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August 11, 2004

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Federal Communications Commission
Office of Secretary

VIA HAND DELIVERY

Ms. Marlene Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

RE: Celsat America, Inc.
Amendment to Contract

Dear Ms. Dortch:

In a letter to the Commission dated July 26, 2002, Celsat America, Inc. submitted a copy of the non-contingent satellite manufacturing contract that it entered into with Space Systems/Loral, Inc. on July 14, 2002. Enclosed herewith please find a copy of an amendment to that contract, which Celstat and Space Systems/Loral, Inc. entered into on July 12, 2004.

Please associate the enclosed contract amendment with the following Commission files:

2 GHz MSS License	Ka-band License
File Nos. 26/27/28-DSS-P-94 36-SAT-AMEND-95 65/66/67- SAT-AMEND-96 192-SAT- AMEND- 97 88-SAT- AMEND-98	File Nos. 192-SAT-AMEND-97 88-SAT-AMEND-98
IBFS Nos. SAT-A/O-19940408-00016/17/18 SAT-AMD-19941125-00089 SAT-AMD-19960124-00007/8/9 SAT-AMD-19970925- 00124 SAT-AMD-19980113-00009 SAT-AMD-20001103-00153	IBFS Nos. SAT-AMD-19970925-00124 SAT-AMD-19980123-00009 SAT-AMD-20001103-00153

Ms. Marlene Dortch
August 11, 2004
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Please contact the undersigned should you have any questions concerning this submission.

Sincerely,



Brian D. Weimer
Counsel to Celsat America, Inc.

Enclosure

cc: Thomas Tycz
Karl Kensinger

AMENDMENT NUMBER 1
DATED 12 JULY 2004
TO
CONTRACT
DATED JULY 14, 2002
BETWEEN
CELSAT AMERICA
AND
SPACE SYSTEMS/LORAL, INC.

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THIS CONTRACT AMENDMENT NUMBER 1 (the "Amendment") is entered into effective as of the 12th day of July 2004, between Celsat America, Inc., a corporation organized and existing under the laws of Delaware, having an office and place of business at 4729 Vanderhill Road, Torrance, California 90505 (hereinafter referred to as "Celsat") and Space Systems/Loral, Inc., a corporation organized and existing under the laws of the State of Delaware, having an office and place of business at 3825 Fabian Way, Palo Alto, California 94303 (hereinafter referred to as "Contractor", and collectively with Celsat are referred to as the "Parties" and individually as a "Party").

WHEREAS, Contractor and Celsat are parties to the original Contract dated July 14 2002; and

WHEREAS, Contractor is currently a debtor in possession in Chapter 11 Case Nos. (RDD) 03-41709 (RDD) through 03-41728 (RDD), filed in the U.S. Bankruptcy Court for the Southern District of New York (the "Bankruptcy Court") on July 15th, 2003 (the "Petition Date"); and

WHEREAS, on 16 July 2003, Celsat issued a stop work order for up to twelve (12) months in order, inter alia, to evaluate the impact of the Loral bankruptcy; and

WHEREAS, Celsat now desires to remove the stop work order and resume performance under the Contract, to revise the Satellite requirements specification, to reduce the procurement from two (2) Satellites to one (1) Satellite, and to make such related and other changes as set forth herein;

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth in this Amendment and for other good and valuable consideration the receipt and sufficiency of which are hereby acknowledged, the Parties hereto agree as follows:

A. MODIFIED PROVISIONS

1. ARTICLE 1 – DEFINITIONS

a. DELETE Article 1.12 in its entirety and INSERT IN LIEU THEREOF:

“1.12 **“Dynamic Spacecraft Simulator”** or **“DSS”** means the dynamic Spacecraft simulator.”

b. DELETE Article 1.31 in its entirety and INSERT IN LIEU THEREOF:

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“1.31 **“Launch Services Agreement”** or **“LSA”** means the contract between Purchaser and the Launch Agency that provides for Launch Services for a Satellite.”

c. DELETE Article 1.38 in its entirety and INSERT IN LIEU THEREOF:

“1.38 **“MISSION OPERATIONS SUPPORT SERVICES”** means IOT and related services specified in Exhibit A, Statement of Work, to be performed by Contractor for a Satellite.”

d. DELETE Article 1.45 in its entirety and INSERT IN LIEU THEREOF:

“1.45 **“Payment Plan”** means the payment plan for the applicable Deliverable Item, as set forth in Exhibit E, Payment Plan and Termination Liability Amounts, as may be amended from time to time in accordance with the terms hereof.”

e. DELETE Article 1.51 in its entirety and INSERT IN LIEU THEREOF:

“1.51 **“Satellite”** means the communication Satellite that is to be manufactured by Contractor and to be delivered to Purchaser pursuant to this Contract.”

f. DELETE Article 1.54 in its entirety and INSERT IN LIEU THEREOF:

“1.54 **“Satellite Performance Specification”** means the Satellite performance specification attached hereto as Exhibit B.”

g. DELETE Article 1.56 in its entirety and INSERT IN LIEU THEREOF:

“1.56 **“Satellite Program Test Plan”** means the Satellite program test plan attached hereto as Exhibit D.”

h. ADD Article 1.58A as follows:

“1.58A **“Start of Construction”** shall have the meaning as set forth in the Statement of Work attached hereto as Exhibit A.”

i. DELETE Article 1.59 in its entirety and INSERT IN LIEU THEREOF:

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“1.59 **“Statement of Work”** or **“SOW”** means the Statement of Work attached hereto as Exhibit A.”

- j. DELETE the term “Satellites” wherever such term appears in the Contract, and replace with the term “Satellite”, REPLACE term “each Satellite” with the term “the Satellite”, and REPLACE the term “any Satellite” with the term “the Satellite”.

2. **ARTICLE 2- SCOPE OF WORK**

- a. DELETE Article 2.1, Provision of Services and Materials, in its entirety and INSERT IN LIEU THEREOF:

“2.1 Provision of Services and Materials

Contractor shall provide the necessary personnel, material, services, and facilities to: design, manufacture, test, provide Launch Support Services, provide mission operations support, and deliver for Purchaser's Acceptance on-orbit one Satellite, together with all other Deliverable Items referred to in Article 3.1, in accordance with this Contract, including the following Exhibits, which are attached hereto and made a part hereof (except as otherwise provided below):

2.1.1 Exhibit A, Statement of Work, Rev. C, dated July 12, 2004.

2.1.2 Exhibit B, Satellite Performance Specification, dated 15 July 2004, 2004.

2.1.3 Exhibit C, Product Assurance Program Plan, Rev. 6

2.1.4 Exhibit D, Satellite Program Test Plan

2.1.5 Exhibit E, Payment Plan and Termination Liability Amounts, dated 7/15/04”

- b. DELETE Article 2.2, Key Milestones, in its entirety and INSERT IN LIEU THEREOF:

“2.2 Key Milestones

Contractor shall achieve the following key milestones by the date indicated below:

A. Conduct Critical Design Review on or before June 10, 2003.

B. Start of Construction by July 17, 2004.”

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3. **ARTICLE 3 - DELIVERABLE ITEMS AND DELIVERY SCHEDULE**

DELETE Article 3, DELIVERABLE ITEMS AND DELIVERY SCHEDULE in its entirety and INSERT IN LIEU THEREOF:

“3.1 Deliverable Items

Subject to the other terms and conditions of this Contract, the items to be delivered under this Contract are specified in the table below and Contractor shall deliver such items on or before the corresponding delivery dates and locations specified in the table below:

<u>Item</u>	<u>Description</u>	<u>Delivery Date</u>	<u>Delivery Location</u>
1.	Satellite No. 1	16 December 2006* (Successful completion of SPSR)	Contractor's Facility in Palo Alto, CA
2.	Deliverable Data	Per SOW, Exhibit A	PMO
3.	Training	Per SOW, Exhibit A	Per SOW, Exhibit A
4.	Launch Support Services	Per SOW, Exhibit A	Per SOW, Exhibit A
5.	Mission Support Services	Per SOW, Exhibit A	Per SOW, Exhibit A

* The nominal Launch Date based on a 16 December 2006 Successful Completion of SPSR would be on or before 16 February 2007; however, Contractor has no responsibility hereunder for establishing or meeting the actual Launch Date, and Contractor's Delivery obligations hereunder for the Satellite are as set forth in item I above.

3.2 Delivery

Delivery of each Deliverable Item shall occur upon Acceptance of such item in accordance with Articles 10 or 11 as applicable, except in the case of the Satellite, Delivery occurs upon successful completion of Satellite Pre-Shipment Review pursuant to Article 9.”

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4. **ARTICLE 4 - PRICE**

DELETE Article 4, PRICE, in its entirety and INSERT IN LIEU THEREOF:

“4.1 Firm Fixed Price

Subject to Article 4.2 hereof, the price to be paid by Purchaser to Contractor for the Deliverable Items 1 through 5 set forth in Article 3.1 hereof, within the scope of Work as detailed in the Statement of Work, shall be a firm fixed price of One Hundred and Fifty Million United States Dollars (\$150,000,000) (the “Firm Fixed Price”). Except as otherwise expressly provided in this Contract, the Firm Fixed Price is not subject to any escalation or to any adjustment or revision. The price for those items, subject to an option under this Contract, if any, are described in the particular Articles that set forth such options.

The itemization of the Firm Fixed Price is as follows:

<u>Item</u>	<u>Description</u>	<u>Amount</u>
1.	One (1) Satellite.	US\$150,000,000
2.	Deliverable Data	NSP
3.	Training	NSP
4.	Launch Support Services	NSP
5.	Mission Support Services	NSP

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The item price for the Satellite includes design, manufacturing, tests, Deliverable Data, training, Orbital Performance Incentives, Launch Support Services, packing and transport of the Satellite to the Launch Site, transit insurance and such other insurance as is required by Article 28 (but does not include Launch Services or any insurance coverage for loss or damage to the Satellite or Launch Vehicle from and after Intentional Ignition, the responsibility for which shall reside exclusively with Purchaser), all in accordance with the terms and conditions of this Contract, as specified herein. The item price for the Satellite also includes the provision of Preliminary Exhibit C, Product Assurance Plan, and Preliminary Exhibit D, Satellite Program Test Plan, and is based on no material changes being made to Contractor's standard documents.

4.2 Taxes

The Firm Fixed Price includes all applicable taxes, duties and similar liabilities (including interest, fines, penalties, or additions attributable or imposed on or with respect to, any such taxes, duties and similar liabilities) imposed by any United States federal, state, or local government in connection with Contractor's performance under this Contract and the taxing authority having jurisdiction over Launch Services and the Launch Site ("Taxes"). Contractor has made or will make all the necessary filings in order to deliver the Work free and clear of any Contractor incurred liens or encumbrances for Taxes. Subject to the indemnification procedures set forth in Article 20.3, in the event any governmental or taxing authority imposes or assesses Taxes against Purchaser in connection with any Deliverable Item Contractor shall indemnify Purchaser for any Taxes paid by Purchaser and shall reimburse Purchaser for related costs of defense (whether or not Purchaser actually pays such Taxes)."

5. **ARTICLE 5 - PAYMENTS**

- a. DELETE Article 5.1, Payment Plan, in its entirety and INSERT IN LIEU THEREOF:

“5.1 Payment Plan

Payments by Purchaser to Contractor of the Firm Fixed Price set forth in Article 4 and of the amounts for options, if any, exercised by Purchaser pursuant to this Contract shall be in accordance with Exhibit E, Payment Plan and Termination Liability Amounts, as applicable thereto.”

- b. DELETE Article 5.2.1, Time Payment, in its entirety and INSERT IN LIEU THEREOF:

“5.2.1 Time Payments.

Subject to Article 5.2.5, all time payments due from Purchaser shall be paid by the due date specified in the Payment Plan in Exhibit E; provided, however, and notwithstanding anything herein to the contrary, Payment No. 5 of Exhibit E, shall be paid no later than five (5) business days after the due date specified in the applicable Payment Plan in Exhibit E. For the avoidance of doubt, Payment No. 5 shall be due on July 17, 2004 (with payment to be received no later than five (5) business days thereafter). Contractor shall give to Purchaser an invoice and certification in the form attached hereto as Attachment A with respect to each such time payment. Subject to Article 5.2.5, the failure of Contractor to deliver any invoice required hereunder shall not affect Purchaser’s obligation hereunder to make any time payments to Contractor.”

- c. DELETE Article 5.2.2, Milestone Payments, in its entirety and INSERT IN LIEU THEREOF:

“5.2.2 Milestone Payments.

All payments due from Purchaser upon the completion of a Milestone described in the Payment Plan shall be paid no later than thirty (30) days after receipt by Purchaser of an invoice and certification in the form attached hereto as Attachment A that the Milestone has been completed in accordance with the requirements of this Contract, together with the necessary or appropriate supporting data and documentation as required hereunder, if any, or as Purchaser may reasonably request within ten (10) days of receipt of invoice. Notwithstanding the foregoing, and without prejudice to Contractor’s rights under Article 5.6, Purchaser, in its sole discretion, may agree to make a partial payment to Contractor for partial completion of a Milestone event. In the event of early completion by Contractor of a Milestone in advance of such Milestone completion date as set forth in the Payment Plan, Purchaser shall not be obligated to make the corresponding Milestone payment to Contractor in advance of the payment due date therefore set forth in Exhibit E, Payment Plan and Termination Liability Amounts.”

- d. DELETE Article 5.2.3, Cumulative Payments, in its entirety and INSERT IN LIEU THEREOF:

“5.2.3 Cumulative Payments.

In no event shall Contractor submit an invoice whose amount, when paid, would exceed the aggregate, cumulative sum of payments (time payments plus Milestone payments) scheduled to be paid to Contractor up to such point of time of payment under Exhibit E, Payment Plan and Termination Liability Amounts.”

- e. DELETE Article 5.2.5, Obligation to Pay, in its entirety, and INSERT IN LIEU THEREOF:

“5.2.5 Obligation to Pay. If Contractor shall not have delivered any invoice required hereunder within the time specified therefor, the relevant payment due from Purchaser shall be payable on or before thirty (30) days after receipt of such invoice except for Payment Nos. 1 through 5 which shall be payable on their respective due dates regardless of whether Contractor shall have issued an invoice therefor.”

- f. DELETE Article 5.3.2, Stop Work, in its entirety and INSERT IN LIEU THEREOF:

“5.3.2 Stop Work.

If the payment associated with Payment Number 5 is not made by Purchaser by 23 July 2004, or if any other payment is not made by Purchaser by the date thirty (30) days after the date due in accordance with Article 5.2, without prejudice to Contractor's other rights and remedies under this Contract, Contractor may elect to cease performance of its obligations under this Contract, without prejudice or penalty. If Contractor subsequently resumes performance, the price, schedule, and other affected terms of this Contract shall be equitably adjusted to compensate Contractor for all impacts on Contractor associated with such work stoppage, including actual costs reasonably incurred by Contractor associated with such work stoppage, plus a markup of ten percent (10%) with such costs and markup to be invoiced and paid pursuant to the provisions of this Article 5.”

6. ARTICLE 6 – PURCHASER FURNISHED ITEMS

- a. DELETE Article 6.1, Purchaser-Furnished Support, in its entirety and INSERT IN LIEU THEREOF:

“6.1 Purchaser-Furnished Items

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To enable Contractor to perform Launch Support and Mission Operations Support Services, Purchaser shall timely make available to Contractor the Purchaser-furnished equipment, facilities and services described in Section 2.6 of the Statement of Work. Such equipment, facilities and services shall be in good working condition and adequate for the required purposes and, for the Launch of the Satellite hereunder, shall be made available free of charge for Contractor's use during the period commencing on the date established therefor at the technical interchange meeting described in Section 2.5 of the Statement of Work and continuing through completion of Acceptance for such Satellite. Purchaser and Contractor will conduct an interface meeting on the date established therefor at the technical interchange meeting described in Section 2.5 of the Statement of Work to confirm the availability and adequacy of such Purchaser-furnished equipment, facilities and services."

- b. DELETE Article 6.2, Communications Authorizations, in its entirety and INSERT IN LIEU THEREOF:

" 6.2 Communications Authorizations

Purchaser shall be responsible, at its cost and expense, for preparing, coordinating and filing all applications, registrations, reports, licenses, permits and authorizations with the FCC if required to do so and with any other national governmental agencies having jurisdiction over Purchaser, for the construction, Launch and operation of the Satellite. Contractor shall provide such reasonable cooperation and support as Purchaser may reasonably request in support of Purchaser's preparation, coordination and filing of such applications, registrations, reports, licenses, permits and authorizations. From and after Acceptance of the Satellite, for any support provided by Contractor under this Article 6.2, Contractor shall be entitled to reimbursement of actual costs reasonably incurred in connection with the provision of such support plus a markup of ten percent (10%), with such costs and associated markup to be invoiced and paid in accordance with Article 5."

- c. DELETE Article 6.3, Radio Frequency Coordination, in its entirety and INSERT IN LIEU THEREOF:

“6.3 Radio Frequency Coordination

Purchaser shall be responsible for the timely preparation and submission of all filings required by the International Telecommunication Union (or any successor agency thereto) and all relevant domestic communications regulatory authorities regarding radio frequency and orbital position coordination. Such filings shall be made in accordance with the Radio Regulations of the International Telecommunication Union (or any successor agency) and the laws and regulations of all domestic communications regulatory authorities having jurisdiction over Purchaser. Contractor shall provide such reasonable cooperation and support as Purchaser may reasonably request in support of Purchaser's efforts in the preparation and submission of such filings. From and after Acceptance of the Satellite, for any support provided by Contractor under this Article 6.3, Contractor shall be entitled to reimbursement of actual costs reasonably incurred in connection with the provision of such support plus a markup of ten percent (10%), with such costs and markup to be invoiced and paid in accordance with Article 5.”

7. **ARTICLE 8 – ACCESS TO WORK IN PROGRESS**

- a. DELETE Article 8.1, General, in its entirety and INSERT IN LIEU THEREOF:

“8.1 General

Contractor represents and warrants that, subject to Article 7, the access to the Work and Work-in-progress to be provided Purchaser personnel (and Purchaser’s duly appointed consultants and agents) under this Contract is or shall be substantially similar to the access to the Work and Work-in-progress Contractor provides to its other major commercial customers purchasing a satellite with substantial new development. In the event Contractor becomes aware that the access to the Work and Work-in-progress provided under this Contract is otherwise, Contractor shall promptly remedy that situation.”

- b. DELETE Article 8.2, Work in Progress at Contractor’s Facility, in its entirety and INSERT IN LIEU THEREOF:

“8.2 Work in Progress at Contractor’s Facility

Subject to Article 7 and compliance with Contractor’s normal and customary safety and security regulations and practices of which Purchaser has received prior written notice, Purchaser personnel (and Purchaser’s duly appointed consultants and agents) shall be allowed access to all Work being performed at Contractor’s facility for the Satellite and other Deliverable Items, for the purpose of observing the progress of such work. Such access shall be upon reasonable prior written notice to Contractor and shall occur during normal working hours or at such other hours as Contractor may agree. Subject to Article 7, Purchaser shall be provided eight (8) non-escort permanent badges and ten (10) escort badges to agreed work areas where the Work is being performed.”

- c. DELETE Article 8.4, On-Site Facilities for Purchaser’s Personnel, in its entirety and INSERT IN LIEU THEREOF:

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“8.4 On-Site Facilities for Purchaser’s Personnel

For the purpose of monitoring the progress of the Work being performed by Contractor hereunder, Contractor shall provide office facilities at or proximate to Contractor’s plant for up to five (5) resident Purchaser personnel (and/or Purchaser’s duly appointed consultants and agents) through Acceptance of the Satellite ordered hereunder. The office facilities to be provided shall include a reasonable amount of office space, office furniture, local telephone service, reasonable long-distance telephone usage, access to copy machines, facsimile machines, meeting rooms, and to the extent available, videoconference rooms, and car parking facilities, to the extent necessary to enable Purchaser personnel to monitor the progress of Work under this Contract. In the case of Contractor’s Major Subcontracts related to the payload, Contractor shall use commercially reasonable efforts to ensure that reasonable office facilities for up to three (3) Purchaser personnel (and/or Purchaser’s duly appointed consultants and agents) are provided on a temporary basis to attend meetings or witness tests.”

8. ARTICLE 9 – SATELLITE PRE-SHIPMENT REVIEW (SPSR) AND LAUNCH READINESS REVIEW (LRR)

DELETE Article 9, SATELLITE PRE-SHIPMENT REVIEW (SPSR) AND LAUNCH READINESS REVIEW (LRR), in its entirety and INSERT IN LIEU THEREOF:

“ARTICLE 9 – SATELLITE PRE-SHIPMENT REVIEW (SPSR) AND LAUNCH READINESS REVIEW (LRR)

9.1 Satellite Pre-shipment Review (SPSR)

9.1.1 Contractor to Review Satellite Prior to Shipment

Contractor shall conduct a review of the Satellite prior to Contractor’s shipment of such Satellite to the Launch Site. This review shall be in accordance with the terms of this Article 9 and Section 2.4.5 of Exhibit A, Statement of Work, (each a “Satellite Pre-shipment Review” or “SPSR”).

9.1.2 Time, Place and Notice of SPSR; Failure to Conduct

The SPSR shall take place at Contractor’s facility. Contractor shall notify Purchaser in writing on or before thirty (30) days prior to the date that each Satellite shall be available for SPSR, which shall be the scheduled date for commencement of such SPSR. If Purchaser cannot commence such SPSR on such scheduled date, Contractor shall make reasonable efforts to accommodate Purchaser’s scheduling requirements. If Purchaser shall fail to commence or complete the SPSR with respect to any Satellite, Purchaser shall be deemed to have notified Contractor pursuant to Article 9.1.6 hereof that SPSR for such Satellite has been successfully completed.

9.1.3 Conduct and Purpose of SPSR

The SPSR shall be conducted in accordance with the terms of this Article 9 and Section 2.4.5 of the Statement of Work. The purpose of the SPSR shall be to (i) review test data and analyses for the

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subject Satellite, (ii) demonstrate all testing has been completed in accordance with Exhibit D, Satellite Program Test Plan, and (iii) determine whether such Satellite meets applicable Satellite Performance Specification requirements (except those that have been waived pursuant to Article 9.1.4 below) and is ready for shipment to the Launch Site.

9.1.4 Waivers and Deviations

Contractor shall submit to Purchaser any request for a waiver of, or deviation from, provisions(s) of the Performance Specification applicable to the Satellite(s) or Deliverable Item. A request for waiver or deviation shall be deemed granted only if it has been approved in writing by a duly authorized representative of Purchaser. Each such waiver or deviation approved by Purchaser shall be deemed an amendment to the Performance Specification for such Satellite or Deliverable Item, permitting such waiver thereof, or deviation therefrom, effective on or after the date of such approval for such Satellite or Deliverable Item. Purchaser shall consider each waiver or deviation request in good faith and shall not unreasonably withhold its consent to any such request.

9.1.5 Purchaser's Inspection Agents

Purchaser may, subject to prior written notice to Contractor, cause any Purchaser personnel, consultant or agent designated by Purchaser to observe the SPSR pursuant to this Article 9; provided, however, that the provisions of Article 7 and Article 8.5 shall apply to any such agent.

9.1.6 SPSR Results

Within seventy-two (72) hours after completion of the SPSR for the Satellite, Purchaser shall notify Contractor in writing of: (i) its concurrence with the results of the SPSR including any waiver of its right to compel correction of those non-conformances to the requirements of Exhibit B, Satellite Performance Specification, specified by Purchaser in such notice or (ii) specific non-conformances of such Satellite to the requirements of Exhibit B,

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Satellite Performance Specification, which require correction. In the event that such SPSR demonstrates (i) all testing has been performed in accordance with Exhibit D, Satellite Program Test Plan and (ii) conformity of such Satellite to the applicable requirements of Exhibit B, Satellite Performance Specification, (including any waivers or deviations approved by Purchaser pursuant to Article 9.1.4), such Satellite shall be prepared and shipped to the Launch Site for Launch. In the event that such SPSR discloses (i) any failure to conduct testing in accordance with Exhibit D, Satellite Program Test Plan, or (ii) any non-conformance of such Satellite to the requirements of Exhibit D, Satellite Performance Specification, either of which is not the subject of any waivers or deviations approved by Purchaser pursuant to Article 9.1.4, Purchaser's notice shall state each such non-conformance (with reference to the applicable requirement of Exhibit D, Satellite Program Test Plan, or Exhibit B, Satellite Performance Specification, deemed not met) it requires to be corrected or repaired, and Contractor shall correct or repair each such non-conformance and resubmit such Satellite for additional testing, in accordance with applicable requirements of Exhibit D, and a second SPSR. Such additional testing and second SPSR shall be conducted to the extent relevant and necessary to demonstrate the Satellite conforms to the requirements of Exhibit B, Satellite Performance Specification. If Purchaser fails to provide such notice within the time specified, the SPSR shall be deemed to have been successfully completed with respect to such Satellite. In the event that the Satellite has been accepted, whether pursuant to the original SPSR or a subsequent SPSR, such Satellite shall be prepared and shipped to the Launch Site for Launch. Contractor shall have no obligation to ship the Satellite to the Launch Site until all non-conformances are corrected, repaired or have an approved waiver or deviation. Following completion of the SPSR for a Satellite in accordance with this Article 9, Contractor shall transport such Satellite, in accordance with Contractor's standard commercial practices, to the Launch Site and proceed with the Launch Readiness Review for such Satellite.

9.1.7 Inspection Costs Borne by Purchaser

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All costs and expenses incurred by Purchaser and its agents in the exercise of its inspection rights under this Article 9, including travel and living expenses, shall be borne solely by Purchaser.

9.1.8 Correction of Deficiencies after SPSR

If at any time following the SPSR for a Satellite and prior to Intentional Ignition (or in the event of a Terminated Ignition, prior to any subsequent Intentional Ignition), such Satellite fails to meet Exhibit B, Satellite Performance Specification, as may be modified as of such time pursuant to Article 9.1.4, Contractor shall promptly undertake to correct such deficiencies prior to Intentional Ignition (or in the case of a Terminated Ignition, prior to any subsequent Intentional Ignition) and the Contract delivery schedule set forth in Article 3 shall be extended as necessary to accommodate such corrective actions, and Contractor shall be entitled to such other compensation for such corrections, if any, to the extent and as provided in Article 12.1.

9.2 Spacecraft Launch Readiness Review (SLRR)

After shipment of the Satellite to its intended Launch Site and prior to Launch, Contractor shall conduct a Spacecraft Launch Readiness Review in accordance with the requirements of Section 2.4.7 of Exhibit A, Statement of Work. Contractor shall give Purchaser personnel reasonable advance notice of such Spacecraft Launch Readiness Review. The purpose of the Spacecraft Launch Readiness Review is to verify that all testing required under Exhibit D, Satellite Program Test Plan, has been successfully completed and the Satellite meets all the parameters required to be tested thereunder (including any waivers or deviations approved by Purchaser). The SLRR will be deemed successfully completed when the Parties agree the above-stated purposes of the SLRR have been met and the Satellite is ready to be integrated with the Launch Vehicle. Within twenty-four (24) hours after completion of the SLLR, Purchaser shall notify Contractor of its (i) concurrence with the results of the SLRR, including any waiver of its right to compel correction of those non-conformances to the applicable provisions of Exhibit A or Exhibit D or (ii) specific non-conformances of such Satellite to the requirements of Exhibit A or Exhibit D, which are not the subject of any waivers or deviations approved by Purchaser. Purchaser's notice shall state each such non-conformance (with reference to the applicable requirements of Exhibit A or Exhibit D deemed not met) it requires to be corrected or repaired, and Contractor shall correct or repair each such non-conformance and resubmit such Satellite for Purchaser's concurrence. Failure to provide such notice within the time specified shall be deemed concurrence."

9. **ARTICLE 10 – SATELLITE ACCEPTANCE**

DELETE Article 10.1, In-Orbit Testing (IOT), in its entirety and INSERT IN LIEU THEREOF:

“10.1 In-Orbit Testing (IOT)

Thirty (30) days prior to the then-scheduled Launch of the Satellite, Contractor shall notify Purchaser in writing of the IOT schedule with respect to such Satellite. Purchaser may observe such IOT at Purchaser’s or Contractor’s location, at Purchaser’s election, subject to Article 7 and Article 8.5 and applicable U.S. Government and Contractor security restrictions.

Contractor shall (i) conduct in-orbit-testing in accordance with Exhibit D, Satellite Program Test Plan, (ii) conduct the In-Orbit Test Review within three (3) days of completing in-orbit testing, and submit the Summary In-Orbit Test Report at least 24 hours prior to conducting the In-Orbit Test Review, (iii) present the Satellite Acceptance Certificate at the In-Orbit Test Review, (iv) conduct the Satellite Acceptance Review one day after completion of the In-Orbit Test Review during which Purchaser shall notify Contractor of its Acceptance of the Satellite in accordance with Article 10.2 hereof, all (i) – (iv) above in accordance with Exhibit A, Statement of Work, and Exhibit D, Satellite Program Test Plan and this Article 10.”

10 **ARTICLE 16 – CHANGES**

DELETE Articles 16, CHANGES, in its entirety and INSERT IN LIEU THEREOF:

“ARTICLE 16 - CHANGES

16.1 Changes Requested by Purchaser

Purchaser may, in writing, request a change in the Work within the general scope of this Contract to:

- a) Order work in addition to the Work provided for herein; or
- b) Modify the whole or any part of the Work provided for herein; or
- c) Direct a stop work for up to fifteen (15) months, cumulative of all stop work orders issued hereunder.

Contractor shall respond to any such requested change in writing to Purchaser within thirty (30) days after receipt of such requested change. If such change request causes an increase or decrease in the cost or the time required for completion of the Work to be provided herein, or otherwise affects any other provision of this Contract, such response shall provide a non-binding preliminary estimate of the impact of the change request on the Firm Fixed Price (including costs associated with processing of the change request), Delivery schedules and other provisions of this Contract. If Purchaser desires to proceed with the change after receipt of Contractor’s preliminary estimate, Purchaser and Contractor shall negotiate and agree in a timely manner to equitable adjustments in the Firm Fixed Price, Delivery schedules and other affected provisions of this Contract, and this Contract shall be amended in writing accordingly. In the event the Parties fail to agree on an adjustment (upward or downward) to the Firm Fixed Price, Delivery schedule or other affected provisions of this Contract with respect to a requested change, then up Purchaser may direct Contractor to proceed with the requested change, Contractor shall proceed with the directed change, the Parties shall continue to negotiate the adjustments to the Contract, and pending completion of such

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negotiations and as a condition for Contractor being obligated to proceed with the directed change, the Parties in good faith shall agree upon and establish a reasonable payment schedule adjustment to compensate Contractor for the Work performed pursuant to the directed change, which payment schedule shall be adjusted as part of the negotiated settlement for the directed change. Notwithstanding the foregoing, in the event Purchaser directs a stop work, within fifteen (15) months, cumulative of all stop work orders issued hereunder, Purchaser shall either: (i) direct Contractor to resume Work hereunder and the price, schedule and other affected terms of this Contract shall be equitably adjusted to compensate Contractor for all impacts on Contractor associated with such work stoppage, including actual costs reasonably incurred by Contractor associated with such work stoppage plus a markup of ten percent (10%), such costs and markup to be invoiced and paid pursuant to Article 5 and the termination liability amount set forth in Exhibit E, Payment Plan and Termination Liability Amount, applicable at the time of the stop work will apply throughout the period of the stop work adjusted only to the extent Contractor incurs actual direct costs as a result of the stop work (e.g., termination liabilities with subcontractors and suppliers, but not overhead or general and administrative costs); or (ii) terminate this Contract for convenience pursuant to Article 21. In the event Purchaser fails to elect either (i) or (ii) above within the time frame specified, Purchaser shall be deemed to have elected to terminate this Contract for convenience pursuant to Article 21

16.2 Changes Requested by Contractor

Contractor may request a change in the Work within the general scope of this Contract to:

- a) Order work in addition to the Work provided for herein; or
- b) Modify the whole or any part of the Work provided for herein.

Any such change requested by Contractor shall be submitted in writing to Purchaser reasonably in advance of to the proposed date of the change. If such Contractor requested change causes an increase or decrease in the cost or the time required for completion of the Work to be provided herein, or otherwise affects any other provision of this Contract, Contractor shall submit, with such request, a written proposal identifying

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such change and the impact thereof on the price, Delivery schedule, or other terms of this Contract. Upon submission of a Contractor-requested change, Purchaser and Contractor shall proceed as follows:

- A. Contractor-Requested Changes Submitted On or Before December 1, 2004: The Parties shall attempt to negotiate a change based on such proposal. In the event the Parties fail to agree on an adjustment (upward or downward) to the Firm Fixed Price, Delivery schedule or other affected provisions of this Contract with respect to Contractor's change proposal, then, up to and including January 1, 2005, either Party by written notice to the other Party may terminate this Contract and such termination shall be deemed a termination for convenience by Purchaser and the provisions of Article 21 shall apply.
- B. Contractor-Requested Changes Submitted After December 1, 2004: If the Parties fail to agree on Contractor's change proposal, Contractor shall proceed with the Work unchanged.

16.3 Other Revisions

The Parties agree that certain provisions of this Contract may require additional revisions, which will be negotiated by the Parties in good faith.”

11. **ARTICLE 21 – TERMINATION FOR CONVENIENCE**

DELETE Article 21.1.2, Termination Liability, in its entirety and INSERT IN LIEU THEREOF:

“21.1.2 Termination Liability

- A. Termination in Whole. If Purchaser terminates this Contract in whole, Contractor shall be entitled to payment of an amount equal to the termination liability amount specified in Exhibit E, Payment Plan and Termination Liability Amount, and interest at the rate specified in Article 5 on any payment not made when required to be made hereunder less the sum of all amounts received by Contractor in cash or cash equivalent under this Contract.
- B. Partial Termination. In the event Purchaser terminates this Contract in part pursuant to this Article 21, Purchaser shall pay to Contractor the sum of (1) through (5) below less any amounts previously paid with respect to completed and/or terminated Deliverable Items.
- 1) The price set forth in Article 4 for Deliverable Items completed prior to such termination therefor whether or not Delivery has occurred with respect to such Deliverable Item; and
 - 2) Actual costs incurred by Contractor in performance of work on Deliverable Items for which this Contract has been terminated pursuant to this Article 21.1.2, that have not been completed prior to such termination; and
 - 3) Actual costs incurred by Contractor in completing the termination process; and
 - 4) Actual costs incurred by Contractor in settling claims of subcontractors and other suppliers and vendors in connection with such termination; provided that Contractor shall use reasonable efforts to minimize such costs; and
 - 5) A fifteen percent (15%) profit in items (1) – (4) above.

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If the termination by Purchaser is partial and as a result thereof Contractor will incur additional costs for the portion of the Work not terminated, then Contractor shall be entitled to submit a change request pursuant to Article 16.2.

- C. Termination Settlement Meeting. In the event of a termination pursuant to this Article 21, a termination settlement meeting shall be held at a mutually agreed time and place no later than sixty (60) days after submission of a claim by Contractor pursuant to Article 21.1. At or prior to the date of such termination settlement meeting, Contractor shall provide Purchaser with such documentation of the termination liability amounts permitted above as Purchaser may reasonably request. Upon completion of the termination settlement meeting, Contractor may submit an invoice for payment in accordance with the terms of Article 5.
- D. Maximum Liability. In no event shall the amounts payable pursuant to this Article 21.1 exceed the termination liability amount applicable on the effective date of termination as set forth in Exhibit E, Payment Plan and Termination Liability Amounts.
- E. Limitation on Right to Terminate. Notwithstanding the foregoing, Purchaser shall have no right to terminate for convenience as to any Deliverable Item hereunder from and after such time as such Deliverable Item has been completed and is ready for delivery.”

12. ARTICLE 22 – LIQUIDATED DAMAGES FOR LATE SATELLITE DELIVERY

DELETE Article 22.1.2 in its entirety and INSERT IN LIEU THEREOF:

“22.1.2 If Delivery of the Satellite does not occur on or before the date specified (as such date may be adjusted pursuant to Articles 17 or 18 in the event of a Force Majeure event or a Purchaser Delay, respectively), then Contractor shall pay Purchaser an amount not to exceed Nine Hundred and Ninety-One Thousand, Six hundred and Fifty U. S. Dollars (\$991,650) for such Satellite, as specified below, as liquidated damages and not a penalty for Contractor’s late Delivery:

<u>Number of Days</u>	<u>Per Day</u>	<u>Period</u>	<u>Cumulative</u>
1-60	\$0	\$0	\$0
61-661	\$1,650	\$991,650	\$ 991,650 “

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13. ARTICLE 23 – TERMINATION FOR DEFAULT AND EXCESSIVE FORCE MAJEURE

DELETE Article 23, TERMINATION FOR DEFAULT AND EXCESSIVE FORCE MAJEURE, in its entirety and INSERT IN LIEU THEREOF:

“ARTICLE 23 – TERMINATION FOR DEFAULT AND EXCESSIVE FORCE MAJEURE

23.1 Default by Contractor

23.1.1 Right to Terminate. Subject to Article 23.1.4 below, Purchaser may terminate this Contract in whole or in part by written notice to Contractor if (i) Contractor fails to Deliver the Satellite within the time specified therefor plus the maximum number of days for liquidated damages specified in Article 22 (or such longer time as may be agreed to in writing by Purchaser); or (ii) Contractor commits a material breach of this Contract (other than failure to Deliver the Satellite within the time specified therefor plus the maximum number of days for liquidated damages specified in Article 22 (or such longer time as may be agreed by Purchaser)) or it becomes reasonably certain after August 16, 2007 that Contractor will fail to Deliver a Satellite within the time specified therefor plus the maximum number of days for liquidated damages specified in Article 22 (or such longer time as may be agreed to in writing by Purchaser) and fails, within ninety (90) days (or such longer period as may be agreed to in writing by Purchaser) after receipt from Purchaser of written notice thereof, to cure such material breach or provide reasonable assurances that it will Deliver a Satellite within the time specified therefor plus the maximum number of days for liquidated damages specified in Article 22 (or such longer time as may be agreed to in writing by Purchaser), as applicable.

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23.1.2 Termination Liability. In the event of termination pursuant to this Article 23.1, subject to Article 23.1.3, Purchaser shall be entitled to refund by Contractor of all payments made by Purchaser for the terminated Work plus interest thereon at the interest rate stipulated in Article 5.3.1 hereof from the date payment was received to the date the refund is received (provided, however, in the case of termination in part, the Parties shall negotiate an equitable refund amount to be paid by Contractor to Purchaser for the portion of the Work so terminated). In addition, Purchaser shall be entitled to payment of any liquidated damages for delay accrued prior to the effective date of termination pursuant to Article 22. Contractor shall pay the foregoing amounts no later than thirty (30) days after Contractor's receipt of Purchaser's written notice requesting such amounts. Payment of such amounts shall be Purchaser's sole remedy in case of a termination pursuant to this Article 23.1.

23.1.3 Contractor's Reimbursement for Terminated Work. In the event of termination pursuant to this Article 23.1, Contractor shall not be required to refund any amounts, and Purchaser shall remain liable for payment of all amounts with respect to Deliverable Items for which Acceptance has occurred pursuant to the terms of Article 10 or Article 11 (unless the utility to Purchaser of such Deliverable Item has been materially adversely impacted by the terminated Work), or that are retained by Purchaser, as follows: (i) at the price set forth in this Contract for such items for which an itemized price is set forth herein and (ii) at the actual cost incurred by Contractor, plus a markup of ten percent (10%) of such cost, for (a) such items for which no itemized price is set forth herein and (b) partially completed items or services and work-in-progress.

23.1.4 Special Provision Limiting Purchaser's Remedies. Purchaser shall have no right to terminate this Contract pursuant to this Article 23.1 above with respect to any Satellite: (i) after successful completion of SPSR of such Satellite; or (ii) during the period up to eighteen (18) months following the Delivery date for the Satellite set forth in Article 3.1, with respect to which Contractor, with reasonable diligence, is undertaking corrective action pursuant to Article 9.8 or Article 27. Purchaser's sole remedy with respect to delays in Delivery of such Satellite shall be as specified in Article 22 and this Article 23.1.

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23.1.5 Disposition of the Work. Unless Purchaser retains Deliverable Items or portions thereof pursuant to Article 23.1.3 hereof, Contractor shall retain title to any and all Work, Work-in-progress, parts or other material, inventories, and any associated warranties, and any subcontracted items Contractor has specifically produced, acquired, or entered into in accordance with this Contract. If Purchaser elects to retain Deliverable Items of hardware or portions thereof as set forth in Article 23.1.3 hereof (hereinafter "Deliverable Hardware"), Purchaser may require Contractor to transfer to Purchaser in the manner and to the extent directed by Purchaser, title to and possession of any items comprising all or any part of the Deliverable Hardware (including all Work-in-progress, parts and materials, all inventories, and associated warranties) and Contractor shall, upon direction of Purchaser, protect and preserve such Deliverable Hardware at Purchaser's expense in the possession of Contractor or its subcontractors in which Purchaser has an interest and shall facilitate access to and possession by Purchaser of items comprising all or part of the Work terminated.

23.1.6 Invalid Default Termination. If, after termination pursuant to this Article 23.1, it is finally determined by arbitration pursuant to Article 25 or written agreement of Purchaser that Contractor was not in default under Article 23.1.1, or that the default was excusable under Articles 17 or 18, the rights and obligations of the Parties shall be the same as if the termination had occurred under Article 21; except that Contractor shall also be entitled to recover its additional actual costs reasonably incurred due to such invalid default termination plus a markup of ten percent (10%) of such costs.

23.2 Default by Purchaser

23.2.1 Right to Terminate. Contractor may terminate this Contract upon written notice to Purchaser if Purchaser fails to cure any default in the payment of any amount that has become due and payable hereunder within thirty (30) days after receiving written notice of such default (or such longer period as may be agreed to in writing by Contractor). Notwithstanding Article 23.2, Purchaser will not be considered in default with respect to any amount that it is disputing in good faith and will have ten (10) Business Days after the resolution (by agreement or arbitration) of such dispute to satisfy any payment required by such resolution.

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23.2.2 Termination Liability. In the event of termination pursuant to this Article 23.2, Contractor shall be paid as if such termination were for convenience pursuant to Article 21. Further, if Purchaser's failure to perform is a failure to pay Contractor invoiced amounts when due, Contractor shall be entitled to late payment interest pursuant to Article 5.3. Payment of any amount by any Financing Entity on behalf of Purchaser shall relieve Purchaser from its obligation to make such payment in the corresponding amount. Payment of the total amounts (termination for convenience amounts plus interest on outstanding invoices) payable by Purchaser pursuant to this Article 23.2.2 shall constitute a total discharge of Purchaser's liabilities to Contractor for termination pursuant to this Article 23.2.

23.2.3 Disposition of the Work. Contractor may elect immediately upon termination to take over all Deliverable Items and Contract work-in-progress and use or dispose of the same in any manner Contractor may elect. In such case, the fair market value of any Deliverable Items or Contract work-in-progress retained or disposed of by Contractor shall be set-off against Purchaser's termination liability under this Article 23.2. Upon completion of all payments to Contractor in accordance with this Article 23.2, Purchaser may require Contractor to transfer to Purchaser in the manner and to the extent directed by Purchaser, title to (not including Deliverable Data or any other portion of the Work to which Contractor would not have otherwise been obligated to transfer title hereunder had the Contract been completed) and possession of any items comprising all or any part of the Work terminated (including all Work-in-progress, parts and materials, all inventories, and associated warranties) not used or disposed of by Contractor pursuant to the foregoing sentence, and Contractor shall, upon direction of Purchaser, protect and preserve property at Purchaser's expense in the possession of Contractor or its subcontractors in which Purchaser has an interest and shall facilitate access to and possession by Purchaser of items comprising all or part of the Work terminated. Alternatively, Purchaser may request Contractor to make a reasonable, good faith effort to sell such items and to remit any sales proceeds to Purchaser less a deduction for actual costs of disposition reasonably incurred by Contractor for such efforts plus a markup of ten percent (10%).

23.2.4 Invalid Default Termination. If, after termination pursuant to this Article 23.2, it is finally determined by arbitration pursuant to Article 25 or written agreement of Contractor that Purchaser was not in default under Article 23.2.1, Contractor shall be liable to Purchaser for direct damages resulting from such termination of this Contract (in no event exceeding amounts payable to Purchaser pursuant to Article 23.1, and subject to the limitation of liability set forth in Article 30).

23.3 Excessive Force Majeure

Purchaser may, upon written notice to Contractor, immediately terminate this Contract, in whole or in part: if and when: (i) delay in Contractor's performance of its obligations hereunder exceeds 36 months due to Force Majeure events under Article 17.3 or (ii) it becomes reasonably certain that the aggregate delay due to Force Majeure events under Article 17.3 will exceed 36 months; or (iii) Contractor notifies Purchaser the it is reasonably certain that delay in Contractor's performance of its obligations hereunder due to Force Majeure events under Article 17.3 will exceed 36 months. Upon the occurrence of any of these events, Purchaser will provide Contractor written notice of its intent to terminate and the rights and obligations of the Parties shall be the same as if such termination had occurred under Article 23.1. Within a reasonable period of time not to exceed thirty (30) days after the occurrence of either (i) or (iii) above, Purchaser will notify Contractor as to its decision to either terminate this Contract or to waive its rights to terminate for such Force Majeure events. Failure to provide such notice in the thirty-day period specified above shall be deemed to be a waiver of Purchaser's rights to terminate for such Force Majeure events under this Article 23.3. For purposes of this Article 23.3, any delays due to non-availability of a Launch Vehicle or Launch Site shall not be considered in determining the length of delay in Contractor's performance hereunder due to Force Majeure.

23.4 Limitation on Right to Terminate

Except as specified in the Contract, each Party shall have no right to terminate or suspend this Contract.

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14. ARTICLE 24 - OPTIONS

DELETE Article 24.1, Satellite Storage, in its entirety and INSERT IN LIEU THEREOF:

“24.1 Satellite Storage

Twelve (12) months prior to SPSR, the Parties will establish an option pursuant to which Purchaser may elect to store the Satellite.”

15. ARTICLE 35 – RISK MANAGEMENT SERVICES

DELETE Article 35.1, Purchaser Responsibility, in its entirety and INSERT IN LIEU THEREOF:

“35.1 Purchaser Responsibility

Purchaser shall be responsible for procuring any Launch and in-orbit insurance policy covering the risks of Launch and in-orbit failures with respect to partial loss and total loss of such Satellite (“Launch and In-Orbit Insurance Policy”) from and after Intentional Ignition.

IN NO EVENT SHALL PURCHASER DISCLOSE OR TRANSFER CONTRACTOR PROVIDED TECHNICAL INFORMATION OR PROVIDE TECHNICAL SERVICES BASED ON CONTRACTOR FURNISHED TECHNICAL INFORMATION TO NON-U.S. PERSONS OR INSURANCE BROKERS OR UNDERWRITERS OR OTHER NON-U.S. PERSONS OR ENTITIES (AS DEFINED IN 22 CFR SECTION 120.15 AND SECTION 120.16) WITHOUT CONTRACTOR’S PRIOR WRITTEN APPROVAL AND, WHERE REQUIRED, PRIOR APPROVAL OF THE U.S. GOVERNMENT”

16. ARTICLE 37 – GENERAL

MODIFY Article 37.1.2, By Purchaser to DELETE the remainder of the Article beginning with item (iii) and INSERT IN LIEU THEREOF:

“ . . .(iii) as part of any collateral pool in favor of other senior lenders providing financing to Purchaser or any of its Affiliates in connection with completion of Purchaser’s satellite system; or (iv) to Mobile Satellite Ventures LP, a Delaware Limited Partnership or any of its Affiliates, provided in any case the assignee, transferee, or successor to Purchaser has expressly assumed all the obligations of Purchaser and all terms and conditions applicable to Purchaser under this Contract pursuant to an assumption agreement (between Purchaser and assignee or transferee) in form and substance reasonably satisfactory to Contractor.”

- B. The stop work order, issued on 16 July 2003, is hereby revoked and Contractor is to resume Work under the Contract as modified by this Amendment.
- C. Nothing contained herein shall be construed as (i) the assumption or rejection by Contractor pursuant to Section 365 of Title 11 of the United States Code of the Contract or any other agreements, or (ii) the creation of a postpetition obligation with respect to the Contract or any other agreements.
- D. This Amendment and the Contract together constitute the entire agreement and understanding between the Parties in connection with the transactions hereby contemplated. This Amendment supersedes all previous agreements, arrangements and understandings between the Parties with regard to such transactions, which shall cease to have any further force of effect (other than the Contract, which shall continue to remain in full force and effect as amended hereby). Neither Party is entering into this Amendment or any of the arrangements hereby contemplated in reliance on any representation, warranty or undertaking not expressly set out or referred to in this Amendment.
- E. This Amendment may be executed in one or more counterparts, each of which shall be deemed an original and all of which together shall constitute one and the same documents.

IN WITNESS WHEREOF, the Parties have executed this Amendment Number 1 to the Contract effective as of the date specified above.

SPACE SYSTEMS/LORAL, INC.

CELSAT AMERICAS, INC.

By: C. P. DeWitt

By: David D. Otten

Name: C. P. DeWITT

Name: DAVID D. OTTEN

Title: PRESIDENT & CHIEF
OPERATING OFFICER

Title: CHAIRMAN & CEO



EXHIBIT A

STATEMENT OF WORK

CELSAT SATELLITE PROGRAM

12 July 2004
(Revision C)

“This document contains data and/or proprietary information (competition sensitive) to Celsat America. The data/information contained herein has been reviewed and approved for release by Space Systems/Loral Export Administration on the basis that this document contains no export-controlled information. This data/information shall not be disclosed, disseminated or reproduced, in whole or in part, without the express prior written approval of Celsat America, except as otherwise provided in the Terms and Conditions of the Contract between Celsat America and Space Systems/Loral, Inc. for the Celsat Satellite Program.”

DEFINITIONS, ABBREVIATIONS AND ACRONYMS

Definitions: Capitalized terms used in this Exhibit A (Statement of Work) shall have the meaning ascribed to them as they appear herein or as defined in the Contract.

Abbreviations and Acronyms:

C/I	Carrier to Interference ratio
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CIL	Configuration Identification List
COP	Contingency Operations Procedure
DSS	Dynamic Satellite Simulator
EDC	Effective Date of Contract
EIDP	End Item Data Package
EIRP	Equivalent Isotropic Radiated Power
EST	Emergency Support Team
fax	Facsimile
FCC	Federal Communications Commission
FMECA	Failure Modes, Effects and Criticality Analysis
G/T	Gain to Noise Temperature ratio (Figure of merit)
GSE	Ground Support Equipment
HOP	Health Operations Procedure
IAW	In Accordance With
ICD	Interface Control Document or Drawing
IFRB	International Frequency Registration Board
IOT	In-Orbit Test
IOTE	In-Orbit Test Equipment
IOTR	In-Orbit Test Review
ITU	International Telecommunications Union
MCC	Mission Control Center (at SS/L in Palo Alto, CA)
MOP	Mission Operations Plan
NCR	Non-Conformance Report
OML	Orbit Maneuver Life
PDR	Program Development Review
PMO	Program Management Office
PMP	Program Management Plan
PPAP	Program Product Assurance Plan
PRR	Program Readiness Review
RF	Radio Frequency
SAR	Satellite Acceptance Review
S/C	Spacecraft
SLRR	Spacecraft Launch Readiness Review
SOE	Sequence of Events

SOOH	Satellite Orbital Operations Handbook
SOP	Standard Operations Procedures
SOW	Statement of Work
SPSR	Spacecraft Pre-shipment Review
SPTP	Satellite Program Test Plan
T&C	Telemetry and Command
TBD	To Be Determined
TC&R	Telemetry, Command & Ranging
TIM	Technical Interchange Meeting
TRR	Test Readiness Review
TT&C	Telemetry, Tracking, & Command

1 — SCOPE

This Statement of Work (SOW) defines the goods, hardware, equipment, services, data and documentation to be provided by Space Systems/Loral (hereinafter "Contractor") to Celsat America, (hereinafter "Purchaser") for the CELSAT Satellite Program (hereinafter "Program").

Contractor shall design, develop, manufacture, test, and transport the Satellite to the launch site, prepare the Satellite for launch, ensure launch vehicle-spacecraft interface compatibility, provide Launch Support Services, Mission Operations Services, In-Orbit Testing and associated Spacecraft Subsystems and Satellite Operations Training. Contractor shall complete the Work in accordance with the Contract and the requirements specified herein. Contractor is not responsible for launch vehicle services other than launch base operations associated with the spacecraft.

1.1 SUMMARY STATEMENT OF WORK

- a. Contractor shall conduct the Program as follows.
 - ◆ Pre-Critical Design Review ("Pre-CDR "): Contractor shall perform the tasks of Pre-CDR as specified in Paragraph 1.3.1, and conclude with a Critical Design Review (CDR).
 - ◆ Post-Critical Design Review ("Post-CDR "): Contractor shall perform the tasks of Post-CDR specified in Paragraph 1.3.2, upon completion and acceptance of the Critical Design Review, and conclude with an In-Orbit Test Review (IOTR) and Satellite Acceptance.
- b. Contractor shall provide one (1) Satellite satisfying the Satellite Performance Specification, Exhibit B of the Contract, and tested in accordance with (IAW) the Satellite Program Test Plan (SPTP), Exhibit D.
- c. Contractor shall deliver the Satellite to the designated launch site. Contractor shall be responsible for packaging, crating, and shipping the Satellite to the launch site.
- d. Contractor shall provide necessary Ground Support Equipment (GSE) to permit full checkout and test of the Satellite during acceptance testing and pre-launch operations, as required.
- e. Contractor shall provide necessary Telemetry, Tracking, and Command (TT&C) ground station capability to ensure proper functioning of the Satellite.
- f. Purchaser shall provide ground facilities, equipment, and personnel to support Contractor in conducting In-Orbit Testing (IOT).
- g. Contractor shall provide training to familiarize Purchaser's experienced operations personnel with the systems and subsystems, and operation of the Satellite.
- h. Contractor shall provide launch operations services and the personnel, data and documentation to support pre-launch activities and launch support services.

- i. Contractor shall provide Launch and Early Orbit Operations support (except as set forth in Paragraph 2.6 of this SOW) from spacecraft-launch vehicle separation through to completion of IOT, and post-IOT On-Orbit Operations Support. Mission Operations during this period shall be performed and controlled from Contractor's Mission Control Center (MCC).
- j. Contractor shall provide data items as specified in the Contract Data Requirements List (CDRL), Annex 1 of this SOW.
- k. Contractor shall conduct a product assurance program in accordance with (IAW) the Program Product Assurance Program Plan (PPAP), Exhibit C.
- l. Contractor shall provide Telemetry and Command Databases for the Satellite.

1.2 PROGRAM OPTIONS

- a. Satellite Storage: Purchaser may direct ground storage of a completed spacecraft IAW the Terms and Conditions and this SOW. Contractor's obligations in support of this option are as described in the Terms and Conditions and this SOW.
- b. Dynamic Satellite Simulator (DSS): Provision of a DSS is an option to the Program.

1.3 PROGRAM REQUIREMENTS

The Program shall be conducted as described herein.

1.3.1 Pre-CDR: System Engineering, Design and Development

Contractor shall commence Pre-CDR at Effective Date of Contract (EDC), conduct the effort for twelve (12) months, and conclude with a Critical Design Review (CDR). The Pre-CDR technical reviews shall be as identified in Paragraphs 2.2.6 and 2.2.7, and described in Paragraph 2.4. The Pre-CDR objective is to develop a mission-effective technical solution to the system requirements.

Contractor shall perform the following tasks during Pre-CDR:

Program Planning

1. Develop a Program Master Schedule for design, development, production and deployment of the Satellite
2. Draft an initial Program Management Plan
3. Draft a preliminary Spacecraft Launch Base Operations Plan
4. Draft a preliminary Mission Profile Description

Space Segment Design, Development and Verification

1. Perform Space Segment system engineering and requirements analysis
2. Conduct key design trades to define a payload subsystem that satisfies mission requirements, as defined in Exhibit B of this Contract

3. Develop a viable, integrated system performance baseline design (bus and payload)
4. Update and verify the Satellite Performance Specification (Exhibit B)
5. Confirm the Product Assurance Program Plan (PAPP, Exhibit C)
6. Confirm the Satellite Program Test Plan (SPTP, Exhibit D)
7. Identify and draft development plans for critical, non-heritage component designs

1.3.2 Post-CDR: Spacecraft Production and Deployment

Contractor shall commence Post-CDR upon completion and acceptance of the Critical Design Review and conclude with an In-Orbit Test Review (IOTR) to be held within thirty (30) days after launch of the Satellite. Contractor shall perform the tasks associated with the detailed design, manufacture, assembly, integration and test of the Satellite. After successful IOTR, Contractor shall hand over the Satellite on station in its mission orbit as specified in the Contract.

Contractor shall perform the following tasks during Post-CDR:

1. Produce detailed governing specifications (spacecraft bus and payload), plans, and interface documents to control the final design and verify/validate manufacturing and testing
2. Initiate and complete spacecraft assembly, integration and qualification testing
3. Deliver the Satellite to the launch site
4. Provide Launch Support Services, including spacecraft preparation and test at the launch site, coordination with the Launch Vehicle Supplier, Spacecraft-Launch Vehicle interface and mate, and launch support
5. Provide Mission Operations Support Services from spacecraft-launch vehicle separation to In-Orbit Testing (IOT)
6. Conduct technical reviews as set forth in Paragraphs 2.4.4 through 2.4.8 below

2 — PROGRAM REQUIREMENTS

The requirements for the goods, hardware, equipment, services, data, and documentation to be provided by Contractor are set forth herein.

Applicable Program Documents

The following Contract exhibits, listed in order of precedence, apply to the Program.

Exhibit A — Statement of Work (this document)

Exhibit B — Satellite Performance Specification

Exhibit C — Product Assurance Program Plan

Exhibit D — Satellite Program Test Plan

2.1 PROGRAM MANAGEMENT

Contractor shall provide management throughout the Program, and progress reporting as specified herein.

2.1.1 Program Management Office

Contractor shall establish a Program Management Office (PMO) led by an assigned Program Manager who shall be responsible for managing all matters related to the performance of the Contract, encompassing both Pre-CDR and Post-CDR. The Program Manager shall ensure that personnel, facilities and other resources necessary for executing Contract provisions are acquired, assigned and made available at the times and places needed to meet the Contract delivery schedule. Contractor shall assign experienced technical and managerial personnel to the PMO.

2.1.2 Progress Reporting and Meetings

Contractor shall hold formal, scheduled, progress review meetings throughout the duration of the Program. Purchaser personnel (and Purchaser's duly appointed consultants and agents) shall be entitled to attend the meetings and reviews (including meetings and reviews held by electronic means) of Contractor and of Contractor with any subcontractor(s) hereunder where such meetings and reviews (or portions of such meetings and reviews) are related to Purchaser's project schedule, management, engineering, design, manufacturing, integration, testing, or Launch. Contractor shall plan (including provision to Purchaser of an agenda within a reasonable period in advance of the meeting or review), organize (including arranging access for Purchaser and its duly appointed consultants and agents), conduct (including the taking of minutes and action items) and close the meetings (including circulation of the minutes and action items within a reasonable period following the meeting), and, unless mutually agreed to the contrary, all meetings shall be held at Contractor's or subcontractors' facilities. The purpose of these meetings is to provide Purchaser with pertinent Program implementation and execution data for review, and to mutually agree upon appropriate

courses of action to be taken on identified action items. The following meetings shall be held during Pre-CDR and/or Post-CDR, as indicated:

- Program Readiness Review (PRR, Inaugural Meeting, Pre-CDR)
- Quarterly Program Status Meetings (Pre-CDR and Post-CDR)
- Program Development Review (PDR, Pre-CDR)
- Critical Design Review (CDR, Pre-CDR)
- Test Readiness Review (TRR, Post-CDR)
- Satellite Pre-Shipment Review (SPSR, Post-CDR)
- Satellite Launch Readiness Review (SLRR, Post-CDR)
- In-Orbit Test (IOT) Review (IOTR, Post-CDR)

Other meetings, e.g., Technical Interchange Meeting (TIM), as may be requested by Purchaser, including their location, date/time, purposes and content, shall be established by mutual agreement.

2.2 DELIVERABLE DATA ITEMS

Contractor shall provide the data items listed in Annex 1, Contract Data Requirements List (CDRL), of this SOW. The location for delivery of data items shall be as specified in the Contract or as otherwise mutually agreed. All deliverable data items shall comply with standard commercial practice. Contractor shall submit changes to delivered data items (at Contractor's option) either as a complete revised edition of the delivered item, or as change insertion sheets with a matrix indicating the latest revision status of each page of the document.

Contractor shall submit CDRL data items for Purchaser approval/acceptance or information as specified in Annex 1. "Approval" document delivery shall be as specified in the Contract. Purchaser shall notify Contractor in writing that any such Deliverable Data requiring Purchaser approval has been accepted/approved ("Acceptance" with respect to each such item of Deliverable Data), or that such Deliverable Data does not comply with the applicable requirements, identifying each such non-conformance (with reference to the applicable requirement of the Statement of Work deemed not met). Contractor shall promptly correct any non-compliant aspect of such Deliverable Data identified in such notice from Purchaser, and re-submit it to Purchaser for a second acceptance inspection. The provisions of this paragraph shall thereafter apply to the corrected Deliverable Data. If Purchaser fails to provide notice within the time specified, Acceptance shall be deemed to have occurred with respect to such Deliverable Data.

"Information" documents shall be delivered to Purchaser Resident Representative if assigned, or forwarded directly to Purchaser.

Purchaser access to other Program-related data under this Contract shall be provided IAW Contractor's and its subcontractor's normal and customary proprietary and security policies and

regulations. Purchaser personnel (and Purchaser's duly appointed consultants and agents) shall have reasonable access at the facilities of Contractor and its subcontractors to (and copies when reasonably requested by Purchaser of) all data and documentation relevant to the Work or Work-in-progress.

Any data or documentation provided hereunder shall be in the English language and, if in electronic form, shall be embodied in, or in a form compatible with, commercially available software.

Electronic Access.

With respect to electronically generated information, Contractor will provide Purchaser with a copy of and/or electronic access (via the Internet, Contractor e-mail, proprietary or otherwise, or as agreed upon) to such information as is necessary to keep Purchaser advised, on a current basis, of program issues, decisions, and problems. Contractor shall provide Purchaser personnel (and Purchaser's duly appointed consultants and agents) access to Contractor's electronic mail systems through the Internet, such access to be at Purchaser's cost. If requested in writing by Purchaser, Contractor shall establish secure data links between its and Purchaser's facilities such that Purchaser has remote electronic access to all documentation generated in performance of the Work and entered into Contractor's documentation and data management system; provided, however, Contractor shall be required to provide such links for a high-data transfer rate (such as for Satellite telemetry) only on an as needed basis, with each Party bearing the costs of establishing the link at its end.

Contractor will also provide Purchaser personnel (and Purchaser's duly appointed consultants and agents) at no cost with "at reasonable time" access to all measured data for the Work taken at the facilities of Contractor and/or its subcontractors hereunder.

2.2.1 Program Management Plan (CDRL 01)

Contractor shall submit a Program Management Plan (PMP) IAW CDRL 01 that describes Contractor's program organization, general management, and technical baseline management. The major topics of the PMP shall be as a minimum:

- a. SS/L CELSAT Program Management Office
 1. Program Management Office (PMO) Organization Chart
 2. Key PMO personnel roles and responsibilities
 3. Major subcontractor(s)
- b. Program Management
 1. Contract Monitoring and Control
 2. Schedule Status and Control
 3. Configuration and Data Management
 4. Action Item Control
 5. Meeting Coordination
 6. Progress Reporting
- c. Technical Management

1. System Engineering
 2. Product Assurance Plan
 3. Reliability Program
 4. Satellite Program Test Plan
 5. Technical Reviews (Design, Readiness)
 6. Subcontract Management
 7. Contract Data Requirements List
 8. Shipping, Transportation and Storage
 9. Purchaser's Resident Field Office
- d. Spacecraft Development
1. Subsystem/Unit Model Philosophy and Development Plan
 - (a) Subsystem/Unit Make/Buy Plan with Heritage
 - (b) Subsystem/Unit Qualification Status
 - (c) Heritage List
 2. Technical Parameter Control
 - (a) Mass Properties
 - (b) Power Budget
 - (c) Pointing Budget
 - (d) Propellant Budget
 - (e) Payload Link Budgets
 - (f) Telemetry, Command and Ranging (TC&R) Link Budgets

2.2.2 Program Master Schedule (CDRL 02)

Contractor shall provide a Program Master Schedule, CDRL 02, that establishes and maintains the Contract delivery schedule ("Baseline Schedule"). The Master Schedule shall be updated monthly and shall accurately track progress of Program events or milestones against the Baseline Schedule:

- a. Hardware and software deliveries
- b. Subcontractor events and deliveries
- c. Major program reviews
- d. System level verification tests
- e. Pre-launch, launch and post-launch activities up to and including in-orbit test and post-eclipse test report
- f. Identification of critical paths

Status reports of progress against the Baseline Schedule shall be prepared and furnished as part of the Monthly Progress Report.

2.2.3 Monthly Progress Report (CDRL 13)

Contractor shall provide monthly Progress Reports, CDRL 13, which shall include a summary of:

- a. Major Program Events
- b. Technical Status
 - 1. Spacecraft (including system budgets)
 - 2. Payload
 - 3. Bus
- c. Program Controls
 - 1. Schedule
 - 2. Major Non-Conformance Report (NCR) status
 - 3. Class 1 Waivers, Deviations
 - 4. Status of Outstanding Action Items
 - 5. Invoice Status
 - 6. Status of Contract Changes, if any

2.2.4 Spacecraft Configuration Data (CDRLs 22 and 03)

Contractor shall submit the following data for information:

- a. Spacecraft Preliminary Configuration Identification List (CIL), CDRL 03a
- b. Spacecraft as-built CIL, CDRL 03b
- c. Spacecraft-to-Launch Vehicle Interface Control Drawing (ICD), CDRL 22

2.2.5 Program Readiness Review Data (CDRL 05)

Contractor shall furnish agenda, invitation, data package, presentation material, minutes, and closeout report for the Program Readiness Review (PRR) of Pre-CDR as described in Paragraph 2.4.1, and deliver PRR data IAW CDRL 05. The PRR data shall include:

- a. Program organization and management description
- b. Preliminary Program plan and master schedule
- c. Mission and system requirements and specifications
- d. Preliminary spacecraft and subsystems description
- e. Summary of deviations from heritage hardware
- f. Summary of preliminary budgets and margins
- g. Description of technical baseline configuration management
- h. Ground command and control subsystems description

2.2.6 Program Development Review Data (CDRL 06)

Contractor shall furnish agenda, invitation, data package, presentation material, minutes, and closeout report for the Program Development Review (PDR) IAW CDRL 06. The PDR meeting is specified in Paragraph 2.4.2. The PDR data shall include:

- a. Summary description of spacecraft and subsystem designs
- b. System requirements and specifications, including interfaces
- c. Summary of deviations from heritage hardware
- d. Spacecraft product structure
- e. Program master schedule
- f. Technical description of spacecraft payload and subsystems
 - 1. Results and summary description of payload and subsystems design analyses
 - 2. Subsystem, component design summaries
 - 3. Mass, power, pointing, propellant, and TC&R link budgets, and stationkeeping tolerances
- g. Launch vehicle interface requirements
- h. Performance compliance matrix (design verification matrix)
- i. Preliminary spacecraft test approach (test plan implementation)

2.2.7 Critical Design Review Data (CDRL 07)

Contractor shall provide agenda, invitation, data package, presentation material, minutes, and closeout report for the Critical Design Review (CDR) IAW CDRL 07. The CDR meeting concludes Pre-CDR and is specified in Paragraph 2.4.3. The CDR data shall include:

- a. Technical description of Satellite systems and subsystems
 - 1. Results and summary description of spacecraft payload and subsystems design analyses
 - 2. Subsystem, component design summaries
 - 3. Mass, power, pointing, fuel, TC&R link budgets, and stationkeeping tolerances
 - 4. Results of Failure Mode, Effects and Criticality Analysis (FMECA), where available
- b. Program master schedule
- c. Launch vehicle interface requirements and compatibility analysis
- d. Preliminary Mission Profile Description
- e. Preliminary Mission Operations Plan (through IOT)
- f. Performance compliance matrix (design verification matrix)
- g. Design Analysis Reports (as available)
- h. Qualification status list

2.2.8 Analysis Reports

Contractor shall perform the analyses and trades specified in Annex 1, Contract Data Requirements List (CDRL), to support the viability of the spacecraft design and its conformance to the Satellite Performance Specification, Exhibit B. Contractor shall document the results of these analyses IAW CDRL 23, Design Analysis Reports. Analyses and studies may be provided that cover equipment and subsystems developed and qualified in previous programs. The Design Analysis Reports shall contain a summary description and results of these analyses and shall be provided in the CDR Data Package, CDRL 07, if available at CDR, or when such data becomes available.

Contractor shall perform mission analyses to evaluate the selected launch vehicle(s), and demonstrate the capability of these selected launch vehicle(s) to place the Satellite in its final mission on-orbit position. The analyses shall show there is sufficient propellant to perform all stationkeeping and repositioning maneuvers for the required orbit maneuver life (OML). The analyses shall include launch vehicle dispersions, OML maximization, stationkeeping, TC&R coverage, Sun angle/eclipse conditions and launch windows. Other studies shall be performed that Contractor deems necessary to construct a Mission Sequence of Events (SOE) timeline. These mission analyses shall be documented in the Mission Profile Description, CDRL 11, and Mission Operations Plan, CDRL 15.

2.2.9 Program Test Plans and Procedures

2.2.9.1 Spacecraft Test Procedures (CDRL 08)

Contractor shall provide spacecraft hardware test procedures, CDRL 08, in conformance with the Satellite Program Test Plan, Exhibit D. Purchaser access to observe system-level tests shall be subject to Contractor's normal and customary proprietary, security and safety policies and procedures.

2.2.9.2 Spacecraft Launch Base Authorization Document (CDRL 10)

Contractor shall prepare a Spacecraft Launch Base Authorization Document that conforms to the Satellite Program Test Plan and deliver IAW CDRL 10. This document shall delineate:

- a. All launch base testing and pre-launch checkouts to be performed on the Satellite to ensure flight worthiness,
- b. Support for integrating the Satellite with the launch vehicle,
- c. On-pad launch operations, and
- d. Coordination with the Launch Vehicle Supplier for launching the Satellite.

2.2.9.3 In-Orbit Tests

Contractor shall provide an In-Orbit Test Description and In-Orbit Test Procedures as prescribed in the following document item descriptions.

In-Orbit Test Description (CDRL 12a)

Contractor shall prepare and submit an In-Orbit Test (IOT) Description document, CDRL 12a. This document, an expansion of the IOT Plan in the Satellite Program Test Plan, Exhibit D, shall provide details of IOT that will be performed before Satellite command authority is transferred to Purchaser. The IOT Description document shall be the basis for preparing IOT Procedures and shall contain:

- a. **Test Resources** — Test resources such as facilities, equipment, and personnel necessary to complete in-orbit testing shall be identified, including both Contractor- and Purchaser-provided resources.
- b. **Baseline IOT Schedule** — A baseline IOT schedule shall be developed and referenced to days after launch (e.g., L+5 days). This schedule shall identify IOT events after launch up to and including handover of Satellite command authority to Purchaser. The schedule shall be updated thirty (30) days before launch and during IOT on an as-required basis.
- c. **Detailed Test Matrices** — Comprehensive test matrices shall be developed and associated test methods described in conformance with the Satellite Program Test Plan.
 1. Bus Test Matrix
 2. TT&C Test Matrix
 3. Payload Test Matrix
- d. **Antenna Pattern Measurement Method** — Measurements shall be used to assess antenna pattern pointing, beam shape and performance by comparison with ground test data.

IOT Procedures (CDRL 12b)

Contractor shall prepare IOT Procedures and deliver IAW CDRL 12b. The procedures shall be developed in conformance with the IOT Plan of the Satellite Program Test Plan and prescribe acceptance criteria for verifying Satellite operation during early orbit operations after successful injection into mission orbit.

The IOT Procedures document shall include:

- a. Detailed test matrix
- b. Detailed test methods
- c. Detailed test procedures
- d. Test conditions
- e. Method and procedure on how to establish Satellite test configuration
- f. Measurement equipment list
- g. Test data sheets

2.2.10 Satellite Coordination Data (CDRL 04)

Contractor shall provide Satellite Coordination Data, CDRL 04, that are required to comply with Federal Communications Commission (FCC) and International Telecommunications Union (ITU)

rules, regulations and procedures. Contractor shall further assist Purchaser, as requested, in preparing documents required by other third parties, such as International Frequency Registration Board (IFRB), insurance agencies and other governmental or world regulatory bodies for implementation of this Program.

Purchaser shall be responsible for preparing, coordinating, and filing all applications, registrations, and reports. Contractor shall provide technical support and coordination for such filings at Purchaser's request on a time and materials basis, as specified in the Contract.

2.2.11 Mission Profile Description (CDRL 11)

Contractor shall provide a Mission Profile Description, CDRL 11, that summarizes all mission events covering the period from launch up to and including on-station operations. The document shall provide an overview of the entire profile from a mission analysis viewpoint, excluding procedures for operating the Satellite, and shall include:

- a. Launch window
- b. Launch vehicle trajectory
- c. TT&C coverage
- d. Sequence of major events
- e. Sun angles and eclipses
- f. Forces and torques analysis
- g. Stationkeeping maneuver strategy

2.2.12 Data Available On-Site

Contractor shall make available at its facilities the following Program-related data for Purchaser review:

- a. Subsystem and unit-level specifications and interface control drawings (ICDs)
- b. System and unit-level test data
- c. Major Non-conformance Report (NCR), CDRL 18
- d. Class 1 Waiver/Deviation Requests and Engineering Change Proposals, CDRL 19

2.2.13 Spacecraft End Item Data Package (CDRL 20)

Contractor shall deliver an End Item Data Package (EIDP), CDRL 20, following completion of Satellite Pre-Shipment Review (SPSR). The EIDP shall contain:

- a. Spacecraft identification
- b. Configuration summary
- c. Test discrepancy logs
- d. Test verification matrix

2.2.14 Product Assurance Data (CDRLs 18 and 19)

Contractor shall submit a Major Nonconformance Report (NCR), CDRL 18, and Class 1 Waiver/Deviation Requests and Engineering Change Proposals document, CDRL 19. Product assurance requirements and definitions shall be as set forth in the Product Assurance Plan, Exhibit C.

2.2.15 Telemetry and Command Database (CDRL 14)

Contractor shall build and manage an electronic Telemetry & Command (T&C) Database beginning with the spacecraft development phase and extending through the spacecraft ground test cycle. T&C Database, CDRL 14, shall be made available electronically to Purchaser subject to Contractor's normal and customary security rules and restrictions regarding such access. Contractor shall document and control changes to the T&C Database; changes shall be allowed up to thirty (30) days before launch, at which time they shall be frozen.

2.2.16 Mission Operations Plan (CDRL 15)

Contractor shall develop and publish a Mission Operations Plan (MOP), CDRL 15, covering all activities and events planned to occur during the period from pre-launch rehearsals through to completion of IOT. The MOP shall contain the information and data needed to guide activities of mission operations personnel during this period. The plan shall include:

- a. Operations staff organization, functions and responsibilities
- b. Schedules and functions to be staffed for each operation
- c. Summary plans, including contingencies for anticipated anomalous behavior of ground equipment, the communications network and the Satellite
- d. A summary of flight events from launch to arrival on station in mission orbit
- e. Description of the Contractor's Mission Control Complex, communication links, and TT&C stations

2.2.17 Satellite Orbital Operations Handbook (CDRL 16)

Contractor shall develop and publish a Satellite Orbital Operations Handbook (SOOH) as delineated in CDRL 16. The SOOH shall contain the information and data needed to guide personnel responsible for operating the Satellite. The SOOH information shall be the basis for commanding, controlling and maintaining the Satellite in normal and contingency operational modes. The SOOH shall consist of four (4) volumes:

- a. **Volume I, Satellite Systems Summary** — An overview of the Satellite and its systems and payload as related to on-orbit operations
- b. **Volume II, Satellite Technical and Operations Description** — A technical, detailed description of the subsystems along with the conditions and expected nominal performance of the subsystems to be used as a basis for operating the Satellite on orbit

- c. **Volume III, Operations Procedures** — Standard, Contingency and Health Operations Procedures (SOP, COP and HOP, respectively), to be used as a basis for operating the Satellite on orbit
- d. **Volume IV, Satellite Parameters Handbook** — Specific quantitative, Satellite parameters (calibration data) as related to on-orbit operations

2.2.18 Start of Construction Report (CDRL 26)

Contractor's Start of Construction shall consist of the initiation of the following major tasks:

- a. Review and verify the resolution and mitigation plans for critical paths and secondary critical paths as well as validate the overall detailed program schedule.
- b. Review and verify the availability of facilities, special machines, parts, qualified and certified personnel, procedure manuals, and long-lead items.
- c. Review and ensure completeness and applicability of manufacturing/production plans, quality/product assurance plans, and qualification test plans and procedures, as well as supporting documents.
- d. All performance budgets, hardware qualification status, and specification compliance matrices to be completed
- e. Begin assignment of hardware to the Program

The results of these tasks shall be reported IAW CDRL 26, Start of Construction Report. In the event that the Start of Construction Report indicates that a revision to the Contract Firm Fixed Price, Delivery Schedule or any other terms, conditions or requirements is appropriate, such change shall be handled in accordance with Article 16.2 of the Terms and Conditions.

2.3 PURCHASER'S REPRESENTATIVES

Contractor shall allow Purchaser's representatives, consultants, and agents access to all phases of Program work being performed at Contractor's facility for the Satellite and other deliverable data items to monitor progress of such work. Such work shall not cause interference with work in progress. Access by Purchaser's representatives to Program-related data, personnel, work in progress and facilities shall be provided IAW Contractor's normal and customary proprietary, security and safety policies and regulations and the Terms and Conditions of the Contract.

Contractor shall provide accommodations at its facilities for (TBD) Purchaser representatives. The accommodations shall be as set forth in Article 8 of the Terms and Conditions.

During normal working hours or other hours agreed to by Contractor, Purchaser's representatives may request access to Program work in process, including Contractor's major subcontractor activities. Upon such requests and subject to the preconditions cited in this paragraph or as may be proscribed in the Contract, Contractor shall arrange and schedule access of designated Purchaser representatives to Contractor or major subcontractor facilities wherein Contract work is being

performed. Purchaser representatives shall be U.S. persons or otherwise comply with U.S. Export Control laws.

Contractor reserves the right to accompany Purchaser representatives on any visit to subcontractor facilities. In no event shall activities of Purchaser's representatives relieve Contractor of any responsibility in performing the Contract or interfere with any work in progress.

2.4 PROGRAM AND TECHNICAL REVIEWS

Contractor shall plan, organize, administer, conduct and close the reviews listed herein. The objective of these reviews is to evaluate critical programmatic and technical parameters and processes, and related documentation to obtain information for deciding to proceed to the next Program phase.

2.4.1 Program Readiness Review

Contractor shall conduct a Program Readiness Review (PRR; Pre-CDR Inaugural Meeting) at its facility within one (1) month after EDC. The purpose of the PRR is to review the planning, preparation and readiness for initiating Program activities and executing the Contract. The PRR shall be considered closed upon sign off of the minutes and action item list with closure dates established.

All data items listed in Paragraph 2.2.5 shall be addressed via the following agenda topics:

- a. Program overview and management
- b. Program plan and master schedule
- c. Configuration and data management plan
- d. Product assurance plan
- e. Test plan
- f. Description of space and ground segments
- g. Performance requirements and technical specifications
- h. Budgets and margins
- i. Design and trades and analyses

2.4.2 Program Development Review (Pre-CDR)

Contractor shall conduct a Program Development Review (PDR) at its facility within six (6) months after EDC. The purpose of the PDR is to review the development and design feasibility of spacecraft subsystems and payload, and ground subsystems hardware and software. Risks shall be evaluated on a technical, schedule and cost basis. All items listed in Paragraph 2.2.6 of this SOW, as appropriate, shall be addressed. The PDR shall be considered closed with sign off of the minutes and action item list with closure dates established.

2.4.3 Critical Design Review (Pre-CDR)

Contractor shall conduct a Critical Design Review (CDR) at its facility within twelve (12) months after EDC. The purpose of the CDR is to ensure that the design meets the requirements of the Satellite Performance Specification, Exhibit B. All items listed in Paragraph 2.2.7 of this SOW, as appropriate, shall be addressed. The outcomes of the CDR shall be a determination that the detailed designs and their development satisfy the functional and performance requirements and verification that all system and subsystem interfaces are compatible. The CDR shall be considered closed with sign off of the minutes and action item list with closure dates established; this also signifies the close of Pre-CDR.

2.4.4 Test Readiness Review (Post-CDR)

Contractor shall conduct a Test Readiness Review (TRR) during Post-CDR to confirm readiness to conduct test activities in conformance with the Satellite Program Test Plan, Exhibit D. The purpose of the TRR is to ensure that the system or subsystem, and the performing organizations are ready to begin formal testing. Contractor's system engineering shall verify that planned and authorized tests will yield the data needed to prove performance requirements have been satisfied. The completed TRR shall confirm the completeness of test procedures by a thorough review of:

- a. Personnel and facility readiness
- b. Test plan, procedures, readiness
- c. New or modified test support equipment readiness

2.4.5 Spacecraft Pre-shipment Review (Post-CDR)

Contractor shall conduct a Spacecraft Pre-Shipment Review (SPSR) at its facilities before the Satellite is shipped to the launch site IAW with this Section 2.4.5 and Article 9 of the Terms and Conditions. The purpose of the SPSR is to (i) review test data and analyses for the subject Satellite, (ii) demonstrate all testing has been completed in accordance with Exhibit D, Satellite Program Test Plan, and (iii) determine whether such satellite meets applicable Satellite Performance Specification requirements (except those that have been waived pursuant to Article 9 of the Terms and Conditions) and is ready for shipment to the Launch Site. The SPSR shall address spacecraft test results, configuration of the spacecraft, nonconformance documentation, and relevant failure data.

Contractor shall submit the System Test Report, CDRL 09, before the SPSR that shall contain relevant test data and information. Any existing waivers shall be submitted before SPSR and resolved before the Satellite is shipped. Purchaser shall provide written authorization for Contractor to ship the Satellite to the launch site within seventy-two (72) hours of completion of the SPSR. Such authorization shall constitute acceptance by Purchaser that the Satellite conforms to the Satellite Performance Specification, as of SPSR, for the purpose of obtaining Purchaser's authorization to ship. Purchaser disapproval, if any, shall provide specific details of contractual non-compliance IAW Article 9 of the Terms and Conditions.

2.4.6 Spacecraft Post Shipment Inspection (Post-CDR)

Contractor shall conduct a post-shipment inspection of the Satellite after it has been delivered to the launch site. Visual inspections and verification tests shall be performed to demonstrate the Satellite has not been degraded by transportation from Contractor's facility. The inspection and verification shall be described in and performed according to the Satellite Program Test Plan.

2.4.7 Spacecraft Launch Readiness Review (Post-CDR)

Contractor shall conduct a Spacecraft Launch Readiness Review (SLRR) at the launch site facility approximately two (2) weeks before the Satellite launch date with Purchaser representatives in attendance. The purpose of the SLRR is to verify (i) all testing has been completed in accordance with Exhibit D, Satellite Program Test Plan, (ii) the Satellite meets all parameters required to be tested under Exhibit D, Satellite Program Test Plan and (iii) readiness of the Satellite for launch and of the ground network to support the mission. The SLRR shall cover the status of all spacecraft subsystems and ground facilities used to support launch and flight operations up to station acquisition. The agreement between Contractor and Launch Vehicle Supplier regarding Go/No-Go criteria shall be finalized at the SLRR. The SLRR shall be in two parts: the first, covering electrical tests, before moving the Satellite to the hazardous operation facility, and the second, after fuel loading and final close-out, before final spacecraft integration with the launch vehicle. The SLRR shall conclude upon the Parties agreement that the purpose of the SLRR has been met and the Satellite is ready to be integrated with the Launch Vehicle.

2.4.8 In-Orbit Test Review and Handover (Post-CDR)

Contractor shall provide the Summary IOT Report (CDRL 12(c)) to Purchaser at least twenty-four (24) hours prior to the In-Orbit Test Review (IOTR). Contractor shall conduct an In-Orbit Test Review (IOTR) within three (3) days after completing IOT and shall be held either at Purchaser's Satellite Control Facility or Contractor's facility, by mutual agreement. The purpose of the IOTR is to evaluate Satellite data obtained during the period from launch through IOT to confirm the Satellite satisfies the acceptance criteria defined in the IOT Procedures, CDRL 12b. The IOTR material shall be the IOT Summary Report, CDRL 12c and Satellite Acceptance Certificate (CDRL 24). At the conclusion of the IOTR, minutes shall be prepared and agreed to, which shall be considered closed with sign off of the minutes and resolution of any open items.

Contractor shall provide the Satellite Acceptance Certificate, CDRL 24, at the IOTR. The Satellite Acceptance Review (SAR) shall be held one (1) day after completion of the IOTR where Purchaser shall provide its acceptance or rejection of such Satellite IAW Article 10 of the Terms and Conditions.

After IOTR and before handover to Purchaser, Contractor shall provide updates, as needed, of Satellite operational configuration data, telemetry limit files and final changes to the T&C Database. Purchaser shall verify all data received and readiness of its personnel and ground control facilities, whereupon Contractor shall transfer Satellite command authority to Purchaser's mission operations team.

2.5 DELIVERABLE HARDWARE, SOFTWARE AND SERVICES

2.5.1 Satellite

Contractor shall provide one (1) Satellite satisfying the requirements of the Satellite Performance Specification, Exhibit B, tested IAW the Satellite Program Test Plan (STP), Exhibit D, Shipped to launch site, launched and upon completion of IOT satellite handover will occur.

2.5.2 Ground Support and Mission Operations Support Equipment and Service

Except for Purchaser-furnished facilities, equipment, and personnel for IOT as specified in Paragraph 2.6 of this SOW, Contractor shall make available all necessary ground and mission operations support equipment, software and personnel to conduct checkout and test of the Satellite during acceptance testing, pre-launch, launch, and IOT phases.

2.5.3 Dynamic Satellite Simulator (CDRL 25), (Option)

Contractor shall provide one (1) Dynamic Satellite Simulator, if option is exercised, that shall be documented IAW CDRL 25. The simulator shall contain hardware and software components integrated so as to simulate the Satellite adequately for checkout of the ground control subsystems and for flight operations training.

2.5.4 Training of Purchaser Personnel (CDRLs 21a and 21b)

Contractor shall develop, produce and conduct a Training Program for Purchaser's personnel experienced in Satellite operations. The objective of the training is to develop in Purchaser's mission operations personnel the ability to confidently command and control the CELSAT Satellite in its mission orbit. The purpose is to provide the essential knowledge and skills experienced personnel need to safely and reliably execute on-orbit operations of the Satellite.

The Training Plan shall be provided in CDRL 21a and contain descriptions of the curriculum, learning objectives, topics and instructional methods. The Training Program shall consist of four (4) total weeks of classroom sessions and accommodate up to ten (10) trainees as listed in Table 2-1.

Table 2-1. Classroom Training Courses

Classroom Course	Duration	Location	No. Trainees
Satellite Description Course	1 week	Contractor's Facility	10
Satellite Operations Course	2 weeks	Purchaser's Prime Control Facility	10
Orbital Operations Course	1 week	Purchaser's Prime Control Facility	10

Each week constitutes five (5) working days; each working day is for eight (8) hours

All class lecture notes and supporting materials shall be provided according to CDRL 21b and shall be documented and presented in English. All training shall conclude two (2) months before the scheduled launch date. The Training Program shall consist of three (3) basic courses:

- a. **Satellite Description**— This one- (1) week course shall present a technical overview and description of each bus subsystem and payload, and shall be conducted at Contractor's facility.

- b. **Satellite Operations**— This two- (2) week course shall be conducted at a Purchaser-provided facility, concluding approximately three (3) months before launch. This training shall focus on operational aspects of the Satellite and subsystems for operational modes under normal and contingency conditions. It shall cover TC&R operations and attitude/orbit maneuver planning and analysis. The course topics shall include:
 - 1. System and Spacecraft Subsystems Overview
 - 2. Mission Operations
 - 3. Stationkeeping Operations
 - 4. Attitude Control
 - 5. Eclipse Management
 - 6. Contingency Operations

- c. **Orbital Operations**— This one- (1) week course shall be conducted at Contractor's facility, concluding approximately two (2) months before launch. This training shall consist of a review of Satellite attitude control concepts and SS/L's philosophy of and approach to Satellite operations. The course topics shall include:
 - 1. Attitude control subsystem functions and modes, and key hardware characteristics
 - 2. Telemetry and command interfaces, redundancy and recommended routine analysis of attitude control parameters
 - 3. Operational characteristics, state of health monitoring, and performance and trend analysis functions related to the attitude control subsystem

2.5.5 Launch Operations Planning

2.5.5.1 Launch Planning and Integration

Contractor shall conduct launch phase planning, spacecraft integration and organizational coordination meetings with the Launch Agency and others supporting launch operations planning. Purchaser representatives shall be invited to attend.

2.5.5.2 Interface Coordination

Contractor shall coordinate all spacecraft-related interfaces with the Launch Agency and others to support launch of the Satellite and its transfer on station in mission orbit. Contractor shall identify and compile the required data and information of CDRL 17, and deliver it to the Launch Agency.

2.5.5.3 Rehearsals

Contractor shall conduct rehearsals of mission operations personnel starting approximately three (3) months before launch. Rehearsals shall be conducted for each mission phase at Contractor's facility, placing particular emphasis on the early orbit operations phase. Alternate operating modes of the ground command and control complex shall be exercised and include selected Satellite and ground system anomalies.

2.5.6 Launch and Early Orbit Operations

2.5.6.1 Launch Support Services

Contractor shall render launch support services to the Launch Agency.

2.5.6.2 Launch Support Services

Contractor shall perform the following spacecraft-related tasks:

- a. Conduct inspection and performance tests of the Satellite at the launch site
- b. Conduct any necessary assembly and checkout, including propulsion subsystem propellant loading and pressurization
- c. Support spacecraft-launch vehicle integration according to a schedule coordinated with the Launch Vehicle Supplier
- d. Support spacecraft-launch vehicle integrated system tests
- e. Conduct flight readiness performance tests of the Satellite
- f. Conduct pre-launch activities
- g. Support Launch Services during the period from Launch through spacecraft-launch vehicle separation

2.5.6.3 Transfer Orbit Operations, if required

Contractor shall provide equipment, personnel and services needed to: (a) acquire Satellite telemetry and orbit data; (b) perform necessary calculations and analysis; and (c) execute commands required to maneuver the Satellite through transfer orbit to its specified mission orbit location.

2.5.6.4 Initial Satellite Operations

Contractor shall perform initial Satellite operations, including IOT, after the Satellite is placed in its mission orbit. Contractor shall provide an IOT Summary Report, CDRL 12c, containing an analysis confirming the Satellite satisfies the acceptance criteria defined in the IOT Procedures (CDRL 12b), and a Detailed IOT Report, CDRL 12d.

Contractor shall provide the following personnel to support IOT:

- a. **IOT Director** — One (1) IOT Director shall be stationed at Contractor's Mission Control Complex (MCC) during orbit raising, and shall relocate to the IOT Coordination Center before start of payload testing. Throughout the IOT period, the IOT Director shall be Contractor's single point of contact for matters related to Satellite testing.
- b. **Payload IOT Coordinators** — Two (2) Payload IOT Coordinators shall be stationed at the IOT Coordination Center during payload tests. One (1) coordinator shall lead real-time payload tests on one (1) of two (2) work shifts. Both shall be system engineers experienced in evaluating payload test data, and shall review such data with Purchaser's designated representatives.

- c. **Bus IOT Coordinator** — One (1) Bus IOT Coordinator shall be stationed at Contractor's MCC during IOT. This coordinator shall be a system engineer familiar with evaluating bus test data, and shall review such data with Purchaser's designated representatives.
- d. **Other Bus IOT Personnel** — Other engineering personnel shall conduct bus IOT and evaluate test data. These personnel shall be stationed at Contractor's MCC.
- e. **Other Payload IOT Personnel** — Other engineering personnel and technicians shall be stationed at the IOT Coordination Center, and shall conduct payload IOT in two (2) shifts per day, calibrate and maintain Contractor's In-orbit Test Equipment (IOTE), and evaluate test data.

2.5.6.5 Communications and Data Lines

Contractor shall provide the required communications and data lines to perform the services specified in Paragraphs 2.5.6.3 and 2.5.6.4. Contractor shall provide and maintain a list of telephone, fax and e-mail contacts for each subsystem to be used by Purchaser personnel in a Satellite emergency.

2.5.7 Transfer Orbit TT&C Stations, if required

Contractor shall make available the required transfer orbit TT&C sites, if required, and shall provide its MCC as the control center for all IOT. Contractor shall verify compatibility of the interface between TT&C stations and the Satellite before launch. Purchaser shall provide TT&C station support for IOT operations as prescribed in Paragraph 2.6.

2.5.8 Long-Term Support

Following completion of In-Orbit Testing (IOT), Contractor shall provide Satellite emergency operations and anomaly resolution support services which are not covered in the Contingency Operations Plans (COPs) throughout the Satellite Mission Life.

2.5.8.1 Satellite Emergency Operations and Anomaly Resolution Support Services

Contractor shall maintain the following throughout the Satellite Mission Life:

- a. Contractor shall provide a contact point that the Purchaser/operator can reach 24 hours per day, 7 days per week, for purposes of requesting Satellite emergency operations and anomaly resolution support services which are not covered in the contingency plans. The point of contact shall be in the form of a live person using English as the primary language, who can be reached via telephone and FAX. The Contractor point of contact shall have the capability to initiate the assembly of a Contractor Emergency Support Team (EST) to perform the Satellite emergency operations and anomaly resolution support services described below, but shall not otherwise have any authority to speak on behalf of Contractor, nor perform diagnostics, nor provide any type of corrective actions.

- b. Upon Purchaser/operator's request for emergency operations and anomaly resolution support services, Contractor shall promptly establish an Emergency Support Team (EST) at Contractor's facilities. The EST shall have the authority to perform diagnostics and give recommendations for corrective actions. The EST shall have the capability to communicate, using English as the primary language, via telephone and fax. The Purchaser/operator shall be responsible for promptly providing the EST with the necessary and appropriate Satellite command and telemetry data, as the EST support may be affected/limited by lack of real-time telemetry. If it is later determined that the EST support was required as a result of Purchaser/operator error, including lack of properly trained (by Contractor) Purchaser/operator personnel, or due to negligence on the part of Purchaser/operator, Purchaser shall reimburse Contractor for such EST support on a time and materials basis.
- c. Contractor shall maintain equipment that is required at Contractor's facilities for Satellite emergency operations and anomaly resolution support. Contractor shall maintain the capability of processing Satellite telemetry during its mission lifetime, but said processing may not be in real-time.
- d. Contractor shall maintain a library of data and documents generated during the Satellite build at the Contractor's facilities. Contractor shall also maintain a library of the latest released SOOH, schematics and TT&C databases at Contractor's facilities. Contractor shall correct, at Contractor's expense, any errors found in such documentation that is determined by Contractor to be a risk to Satellite operations.
- e. Purchaser/operator shall be entitled to request Satellite emergency operations support services when the Purchaser/operator cannot maintain the Satellite in its required orbit and attitude or the Satellite is experiencing a Satellite anomaly, as defined in f) below, which has resulted in or is likely to result in the immediate loss of the Satellite. In this event, the EST will promptly take reasonable actions consistent with accepted industry practices to advise the operator in attempting to return the Satellite to an operational condition. Such Satellite emergency operations support services shall cease when the EST determines either that the Satellite can be returned to an operational condition and maintained in its required orbit and attitude, or that the Satellite cannot reasonably be returned to a full or partial operational condition.

2.5.9 Insurance Support

Contractor shall support Purchaser in matters relating to spacecraft insurance in Purchaser's dealings with the insurance company(ies) as specified in the Terms and Conditions. In addition, Contractor shall make necessary arrangements for up to two (2) surveys related to insurance procurement to be conducted by insurance company representatives at Contractor's premises during performance of the Contract. Contractor shall use its best efforts to obtain permission for similar surveys on the premises of its major subcontractors, if required.

2.5.10 Spacecraft Storage (Option)

Should Purchaser direct ground storage of a Satellite IAW the Contract, Contractor shall arrange to store the Satellite for up to eighteen (18) months. Purchaser shall notify Contractor of the planned

storage at least four (4) months before the originally planned delivery date. Purchaser's obligations in support of this option shall be as specified in the Terms and Conditions. Upon recall from storage, Contractor shall conduct visual inspections and verification tests to confirm the Satellite has not degraded during the storage period as required by the Storage Plan.

2.6 PURCHASER FURNISHED ITEMS

2.6.1 Equipment, Facilities and Services

Purchaser and Contractor shall participate in a Technical Interchange Meeting (TIM) at a mutually agreed to date during Post-CDR to review and agree upon the availability and adequacy of equipment, facilities and services listed below.

- a. Contractor shall be allowed access to Purchaser-owned Earth station sites or facilities that are within the proper look angle of the Satellite at its on-station orbital location. Such access shall include radio frequency (RF) communications equipment, TT&C facilities and equipment, standard communications test equipment and support services.
- b. Purchaser shall provide, operate, and maintain all payload-test Earth stations required for IOT. These Earth stations shall be capable of performing IOT and shall consist of antennas and RF equipment, high power amplifiers, low noise amplifiers, etc., with interfaces to Contractor-provided In-Orbit Test Equipment (IOTE). At each Earth station, Purchaser shall provide space and interface support for temporary installation of Contractor-provided IOTE. One Earth station shall be designated as the IOT Coordination Center.
- c. Contractor shall be allowed access to and use of Purchaser's test and support technicians during on-site installation, integration and test activities.
- d. At or in close proximity to the Earth stations or facilities, Purchaser shall provide space and interface support. Purchaser shall provide reasonable office space, conference room, and administrative areas for Contractor personnel during temporary installation of Contractor-provided IOTE and during orbit raising and IOT. These locations shall be equipped with telephones, fax, and copier.
- e. Purchaser shall provide appropriate personnel to participate in two (2) technical reviews at Contractor's facility, before launch, for compatibility testing and for one (1) mission rehearsal.
- f. Purchaser shall provide remote ranging site, including antenna, RF, and frequency translation equipment to support turn-around ranging.
- g. Purchaser shall provide the following personnel to support IOT:
 1. **IOT Director** — An IOT Director who shall be stationed at the IOT Coordination Center and work with Contractor's IOT Director to support day-to-day IOT operations
 2. **Earth Station Coordinators** — An Earth Station Coordinator who shall be stationed at the IOT Coordination Center, work with Contractor's Payload IOT Coordinators and operate Purchaser-provided antennas and RF equipment.

3. **Bus Technical Representative** — A Bus Technical Representative who shall be stationed at Contractor's MCC and review and approve Bus IOT data with Contractor's Bus IOT Coordinator.
 4. **Payload Technical Representatives** —Payload Technical Representatives who shall be stationed at the IOT Coordination Center, and review and approve payload IOT data with Contractor's Payload IOT Coordinator. The representatives shall be responsible for approving transponder test data and antenna pattern data.
- h. Purchaser shall provide an interim orbital location for IOT, if different from the final mission orbit location, within twelve (12) months following the start of Post-CDR. Purchaser shall be responsible for obtaining permission to use this interim location for IOT.
 - i. Purchaser shall provide documentation that supports calibration of Purchaser-furnished items. Certification of calibration satisfactory to Contractor shall be provided.
 - j. If Purchaser desires Contractor to provide post-IOT long-term support to on-orbit operations, in excess of that described in Section 2.5.8 (Long Term Support) above, this SOW and the Contract shall be amended, or a separate contract and SOW executed for such additional services.

2.6.2 Data

Purchaser shall provide:

- a. Telemetry and command RF frequencies at EDC
- b. Monthly reports of Satellite in-orbit status
- c. Documentation to support calibration of Purchaser-provided equipment for IOT listed in Paragraph 2.6.1.

2.7 SPECIAL REQUIREMENTS

Contractor shall treat all assigned command RF and command address codes as Purchaser Proprietary Information and shall not publicize these except as approved in writing by Purchaser prior to any disclosure.

Annex 1 — Contract Data Requirements List

No.	Title	Class	Quantity	Due Date ⁽¹⁾	SOW Paragraph
01	Program Management Plan	I	5	Draft at PDR (Pre-CDR)	2.2.1
02	Program Master Schedule	I	5	Draft at PDR (Pre-CDR)	2.2.2
03	Spacecraft Configuration Data				2.2.4
	a. Preliminary CIL	I	3	At CDR (Pre-CDR)	
	b. As-built CIL	I	3	At SPSR (Post-CDR)	
04	Satellite Coordination Data	I	3	As required	2.2.10
05	PRR Data (Pre-CDR)				
	a. Data Package	I	5	10 days before review	2.2.5
	b. Presentation Material	I	As req'd	1 day before review	2.2.5
	c. Minutes/ Action Items	A	5	At conclusion of review	2.2.5
	d. Close-out Report	A	4	20 working days after review	2.2.5
	e. Agenda	I	1	10 days before review	2.2.5
	f. Invitation	I	1	20 days before review	2.2.5
06	PDR Data (Pre-CDR)				
	a. Data Package	I	5	10 days before review	2.2.6
	b. Presentation Material	I	As req'd	1 day before review	2.2.6
	c. Minutes/ Action Items	A	5	At conclusion of review	2.2.6
	d. Close-out Report	A	4	20 working days after review	2.2.6
	e. Agenda	I	1	10 days before review	2.2.6
	f. Invitation	I	1	20 days before review	2.2.6
07	CDR Data (Pre-CDR)				
	a. Data Package	I	5	10 working days before review	2.2.7
	b. Presentation Material	I	As req'd	1 day before review	2.2.7
	c. Minutes/ Action Items	A	5	At conclusion of the review	2.2.7
	d. Close-out Report	A	5	20 working days after review	2.2.7
	e. Agenda	I	1	10 working days before review	2.2.7
	f. Invitation	I	1	8 weeks before review	2.2.7
08	Spacecraft Test Procedures	I	5	30 days before test	2.2.9.1
09	System Test Report	I	2	3 days before SPSR	2.4.5
10	S/C Launch Base Authorizing Doc.	I	5	10 days before shipment	2.2.9.2
11	Mission Profile Description	I	5	Preliminary: At CDR Final: 30 days before launch	2.2.11, 2.2.8.13

Class Code A = For Approval by Purchaser
 I = For Information

The Parties will review the Class Codes and revise as appropriate upon mutual agreement.

Notes: ⁽¹⁾EDC = Effective Date of Contract

Annex 1 — Contract Data Requirements List (Continued)

No.	Title	Class	Quantity	Due Date ⁽¹⁾	SOW Paragraph
12	In-Orbit Test (IOT):				
	a. IOT Description	I	5	At 6 months before Launch	2.2.9.3
	b. IOT Procedures	I	5	2 weeks before Launch	2.2.9.3
	c. Summary IOT Report	I	5	24 hours prior to IOTR	2.5.6.4
	d. Detailed IOT Report	I	5	At completion of IOT + 1 mo.	2.5.6.4
13	Monthly Progress Report	I	5	First Issue: EDC+2 months, subsequent by 10 th of each month	2.2.3
14	Telemetry & Command Database	I	Available in electronic format	Initial at CDR, updates as required	2.2.15
15	Mission Operations Plan	I	3	Preliminary: At CDR Final: 6 months before launch	2.2.16
16	Satellite Orbital Operations Handbook (SOOH)	I	Also provided in electronic media; in PDF format		2.2.17
	SOOH, Volume I, Satellite Systems Summary		5	Initial 3 months after CDR, updates as required Final update at completion of IOT + 1 month	2.2.17 (a)
	SOOH, Volume II, Satellite Technical and Operations Description		5	Initial 4 months before launch, updates as required Final update at completion of IOT + 1 month	2.2.17 (b)
	SOOH, Volume III, Operations Procedures		5	Initial 4 months before launch, updates as required Final update at completion of IOT + 1 month	2.2.17 (c)
	SOOH, Volume IV, Satellite Parameters Handbook		5	Initial 1 month before launch, updates as required Final update at completion of IOT + 1 month	2.2.17 (d)
17	Documentation Required by Launch Vehicle Supplier	I	3	As required; delivered to Launch Vehicle Supplier	2.5.5.2
18	Major Non-conformance Report	A	3	As required	2.2.14
19	Class I Waivers, Deviations, and Engineering Change Proposals	A	3	As required	2.2.14
20	Spacecraft End Item Data Package	I	2	1 week following SPSR	2.2.13

Annex 1 — Contract Data Requirements List (Concluded)

No.	Title	Class	Quantity	Due Date ⁽¹⁾	SOW Paragraph
21	Purchaser Training:				
	a. Training Plan	I	5	3 months before training	2.5.4
	b. Training Materials	I	As req'd	At training	2.5.4
22	Spacecraft to Launch Vehicle ICD	I	3	Initial at CDR; Final 6 months after CDR	2.2.4
23	Design Analysis Reports	I	*	*Included in CDR Data Package (or as available)	2.2.8
	23a. Communication Subsystem Analysis Report				2.2.8.1
	23b. Thermal Analysis Report				2.2.8.2
	23c. Structural Analysis Report				2.2.8.3
	23d. Electrical Power Subsystem Analysis Report				2.2.8.4
	23e. Pointing Error Analysis Report				2.2.8.5
	23f. Propellant Requirements Analysis Report				2.2.8.6
	23g. Reliability Analysis Report				2.2.8.7
	23h. Mass Properties Analysis Report				2.2.8.8
	23i. Flight Dynamics Analysis Report				2.2.8.9
	23j. Control Subsystem Analysis Report				2.2.8.10
	23k. Radiation and Electrostatic Discharge Analyses Report				2.2.8.11
	23m. TC&R Subsystem Analysis Report				2.2.8.12
24	Satellite Acceptance Certificate	A	1	At In-orbit Test Review	2.4.8
25	Dynamic Satellite Simulator documentation (option)	A	1	To be specified upon exercise of option	2.5.3
26	Start of Construction Report	I	1	01 September 2004	2.2.18

Annex 2

PRE-CDR SYSTEM DESIGN SUPPORT OPTION: STATEMENT OF WORK

1. INTRODUCTION

The baseline Pre-CDR tasks are comprised of engineering, design, and development activities to optimize the satellite technical approach and address market and regulatory developments.

This document provides a description of the additional tasks and deliverables proposed as Option 1. These additional tasks are to be performed during Pre-CDR using hardware and/or software modeling and simulation to refine capacity estimations and overall system design.

The baseline Pre-CDR tasks establish a technical solution in response to the Purchaser-defined satellite requirements. These additional system design support tasks are intended to provide satellite performance analyses and simulations that allow the Purchaser to optimize the overall system design.

2. TASKS & DELIVERABLES

2.1 COVERAGE OPTIMIZATION

System capacity and addressable satellite service market area is determined primarily by the satellite antenna performance. The coverage optimization tasks provide the Purchaser analytical satellite antenna performance results that support and validate Purchaser system designs and capacity models. Coverage results may also be needed to support Purchaser regulatory filing and coordination activities.

2.1.1 Antenna Optimization

Contractor shall identify alternate user antenna configurations candidates and determine the performance of the Contractor selected alternate satellite antenna configurations. Performance characterizations shall include: alternate numbers of spot beams and alternate beam shaping(s) to optimize G/T, EIRP and C/I .

The Contractor shall deliver, in Contractor selected format, G/T, EIRP and C/I contour plots and estimates of the relative satellite configuration impact.

2.1.2 Digital Beam Former Optimization Studies

The Contractor shall define the digital beam former algorithm descriptions and operational parameters.

The Contractor shall deliver, in Contractor-selected format, algorithm descriptions, feed element weight dynamic range and quantization requirements, algorithm timing requirements and recommended operational parameter upload requirements and timelines.

2.2 CHANNELIZER OPTIMIZATION STUDIES

The channelizer digitally implements the filtering of signals received in each beam. The bandwidth assigned to each beam determines the subscriber capacity available within the beam coverage area. The channelizer optimization studies, in conjunction with the Digital Beam Former Optimization Studies are intended to provide the Purchaser requirement trades, performance estimates and refined processor sizing estimates.

2.2.1 Filter Characteristics

The Contractor shall identify alternate filter response and algorithm candidates and determine the performance of at least two Contractor-selected configurations. Performance characterizations shall include: in-band and out-of-band gain and group delay frequency responses, filter coefficient word length, dynamic range and digital processor quantization requirements.

The Contractor shall deliver, in Contractor-selected format, gain and group delay frequency responses, filter element weight dynamic range and quantization requirements estimates of the relative digital channelizer and beam former configuration impact.

2.2.2 Waveform Performance

The Contractor shall utilize forward and return link simulation models and generate Bit Error Rate (BER) simulation results for one customer defined modulation and coding format.

The Contractor shall deliver, in Contractor selected format, simulation model descriptions, engineering documentation and baseline BER simulation results.

2.2.3 Size, Weight, Power Optimization

The Contractor shall evaluate the requirements derived in tasks 2.1.2, 2.2.1, and 2.2.2 of this Annex 2, and generate an optimized digital channelizer and beam former size weight and power estimate.

The Contractor shall deliver, in Contractor selected format, a digital channelizer and beam former configuration description including size weight and power estimates.

2.3 TRAFFIC LOADING STUDIES

Proper utilization of the satellite resources to maximize system capacity and call completion probability is determined by bandwidth and transmit power assignment per beam and limited by satellite resources and achievable antenna C/I performance. The traffic loading studies are intended to provide the Purchaser with initial operational algorithms and preliminary capacity estimates.

2.3.1 Transmit Power Optimization, Traffic Throughput Optimization

The Purchaser shall supply three (3) beam loading traffic scenarios to represent low, nominal and busy hour peak loading. Call quantity, arrival and duration statistics shall be supplied for each beam.

The Contractor shall utilize simulation models that estimate the bandwidth assigned to each beam, the user downlink power assigned to each beam and the satellite power utilization for each scenario.

The Contractor shall deliver, in Contractor-selected format, simulation model descriptions, engineering documentation and baseline traffic, bandwidth and power assignment, power utilization simulation results.