/handset interfaces or speaker(s)) for only the active line keys that are on the current page.
Dual-Homed	Keysets with the dual-homed capability requires the two physical switch connections on the keyset for simultaneous connectivity to two switch subsystems. However, simultaneous operation on two switches (i.e., login and access to two switches) is not required. A user interface of some sort on the keyset is required to allow the user to select the switch at the time of user login.
Dual Tone Multi Frequency (DTMF)	A method used by the telephone system to communicate the keys pressed when dialing. Pressing a key on the phone's keypad generates two simultaneous tones, one for the row and one for the column. These are decoded by the exchange to determine which key was pressed.
Dial-up Conferences	Conferences created dynamically in real-time (e.g., Plain Old Telephone System (POTS) connections)
Echo Cancellation	The elimination of reflected signals (""echoes"") in a two-way transmission created by some types of telephone equipment, used in data transmission to improve the bandwidth of the line.
Energy-Star	A Government-backed program helping businesses and individuals protect the environment through superior energy efficiency.
Follow me	The capability of the User to access an approved database configuration via password and ID at any keyset within the system. Users are limited to one keyset login at any given time.

Term	Definition
Hot Swappable	The capability of being able to disconnect and connect devices (LRUs) while the system is in operation and have those devices (LRUs) be detected and start operation without having to reboot the system.
Incoming Signaling	Control information being received at the MOVE switch from an external system resulting in processing to create, update, or terminate a conference. Reference Signaling definition for additional information.
Institute of Electrical and Electronics Engineers (IEEE)	A membership organization comprised of engineers, scientists and students that sets standards for computers and communications.
Internal Signaling	Control information totally within the MOVE switch subsystem resulting in processing to create, update, or terminate a conference. Reference Signaling definition for additional information.
Keyset	Defined as the physical device that provides a man-machine interface that allows a user to participate in audio conferences.
Keyset PTT Response Time	The time period from activation of the PTT by a keyset user to the time period when the keyset user's voice can be heard by other switch ports on the same connection.
Local Area Network (LAN)	Collection of computers and associated peripherals interconnected by a communications channel to allow for a sharing of resources. A network connecting a number of computers to each other or to a central server so that the computers can share programs and files.
Local Keyset	A device that is directly connected to the voice switch via a copper interface over a specified maximum distance. This includes keysets connected via other vendor-provided equipment such as bridges, fan-outs, multiplexers, etc.
Manual Conference Signaling	A signaling protocol, which provides ring-down signaling between user ports (internal or external) on a conference. Signaling is initiated manually when a user activates the conference to talk/listen mode and then presses a ring key. Manual Conference Signaling is a two-step process – 1) the user activates a conference in talk/listen mode; and 2) the user presses a signaling (ring) key on the keyset to manually send a signal out to other conference users.
Mass Release function	Is Used to facilitate simultaneous disconnects from all calls placed from the keyset. This does not eliminate the ability to release calls on an individual basis if desired.
MTBCF	The total MTBF of all critical (non-redundant) elements (LRUs) within a system. (See the SOW, Appendix D for further definition and algorithms used for computation)
MTBF	The average time a device will function before failing. (See the SOW, Appendix D for further definition and algorithms used for computation)
MTSR	The mean time to restore service following system failures that result in a service outage. Note: The time to restore includes all time from the occurrence of the failure until the restoral of service (i.e., includes the time to isolate a failure to the defective replaceable module and the time to access, remove, and replace the defective module with an operational spare). (See the SOW, Appendix D for further definition and algorithms for computation)
Mute Groups	A group of keysets which when any PTT is engaged will result in the muting of all keyset speakers in the defined group. The keysets in a mute group are established by the LSA.

Term	Definition
Non-blocking conferencing	The capability to provide fully integrated conference access.
Outgoing Signaling	Control information being transmitted from the MOVE switch to an external system resulting in processing to create, update, or terminate a conference. Reference Signaling definition for additional information.
PABX	A common internal phone switching system for medium to large-sized businesses
Plain Old Telephone Service (POTS)	A conference that connects to an external telephone line allowing users to place phone calls in the traditional manner. T1 Signaling: Standard A/B bit signaling for ground start and conference start lines FXO & FXS lines.
Populated	Refers to interface ports (T1 and Keyset) within the switch. Populated ports are those ports that contain physical interface cards (T1 or Keyset) and are available for external connectivity to either a T1 or keyset.
Pre-defined Conferences	Conferences defined via pre-defined conference definitions.
Rack	A storage device in which equipment is placed.
Remote Keyset	It is identical in function to a local keyset, with the exception that it is connected to the voice switch via a medium that does not have distance constraints. (e.g., telephone common carrier, etc.) (Maximum bandwidth utilization is 128 kbps)
Roll-off points	Bandwidth in an analog circuit is determined by measuring the power transferred to a load versus the frequency of the signal. The low and high frequency end points (roll off points) are where the power is 3dB below the nominal level measured. Bandwidth is then the difference between the high and low frequency points.
Side tone	An attenuated portion of the transmit audio returned to the originator. Can be intentional as all phones produce some side tone and are caused by unbalanced 2-to-4 wire hybrids.
Signaling	The exchange of information between different points/equipment that pertains to the establishment and control of connections between the two points. Typically this control information is transferred via in-band signaling or out-of-band signaling methods. When signals are transmitted on the same path/channel as the voice data with which they are associated, it is referred to as in-band signaling. In-band signaling is also known as Channel Associated Signaling (CAS). When signals are transmitted on a dedicated path/channel, separate from the voice path/channel, it is referred to as out-of-band signaling. Out-of-band signaling is also known as Common Channel Signaling (CCS).
Silence Suppression	The capability that allows a data network carrying voice traffic over the Internet to detect the absence of audio and conserve bandwidth by preventing the transmission of "silent packets" over the network.
SINAD	Signal, Noise, and Distortion
Switch port PTT Response Time	The time period from activation of PTT associated with transmit or receive of voice information for an analog or T1 DS0 port to the time when other switch ports on the same connection can receive the transmitting port's voice.
T1	A dedicated digital communication link provided by a telephone company that offers 1.544 megabits per second of bandwidth.
Talk-Listen	The capability of the User to talk and listen simultaneously.
Toggling	The capability to switch between pre-configured conference database pages on keysets.
Ultra High Frequency -	Generally 300 MHz to 3000 MHz

Term	Definition
User Port	A physical connection point within the switch, which provides the capability for voice distribution. For MOVE, the physical connection points include the following: Keyset ports (local, remote, and VoIP) and T1 ports (24 DS0 interfaces).
Very High Frequency	(30 to 300 MHz) High Band wireless systems are usually 150 MHz to 216 MHz. Low Band wireless systems are usually 30 MHz to 50 MHz.
Virtual Console	A virtual console provides the capability to quickly switch, conference and monitor selected circuits in a real-time operational scenario. To provide this capability, the virtual console must have the capability to display up to 400 voice ports or conferences simultaneously, and provide a one-action mechanism to invoke switchboard actions.
Virtual Keyset	A GUI-based logical keyset that emulates physical keyset capabilities.
Voice Conferencing	The ability of two or more parties to participate in a conversation.
Voice Conference	A voice **conference** utilized to broadcast a specific function or support a specific task. (i.e., S/G, Shuttle Flight Director)
Voice Over Internet Protocol (VoIP)	Sending voice information in digital form in discrete IP packets rather than in the traditional circuit-committed protocols of the public switched telephone network.
Voice Recorders	Provides the capability to record voice conferences and/or keyset activity onto a storage medium.
Wide Area Network (WAN)	A network that interconnects geographically distributed computer or LANs.
Wireless	Describing radio-based systems allowing transmission or telephone and/or data signals through the air without a physical connection, such as a metal wire or fiber optical cable.

Attachment C
IDIQ Price List

Indefinite Delivery/Indefinite Quantity (ID/IQ) Price List

Contract Line Item	SOW/SRD Reference	Vendor Part #			Unit	CY 1 Price	CY 2 Price	CY 3 Price	CY 4 Price	CY 5 Price	CY 6 Price	CY 7 Price	CY 8 Price	CY 9 Price	CY 10 Price	CY 11 Price	CY 12 Price	CY 13 Price	CY 14 Price	CY 15 Price
SWITCH			Additional Switch Subsystems																	
			Switch																	
			100 keyset port (+120 pre-wired) / 10 T1 port switch (+12 pre-wired) / 10 VoIP ports (+12 pre-wired)																	
0100a	SRD 4.2		Hardware Element	1	Each	217079	222506	228069	233771	239615	245605	251745	258039	264490	271102	277880	284827	291948	299247	306728
0100b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	4342	4450	4561	4675	4792	4912	5035	5161	5290	5422	5558	5697	5839	5985	6135
LSA			Additional LSA Subsystems																	
	SRD 4.3		LSA Subsystem																	
0101a	SRD 4.3		Hardware Element	1	Each	3608	3698	3790	3885	3982	4082	4184	4289	4396	4506	4619	4734	4852	4973	5097
0101b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	72	74	76	78	80	82	84	86	88	90	92	95	97	99	102
Keyset			Additional Keysets																	
			Individual Keysets		Each															
			Type A – Outdoor Jackbox																	
0102a	SRD 4.4		Hardware Element	1	Each						2078	2130	2183	2238	2294	2351	2410	2470	2532	2595
0102b	SOW 3.7.4		Maintenance for Hardware Element	1	Year						42	43	44	45	46	47	48	49	51	52
			Type B – Hazardous Environment																	
0103a	SRD 4.4		Hardware Element	1	Each						2078	2130	2183	2238	2294	2351	2410	2470	2532	2595
0103b	SOW 3.7.4		Maintenance for Hardware Element	1	Year						42	43	44	45	46	47	48	49	51	52
			Type C – Virtual Keyset																	
0104a	SRD 4.4		Hardware Element	1	Each	966	991	1016	1041	1067	1094	1121	1149	1178	1207	1237	1268	1300	1333	1366
0104b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	19	20	20	21	21	22	22	23	24	24	25	25	26	27	27
			Type D – Desktop																	
0105a	SRD 4.4		Hardware Element	1	Each	2263	2319	2377	2436	2497	2559	2623	2689	2756	2825	2896	2968	3042	3118	3196
0105b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	45	46	48	49	50	51	52	54	55	57	58	59	61	62	64
			Type D – Rackmount 4U																	
0106a	SRD 4.4		Hardware Element	1	Each	2343	2401	2461	2523	2586	2651	2717	2785	2855	2926	2999	3074	3151	3230	3311
0106b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	47	48	49	50	52	53	54	56	57	59	60	61	63	65	66
			Type D – Vertical Console																	
0107a	SRD 4.4		Hardware Element	1	Each	2362	2421	2482	2544	2608	2673	2740	2809	2879	2951	3025	3101	3179	3258	3339
0107b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	47	48	50	51	52	53	55	56	58	59	61	62	64	65	67
			Type E – Rackmount 2U																	
0108a	SRD 4.4		Hardware Element	1	Each	2432	2492	2554	2618	2683	2750	2819	2889	2961	3035	3111	3189	3269	3351	3435
0108b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	49	50	51	52	54	55	56	58	59	61	62	64	65	67	69
Expansion			Switch Subsystem Expansion [See Note 1]	Note 4																
			Does not include Interface Cards																	
			64 keyset / 8 T1 Switch Expansion	1	Each															
0200a		30-0200500	BGT CIF (Switch/CNF)	2		5989	6139	6292	6449	6610	6775	6944	7118	7296	7478	7665	7857	8053	8254	8460
0200b	SOW 3.7.4		Maintenance for Hardware Element		Year	120	123	126	129	132	136	139	142	146	150	153	157	161	165	169
0201a		40-0200600	SBG COPT 01.00	2		510	522	535	548	562	576	590	605	620	636	652	668	685	702	720
0201b	SOW 3.7.4		Maintenance for Hardware Element		Year	10	10	11	11	11	12	12	12	12	13	13	13	14	14	14
0202a		30-0112300	BG CIF5 01.00	2		3188	3267	3349	3433	3519	3607	3697	3789	3884	3981	4081	4183	4288	4395	4505
0202b	SOW 3.7.4		Maintenance for Hardware Element		Year	64	65	67	69	70	72	74	76	78	80	82	84	86	88	90
0203a		30-0112400	BG JIF5 01.00 (Switch)	4		2488	2550	2614	2679	2746	2815	2885	2957	3031	3107	3185	3265	3347	3431	3517
0203b	SOW 3.7.4		Maintenance for Hardware Element		Year	50	51	52	54	55	56	58	59	61	62	64	65	67	69	70
0204\a		30-0200500	BGT CIF (KIF)	2		5989	6139	6292	6449	6610	6775	6944	7118	7296	7478	7665	7857	8053	8254	8460
0204b	SOW 3.7.4		Maintenance for Hardware Element		Year	120	123	126	129	132	136	139	142	146	150	153	157	161	165	169
0205a		30-0112400	BG JIF5 01.00 (KIF T1)	16		2488	2550	2614	2679	2746	2815	2885	2957	3031	3107	3185	3265	3347	3431	3517
0205b	SOW 3.7.4		Maintenance for Hardware Element		Year	50	51	52	54	55	56	58	59	61	62	64	65	67	69	70
0206a		20-0499991	FAN UNIT 19" DC 24V RJ45 D2	1		664	681	698	715	733	751	770	789	809	829	850	871	893	915	938
0206b	SOW 3.7.4		Maintenance for Hardware Element		Year	13	14	14	14	15	15	15	16	16	17	17	17	18	18	19
0207a		20-0000821	AIRFLOW CONTROL PLATE 19/1HE	4		200	205	210	215	220	226	232	238	244	250	256	262	269	276	283
0207b	SOW 3.7.4		Maintenance for Hardware Element		Year	4	4	4	4	4	5	5	5	5	5	5	5	5	6	6
0208a		20-0000807	CABINET 47HE	2		2338	2397	2457	2518	2581	2646	2712	2780	2850	2921	2994	3069	3146	3225	3306
0208b	SOW 3.7.4		Maintenance for Hardware Element		Year	47	48	49	50	52	53	54	56	57	58	60	61	63	65	66
0209a		20-0690001	Cabinet Cabeling	2		1625	1666	1708	1751	1795	1840	1886	1933	1981	2031	2082	2134	2187	2242	2298
0209b	SOW 3.7.4		Maintenance for Hardware Element		Year	33	33	34	35	36	37	38	39	40	41	42	43	44	45	46
0210a		20-0000814	Power Supply 230Vac 24Vdc 30A SL30.100	8		551	565	579	593	608	623	639	655	671	688	705	723	741	760	779
0210b	SOW 3.7.4		Maintenance for Hardware Element		Year	11	11	12	12	12	12	13	13	13	14	14	14	15	15	16
0211a		30-9407701	BGT PS 01	1		894	917	940	964	988	1013	1038	1064	1091	1118	1146	1175	1204	1234	1265
0211b	SOW 3.7.4		Maintenance for Hardware Element		Year	18	18	19	19	20	20	21	21	22	22	23	24	24	25	25
0212a		20-0000289	PSU AC SR92	2		634	650	666	683	700	718	736	754	773	792	812	832	853	874	896
0212b	SOW 3.7.4		Maintenance for Hardware Element		Year	13	13	13	14	14	14	15	15	15	16	16	17	17	17	18
0213a		30-0690002	BGT T1	1		934	957	981	1006	1031	1057	1083	1110	1138	1166	1195	1225	1256	1287	1319
0213b	SOW 3.7.4		Maintenance for Hardware Element		Year	19	19	20	20	21	21	22	22	23	23	24	25	25	26	26
			128 keyset / 16 T1 Switch Expansion	1	Each															
0300a		30-0200500	BGT CIF (Switch/CNF)	2		5989	6139	6292	6449	6610	6775	6944	7118	7296	7478	7665	7857	8053	8254	8460
0300b	SOW 3.7.4		Maintenance for Hardware Element		Year	120	123	126	129	132	136	139	142	146	150	153	157	161	165	169
0301a		40-0200600	SBG COPT 01.00	2		510	522	535	548	562	576	590	605	620	636	652	668	685	702	720
0301b	SOW 3.7.4		Maintenance for Hardware Element		Year	10	10	11	11	11	12	12	12	12	13	13	13	14	14	14
0302a		30-0112300	BG CIF5 01.00	2		3188	3267	3349	3433	3519	3607	3697	3789	3884	3981	4081	4183	4288	4395	4505
0302b	SOW 3.7.4		Maintenance for Hardware Element		Year	64	65	67	69	70	72	74	76	78	80	82	84	86	88	90
0303a		30-0112400	BG JIF5 01.00 (Switch)	8		2488	2550	2614	2679	2746	2815	2885	2957	3031	3107	3185	3265	3347	3431	3517

0303b	SOW 3.7.4		Maintenance for Hardware Element		Year	50	51	52	54	55	56	58	59	61	62	64	65	67	69	70
0304\a		30-0200500	BGT CIF (KIF)	3		5989	6139	6292	6449	6610	6775	6944	7118	7296	7478	7665	7857	8053	8254	8460
0304b	SOW 3.7.4		Maintenance for Hardware Element		Year	120	123	126	129	132	136	139	142	146	150	153	157	161	165	169
0305a		30-0112400	BG JIF5 01.00 (KIF T1)	32		2488	2550	2614	2679	2746	2815	2885	2957	3031	3107	3185	3265	3347	3431	3517
0305b	SOW 3.7.4		Maintenance for Hardware Element		Year	50	51	52	54	55	56	58	59	61	62	64	65	67	69	70
0306a		20-0499991	FAN UNIT 19" DC 24V RJ45 D2	1		664	681	698	715	733	751	770	789	809	829	850	871	893	915	938
0306b	SOW 3.7.4		Maintenance for Hardware Element		Year	13	14	14	14	15	15	15	16	16	17	17	17	18	18	19
0307a		20-0000821	AIRFLOW CONTROL PLATE 19/1HE	5		200	205	210	215	220	226	232	238	244	250	256	262	269	276	283
0307b	SOW 3.7.4		Maintenance for Hardware Element		Year	4	4	4	4	4	5	5	5	5	5	5	5	5	6	6
0308a		20-0000807	CABINET 47HE	2		2338	2397	2457	2518	2581	2646	2712	2780	2850	2921	2994	3069	3146	3225	3306
0308b	SOW 3.7.4		Maintenance for Hardware Element		Year	47	48	49	50	52	53	54	56	57	58	60	61	63	65	66
0309a		20-0690001	Cabinet Cabeling	2		1625	1666	1708	1751	1795	1840	1886	1933	1981	2031	2082	2134	2187	2242	2298
0309b	SOW 3.7.4		Maintenance for Hardware Element		Year	33	33	34	35	36	37	38	39	40	41	42	43	44	45	46
0310a		20-0000814	Power Supply 230Vac 24Vdc 30A SL30.100	10		551	565	579	593	608	623	639	655	671	688	705	723	741	760	779
0310b	SOW 3.7.4		Maintenance for Hardware Element		Year	11	11	12	12	12	12	13	13	13	14	14	14	15	15	16
0311a		30-9407701	BGT PS 01	1		894	917	940	964	988	1013	1038	1064	1091	1118	1146	1175	1204	1234	1265
0311b	SOW 3.7.4		Maintenance for Hardware Element		Year	18	18	19	19	20	20	21	21	22	22	23	24	24	25	25
0312a		20-0000289	PSU AC SR92	2		634	650	666	683	700	718	736	754	773	792	812	832	853	874	896
0312b	SOW 3.7.4		Maintenance for Hardware Element		Year	13	13	13	14	14	14	15	15	15	16	16	17	17	17	18
0313a		30-0690002	BGT T1	1		934	957	981	1006	1031	1057	1083	1110	1138	1166	1195	1225	1256	1287	1319
0313b	SOW 3.7.4		Maintenance for Hardware Element		Year	19	19	20	20	21	21	22	22	23	23	24	25	25	26	26
			256 keyset / 32 T1 Switch Expansion	1	Each															
0400a		30-0200500	BGT CIF (Switch/CNF)	2		5989	6139	6292	6449	6610	6775	6944	7118	7296	7478	7665	7857	8053	8254	8460
0400b	SOW 3.7.4		Maintenance for Hardware Element		Year	120	123	126	129	132	136	139	142	146	150	153	157	161	165	169
0401a		40-0200600	SBG COPT 01.00	2		510	522	535	548	562	576	590	605	620	636	652	668	685	702	720
0401b	SOW 3.7.4		Maintenance for Hardware Element		Year	10	10	11	11	11	12	12	12	12	13	13	13	14	14	14
0402a		30-0112300	BG CIF5 01.00	2		3188	3267	3349	3433	3519	3607	3697	3789	3884	3981	4081	4183	4288	4395	4505
0402b	SOW 3.7.4		Maintenance for Hardware Element		Year	64	65	67	69	70	72	74	76	78	80	82	84	86	88	90
0403a		30-0112400	BG JIF5 01.00 (Switch)	16		2488	2550	2614	2679	2746	2815	2885	2957	3031	3107	3185	3265	3347	3431	3517
0403b	SOW 3.7.4		Maintenance for Hardware Element		Year	50	51	52	54	55	56	58	59	61	62	64	65	67	69	70
0404a		30-0200500	BGT CIF (KIF)	5		5989	6139	6292	6449	6610	6775	6944	7118	7296	7478	7665	7857	8053	8254	8460
0404b	SOW 3.7.4		Maintenance for Hardware Element		Year	120	123	126	129	132	136	139	142	146	150	153	157	161	165	169
0405a		30-0112400	BG JIF5 01.00 (KIF T1)	64		2488	2550	2614	2679	2746	2815	2885	2957	3031	3107	3185	3265	3347	3431	3517
0405b	SOW 3.7.4		Maintenance for Hardware Element		Year	50	51	52	54	55	56	58	59	61	62	64	65	67	69	70
0406a		20-0499991	FAN UNIT 19" DC 24V RJ45 D2	1		664	681	698	715	733	751	770	789	809	829	850	871	893	915	938
0406b	SOW 3.7.4		Maintenance for Hardware Element		Year	13	14	14	14	15	15	15	16	16	17	17	17	18	18	19
0407a		20-0000821	AIRFLOW CONTROL PLATE 19/1HE	7		200	205	210	215	220	226	232	238	244	250	256	262	269	276	283
0407b	SOW 3.7.4		Maintenance for Hardware Element		Year	4	4	4	4	4	5	5	5	5	5	5	5	5	6	6
0408a		20-0000807	CABINET 47HE	3		2338	2397	2457	2518	2581	2646	2712	2780	2850	2921	2994	3069	3146	3225	3306
0408b	SOW 3.7.4		Maintenance for Hardware Element		Year	47	48	49	50	52	53	54	56	57	58	60	61	63	65	66
0409a		20-0690001	Cabinet Cabeling	3		1625	1666	1708	1751	1795	1840	1886	1933	1981	2031	2082	2134	2187	2242	2298
0409b	SOW 3.7.4		Maintenance for Hardware Element		Year	33	33	34	35	36	37	38	39	40	41	42	43	44	45	46
0410a		20-0000814	Power Supply 230Vac 24Vdc 30A SL30.100	14		551	565	579	593	608	623	639	655	671	688	705	723	741	760	779
0410b	SOW 3.7.4		Maintenance for Hardware Element		Year	11	11	12	12	12	12	13	13	13	14	14	14	15	15	16
0411a		30-9407701	BGT PS 01	1		894	917	940	964	988	1013	1038	1064	1091	1118	1146	1175	1204	1234	1265
0411b	SOW 3.7.4		Maintenance for Hardware Element		Year	18	18	19	19	20	20	21	21	22	22	23	24	24	25	25
0412a		20-0000289	PSU AC SR92	2		634	650	666	683	700	718	736	754	773	792	812	832	853	874	896
0412b	SOW 3.7.4		Maintenance for Hardware Element		Year	13	13	13	14	14	14	15	15	15	16	16	17	17	17	18
0413a		30-0690002	BGT T1	2		934	957	981	1006	1031	1057	1083	1110	1138	1166	1195	1225	1256	1287	1319
0413b	SOW 3.7.4		Maintenance for Hardware Element		Year	19	19	20	20	21	21	22	22	23	23	24	25	25	26	26
Ports			**Expansion Within Unpopulated Card Slots**	**Note 2**																
			LSA Interface Card	**N/A - Included in base switch subsystem**																
0109a	SRD 4.2.1		Hardware Element (indicate port capacity in next column)	1	Each															
0109b	SOW 3.7.4		Maintenance for Hardware Element	1	Year															
			Local Keyset Interface Card																	
0110a	SRD 4.2.1	30-0112400	BG JIF5 01.00 (KIF T1)	4	Each	2565	2629	2695	2762	2831	2902	2975	3049	3125	3203	3283	3365	3449	3535	3623
0110b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	51	53	54	55	57	58	60	61	63	64	66	67	69	71	72
			Remote Keyset Interface Card																	
0111a	SRD 4.2.1	30-0112400	BG JIF5 01.00 (KIF T1)	4	Each	2565	2629	2695	2762	2831	2902	2975	3049	3125	3203	3283	3365	3449	3535	3623
0111b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	51	53	54	55	57	58	60	61	63	64	66	67	69	71	72
			VoIP Keyset Interface Card																	
0112a	SRD 4.2.1	30-0200500	BG CIF5 01.00 (VoIP KIF)	4	Each	3287	3369	3453	3539	3627	3718	3811	3906	4004	4104	4207	4312	4420	4531	4644
0112b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	66	67	69	71	73	74	76	78	80	82	84	86	88	91	93
			T1 Interface Card																	
0113a	SRD 4.2.1	30-0006608	BG GPIF 04.01	1	Each	878	900	923	946	970	994	1019	1044	1070	1097	1124	1152	1181	1211	1241
0113b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	18	18	18	19	19	20	20	21	21	22	22	23	24	24	25
LRUs			**LRUs [See Note 3]**																	
			Description																	
0500a	SRD 4.0	30-0690001	BGT CIF-X	1		6174	6329	6487	6649	6815	6985	7160	7339	7522	7710	7903	8101	8304	8512	8725
0500b	SOW 3.7.4		Continue as Required (maintenance)...	1	Year	123	127	130	133	136	140	143	147	150	154	158	162	166	170	175
			Description																	
0502a	SRD 4.0	20-0000290	PSU AC SR93 (DCDC)	1		587	601	616	631	647	663	680	697	714	732	750	769	788	808	828
0502b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	12	12	12	13	13	13	14	14	14	15	15	15	16	16	17
			Description																	
0503a	SRD 4.0	30-0690003	TMCS Server + DB	1		6283	6440	6601	6766	6935	7108	7286	7468	7655	7846	8042	8243	8449	8660	8877

0503b	SOW 3.7.4		Continue as Required (maintenance)...	1	Year	126	129	132	135	139	142	146	149	153	157	161	165	169	173	178
			Description																	
0504a	SRD 4.0	30-0690006	Ethernet Switch	1		322	330	338	346	355	364	373	382	392	402	412	422	433	444	455
0504b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	6	7	7	7	7	7	7	8	8	8	8	8	9	9	9
			Description																	
0505a	SRD 4.0	0	19" TFT Flatscreen Monitor	1		387	396	406	416	426	437	448	459	470	482	494	506	519	532	545
0505b	SOW 3.7.4		Maintenance for Hardware Element	1	Year	8	8	8	8	9	9	9	9	9	10	10	10	10	11	11
Misc			Miscellaneous [See Note 5]																	
			Description																	
0601a	SRD		Hardware Element	1	Each															
0601b	SOW		Maintenance for Hardware Element	1	Year															
			Continue as Required...																	
0602a	SRD		Continue as Required...	1	Each															
0602b	SOW		Continue as Required (maintenance)...	1	Year															
Training			Additional Training Sessions																	
0114	SOW 3.7.5		Maintenance Training Session	1	Each	10314	10572	10836	11107	11385	11670	11962	12261	12568	12882	13204	13534	13872	14219	14574
0115	SOW 3.7.5		Operations Training Session	1	Each	8822	9043	9269	9501	9739	9982	10232	10488	10750	11019	11294	11576	11865	12162	12466
0116	SOW 3.7.5		Keyset User Training Session	1	Each	7541	7730	7923	8121	8324	8532	8745	8964	9188	9418	9653	9894	10141	10395	10655
Support			Additional System Support																	
0117	SOW 3.8		Skill Category #1 – Sr engineer	1	Hour	149	153	157	161	165	169	173	177	181	186	191	196	201	206	211
0118	SOW 3.8		Skill Category #2 – Jr Engineer	1	Hour	113	116	119	122	125	128	131	134	137	140	144	148	152	156	160
0119	SOW 3.8		Skill Categoty #3 - Field Engineer	1	Hour	134	137	140	144	148	152	156	160	164	168	172	176	180	185	190
0120	SOW 3.8		Skill Category #4 – Software engineer	1	Hour	131	134	137	140	144	148	152	156	160	164	168	172	176	180	185

NOTE 1: List and Price all LRUs, racks and subassemblies included in the incremental expansion
For evaluation purposes, provide a total price for each incremental expansion for each Contract Year

NOTE 2: In this column, for port cards, indicate the number of ports supported on one card

NOTE 3: List and price all other LRUs for the voice systems (excluding those already listed under "Switch Subsystem Expansion")

NOTE 4: In this column, indicate the quantities of each rack, subassembly or LRU required for the expansion

NOTE 5: List and price any other items which you are offering to the Government. The estimated quantities for these items will be 1 in all contract years.

Attachment D
Safety and Health Plan

Restriction

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D SUBFACTOR D: Safety and Health Plan

D.1. MANAGEMENT LEADERSHIP AND EMPLOYEE PARTICIPATION

D.1.1. Policy

The Frequentis Team will make all necessary efforts and follow procedures to be consistent with all applicable GSFC requirements in reference to the Safety and Health Plan. The GSFC website will be monitored for possible changes. Frequentis teammate, Honeywell will perform operations and maintenance of hardware and software associated with the MOVE contract. Work performed on MOVE is predominately in an office or mission control center environment. The only special hazards associated with this work are the presence of significant amounts of cabling and the fact that many of the facilities have elevated floors with removable panels. Special attention placed on ensuring cabling does not create a tripping or a shock hazard especially for temporary setups associated with maintenance and testing. Special procedures are also in place to ensure that pedestrian traffic is controlled during operations where floor panels are removed. Some of the support activities such as facilities maintenance, logistics and hardware maintenance have potentially hazardous operations, but training and common control measures and standardized safety practices are in place as described throughout this plan.

It is the Frequentis Team's policy and philosophy to take every reasonable precaution to protect the health and safety of our employees, our customers and the public; to continuously improve our support to our customers; preserve and protect the environment; ensure mission success, and prevent events that may cause damage to equipment and resources. It is the Occupational Safety and Health Administration (OSHA) vision that "every employer and employee in the nation recognizes that safety and health adds value to the American businesses, workplaces, and workers lives." It is NASA's policy to provide a safe and healthy environment for all civil servants, contract employees, and visitors. Frequentis' team policy comprehensively includes the basic concepts of both NASA's and OSHA's policies.

The Frequentis Team (Team includes all employees, contractors and subcontractors on the MOVE contract) subscribes to the following precepts in conducting all business activities:

- All mishaps are preventable through implementation of effective safety and health control policies and practices.
- Protection of our employees takes precedence over productivity; it is good business; it prevents human suffering, and increases prosperity of all affected.
- Employees will be trained to identify, evaluate, and control safety, health, and environmental hazards; and to protect themselves, other workers, and property.
- Every manager and team member is responsible and accountable for their own safety and the safety of others in the workplace. We are responsible for following the MOVE Safety and Health Plan policies and procedures at all times.
- Management will audit/review safety performance and the working environment and take corrective action to ensure a safe and healthful working environment for all employees. In consonance with this policy, the Frequentis Team Plan is designed to comply with existing OSHA, Environmental Protection Agency (EPA), NASA Agency-wide, and NASA-specific requirements, procedures, guidelines, and instructions; as well as with Frequentis corporate policies.
- Environmental preservation and protection shall be evident in all aspects of business performance to optimize the

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value of our support to NASA, MOVE supported facilities and our service to the local community.

- We will partner with our subcontractors and others to safely reach NASA's goals.
- We will remain flexible to adapt to changes and modify or create safety procedures or processes to provide the highest level of protection.

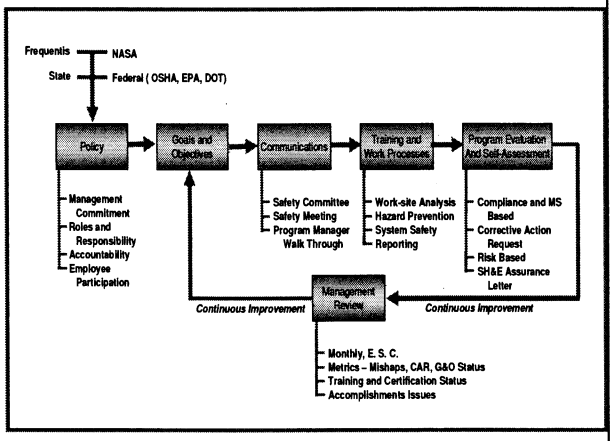

Figure 1: SHP Management Approach

We hold each member of the Frequentis team accountable and responsible for the implementation of this Safety and Health Plan, and furthermore, we hold our Program Manager (PM) accountable for the performance of our overall Safety Program. Conformance to the requirements in this Safety and Health Plan will be considered conditions of employment for all Frequentis employees and subcontractors performing work on the MOVE Program. Our Safety and Health Program will comply with all Federal, State, and NASA requirements.

Note: When NASA is referenced within this plan, all safety-related directives and reference documentation pertaining to and produced by sites and facilities under its control are included.

The Frequentis Team recognizes the complexity of managing a comprehensive and effective Safety and Health Program (SHP) and to accomplish the top level SHP goals. To ensure that we successfully provide a safe and healthful environment for employees and the public, and prevent damage to property and equipment, Frequentis will implement a proven management system infrastructure for the SHP. This approach is illustrated in **Figure 1: SHP Management Approach.**

D.1.2. Goals and Objectives

The goal of our SH Program is to provide a safe and healthy working environment for all employees working at NASA's on-site and off-site facilities, under the MOVE contract. In addition, it is our objective to enhance NASA's excellent Safety and Health Program by:

- Maintaining a superior compliance record for all EPA, OSHA, NASA, and NASA requirements as follows:
  - > Timely reporting.
  - > Accurate records.
- Review of pending standards and regulations with respect to the MOVE contract.
- Striving to reduce or replace products that harm the environment.
- Reinventing safety processes to achieve a Zero Tolerance Mindset for all team members in regards to unsafe actions and conditions.
- Supporting and implementing the annual safety and health goals and visions established by the NASA Health and Safety Committee.
- Participating in all NASA safety activities that are used to promote safety awareness and wellness.

D.1.2.1. Specific Goals and Objectives

Specific MOVE performance-related SHP goals include:

- Zero Lost Time Incidents (DAFW)
- Zero OSHA Recordables
- Severity Zero
- Zero "Significant" Safety Audit Findings
- Zero NASA Incidents (Type A, B, or C)
- No breach of environmental compliance
- One Close Call report per employee per year

- Zero Property Damage

The Frequentis management team members will collectively develop annual SHP goals and objectives for the MOVE contract that will set the strategic direction for all employees. This will ensure that all MOVE employees understand the Corporation's safety expectations and align their goals accordingly.

An important part of this process is the Frequentis Annual Operating Plan (AOP). It allows management to allocate a budget for procurement of safety supplies to ensure that work activities are accomplished safely and employees are provided adequate personal protective equipment.

Self-evaluation of our program will be conducted at the beginning of each contract year. The Frequentis Team will request that NASA Safety Environmental and Security Office, Code 205, assist in measuring the effectiveness of our safety program to fulfill the NASA and Frequentis Team requirements for annual self-assessments. The NASA evaluation, and our own self-assessment, will include both Frequentis Team managers and employees to obtain an objective program evaluation. The results of all evaluations will be compared to existing documentation such as close-call reports (refer to Section 2.3), audits, mishap investigations (refer to Section 3.1), and baseline facility evaluations (refer to Section 2.1) to assess program effectiveness. This information will be used to develop and monitor goals for the upcoming year.

D.1.2.2. Approach to Achieving Level 5 PEP

The MOVE Program Manager and MOVE Safety Manager will utilize the Performance Evaluation Profile (PEP) survey on an annual basis to further evaluate the MOVE Safety, Health, and Management performance. The survey will include all subcontractors and subcontracted tasks. As the incumbent for MOVE operations, Frequentis' teammate, Honeywell, already has active safety processes and programs in place. Improvement steps are as follows:

- Analyze results of PEP.
- Determine areas below level 5.
- Develop a strategy for continuous improvement for each area.
- Execute improvement steps.
- Measure performance improvement.

The Frequentis Team expects to achieve and maintain PEP level 5 within 18 months of MOVE contract start. When a written program evaluation is requested by NASA, it will be delivered to the Government no later than 30 days after the end of each contract year or 30 days after the end on the contract, whichever is applicable.

D.1.2.3. Safety Record, Accident History, and Goals

The Frequentis Team recognizes that setting goals does not guarantee safety success. The team brings a proven, comprehensive SHP

that will:

- Assess all existing hazards or potential hazards at our contract sites.
- Eliminate hazards by redesign of processes or tasks.
- Implement controls where hazards cannot totally be removed.
- Evaluate its success or opportunities for improvement monthly.
- Is reliable and respond to change.

By using this program, Frequentis will maintain a World Class safety record.

D.1.2.4. Past performance with respect to NASA contracts

Frequentis and Honeywell have used a combination of empowered employees, best practices, proactive safety measures and

partnering with NASA to bring injury rates down to the low levels they are today.

D.1.3. MANAGEMENT LEADERSHIP

The Frequentis Team believes that it is essential for our managers to provide visible leadership to attain our Safety and Health Program goals and objectives. Responsibilities will be assigned in writing and expectations clearly communicated for safety and health performance of all personnel. This Safety and Health Plan is developed with clear, written safety policies that are endorsed by our PM. Progress toward our goals will be continuously measured and reviewed, and modifications and improvements made, as necessary, at all contract levels.

The Frequentis Team's PM and leadership team will:

- Regularly communicate with employees about workplace safety and health matters through weekly and monthly meetings.
- Begin every meeting with a "Safety Message."
- Provide employees with access to information relevant to the program by e-mails, postings, and presented metrics.
- Involve employees in hazard identification and assessment, prioritizing hazards, training, and program evaluation through the MOVE Close Call Program and the Failure Modes and Effects Analysis (FMEA) process.
- Establish means for employees to report job-related fatalities, injuries, illnesses, incidents, and hazards promptly, and to make recommendations about appropriate ways to control those hazards through the use of the Frequentis Safety Input form and the NASA Form 1627.
  Provide prompt responses to such reports and recommendations.
- Participate and support the MOVE Safety Committee.
- Ensure corrective action plans are developed and implemented for identified safety and health concerns.

Frequentis's SHP office in Rockville, Maryland will assist the MOVE PM who is ultimately responsible for the enforcement, care, and maintenance of this plan as it pertains to all work performed under the MOVE contract.

The Frequentis Team's managers will be responsible for overseeing the safety and health of their people, spaces, and equipment. Managers throughout the organization will set the example by consistently following the rules and behavioral expectations established for the workforce as a matter of personal practice. Our management, at all levels, will consistently address the safety behavior of others by coaching, correcting poor behavior, and reinforcing good behavior. Managers will solicit volunteers from their organizations to serve as Task Safety Coordinators.

D.1.4. Employee Involvement

All Frequentis Team employees will be required to participate in the MOVE Safety and Health Program. Employee participation will provide a means for individuals to identify risks, recommend and monitor risk controls, and to be a part of making a safe and healthy workplace. Employee representatives will be trained to enhance productive participation in such activities through the Frequentis Safety Excellence Program. Our employees will have a substantial impact on the design and operation of the MOVE safety and health program. We require communication between managers and employees regarding safety issues, and provide for open communication with representatives of the NASA Safety Environmental and Security Office. Our employees will be authorized and empowered to stop work on activities that they believe present potential serious safety or health risks. The avenues and mechanisms for involvement have proven effective in reducing accidents and enhancing safe behaviors. Our

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procedure to promote and implement employee involvement in the Safety and Health Program development, implementation, and decision making will include:

- Participating as Task level Safety Coordinator.
- Participating in safety and health inspections/audits.
- Performing Job Hazard Analyses (JHA).
- Participating in Mishap and Close Call Investigations.
- Providing safety and health inputs and identifying risks (through the Close Call Reporting System) directly to the MOVE Safety Manager or program leadership.
- Participating with the MOVE Safety Manager to develop creative themes and methods to effectively communicate employee awareness both on and off-the-job safety.
- Joining safety committees.
- Attending both general and task specific safety training.
- Reporting health hazards immediately to their Task Lead.

D.1.4.1. Employee Safety Committees

The MOVE Frequentis Team will support NASA Safety Council meetings in discussions about the status of safety, required improvements, and lessons learned within current programs. Frequentis will also participate in the NASA center-wide meetings and the Contractor Safety Forum.

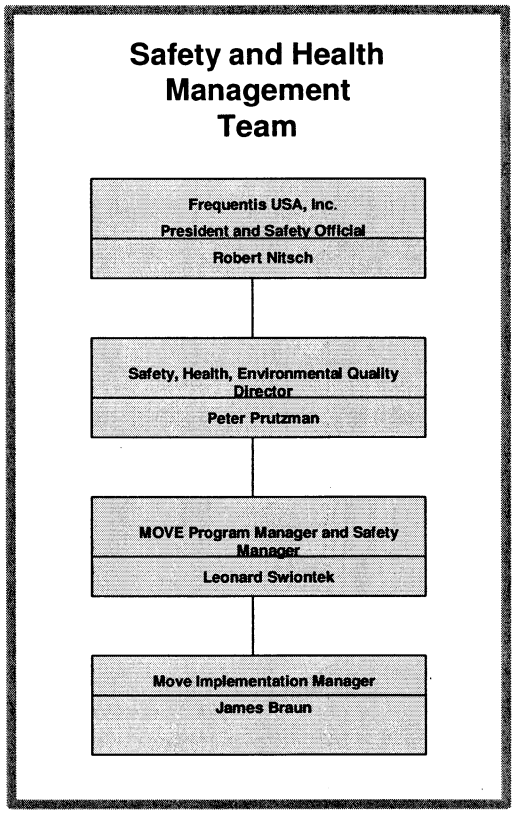

Figure 2: Safety and Health Management Team

The MOVE Safety Committee will be an integral part of our company's safety management effort to support the MOVE contract. Project Managers and Task Leads will gain valuable assistance in their areas by teaming with their committee members. Committee membership will be a voluntary service available to all employees.

The MOVE Safety Committee will adopt the following goals:

- Involve employees in safety management.
- Lower the rate and severity of accidents and injuries on and off the job.
- Maintain a safe workplace.
- Increase employee participation in safety programs.
- Provide a channel to resolve contract-based safety concerns.

- Allow an open forum where SHP issues and accomplishments are discussed.
- Provide feedback on lessons learned regarding SHP related information.

D.1.5. Assignment of Responsibility

The Frequentis Team will provide a dedicated Safety Team to support the MOVE contract. A detailed diagram of the support structure is provided in Figure 2: Safety and Health Management Team.

We will communicate and interface through our Frequentis program structure. Direction will come through the management chain, and oversight and compliance will be performed by the technical staff both within MOVE and from the corporate level. Communications will include memoranda, audit and inspection reports, newsletters, direct verbal communication, and electronic communications.

The line and staff responsibilities are as follows:

a. MOVE Safety Manager

The Safety and Health duties of the MOVE Safety Manager will be as follows:

- Approve the selection and appointment of Task Safety Coordinators. Establish and maintain a training program for Task Safety Coordinators.
- Monitor MOVE employee and subcontractor safe work practices and performance to contract safety requirements. Establish a MOVE trending program.
- Advise MOVE Project Managers and Task Leads regarding safety matters through various forms of communication and personal contact.
- Review and approve all Frequentis Team hazardous activity procedures. Review new and modified facility and system designs for life safety. Conduct pre-operational hazard assessments prior to testing and turnover of new equipment or modified building areas for use.
- Establish and maintain a liaison with the NASA or NASA Safety, Environmental, and Security Office to ensure that Frequentis complies with all NASA regulations and emergency procedures.
- Aid MOVE Project Managers and Task Leads in establishing effective safety programs in their work areas.
- Audit MOVE working areas and operations, bringing violations of safety regulations and existence of hazards to the attention of Project Managers and Task Leads for corrective action.
- Develop the general safety briefing and orientation for new MOVE employees. Ensure the training is presented to employees before they start work.
- Develop and implement a continuous MOVE safety training program.
- Ensure the proper investigation and documentation of all occupational accidents and illnesses. Serve as the Mishap Investigation Coordinator for the Frequentis Team. Provide for the required NASA and company monthly safety reporting.
- Maintain records and submit reports of MOVE safety inspections, safety training, safety meetings, occupational illness, and/or injuries, and investigations.
- Receive, track, and resolve MOVE related safety and health complaints, suggestions, and reports.
- Assist in evaluating prospective MOVE subcontractor qualifications relative to safety and health.
- Work with MOVE procurement to ensure that each subcontractor adopts this plan and meets the requirements of the Frequentis "Contractor Safety Program" and its policies. This program outlines the process and procedures that apply to contractors or subcontractors hired to conduct work at NASA locations. Also

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included are procedures for the administration of the program, documentation requirements, and the SHP information that the contractors or subcontractors will receive prior to the start of work.

- Ensure each MOVE subcontractor assigns a competent safety coordinator, who is capable of identifying unsanitary, hazardous, or dangerous working conditions, and is capable of identifying existing or potential hazards in the workplace and has the authority to take prompt corrective measures to eliminate the hazardous conditions and unsafe acts.
- Review compliance of all subcontractors with safety policies and practices annually as mandated in the Frequentis Contractor Safety Program. All subcontractors are contractually obligated to meet all of the requirements of this program.

b. Building Fire Wardens

A Frequentis manager will be given responsibility for each building occupied by Frequentis Team personnel and will assign an individual to facilitate the site's or location's fire safety program, including coordination of related issues with NASA facility managers and emergency planning and response officials and their representatives. Fire wardens will participate in both scheduled and unscheduled drills and training as required.

c. Designated Safety Officials

The MOVE PM and the MOVE Safety Official will be responsible for the implementation of this plan and all formal contacts with regulatory agencies and with NASA.

d. MOVE Program Manager

The Program Manager's SHP responsibilities will be:

- Provide total oversight for the development and implementation of the Safety and Health Program. The PM is held accountable for the success of this program and has complete and final authority on all Frequentis-related decisions pertaining to safety on the MOVE contract.
- Assign and communicate responsibility for all aspects of the program so that managers, supervisors, and employees in all parts of the organization know performance expectations.
- Ensure that adequate resources are provided to meet the needs of the contract's Safety and Health Program.
- Enforce safety and health policies and procedures, and ensure compliance with applicable local, state, and Federal safety and health regulations.
- Hold all employees accountable for meeting their responsibilities, so that all tasks will be performed safely.
- Ensure that all employees receive training as required by this plan or contractual documents.
- Review program operations at least annually to evaluate success in meeting assigned safety and environmental goals and objectives, to identify deficiencies, and to take corrective actions needed to meet the goal of effective safety and health protection.
- Act as Chairman of the Program-level MOVE Safety Committee.

e. MOVE Safety Official

The MOVE Safety Official will be a Frequentis corporate manager who acts as the formal support liaison for all Frequentis related activities and operations concerning overall safety on the MOVE contract. The official will assist the PM (and MOVE Safety Manager) with establishing organizational safety policies and ensuring compliance with Frequentis, OSHA, EPA, NASA, and NASA safety policies and requirements. The MOVE PM will be the Designated Safety Officials for all contacts with

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regulatory agencies and NASA or NASA concerning safety and health issues on this contract. Selection of safety support personnel will be based on qualifications approved by the Frequentis Corporate SHP Director, the MOVE Safety Official, and the MOVE PM.

f. MOVE Project Managers

The MOVE Project Manager's duties in regard to Safety and Environmental direction and support will be as follows:

- Assign and communicate responsibility for all aspects of the program so that Task Leads and their employees know performance expectations.
- Ensure that adequate resources are provided to meet the needs of the MOVE Safety and Health Program.
- Enforce safety and health policies and procedures, and ensure compliance with applicable local, state, and Federal safety and health regulations.
- Designate Safety Coordinators to support all Task level safety activities. Act as Chairman of the Project Level Safety Committee.
- Provide day-to-day oversight of contract safety and health programs.
- Develop, conduct, and document employee training.
- Take necessary action when unsafe conditions are found, including Stop Work.
- Support NASA and NASA specific safety, health, environmental, and fire protection concerns and goals.
- Participate in MOVE Contractor Safety meetings as required by Code 205, and other activities related to the Safety, Health, and Environment of Frequentis Team members and our NASA partners.
- Develop a monthly schedule for associated Task Level Safety Coordinators to conduct safety and health inspections.
- Investigate Close Calls and accidents that happen on the job using Frequentis Root Cause/Corrective Action (RCCA) methodology.
- Maintain records and prepare reports required by OSHA, NASA, NASA, and corporate directives.
- Provide reporting and investigative support to the appropriate state Worker's Compensation program.

g. MOVE Task Level Coordinators

Frequentis Team Task Level Coordinators are responsible for overseeing the safety, health, and environment of the personnel, workspace, and equipment they are assigned. They perform safety audits, training, and mishap investigations. They also serve on the MOVE Safety Committee. This function is a collateral duty.

h. Access to Safety and Health Support

The Frequentis MOVE Team contract has access to certified safety and health professionals (Certified Safety Professionals [CSP's]) and Professional Engineers (PE) available from within Frequentis's SHP office.

D.1.6. Provision of Authority

This plan was developed and will be maintained to be consistent with the NASA principles, our corporate safety and health manuals, applicable NASA requirements, MOVE contractual direction, and applicable Federal, state, and local regulations and directives. Updates will be secured through the NASA and NASA Safety Offices, corporate directives, and other recognized sources. To ensure this is maintained throughout the lifetime of the contract, it will be an audited activity included in our Quality audits. Refer to the reference documents listed in Section 7.0, Document Listing.

D.1.7. Accountability

D.1.7.1. Management Accountability

MOVE managers and Task Leads will be held accountable for meeting all safety, health, and environmental protection responsibilities that affect their employees or their work areas. Annually, Frequentis leadership at all contract locations are required to assess their SHP programs and validate compliance through SHP Assurance Letter Processes. Program Managers at each site are required to sign a document stating this and cannot be delegated. Authority and responsibility for MOVE safety and health protection will be clearly defined in their individual performance plan. Individual performance plans will be reviewed bi-annually and course corrections made at that time. Goals for safety improvement (e.g., safety related training, safety conference attendance) may also be included. MOVE management will evaluate SHP protection performance as part of the annual personnel evaluation. Accountability data will be used by individuals and teams to revise goals and objectives to facilitate continuous improvement in safety and health. Failure to support the Safety Program and personal goals related to it can result in poor performance evaluations and possible disciplinary actions.

D.1.7.2. Employee Accountability

All Frequentis Team employees will be held responsible for their own safety and the safety and health of their coworkers. Employees accept personal responsibility for ensuring a safe and healthy workplace. Annual performance reviews for employees will include measurements of safety performance. Any failures to meet safety responsibilities will be addressed and result in appropriate coaching, counseling, or action. Employees will never be subjected to disciplinary action for reporting hazardous conditions in their workspaces.

D.1.7.3. Motivation - Employee Total Recognition Program

To encourage MOVE Team member participation and accountability in the MOVE Safety and Health Program, a safety awards program will be implemented. Team members may receive awards and recognition for outstanding support of the MOVE Contract Safety and Health Program based on their participation beyond the required compliance levels outlined by this and other MOVE related supporting documentation. As previously mentioned, the MOVE Total TRP will be used for safety awards.

D.1.7.4. Disciplinary Policy and Procedures

Frequentis Team members (including contractors, subcontractors and vendors) will be required to perform assigned tasks in a manner that ensures safety for themselves and fellow MOVE workers. Failure to do so may constitute a safety violation. A site-specific list of "Cardinal Safety Rules" will be posted within areas controlled by the Frequentis Team. **Figure 3: Frequentis Team Cardinal Safety Rules – Example** contains an example of a posting. These rules will specifically list what actions are not tolerated or accepted while on the job. Disciplinary actions resulting from safety violations will be handled at the PM level and depending on the seriousness of the violation could be grounds for immediate termination of MOVE employment. Willful or deliberate violation of safety regulations, including withholding information that could assist with an investigation conducted by a customer or management, will be considered a serious violation. Any Frequentis Team employee or supervisor found to have negligently violated safety procedures will be subject to disciplinary action up to and including dismissal. Intentional violation of safety procedures will be cause for dismissal, except under extenuating circumstances. Discipline may include a letter to the personnel file, reassignment of duties and responsibilities, salary adjustments, or dismissal. Minor violations will be handled on a case by

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case basis. Frequentis Team members will ensure that a similar disciplinary program is in force throughout the MOVE contract lifetime.

CARDINAL SAFETY RULES

No employee may:

Engage in horseplay or disorderly conduct that endangers or injures employees, risks damage or actually does damage to company or customer property.

Bring onto the site, NASA Facilities or have in his/her possession: firearms, explosives, or weapons of any type.

Bypass or operate equipment without established safety devices or safeguards.

Disassemble, enter or perform servicing, changeover or maintenance on equipment without properly de-energizing and safeguarding all power sources according to the current lock-out/tag-out policy.

Knowingly place her/himself or another person in physical danger, conceal a known hazard, or fail to promptly obtain attention for a personal injury or incident.

The actions listed above have been found to have such great potential for serious injury that any employee that engages in such actions will be subject to termination from the Corporation regardless of previous performance. This policy is intended to protect the employee, his/her co-workers and our customers.

All employees are expected to understand and adhere to these Cardinal Rules and to request assistance in questionable situations. Further more, all employees are encouraged to question the safety of all contract operations and/or tasks and become involved in improving their safety.

_____
Task Lead

_____
Employee

Date Signed _____

Figure 3: Frequentis Team Cardinal Safety Rules – Example

D.1.8. Program Evaluation

Frequentis has grown and matured to become a leader in the voice communications service and products field. This success is due in a large part to our commitment to continuous process improvements. Commitment to safety improvement is one of the parameters by which we measure our success. The Frequentis Team brings with it a strong commitment to safety. As part of our own internal program evaluation, we will use the PEP Survey where applicable to assist in the evaluation of the MOVE SHP management systems. The MOVE PM and the MOVE Safety Manager will schedule an annual MOVE survey using various tools (SHP Maturity Path, PEP, Frequentis Assurance Letter Process) to assess the current state of the program and identify areas for growth. The survey will include all subcontractors and subcontracted tasks. When a written program evaluation is requested by NASA, it will be delivered to the Government no later than 30 days after the end of each contract year or at the end of the contract, whichever is applicable. The PEP survey is normally scheduled and administered at the discretion of NASA.

D.1.8.1. Safety and Health Management System

The Frequentis Team will incorporate the SHP Management System process into all MOVE contract activities. The goal of this system is continuous improvement of HSE knowledge, programs, and processes. This 16-element program will be used initially to determine the baseline for MOVE SHP and to establish goals to reach a mature SHP program. A biannual review using the elements will be conducted to assess the progress. The review will be made available to all team members by the MOVE PM.

The following elements are covered:

- SHP Policy
- Leadership and Employee Involvement
- SHP Hazards, Risks, and Impacts
- Legal and other Requirements
- Objectives and Targets
- Organization
- Training, Awareness, and Capability
- Communication

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- Document Management
- Procedures and Operational Controls
- Emergency Preparedness and Response
- Monitoring and Measurement.
- Corrective and Preventive Action
- Records and Information Management
- SHP – Management System Self-Assessment
- Leadership Review

D.1.9. Safety and Health Program Performance

The Frequentis team will use products generated from the monthly trending of safety related reports, metrics, and audits to provide the Government with the necessary visibility and insight to gauge the safety and health performance of the MOVE contract. Documentation available to the Government will include the identification, acquisition, and processing of safety and health data, development of procedures, record keeping; and statistical analyses including metrics. Electronic access by the Government to this data will be provided as long as Privacy Act requirements are met. Government safety and health professionals and their representatives will have full and unimpeded access for review and audit purposes. For activities conducted on NASA property, the Frequentis Team will make available to the Government any records required (in accordance with the Voluntary Protection Program [VPP] criteria of OSHA as implemented in NASA's Requirements Handbook for Safety, Health, and Environmental Protection, as revised). For the purpose of this plan, safety and health documentation includes, but is not limited to, logs, records, minutes, procedures, checklists, statistics, reports, analyses, notes, or other written or electronic document which contains in whole or in part any subject matter pertinent to safety, health, environmental protection, or emergency preparedness.

D.1.9.1. Standing Requests

When documenting MOVE Safety and Health Performance, there are numerous requirements that need to be addressed, including:

- Identification, acquisition, and processing of safety and health data.
- Development of procedures.
- Record keeping.
- Statistical analyses including metrics.
- Furnishing of data and reports to the government.
- Provision of electronic access.
- For activities on Government sites, identify records to be made available in accordance with VPP criteria as implemented in NASA Requirements Handbook for SHP Protection.

The following are standing requests:

a. Roster of Terminated Employees

The Human Resources Generalist for the MOVE contract will communicate directly with the NASA occupational health program office whenever an employee is terminated while providing MOVE support. All MOVE subcontractors will also perform this requirement. In the communication, terminated personnel will be identified by employer. The report will be forwarded to the Occupational Health Officer no later than 30 days after the end of each contract year or at the end of the contract, whichever is applicable.

The following information will be provided:

- Date of report, contractor identity, and contract number.
- The name, social security number, assigned Center badge number, and date of termination.
- The name, address, and telephone number of the contractor representative to be contacted for questions or other information.

b. Material Safety Data

This plan is applicable and binding to all MOVE contract personnel and those firms or individuals who may in the future be subcontracted to support the Frequentis Team. Each supplier of goods and services to the Frequentis Team is held responsible for compliance with OSHA, EPA, and NASA requirements and the referenced documents upon which this plan is based.

Frequentis Team procurement directives will require a Safety and Health review of all purchases and subcontracts to ensure that they contain provisions for applicable safety, health, and environmental protection requirements. This review process ensures that all applicable safety codes, standards, and requirements will be contained in the purchase document or subcontract. Particular emphasis will be placed on purchases and/or construction of major hardware systems, high value procurements, critical equipment, personal protective equipment, tools, handling equipment, characteristically hazardous materials, and hazardous items, and procurements that result in the generation of hazardous waste.

Procurement directives require that purchase orders for hazardous items contain a clause requiring the supplier to provide a copy of the Material Safety Data Sheet (MSDS) with each shipment. The Frequentis team will prepare a Material Safety Data Sheet(MSDS) and deliver the same to GSFC for products brought into government property. In accordance with Occupational Safety & Health Administration (OSHA) regulation, 29 CFR 1910.1200, "Hazard Communication," and Federal Standard 313 (or FED-STD-313), "Material Safety Data, Transportation Data & Disposal Data for Hazardous Materials Furnished to Government Activities," as revised. A copy of each Material Safety Data Sheet (MSDS) will be sent to the GSFC Safety & environment Branch, Mail Code250, upon receipt of the material for use on NASA property. These forms will be used to update the various systems available at NASA that record information applicable to hazardous materials. The Center has a new automated chemical inventory system, MSDSPro. MSDSs will be forwarded to the NASA Safety Environmental and Security (Code 205) Office for inclusion within the central repository.

Quality and Safety professionals will audit purchases and subcontracts to ensure that they contain data that clearly describes the product or service that is being ordered or subcontracted. Required data includes all SHP requirements. The product or service requirements will be verified; either at the Frequentis Team receiving inspection or at the supplier's or subcontractor's premises, as applicable, before acceptance.

c. Hazardous Materials Inventory

The receipt, storage, issuance, use, and disposal of hazardous materials will be in accordance with NPG 8715.3, NASA Safety Manual, and the NASA Hazard Communication Program.

Frequentis procurement requires that MSDSs be delivered with all shipments of hazardous materials. If items are delivered without the required MSDSs, they will be placed on hold to await the MSDS or returned. Copies of MSDSs will be maintained physically or electronically for easy reference by Frequentis Team or contractor personnel working with or around hazardous materials.

The use of hazardous materials in various operations represents a significant potential for danger to personnel and the environment. All personnel and all levels of management will comply with the NPG 8715.3, NASA Safety Manual.

The Frequentis Team will compile an annual inventory report of all hazardous materials it has located on NASA properties and which is within the scope of 29 CFR 1910.1200, Hazard Communication, and Federal Standard 313 (or FED-STD-313), Material Safety Data, Transportation Data, and Disposal Data for Hazardous Materials Furnished to Government

Activities, as revised. This annual inventory report will provide the following:

- The identity of the material.
- The location of the material by building and room.
- The quantity of each material normally kept at each location.

The procedure stated in NPG 8715.3, NASA Safety Manual, and all applicable NASA and NASA documents that provide direction on Hazardous Waste Management Procedures and Disposal of Chemical, Toxic, and Hazardous Waste Material," will be strictly followed. We will

implement a waste minimization program for processes that produce hazardous waste. Frequentis team members will practice a "Point of Use Abatement Process" (as suggested in Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, & Federal Acquisition") to reduce and restrict to the lowest level the actual amount of chemical that is required to successfully complete a task. Our commitment is to reduce the amount of hazardous waste generated on the MOVE contract.

Comprehensive controls including the training of personnel, will be developed for the storage, handling, and disposal of hazardous waste. Waste is considered hazardous if it possesses one or more of the following characteristics:

- Ignitable - It is easily combustible or flammable (e.g., paint waste, degreasers, and other solvents).
- Corrosive - It dissolves metals or other materials or burns the skin (waste rust removers, waste acid, alkaline cleaning fluids, and waste battery acids).
- Reactive - It is unstable and undergoes rapid or violent reaction with water or other materials (cyanide plating waste, waste bleaches, other waste oxidizers).

Frequentis Team members will search for potential substitutes via electronic databases such as the Integrated solvent substitution Data System (ISSDA) at http://es.epa.gov/issds/ and to other EPA resources offered through the Pollution Prevention and Stratospheric Ozone Protection programs to support our "greening" efforts.

D.1.10. Government Access to Safety and Health Program Documentation

Frequentis will make all safety and health documentation (including relevant personnel records) available for inspection or audit only at the Government's request (refer to Section 1.9). The Frequentis Team protects the privacy of the health information of our employees. The Frequentis Team is aware of its obligation to abide by the 2003 HIPPA (Health Insurance Portability and Accountability Act of 1996) amendment concerning the release of medical information. The transmission of personal medical records is only accomplished by special delivery, registered mail, or secure facsimile machines. Doctor-to-patient confidentiality is maintained at all times.

D.1.11. Contractor Support of the Safety Review Process

The Frequentis Team will participate, when requested by NASA, in the review and modification of safety requirements that are to be implemented by the Government, including any review of new documents or proposed changes to referenced documents. We will also represent operations at major safety reviews when requested and will formally notify the cognizant NASA manager of any safety issues or concerns identified during the review process.

D.1.12. Procurement

We have made it a priority to ensure that potential health, safety, and environmental risks associated with the introduction of chemicals into the work environment will be evaluated and effective control measures will be in place prior to their introduction. Frequentis Team procurements will be reviewed and approved by the MOVE Safety Manager and/or designated MOVE safety professional. Purchase requests will be individually screened to:

- Include verification that proposed new chemicals comply with applicable chemical import and export regulations.
- Chemicals with the lowest occupational health, safety, and environmental impact are selected whenever possible.
- Ensure that, prior to the introduction of new chemicals, Material Safety Data Sheets (MSDS) and appropriate hazard warning labels are obtained and are in

- use and that the Hazard Communication Program is updated as necessary.

Purchase requests will be individually screened to determine if supplemental safety specifications or Material Safety Data Sheets (MSDS) are required. Supplemental safety requirements may be added to the purchase request, as required. For example, electronic equipment used in an area where explosive vapors may be present must meet the requirements of the National Electric Code for Class I Division II. When an MSDS is required, the purchase request will be flagged through the site purchasing system. Items received that do not meet safety

specifications or have an inappropriate MSDS will be segregated, and a formal request will be sent to the vendor. The vendor must provide the appropriate documentation or certifications before the material will be accepted. Failure to do so will result in the return of the goods to the vendor. General purchase order provisions require prospective contractors/vendors for contracts to comply with applicable Federal and state laws and orders. Contractors/vendors must successfully meet these criteria and those of the Frequentis Team Contractor Safety Program to be considered for contract award. Subcontractor's performing services on NASA or NASA controlled properties will be required to provide proof of insurance, level of training, and the content of their safety programs where appropriate. Subcontractors will receive a 2-hour site safety presentation. The subcontractors will be continuously evaluated for compliance. If required, corrective actions, up to and including a stop work order or termination of contract for cause, will be employed to ensure that subcontractors meet both NASA and NASA safety standards.

D.2. Workplace Analysis

The classification and assessment of hazards and risk levels is a cornerstone of any effective safety program. The identification and control of hazards before mishaps, close calls, or failures occur is a prime objective of safety analysis. Hazard identification and control involves research, observations, inspections, and analysis of operations as they evolve. The identification of hazards related to MOVE operations, equipment, or facilities early in their life cycle results in proper task design and controls. This process will be used to systematically identify hazards during the duration of the contract. The processes detailed in the text that follows provide detailed information on the information collection process. A combination of surveys, analyses, and inspections of the workplace, investigations of mishaps and close calls, and the collection and trend analysis of safety and health data will be used to identify statistics for the workplace analysis. Data identified by any of the techniques identified will be ranked and processed in accordance with NASA procedures.

The Frequentis Team will use an SHP compliance applicability screening checklist to determine the level of risk for employees within their work environment. The checklist will allow the MOVE Safety Manager to conduct a workplace analysis for potential environmental, industrial health, and safety issues in order to reduce an employee's exposure to a possible on-the-job accident. Once a determination has been made through the screening process, a risk-specific hazard assessment will be conducted utilizing methods such as ergonomic surveys, job hazard analysis and Personal Protective Equipment (PPE) assessments to reduce or eliminate the potential for employee exposure. These risk assessments will be the responsibility of the functional supervisor of the affected area. Copies of the initial assessment will be stored within the Project for review, audit use, and feedback for process improvement.

D.2.1. Hazard Identification

Job Hazards Analysis (JHA) is a procedural tool used to make a job safe by identifying the hazards or potential accidents associated with each step of a job, and developing a solution strategy for each hazard that will either eliminate or control the exposure. JHAs are a valuable tool to use in reviewing job methods. Such reviews may uncover hazards that were overlooked in the initial design and review of the operation, or in the design of machinery, equipment, and processes, or were developed after operations began. Once the hazards are known, the proper solutions will be developed and implemented.

Developing a JHA will be a joint effort between the Program Manager and the person performing the job. Each person, through knowledge and experience, can contribute to obtaining an accurate step-by-step breakdown and compiling a complete record of hazards and potential

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accidents for each job. A JHA is required for almost every MOVE task for each employee.

A JHA will be conducted on each type of task (NASA JHAs will be used where available). When we identify new work, a JHA requirement is triggered. The JHA will be performed and its findings forwarded to the Safety Manager for review, inventory, and action. Findings identified through these analyses will be forwarded to the Government in a manner suitable for inclusion in the facilities baseline documentation as a permanent record of the facility. Copies will also be added to the MOVE baseline survey.

a. Comprehensive Baseline Survey

The Frequentis Team will perform a comprehensive baseline survey (job hazard analysis) of all MOVE work areas within the first 30 days of each task order performance period. It will include facilities, equipment, SHP processes and materials including waste. This baseline survey will stand as the foundation of recurring JHA. The baseline survey will account for the as-used state of facilities and equipment, as-run work processes, assessment of applicable hazards within the work-site control areas (including wastes), and mitigating systems or circumstances available to help control or limit these hazards. Whenever hazardous situations are identified, appropriate cautions, warnings, or danger warnings will be placed in appropriate procedures, instructions, or process descriptions. When it is determined through our baseline survey that an area meets the Immediately Dangerous to Life or Health (IDLH) criteria, it will immediately be reported to the NASA Safety Environmental and Security Office.

The baseline survey will be performed using standard assessment tools such as audits and surveys.

b. Change Analysis

The Frequentis Team's change management process will be utilized when we consider modifications to facilities, equipment, processes, and materials (including waste) and related procedures for operations and maintenance. Our comprehensive hazard review process involves competent, qualified specialists appropriate to the hazards anticipated and the operational changes being planned.

The MOVE Safety Manager will be contacted whenever a new or modified process is in its planning stages, so that an environmental review can be performed (if required) to determine any environmental regulatory issues or environmental emissions/discharges of the process. If the process change or new process is on a Government site, the MOVE Safety Manager will notify NASA Safety Environmental and Security Office, Code 205. If a permit is required, the Manager is required to allow enough lead time for the processing of permits through the applicable state and Federal natural resources and conservation commissions as appropriate.

c. Hazard Analysis

Hazard analysis provides the foundation on which safety assessment is based. Sufficient data is the key to a successful, effective, and complete hazard analysis of facilities, systems/subsystems, operations, processes, materials (including waste), and specific tasks or jobs. This data may include drawings, block diagrams, system descriptions, and operating instructions that support the task or process. Hazard analysis is conducted to satisfy the following objectives.

- Identify and document potential and actual hazards, and accident risk factors.
- From recommended controls, determine those that will reduce accident risks and control or eliminate hazards.
- Verify compliance with safety requirements and verify implementation of controls.
- Provide accident risk assessments for management action.
- Provide feedback for Lessons Learned to other MOVE Contract work areas.

NASA requires that hazard analyses be performed when a procedure involves any identifiable type of hazard. The NASA Safety Environmental and Security Office (Code 205) has hazard analysis tools that are to be used for performing hazard analyses of individual tasks, laboratory or shop areas, and chemical processing laboratories. These tools are not mandated by OSHA or NASA, but NASA's Safety Policy requires that "all alleged hazardous conditions are investigated, all identified safety and health risks are properly assessed and controlled, and pertinent lessons-learned situations are publicized to prevent reoccurrences". One or more of the following tools has proven to be appropriate for nearly every task at NASA. The hazard analyses tools are:

- Task Safety Analysis — for any specific operation or task that does not fall under the category of laboratory research.
- Chemical Process Hazard Analyses — for any of three levels: Low, Moderate, or High. These are for laboratories performing chemical research.
- Area Hazard Analysis — for general types of work operations performed in a laboratory or shop environment. It provides checklists to help minimize the hazards.

The following required forms can be obtained on-line at:
http://gdms.NASA.nasa.gov/gdms/pls/masterlist.menu

- Low (NASA Form 23-56)
- Moderate (NASA Form 23-57)
- High (NASA Form 23-58)
- Task Safety Analysis (NASA Form 23-60)
- Area Hazard Analysis - Not available at this time.

Frequentis team members will use the following tools:

- The Frequentis System Safety Analysis Matrix to assist in identifying task hazards.
- The Frequentis Hazard Analysis Worksheet to assist in determining and rating risks. (see **Error! Reference source not found.**)
- The Failure Mode and Effects Analysis Worksheet used to determine the effects of a failure on a system and to classify each potential failure mode in accordance with the severity of its effect (see **Figure 4: Failure Mode & Effects Analysis worksheet**).

FREQUENTIS SYSTEM SAFETY ANALYSIS MATRIX
PROGRAM/SUBSYSTEM_____
ENGINEER:_____
PROJECT LIFE-CYCLE STATUS_____
DATE:_____

SUBSYSTEMS OR TASKS / GENERIC HAZARDS									
COLLISION MECHANICAL DAMAGE									
LOSS OF HABITABLE ATMOSPHERE									
CORROSION									
CONTAMINATION									
ELECTRICAL SHOCK									
FIRE/EXPLOSION									
PATHOLOGICAL/ PSYCHOLOGICAL									
TEMPERATURE EXTREMES									
RADIATION									
CATASTROPHIC ACTS OF NATURE									