1001 Pennsylvania Avenue, NW, Washington, DC 20004-2595 ▪ p202 624-2500 ▪ f202 628-5116

crowell moring

ORIGINAL

William D. Wallace
(202) 624-2807
wwallace@crowell.com

August 23, 2002

BY HAND DELIVERY

RECEIVED

AUG 2 3 2002

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

RE: Globalstar, L.P.

File Nos. 182-SAT-P/LA-97(64) and 183-186-SAT-P/LA-97
(IBFS File Nos. SAT-LOA-19970926-00156, SAT-LOA-19970926-00151-154)

Dear Ms. Dortch:

Pursuant to a request from the Commission's International Bureau,[1] on July 29, 2002, Globalstar, L.P., submitted a copy of its "Contract between Globalstar, L.P. and Space Systems/Loral for the Globalstar 2nd Generation Satellite Program" (executed on July 16, 2002) (hereafter referred to as "Contract"). That submission was accompanied by a request for confidential treatment for the Contract. Also, another member of the International Bureau staff in a telephone conference requested that we submit under a separate cover a redacted version of the Contract for placement in the public file.

Enclosed herewith is a version of the Contract, with redactions to protect proprietary and confidential information, for the purpose of placement in the above-referenced public files. The copies of the Contract submitted on July 29, 2002, should continue to be accorded confidential treatment pursuant to the request made at that time.

---

[1] See Letter from Cassandra C. Thomas, Deputy Chief, Satellite Division, to William D. Wallace re Globalstar, L.P. (dated July 18, 2002).

Should there be any questions regarding this submission, please communicate with this office.

Respectfully submitted,

GLOBALSTAR, L.P.

William D. Wallace

CROWELL & MORING LLP
1001 Pennsylvania Avenue, N.W.
Washington D.C. 20004
(202) 624-2500

Its Attorneys

Of Counsel:

William F. Adler
Vice President, Legal and
Regulatory Affairs
Globalstar, L.P.
3200 Zanker Road
San Jose, CA 95134
(408) 933-4401

Enclosure

cc: Cassandra Thomas
Howard Griboff

EXECUTION COPY

# CONTRACT

**Between**

**Globalstar L.P.**

**and**

**Space Systems / Loral**

**for the**

**Globalstar 2nd Generation Satellite Program**

**GS-C-02-0612**

**REDACTED VERSION FOR PUBLIC DISCLOSURE**

## TABLE OF CONTENTS



GLP S
SS/L S

GLP S
SS/L S

## TABLE OF CONTENTS (Continued)



GLP S
SS/L S

## PREAMBLE

For the purpose of designing, producing, launching and delivering on-orbit Satellites and providing related services for the Globalstar 2nd Generation Satellite System, this Contract is entered into as of 17 July, 2002 (the "Effective Date of Contract" or "EDC") between Globalstar L.P., a debtor-in-possession, organized and existing under the laws of the State of Delaware, having an office and place of business at 3200 Zanker Road, San Jose, California 95134 (hereinafter referred to as "Purchaser") and Space Systems/Loral, Inc. a corporation organized and existing under the laws of Delaware, having an office and place of business at 3825 Fabian Way, Palo Alto, CA 94303-.4604 (hereinafter referred to as "Contractor").

## RECITALS

**WHEREAS**, Purchaser desires to procure from Contractor four (4) geostationary (GEO) communications Satellites and fifty-six (56) low-earth orbit (LEO) communications Satellites designed, manufactured, tested and launched for delivery and acceptance on-orbit, each at its assigned location, fully tested and ready for operation, in accordance with the terms and conditions set forth herein, and

**WHEREAS**, Contractor is willing to design and furnish such Satellites, associated hardware and services, in accordance with the terms and conditions set forth herein, and

**WHEREAS**, the Parties intend that the work to be performed hereunder be allocated between Phase I (definition), Phase II (development), and Phase III (production).

**NOW, THEREFORE**, the Parties hereto agree as follows:

GLP S
SS/L S

## ARTICLE 1 — DEFINITIONS

Capitalized terms used and not otherwise defined herein shall have the following meanings:

1.1 **"Acceptance"** (i) with respect to a Satellite shall be as provided for in Article 10, and (ii) with respect to any Deliverable Item other than a Satellite shall be as provided for in Article 11.

1.2 **"Attachment(s)"** means the attachment(s) identified in Article 38 and attached hereto, as may be amended from time to time in accordance with the terms hereof.

1.3 **"Contract"** means the articles of this executed contract, its Exhibits and its Attachment(s) as set forth in Articles 2.1 and 38, as may be amended from time to time in accordance with the terms hereof.

1.4 **"Contractor"** has the meaning set forth in the Preamble and any successor or assignee permitted hereunder.

1.5 **"Deliverable Data"** means the data and documentation required to be delivered to Purchaser as specified in the Statement of Work.

1.6 **"Deliverable Item"** means any of the items listed in Article 3.1, as may be amended from time to time in accordance with the terms hereof, and, collectively, the **"Deliverable Items"**.

1.7 **"Delivery"** (i) with respect to a Satellite shall be as provided for in Article 12.1, and (ii) with respect to any Deliverable Item other than a Satellite shall be as provided for in Article 12.2.

1.8 **"Effective Date of Contract"** or **"EDC"** means the effective date of this Contract as specified in the preamble.

1.9 **"Exhibit(s)"** means the exhibit(s) identified in Article 2.1 and attached hereto, as may be amended from time to time in accordance with the terms hereof.

1.10 **"FCC"** means the Federal Communications Commission or any successor agency or governmental licensing authority.

1.11 **"Final Operational Constellation"** shall mean the forty-eight (48) LEO Satellites have been delivered and Accepted in their assigned on-orbit locations. .

1.12 **"Firm Fixed Price"** has the meaning set forth in Article 4.2.

1.13 **"Force Majeure"** has the meaning set forth in Article 17.

1.14 **"In-Orbit Testing"** or **"IOT"** means the testing of a Satellite on-orbit in accordance with the Satellite Program Test Plan.

1.15 **"Intellectual Property Claim"** has the meaning set forth in Article 19.

1.16 **"Intentional Ignition"** means, with respect to any Satellite, the start of the ignition process for the purpose of Launch, which is the time at which the command signal is sent to the Launch Vehicle.

1.17 **"Launch"** means, with respect to a Satellite, Intentional Ignition followed by Lift-Off as defined in the applicable Launch Services Agreement .

1.18 **"Launch Agency"** means the provider of Launch Services responsible for conducting the Launch Services for a Satellite.

1.19 **"Launch Readiness Review"** or **"LRR"** has the meaning set forth in Article 10.1.

1.20 **"Launch Services"** means those services provided by the Launch Agency for the Launch of the Satellite pursuant to the Launch Services Agreement.

1.21 **"Launch Services Agreement"** or **"LSA"** means the contract between Contractor and the Launch Agency, which provides for Launch Services for a Satellite, as such contract may be amended from time to time in accordance with its terms.

1.22 **"Launch Site"** means the geographical location that will be used by the Launch Agency for purposes of launching a Satellite.

1.23 **"Launch Support"** or **"Launch Support Services"** means those services specified in the Statement of Work to be provided by Contractor in support of Launch Services.

1.24 **"Launch Vehicle"** means the launch vehicle selected by Contractor and used for Launch Services for a Satellite.

1.25 **"LIBOR"** means the rate of interest per annum, at any relevant time, at which thirty (30) day U.S. dollar deposits are offered at such time in the London interbank market, as determined by Contractor.

1.26 **"Mission Operations Support Services"** means the orbit-raising, IOT and related services specified in the Statement of Work to be performed by Contractor for a Satellite.

1.27 **"Notice of Arbitration"** has the meaning set forth in Article 25.

1.28 **"Orbital Life"** shall mean, with respect to any GEO Satellite, the period of [CONFIDENTIAL] years or [CONFIDENTIAL] consecutive days and with respect to any LEO Satellite, the period of [CONFIDENTIAL] years or [CONFIDENTIAL] consecutive days, commencing on the day following Acceptance of such Satellite.

1.29 **"Orbital Performance Incentive Period"** means, with respect to any GEO Satellite, the period of [CONFIDENTIAL] consecutive days and with respect to any LEO Satellite, the period of [CONFIDENTIAL] consecutive days, commencing on the day following Acceptance of such Satellite, as further described in Article 13.1.

1.30 **"Orbital Performance Incentives"** means, with respect to any Satellite, the amount specified in Article 13.2, which may be earned by Contractor based on on-orbit performance of such Satellite, as may be adjusted pursuant to Article 13.3.

1.31 **"Orbital Storage"** means, with respect to any Satellite, any period of time of intentional non-use by Purchaser of such Satellite provided that such Satellite has been placed into orbit and is capable of performing in accordance with the Satellite Performance Specification.

1.32 **"Party"** or **"Parties"** means Purchaser, Contractor or both, as the context requires.

1.33 **"Payment Plan"** means the payment plan for the applicable contract Phase, attached as Attachments 1,2 and 3, as may be amended from time to time in accordance with the terms hereof.

1.34 **"Performance Specification"** means the applicable performance specification for a Satellite or other Deliverable Item, as appropriate, in the content of the applicable clause, as such specification may be amended from time to time in accordance with the terms hereof.

1.35 **"Person"** means an individual, corporation, limited liability company, partnership, trust, unincorporated organization, association or any other entity.

1.36 **"PMO"** means the Purchaser's program management office, located at 3200 Zanker Road, San Jose, California 95134.

1.37 **"Product Assurance Program Plan"** means the product assurance program plan attached as Exhibit D, as may be amended from time to time in accordance with the terms hereof.

1.38 **"Proprietary Information"** has the meaning set forth in Article 31.

1.39 **"Purchaser"** has the meaning set forth in the preamble and any successor or assignee permitted hereunder.

1.40 **"Satellite"** means a communications satellite that is to be manufactured by Contractor pursuant to this Contract.

1.41 **"Satellite Acceptance Review"** has the meaning set forth in Article 10.

1.42 **"Satellite Anomaly"** means, with respect to any Satellite on-orbit, a condition or occurrence that has a material adverse impact on the Satellite Stated Life or performance of such Satellite.

1.43 **"Satellite Pre-Shipment Review" or "PSR"** has the meaning set forth in Article 9.

1.44 **"Satellite Program Test Plan"** means the Satellite program test plan attached as Exhibit C, as may be amended from time to time in accordance with the terms hereof.

1.45 **"Statement of Work"** or **"SOW"** means the statement of work attached as Exhibit A, as may be amended from time to time in accordance with the terms hereof.

1.46 **"Total Failure"** shall mean with respect to any Satellite where any condition(s) exceeds a loss value of [CONFIDENTIAL] in accordance with Attachment 4.

1.47 **"TT&C"** means telemetry, tracking and control.

1.48 **"Warranty Payback"** means the amount of any unearned Orbital Performance Incentives referred to in Article 14.

GLP S
SS/L S

## ARTICLE 2 — SCOPE OF WORK

2.1 Provision of Services and Materials

Contractor shall provide the necessary personnel, material, services, and facilities to: design, manufacture, test, launch, provide mission operations support, and deliver for Purchaser's Acceptance on-orbit the Satellites, together with all other Deliverable Items referred to in Article 3.1, in accordance with the following Exhibits, which are attached hereto and made a part hereof:

2.1.1 Exhibit A-1, GEO Statement of Work (SOW), dated July 17, 2002; No. GS-02-0798.

2.1.2 Exhibit A-2, LEO Statement of Work (SOW), dated July 17, 2002; No. GS-02-0800

2.1.3 Exhibit B-1, GEO Satellite Specification, dated July 17, 2002, No. GS-02-0804 (Preliminary)

2.1.4 Exhibit B-2, LEO Satellite Specification, dated July 17, 2002; No. GS-02-0799 (Preliminary)

2.1.5 Exhibit C-1, GEO Satellite Program Test Plan, dated July 17, 2002; No. GS-02-0802 (Preliminary).

2.1.6 Exhibit C-2, LEO Satellite Program Test Plan, dated July 17, 2002; No. GS-02-0801 (Preliminary).

2.1.7 Exhibit D, Commercial Programs Product Assurance Plan, dated January 24, 2002; No. E038152 Rev. 5 (Preliminary).

GLP S
SS/L S

## ARTICLE 3 — DELIVERABLE ITEMS AND DELIVERY SCHEDULE

3.1 Deliverable Items

Subject to the other terms and conditions of this Contract, the items to be delivered under this Contract and the corresponding delivery schedules and locations are as follows:

For Phase I - This definition phase commences with the Effective Date of Contract and concludes with each GEO or LEO Space Segment Critical Design Review as defined in the SOW. This phase is subject to any limitation in funding as set forth in Article 4.1 herein.

| Item | Description | Delivery Schedule | Delivery Location |
|---|---|---|---|
| 1. | Space Segment Requirements Review and Design Concept Review (RR&DCR) | GEO: EDC + Six (6) months | Contractor Facility |
| 2. | Space Segment Critical Design Review (CDR) | GEO: EDC + Twelve (12) months<br>LEO: EDC + Twelve (12) months | Contractor Facility |
| 3. | Deliverable Data | Per SOW | PMO |

GLP S
SS/L S

For Phase II - This development phase for each GEO and LEO work commences with closure of the applicable CDR and concludes with the respective Space Segment Final Design Review as defined in the SOW.

| Item | Description | Delivery Schedule | Delivery Location |
|---|---|---|---|
| 1. | Space Segment Final Design Review (FDR) | GEO: EDC + Thirty (30) months<br><br>LEO: EDC + Thirty (30) months | Contractor Facility |
| 2. | Deliverable Data | Per SOW | PMO |
| 3. | Dynamic Simulators | Per SOW | Per SOW |

GLP S
SS/L S

For Phase III - This phase commences the manufacturing, integration and test for the required number of Satellites including delivery to the Launch Site, Launch Support Services (including GEO and LEO Satellite dispensers, Launch Services, Launch base operations and Launch risk insurance) and Mission Operations Support Services from Launch through IOT.

| Item | Description | Delivery Schedule | Delivery Location |
|---|---|---|---|
| 1. | Four (4) Each GEO Satellites | Per SOW | On-Orbit Location as determined by Purchaser |
| 2. | Fifty-six (56) each LEO Satellites | Per SOW | On-Orbit Location as determined by Purchaser |
| 3. | In-Orbit Test Equipment | Per SOW | Ground network location as determined by Purchaser |
| 4. | Deliverable Data | Per SOW | PMO |
| 5. | Training | Per SOW | To be determined by Purchaser |
| 6. | Launch Services and Launch risk Insurance | Per SOW and Article 35 | Per SOW |
| 7. | Satellite Pre-Shipment Reviews (PSR) | Prior to each shipment | Assembly Integration and Test Facility |
| 8. | Launch Readiness Reviews (LRR) | Prior to each launch | Launch Facility |
| 9. | Final Operational Constellation Review (FOCR) | After placement of LEO Satellites in Final Operational constellation | Purchaser Facility |

GLP S
SS/L S

## ARTICLE 4 — PRICE AND PAYMENTS - PHASE I AND II

4.1 Cost and Fee

4.1.1. Phase I. Purchaser shall pay Contractor its actual costs incurred in performance of Phase I and a Base Fee of [CONFIDENTIAL] percent ([CONFIDENTIAL]%) as follows:

| | |
|---|---|
| GEO Target Cost: | $[CONFIDENTIAL] |
| Base Fee: | $[CONFIDENTIAL] |
| GEO Funding Limit: | $[CONFIDENTIAL] |
| LEO Target Cost: | $[CONFIDENTIAL] |
| Base Fee: | $[CONFIDENTIAL] |
| LEO Funding Limit: | $[CONFIDENTIAL] |

TOTAL Phase I Funding Limit: $[CONFIDENTIAL].

4.1.2 Phase II. Purchaser shall pay Contractor its actual costs incurred in performance of Phase II and a fee consisting of a [CONFIDENTIAL]percent (X%) Base Fee and a [CONFIDENTIAL] percent (X) Schedule Incentive Fee, as follows:

| | |
|---|---|
| GEO Target Cost: | $[CONFIDENTIAL] |
| Base Fee: | $[CONFIDENTIAL] |
| Schedule Incentive Fee: | $[CONFIDENTIAL] |
| GEO Funding Limit: | $[CONFIDENTIAL] |

GLP S
SS/L S

LEO Target Cost: $[CONFIDENTIAL]

Base Fee: $[CONFIDENTIAL]

Schedule Incentive Fee: $[CONFIDENTIAL]

LEO Funding Limit: $[CONFIDENTIAL]

TOTAL Phase II Funding Limit: $[CONFIDENTIAL]

4.1.3 Contractor shall have no obligation to incur costs in excess of the amounts authorized by Purchaser under 4.1.1 or 4.1.2 above.

4.2 First Payment under Phase I. Purchaser shall pay Contractor [CONFIDENTIAL] U.S. Dollars ($CONFIDENTIAL) upon Contract Execution. If the total $[CONFIDENTIAL] payment is not made within [CONFIDENTIAL] days of Contract execution, Contractor may cease performance hereunder, terminate this Contract without liability to Purchaser in connection therewith. Invoices for work under Phase I are to be applied against this First Payment until exhausted. Thereafter, invoices are to be paid in accordance with Article 4.6.

4.3 Lost Schedule Incentives. In the event that the Contractor is not awarded all of the Schedule Incentive Fees, the amount of Schedule Incentive Fees not awarded shall be available to be earned as Orbital Performance Incentive fees under Phase III of the Contract in accordance with Article 13 as Lost Orbital Performance Incentive Pool as defined therein.

4.4 Audit. The Purchaser reserves the right to audit the accounts of the Contractor pertaining to the costs allocated to the work performed under each Contract Phase other than Contractor costs pertaining to Firm Fixed Price work under this Contract.. Such audit shall be performed by an independent, recognized auditing firm mutually acceptable to the Parties. There shall be no more than one (1) audit per each calendar quarter and such audits shall be made at any time prior to one (1) year after completion of, and final payment for each Phase. Any payments remaining due the Contractor shall be reduced by any amounts incorrectly charged to the Contract; otherwise, the Contractor shall refund to the Purchaser any amounts incorrectly charged to the Contract.

4.5 Invoicing. Contractor shall invoice Purchaser monthly for actual costs incurred, plus a portion of the Base Fee and any portion of the Schedule Incentive Fee that has been earned. Together with the invoice, the Contractor will provide a detailed breakdown of the cost elements of the invoiced amounts in accordance with Contractor's

GLP S
SS/L S

standard practices including actual hours worked by the appropriate labor categories. Supporting documentation for any fee invoiced shall be submitted. The cumulative amounts of invoices payable by the Purchaser in a payment period shall be subject to the maximum amounts specified for such period in Article 29 - Limitation Of Funds. Any invoiced amounts that are unpaid because they exceed specified funding limitations shall be paid in the next payment period up to the amount of the cumulative funding limitation specified in Article 29 as of that subsequent payment period. The cumulative total of payments made to the Contractor plus the amount of unpaid invoices shall not exceed the cumulative funding limitation specified in Article 29 as of that next payment period.

4.6 Payment by Purchaser. The Purchaser shall make payment, as such payment amount may be adjusted in accordance with Article 4.4, within [CONFIDENTIAL] days after receipt of each invoice submitted in accordance with the requirements of this Contract. All payments to the Contractor from the Purchaser shall be in United States Dollars and shall be made by electronic funds transfer (EFT) as identified in the invoice by Contractor. In the event that the Purchaser does not make payment by the due date, without prejudice to Contractor's other rights and remedies under this Contract, at law or in equity, Purchaser shall pay the Contractor interest at the rate of LIBOR (30 day rate) + 3% per annum on the unpaid balance until such time as payment is made, unless Purchaser promptly notifies Contractor in writing that such nonpayment is due to application of the funding limitations described in Article 4.5, or to Purchaser's good faith determination that such payment is not due under the Contract. If any payment is not made by the date [CONFIDENTIAL] days after the date due in accordance with Article 4.6 (subject to Purchaser's good faith determination that such payment is not due under the Contract), without prejudice to Contractor's other rights and remedies under this Contract, at law or in equity, Contractor may elect to cease performance of its obligations under this Contract, without prejudice or penalty. If Contractor subsequently resumes performance, the schedule, price and other affected provisions of this Contract shall be modified to compensate Contractor for the impacts on Contractor associated with such work stoppage.

4.7 Forecast of Expenditures. During Phase I and Phase II, at least two (2) weeks prior to the start of each calendar quarter, the Contractor shall furnish to the Purchaser a forecast of the costs and fees that the Contractor expects to incur and to invoice the Purchaser for each month in the next quarter. In addition, the Contractor shall, once each quarter, furnish to the Purchaser its estimate of expected billings for the remainder of each Phase. Contractor shall only invoice actual hours worked by the appropriate labor categories in accordance with Attachment 5.

4.8 Duties. Any tariffs, duties, taxes (except income, payroll, FICA or franchise taxes) or other charges levied by any taxing authority within the United States of America or by a foreign government or taxing authority, on the goods, equipment, materials or

GLP S
SS/L S

effort covered by Phase I and/or Phase II shall be reimbursable to the Contractor during Phase I or Phase II to the extent that the total costs incurred by the Contractor on account of such taxes, duties and other charges do not exceed the applicable limitation on funds..

## ARTICLE 5 — PRICE AND PAYMENTS - PHASE III

5.1 Firm Fixed Price (Phase III)

The price to be paid by Purchaser to Contractor for the Phase III Deliverable Items set forth in Article 3.1 within the scope of work detailed in the Statement of Work, shall be firm fixed (the "Firm Fixed Price" or "FFP"); however, such Firm Fixed Price is subject to confirmation as described in Article 5.3. The prices for those Deliverable Items subject to an option under this Contract, if any, are described in the particular Articles that set forth those options. The itemization of the Firm Fixed Price is as follows:

| Item Description | Amount |
|---|---|
| 1. GEO Satellites No. 1 through 4 | US$[CONFIDENTIAL] |
| 2. LEO Satellites No. 1 through 56 | US$[CONFIDENTIAL] |
| TOTAL FIRM FIXED PRICE | US$[CONFIDENTIAL] |

The Firm Fixed Price for GEO and LEO Satellites include design, manufacturing, tests, Deliverable Data, training, Orbital Performance Incentives, Launch Support Services, Mission Operations Support Services and shipment, all in accordance with the terms and conditions of this Contract, as specified herein. Prices include all applicable taxes, duties and similar liabilities imposed by the United States Government or foreign government or other taxing authority in connection with this Contract.

5.2 Cost Plus Fee (Phase III)

The price to be paid by Purchaser to Contractor for Launch Services and Launch risk insurance (as set forth in Article 35) shall be provided by Contractor at [CONFIDENTIAL]. The itemization of the estimated cost inclusive of fee is as follows:

| Item Description | Amount |
|---|---|
| 1. GEO Launch Services | US$[CONFIDENTIAL] |
| 2. GEO Insurance | US$[CONFIDENTIAL] |
| 3. LEO Launch Services | US$[CONFIDENTIAL] |
| 4. LEO Insurance | US$[CONFIDENTIAL] |
| TOTAL ESTIMATED PRICE | US$[CONFIDENTIAL] |

5.3 Confirmation of Firm Fixed Price for Satellites

5.3.1 No later than at the conclusion of each GEO and LEO Satellite Final Design Review, the Contractor shall notify the Purchaser in writing [CONFIDENTIAL].

5.3.2 In the event of notification under 5.3.1 by Contractor [CONFIDENTIAL].

GLP S
SS/L S

5.4 Payment Plan – Phase III

5.4.1 Payments by Purchaser to Contractor of the Firm Fixed Price set forth in Article 5.1 shall be made based on time interval payments (CONFIDENTIAL %), upon achievement of milestones (CONFIDENTIAL %), and for Orbital Performance Incentives (CONFIDENTIAL %) as the Parties shall set forth in the Payment Plan in Attachment 3.

5.4.2 Payments by Purchaser to Contractor for Launch Services and for Launch risk insurance shall be made as set forth in Article 5.2 and Article 5.5. Payments shall be based on quarterly Contractor invoices for amounts to be paid by Contractor to the applicable provider in the quarter for which the invoice is submitted.

5.5 Orbital Performance Incentives.

The Orbital Performance Incentive payments due to Contractor pursuant to Article 13 with respect to each Satellite shall be due and payable on the date specified for such payment in Article 13.1.

GLP S
SS/L S

5.6 Payment Conditions

Upon presentation of an invoice together with supporting documentation relating to the accomplishment of a particular milestone, the Purchaser shall make payment within [CONFIDENTIAL] days of the date of receipt of an invoice. Supporting documentation for milestone payments shall be as described in the Payment Plan and in accordance with the SOW. All payments to the Contractor shall be in United States Dollars and shall be made by electronic funds transfer (EFT) to the following account:

SPACE SYSTEMS/LORAL, INC

ACCOUNT NO. 81888-02626

BANK OF AMERICA NT&SA

CHICAGO, ILLINOIS

ABA# 071-000-039

or other such accounts as the Contractor may specify from time to time by written notice to the Purchaser.

5.7 Invoices

Invoices required to be delivered by Contractor hereunder shall be submitted to Purchaser (original plus one (1) copy) at the following address:

Globalstar L.P.

Attn.: Accounts Payable

P.O. Box 640670

San Jose, California 95164-0670

or to such other address as Purchaser may specify in writing to Contractor.

5.8 Late Payment

In the event that any payment to Contractor is not made when due hereunder, without prejudice to Contractor's other rights and remedies under this Contract, at law or in equity, Purchaser shall pay the Contractor interest at the rate of LIBOR (30 day rate) + 3% per annum on the unpaid balance from the due date until such time as payment is made unless Purchaser promptly notifies Contractor in writing that such nonpayment is due to Purchaser's good faith determination that such payment is no

GLP S
SS/L S

due under the Contract. If any payment is not made by the date [CONFIDENTIAL] days after the due date, without prejudice to Contractor's other rights and remedies under the Contract, at law or in equity, Contractor may elect to cease performance of its obligations under this Contract, without prejudice or penalty. If Contractor subsequently resumes performance, the schedule, price and affected provisions of this Contract shall be modified to compensate Contractor for the impacts on Contractor associated with such stoppage.

5.9 Forecast of Expenditures

Two (2) weeks prior to the start of each quarter the Contractor shall furnish to the Purchaser its best estimate of the expected milestone billings and time payments due for each month in the next succeeding quarter, and projections of milestone billings for each subsequent quarter of the Contract.

5.10 Early Achievement of Milestones

In the event that the Contractor achieves any milestone in advance of the scheduled achievement date provided for in Attachment 3, then the Contractor may invoice the Purchaser as the milestone is achieved. The Purchaser shall pay for any such milestone, subject to its having received the required supporting documentation, and further provided that the early achievement of the milestone does not cause the amount due to exceed the forecast amount required by Article 5.9 for that payment period.

## ARTICLE 6 — PURCHASER-FURNISHED ITEMS

6.1 Purchaser-Furnished Support

The Contractor shall be responsible for Mission Operations Support Services from launch through in-orbit Satellite Acceptance. To assist the Contractor in providing these services, the Purchaser shall provide certain ground control network facilities, equipment and services in accordance with Section 6 of the GEO SOW and Section 7 of the LEO SOW.

6.2 Communications Authorizations

Except as provided in Article 7, Purchaser shall be responsible, at its expense, for preparing, coordinating and filing all applications, registrations, reports, licenses, permits and authorizations with the FCC, as required, and with any other U.S. or foreign governmental authority having jurisdiction over Purchaser, for the construction, launch and operation of each Satellite. If requested by Purchaser, Contractor shall provide reasonable assistance to the Purchaser in connection with such activities.

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 national 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 and the laws and regulations of all national communications regulatory authorities having jurisdiction over Purchaser.

6.4 Satellite Performance Data

Commencing with the first full calendar month following Acceptance of each Satellite, Purchaser shall provide a report to Contractor describing the general health and operating status of such Satellite. This report shall be provided to Contractor on a monthly basis thereafter, delivered to Contractor promptly after the end of each month during the operational life of such Satellite. In the event of a Satellite Anomaly, Purchaser shall timely provide Contractor with or give Contractor access to any data Contractor may reasonably require to investigate or correct (if Contractor is able to do so) such Satellite Anomaly or make or settle any insurance claim relating to such Satellite Anomaly.

6.5 Late Delivery of or Defects in Purchaser-Furnished Items or Services

The late delivery of or defects in Purchaser-furnished items or services, individually or combined, shall be considered an event beyond the reasonable control of Contractor, and Contractor shall be entitled to an adjustment in price, schedule, and other affected terms to compensate Contractor for the impacts of such defects and/or late delivery.

## ARTICLE 7 — COMPLIANCE WITH U.S. EXPORT LAWS AND DIRECTIVES

7.1 Compliance with U.S. Export Control Laws

7.1.1 Any obligation of Contractor hereunder to provide hardware, software, Deliverable Data, other technical information or technical services to Purchaser and its employees, agents and representatives shall be subject to applicable U.S. Government export control and security laws, regulations, policies and license conditions, as construed by Contractor. The Parties shall work cooperatively and in good faith to implement this Contract in compliance with such laws, regulations, policies and license conditions.

7.1.2 If and to the extent required by U.S. law, Purchaser and its employees, agents and representatives shall enter into U.S. Government-approved agreement(s), separate from this Contract, governing Contractor's provision of hardware, software, Deliverable Data, other technical information or technical services in connection with this Contract.

7.1.3 Any obligation of Purchaser hereunder to provide technical data, information and other technical services to Contractor shall be subject to applicable U.S. Government export control and security laws, regulations, policies and license conditions, as construed by Purchaser. The Parties shall work cooperatively and in good faith to implement this Contract in compliance with such laws, regulations, policies and license conditions.

7.2 Licenses and Other Approvals

Contractor shall apply for and, once issued, maintain U.S. Government export licenses, agreements and other approvals that are required for "foreign person" employees, agents and representatives of Purchaser to have access to Contractor facilities, hardware, software, Deliverable Data, other technical information or technical services in connection with the performance of this Contract. A "foreign person" shall be as defined in the International Traffic in Arms Regulations, 22 C.F.R. §120.16. As early as practicable, and in no event later than [CONFIDENTIAL] days after EDC, Purchaser shall provide Contractor with a list of countries (if other than the U.S.) of which "foreign person" employees, agents and representatives of Purchaser are citizens if such employees, agents and/or representatives will or may have access to export-controlled items under this Contract. Purchaser shall provide the cooperation and support necessary for Contractor to apply for and maintain such required export licenses, agreements and other approvals, and shall promptly notify Contractor of any occurrence or change in circumstances of which it becomes aware that is relevant to or affects such export licenses, agreements and approvals.

GLP S
SS/L S

NOTWITHSTANDING ANY PROVISION IN THE CONTRACT, IN NO EVENT SHALL CONTRACTOR BE OBLIGATED UNDER THIS CONTRACT TO PROVIDE ACCESS TO CONTRACTOR OR SUBCONTRACTOR FACILITIES; PROVIDE ACCESS TO OR FURNISH HARDWARE, SOFTWARE, DELIVERABLE DATA OR OTHER TECHNICAL INFORMATION; OR PROVIDE TECHNICAL SERVICES, TO ANY PERSON EXCEPT IN COMPLIANCE WITH APPLICABLE U.S. EXPORT CONTROL LAWS, REGULATIONS, POLICIES AND LICENSE CONDITIONS, AS CONSTRUED BY CONTRACTOR.

7.3 No Unauthorized Exports or Retransfers

NEITHER PARTY SHALL EXPORT OR TRANSFER TO ANY "FOREIGN PERSON", OR RE-EXPORT, RE-TRANSFER OR DIVERT TO ANY THIRD PARTY, ANY HARDWARE, SOFTWARE, DELIVERABLE DATA, OTHER TECHNICAL INFORMATION OR TECHNICAL SERVICES FURNISHED HEREUNDER, EXCEPT AS EXPRESSLY AUTHORIZED BY THE U.S. GOVERNMENT IN ACCORDANCE WITH THE EXPORT LICENSES, AGREEMENTS AND OTHER APPROVALS REFERENCED IN ARTICLE 7.1 AND 7.2 OR AS OTHERWISE EXPRESSLY AUTHORIZED UNDER U.S. EXPORT CONTROL LAWS.

## ARTICLE 8 — ACCESS TO WORK IN PROGRESS

8.1 Work in Progress at Contractor's Plant

Subject to compliance with Article 7 and with Contractor's safety and security regulations, Purchaser's employees (or Purchaser's duly appointed consultants, representatives and agents, collectively "employees" for purposes of this Article 8) shall be allowed access to work being performed at Contractor's facility at the subsystem level and above for the Satellites 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.

8.2 Work in Progress at Subcontractors' Plant

To the extent permitted by Contractor's subcontractors supplying services or goods valued in excess of [CONFIDENTIAL] U.S. dollars (U.S. $CONFIDENTIAL) in connection with any Satellite, and subject to compliance with Article 7 and with each such subcontractor's safety and security regulations, Contractor shall allow Purchaser's employees access to work being performed with respect to such Satellite in each such subcontractor's plants for the purpose of observing the progress of such work, subject to the right of Contractor to accompany Purchaser on any such visit to a subcontractor's plant. Contractor will use reasonable efforts to obtain permission for such access to subcontractor's facilities.

8.3 On-Site Facilities for Purchaser's Employees

For the purpose of monitoring the progress of the work to be performed by Contractor, Contractor shall provide office facilities at or proximate to Contractor's plant(s) for one (1) resident employee of Purchaser and two (2) visiting employees of Purchaser through Acceptance of the last Satellite ordered hereunder. Should the work for the communications payload reside in a separate facility (e.g. at a subcontractor), then Contractor shall use reasonable efforts to provide or subcontract such additional office facilities for one (1) resident Purchaser employees through Acceptance of the last Satellite ordered hereunder. The office facilities to be provided shall include a reasonable amount of office space, office furniture, local telephone service, access to copy machines and access to facsimile machines, to the extent necessary to enable Purchaser's employees to monitor the progress of work under this Contract.

GLP S
SS/L S

8.4 Purchaser Representatives as Competitors/Foreign Persons

Purchaser's consultants, representatives and agents shall themselves not be in engaged in a business or trade that is in direct competition with, and shall not currently be employed by companies or entities that are in direct competition with, Contractor. Purchaser shall notify Contractor in writing of the name, title or function, business relationship, employer, citizenship status under U.S. export laws and such other information as may be reasonably requested by Contractor, with respect to each of its intended consultants, representatives and agents, and cause each such consultant, representative or agent (1) to execute a confidentiality agreement directly with Contractor in form and substance satisfactory to Contractor and containing terms substantially the same as those set forth in Article 31 and Article 32; and (2) pursuant to Article 7, to execute a Technical Assistance Agreement or other agreement to the extent deemed necessary by Contractor to ensure compliance with applicable U.S. export control laws. Contractor may in its reasonable discretion deny any consultant or agent of Purchaser access to Contractor facilities, products or information; in which case, Contractor shall provide Purchaser with a written justification for its denial.

8.5 Interference with Operations

Purchaser shall exercise its rights under this Article 8 in a manner that does not unreasonably interfere with Contractor's or its subcontractors' normal business operations or Contractor's performance of its obligations under this Contract or any agreement between Contractor and its subcontractors.

## ARTICLE 9 — SATELLITE PRE-SHIPMENT REVIEW (PSR)

9.1 Contractor to Review Each Satellite Prior to Shipment

Contractor shall conduct a review of each 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 4.2.3 of the Statement of Work (each a Satellite "Pre-Shipment Review" or "PSR").

9.2 Time, Place and Notice of PSR; Failure to Conduct

Each PSR shall take place at Contractor's Assembly Integration and Test (AIT) facility. Contractor shall notify Purchaser in writing approximately [CONFIDENTIAL] days prior to the date that each Satellite shall be available for PSR, which shall be the scheduled date for commencement of such PSR. If Purchaser cannot commence such PSR on such scheduled date, Contractor shall make reasonable efforts to accommodate Purchaser's scheduling requirements.

9.3 Conduct and Purpose of PSR

Each PSR shall be conducted in accordance with Section 4.2.3 of the Statement of Work. The purpose of each PSR shall be to review test data and analyses and other information required by the SOW and reasonably requested by Purchaser for the subject Satellite to determine whether such Satellite meets applicable Satellite Performance Specification requirements and is therefore ready for shipment to the Launch Site.

9.4 Waivers or Pending Waivers

Contractor may request a waiver of or deviation from the Performance Specification for hardware items in writing to Purchaser promptly as and when they occur. If Purchaser approves the waiver or deviation, and the waiver or deviation affects the price of the hardware item(s), then the Parties shall negotiate a mutually acceptable revision of the Contract price. Each such waiver or deviation shall be deemed an amendment to the Performance Specification only for such hardware item effective on or after the date of approval. Purchaser shall, in keeping with customary industry practice, consider each waiver or deviation request in good faith and shall not unreasonably withhold its consent to any such request.

9.5 Purchaser's Inspection

Purchaser may observe the PSR pursuant to the terms and conditions of Articles 7 and 8.

GLP S
SS/L S

9.6 PSR Results

Within twenty-four (24) hours after completion of the PSR and delivery of the PSR report for any Satellite, Purchaser shall notify Contractor in writing of the results of the PSR with respect to such Satellite. In the event that the PSR discloses any non-conformance of such Satellite with the requirements of the Satellite Performance Specification, which non-conformance is not the subject of any approved waivers or deviations, Purchaser shall identify each such non-conformance with sufficient specificity (with reference to the applicable requirement of the Satellite Performance Specification deemed not met), to allow Contractor to correct or repair the non-conformance and to resubmit such Satellite for PSR. The approved PSR report constitutes approval by Purchaser for Contractor to prepare and ship the satellite to the Launch Site, or as appropriate, to storage pending Launch.

9.7 Inspection Costs Borne by Purchaser

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

9.8 Correction of Deficiencies after PSR

If at any time following the PSR for a Satellite, and prior to Intentional Ignition, such Satellite fails to meet the Satellite Performance Specification, as may be modified as of such time pursuant to Article 9.4, Contractor shall promptly undertake to correct such deficiencies prior to Intentional Ignition at its own expense.

GLP S
SS/L S

## ARTICLE 10 — SATELLITE ACCEPTANCE

10.1 Following completion of the PSR for a Satellite pursuant to Article 9, Contractor shall transport such Satellite, in accordance with Contractor's reasonable commercial practices, to the Launch Site and proceed with the Launch of such Satellite.

10.1.1 Contractor shall conduct a Launch Readiness Review (LRR) at the launch base after testing and final integration with the Launch Vehicle. This review shall be in accordance with Section 4.3.3 of the Statement of Work. The review shall demonstrate that the Satellites and Launch Vehicle systems are ready for Launch. Completion of the LRR and of any actions required under Article 9.8 will constitute Purchaser's approval to Launch.

10.1.2 [CONFIDENTIAL] days prior to the then-scheduled Launch of each Satellite, Contractor shall notify Purchaser of the IOT schedule with respect to such Satellite. Purchaser may observe the IOT at Purchaser's or Contractor's location, at Purchaser's election.

10.1.3 The Satellite shall be presented for a Satellite Acceptance Review after the completion of IOT in accordance with Exhibit C, Satellite Program Test Plan, and the submission to Purchaser of the IOT report, such report to be submitted within one (1) week of the completion of IOT. Purchaser shall review the IOT report and, within twenty-four (24) hours, shall notify Contractor of Acceptance of such Satellite pursuant to Article 10.2, Article 10.3 , or that the Satellite is a Total Failure.

10.2 Unqualified Acceptance of the Satellite. Unqualified Acceptance of each Satellite shall take place when such Satellite has reached its assigned orbital location and has been fully tested in accordance with the Program Test Plan and it is demonstrated at the IOT review that the Satellite meets the requirements of the Performance Specification.

GLP S
SS/L S

10.3 Qualified Acceptance of the Satellite. Qualified Acceptance of a Satellite shall be made by the Purchaser upon demonstration that the Satellite, although it does not fully meet the conditions for Unqualified Acceptance set forth in Article 10.2, is initially suitable for operation, and meets the criteria set forth in Attachment 4. As the Purchaser's sole and exclusive remedy for or related to the use or performance of a Satellite for which Qualified Acceptance applies (except to the extent of any insurance paid under the applicable Launch risk insurance policy, and without prejudice to the Purchaser's remedies under Article 15.2 and Article 19), the Orbital Performance Incentive payments to be made pursuant to Article 13 shall be reduced in accordance with the schedule provided in Attachment 4. The Purchaser may, at its sole option elect to give Qualified Acceptance to a Satellite that does not meet the requirements of Attachment 4. If the Purchaser elects to give Qualified Acceptance to such a Satellite, the Parties shall negotiate a reasonable amount to be paid for the Orbital Performance Incentive Payment associated with such a Satellite. Notwithstanding the foregoing, however, if the conditions for Qualified Acceptance hereunder are solely or substantially due to cause(s) not reasonably attributable to the Contractor (including Contractor's subcontractors for the Satellites), then the Contractor shall be entitled to earn the full Orbital Performance Incentive Payment as if the Satellite were subject to Unqualified Acceptance.

10.4 Total Failure of a Satellite. If a Satellite is a Total Failure due solely or substantially to the Launch Vehicle or any cause(s) not reasonably attributable to the Contractor (including Contractor's subcontractors for the Satellites), then the Contractor shall be entitled to earn the full Orbital Performance Incentive Payment as if the Satellite were subject to Unqualified Acceptance. Except as set forth in the immediately preceding sentence, if a Satellite is a Total Failure, the Purchaser's sole and exclusive remedy for or related to the use or performance of the Satellite (except to the extent of any insurance paid under the applicable Launch risk and/or in-orbit insurance policy(ies)) shall be Contractor's loss of the Orbital Performance Incentive Payment.

## ARTICLE 11 – ACCEPTANCE INSPECTION FOR DELIVERABLE ITEMS OTHER THAN SATELLITES

11.1 Inspection of Deliverable Items of Hardware Other Than Satellites

With respect to each Deliverable Item of hardware other than Satellites, Purchaser shall perform Acceptance inspection within [CONFIDENTIAL]) calendar days after such Deliverable Item arrives at the location designated for delivery thereof in Article 3.1. Such Acceptance inspection shall be conducted in accordance with the procedures described in the Exhibit A, Statement of Work and testing requirements in accordance with Exhibit C. The purpose of the Acceptance inspection shall be to determine whether each such Deliverable Item meets applicable Performance Specification requirements as of the date of such delivery, as such requirements may have been modified pursuant to Article 11.3.

11.2 Purchaser's Inspection

Subject to the provisions of Articles 7 and 8, Purchaser may, upon prior written notice to Contractor, conduct the Acceptance inspection pursuant to this Article 11 in whole or in part.

11.3 Pending Waivers

Waivers of or deviations from the Performance Specification applicable to any Deliverable Item subject to Acceptance inspection shall be addressed as set forth in Article 9.4.

11.4 Acceptance Inspection Results

Within forty-eight (48) hours of completion of Acceptance inspection, Purchaser shall notify Contractor in writing of the results of such Acceptance inspection. In the event that such Acceptance inspection discloses any non-conformance of such Deliverable Item to the applicable Performance Specification, Purchaser's notice shall detail each such non-conformance (with reference to the applicable requirement of the Performance Specification deemed not met), and Contractor shall correct or repair such non-conformance and resubmit such Deliverable Item for Acceptance inspection in accordance with this Article 11 as to each such corrected or repaired element. Unless Purchaser shall have given notice of non-conformance to Contractor, each Deliverable Item shall be deemed accepted.

11.5 Inspection Costs Borne by Purchaser

All expenses incurred by Purchaser in the performance of Acceptance Inspection, including travel and living expenses, shall be borne solely by Purchaser.

11.6 Warranty Obligations

In no event shall Contractor be released from any of its warranty obligations applicable to any Deliverable Item other than Satellites as set forth in Article 15 as a result of such Deliverable Item having been Accepted as set forth in this Article 11.

11.7 Design Reviews and Deliverable Data

Purchaser shall, within [CONFIDENTIAL] days, review and approve or require modifications of the data packages provided in connection with each design review specified in Article 3.1 in accordance with Exhibit A,

11.8 Training

Acceptance of training as specified in Article 3.1 and the Statement of Work shall be deemed to occur upon completion of such training.

## ARTICLE 12 — DELIVERY, TITLE AND RISK OF LOSS

12.1 Satellites

12.1.1 Delivery and risk of loss or damage to each Satellite under this Contract shall pass from the Contractor to Purchaser at the time of Intentional Ignition of the applicable Launch Vehicle.

12.1.2 Title to each Satellite to be delivered under this Contract shall pass from the Contractor to Purchaser upon the earlier of (i) Acceptance of such Launched Satellite, or (ii) the event that results in the Satellite becoming a Total Failure.

12.1.3 Title and risk of loss of any Satellites delivered to storage by the Contractor pursuant to Article 13.10 shall remain with the Contractor for the period of storage until the Purchaser has directed the Launch of such Satellites. Title and risk of loss shall be in accordance with 12.1.1 and 12.1.2.

12.1.4 UPON AND AFTER INTENTIONAL IGNITION OF THE LAUNCH VEHICLE FOR A SATELLITE, CONTRACTOR'S SOLE FINANCIAL RISK, AND THE SOLE AND EXCLUSIVE REMEDIES OF PURCHASER OR ANY PARTY ASSOCIATED WITH PURCHASER, WITH RESPECT TO THE USE OR PERFORMANCE OF SUCH SATELLITE (INCLUDING WITH RESPECT TO ANY ACTUAL OR CLAIMED DEFECT CAUSED OR ALLEGED TO BE CAUSED AT ANY TIME BY CONTRACTOR'S OR ANY OF ITS SUBCONTRACTOR'S NEGLIGENCE OF ANY DEGREE) SHALL BE AS SET FORTH IN ARTICLES 10, 13, 14, 15 AND 19, IN ALL CASES SUBJECT TO THE LIMITATION OF LIABILITY SET FORTH IN ARTICLE 30.

12.2 Deliverable Items Other Than Satellites

Delivery and risk of loss of, and title to, each Deliverable Item of hardware other than Satellites shall pass from Contractor to Purchaser upon Acceptance of such Deliverable Item pursuant to Article 11.4. Purchaser's rights in Deliverable Data are as set forth in Article 32. Delivery of training shall be deemed to occur upon Acceptance pursuant to Article 11.8.

## ARTICLE 13 — ORBITAL PERFORMANCE INCENTIVES

13.1 General

Purchaser shall pay Orbital Performance Incentives to Contractor with respect to each Satellite in the amount set forth in Article 13.2 or Article 13.3, as applicable, on the first day of the Orbital Performance Incentive Period for such Satellite. Contractor shall earn and accrue the Orbital Performance Incentives for each Satellite over the Orbital Performance Incentive Period with respect thereto. For the purpose of calculating the Orbital Performance Incentives for each Satellite, the first day of the applicable Orbital Performance Incentive Period shall be deemed to commence at 12:01 a.m. Greenwich Mean Time on the first day after Acceptance for such Satellite. All measurements, computations and analyses made pursuant to this Article 13 shall be made in accordance with good engineering practice applying standards generally applicable in the aerospace industry.

13.2 Upon Acceptance of each GEO & LEO Satellite, provided that such Satellite is not subject to a Qualified Acceptance, the Purchaser shall pay to the Contractor Orbital Performance Incentives with respect to such Satellite . The calculation of advance payment, deferral of advance payment with interest or a combination thereof of Orbital Performance Incentives shall be determined by the Parties upon confirmation of the FFP in accordance with Article 5.3.

13.3 Daily Rate - Performance Incentives for Unqualified Acceptance

The Contractor shall earn Orbital Performance Incentives at a daily rate for each GEO Satellite and each LEO Satellite, for each day the Satellite performs in accordance with the requirements of Exhibit B, the Satellite Performance Specification during the Orbital Performance Incentive Period.

GLP S
SS/L S

13.3.1. Daily Rate - Performance Incentives for Qualified Acceptance

For any Satellite which receives Qualified Acceptance by the Purchaser, the Orbital Performance Incentives to be paid by the Contractor shall be reduced in accordance with Attachment 4. In the event a Satellite does not meet the conditions of the Performance Specification or the criteria for Qualified Acceptance in Attachment 4, but the Purchaser decides to Accept the Satellite, the Parties shall negotiate a reasonable reduction in the Orbital Performance Incentive amount that may be paid by that particular Satellite. Any Orbital Performance Incentives that the Contractor is not entitled to receive at the time of Acceptance shall be retained in a Lost Orbital Performance Incentive Pool by the Purchaser, and may become payable to the Contractor for extended life pursuant to Article 13.8. The payment of the Orbital Performance Incentive to the Contractor at the time of Acceptance of the particular Satellite shall be reduced by the amount placed in the Lost Orbital Performance Incentive Pool.

13.4 Method of Warranty Payback

13.4.1 Deteriorated Performance of a Satellite with Unqualified Acceptance

If, during the Orbital Performance Period of a Satellite that has received Unqualified Acceptance, performance of that Satellite deteriorates below the requirements of Exhibit B, the Satellite Performance Specification, the Parties shall establish the degraded level of service achieved by the Satellite by reference to Attachment 4, if applicable, or by negotiation between the Parties. Any remaining Orbital Performance Incentives shall be earned by the Contractor at the lower rate. Any balance of the Orbital Performance Incentives that the Contractor is not entitled to earn shall be refunded to the Purchaser as a Warranty Payback.

13.4.2 Deteriorated Performance of a Satellite Qualified Acceptance

If, during the Orbital Performance Period of a Satellite that has received Qualified Acceptance, performance of that Satellite deteriorates below the level established at the time of Qualified Acceptance, the Parties shall establish the degraded level of service achieved by the Satellite by reference to Attachment 4, if applicable, or by negotiation between the Parties. Any remaining Orbital Performance Incentives shall be earned by the Contractor at the lower rate. Any balance of the Orbital Performance Incentives that the Contractor is not entitled to earn shall be refunded to the Purchaser as a Warranty Payback.

13.5 Temporary Outages

13.5.1 Temporary Outages for GEO Satellites.

13.5.1.1 In the event of a service outage of a GEO Satellite (except those caused as a direct result of ground operations) that lasts more than [CONFIDENTIAL], but not more than [CONFIDENTIAL], the Contractor shall refund or forfeit [CONFIDENTIAL] of Orbital Performance Incentives (the penalty period) for each such outage to the Purchaser.

13.5.1.2 For any outage longer than [CONFIDENTIAL], the Contractor shall refund or forfeit Orbital Performance Incentives for a period of [CONFIDENTIAL] for each [CONFIDENTIAL]of outage.

13.5.1.3 If, after a temporary service outage, the Satellite resumes performance in accordance with the Performance Specification, then the Contractor shall resume earning Orbital Performance Incentives at the appropriate daily rate, beginning the next day after the applicable penalty period has expired, for each day in which the Satellite performs in accordance with the Performance Specification with no outages in excess of five minutes.

13.5.2 Temporary Outages for LEO Satellites. In the event of a service outage of a LEO Satellite (except those caused as a result of ground operations), the following penalties shall be charged to the Contractor:

13.5.2.1 No Orbital Performance Incentive penalties are assessed for satellite outages until after the first [CONFIDENTIAL] after initial detection of the outage by the Purchaser's SOCC. In the event that Purchaser's Ground Operations Control Center (GOCC) first detects the outage, the outage period starts upon SOCC notification of the Satellite outage by the GOCC.

13.5.2.2 For outages lasting more than [CONFIDENTIAL] but less than [CONFIDENTIAL], the Contractor shall refund or forfeit Orbital Performance Incentives for a period of [CONFIDENTIAL] days .

13.5.2.3 For outages lasting between [CONFIDENTIAL] and [CONFIDENTIAL] days, the Contractor shall additionally refund or forfeit on a day for day basis (i.e. one day of outage results in [CONFIDENTIAL] of penalty) calculated using the [CONFIDENTIAL] for that Satellite.

13.5.2.4 For any outage of more than [CONFIDENTIAL], the Contractor shall refund or forfeit any remaining Orbital Incentives with respect to that Satellite.

13.5.2.5 If, after a temporary service outage of [CONFIDENTIAL] days or less, the Satellite resumes performance in accordance with the Performance Specification, then the Contractor shall resume earning Orbital Performance Incentives at the appropriate daily rate, beginning the next day after the applicable penalty period has expired, for each day in which the Satellite performs in accordance with the Performance Specification with no outages in excess of 114 minutes.

13.6 Restoration of Normal Service

If the Contractor ceases to earn Orbital Performance Incentives, or if the Contractor is earning Orbital Performance Incentives at a reduced rate, with respect to a Satellite which thereafter (i) resumes performance in accordance with Unqualified or Qualified Acceptance of the particular Satellite for a period of not less than [CONFIDENTIAL] days, and (ii) the Satellite has not experienced an outage in excess of [CONFIDENTIAL] days, and if the full balance of Orbital Performance Incentives which may be earned by a particular Satellite have been refunded to the Purchaser under the Warranty Payback provisions of this Contract, then the amount of Orbital Performance Incentives that remain to be earned by the Contractor shall be paid to the Contractor and the provisions of this Article shall pertain to the Contractor's right to earn and accrue such Orbital Performance Incentives. The Contractor shall earn Orbital Performance Incentives at the applicable daily rate from the day following the day the applicable penalty period expires or the day service is restored, whichever is latter. Such Orbital Performance Incentives shall be paid at the rate established for Unqualified or Qualified Acceptance. If a Satellite resumes performance as stipulated above after an outage in excess of [CONFIDENTIAL] days, , then the Parties shall negotiate an equitable Orbital Performance Incentive Amount and the Contractor shall earn such Orbital Performance Incentive pursuant to the provisions of this Article 13.

13.7 Total Failure of a Satellite

In the event of a Total Failure of a Satellite during the Orbital Performance Period due solely or substantially to causes attributable to Contractor, the remaining unearned Orbital Performance Incentives for that particular Satellite shall be refunded by the Contractor to the Purchaser as a Warranty Payback; provided, that if the Purchaser nonetheless elects to continue using the Satellite for revenue bearing traffic, the Contractor shall be entitled to continue to earn reduced Orbital Performance Incentives in an amount to be negotiated between the Parties for so long

as Purchaser so uses the Satellite. In the event of a Total Failure due to causes not attributable solely or substantially to Contractor (or Contractor's subcontractors), Contractor shall be entitled to all Orbital Performance Incentives otherwise due hereunder.

13.8 Extended Life Incentive

If the Purchaser elects to continue operating Satellites in revenue-bearing service after they have exceeded their Orbital Performance Incentive Period, then the Contractor shall be entitled to earn back any Orbital Performance Incentives that have been forfeited by the Contractor over the course of the Orbital Performance Incentive Period of the Satellites. The amount of the Orbital Performance Incentives that have been forfeited shall be collected into a pool (Lost Orbital Performance Incentives Pool) . This pool may be paid to the Contractor on any Satellite that is not a Total Failure and continues to operate beyond the Orbital Performance Incentive Period. In this case, the Contractor shall be entitled to earn back, at the daily rate prevailing for each Satellite at the end of its Orbital Performance Incentive Period, any amounts in the Lost Orbital Performance Incentive Pool, provided that the performance of each particular Satellite remains the same. The Contractor may earn and be paid the total amount in the Lost Orbital Performance Incentive Pool. Any amounts due to the Contractor under Article 13.8 shall be paid to the Contractor on a quarterly basis.

13.9 Survival of Contractor/Purchaser's Rights in Orbital Performance Incentive Payments

The Contractor's right to Orbital Performance Incentive payments under this Article for any Satellites that have been Accepted prior to termination of this Contract for whatever reason shall survive such termination. The Purchaser's right to receive amounts as Warranty Payback shall also survive termination of this Contract.

13.10 Satellites Delivered to Storage

The Contractor shall be responsible for ground storage of unlaunched Satellites as follows.

13.10.1 GEO Satellite Storage: From EDC through completion of Launch for all four GEO Satellites in accordance with Annex D to Exhibit A.

13.10.2 LEO Satellite Storage: From EDC through completion of the Final Operational Constellation plus two years for spare satellites not required to complete the Final Operational Constellation.

13.10.3 Optional Storage: Purchaser may request the Contractor to store unlaunched Satellites pursuant to Article 24.3. For any such Satellites that may be stored by the Contractor beyond the requirements of 13.10.1 and 13.10.2, the Parties shall determine the appropriate Orbital Performance Incentive amount to be paid at the confirmation of the FFP in accordance with Article 5.3.

13.11 On-Board Redundancy

The use of any Satellite's on-board redundancy to maintain service shall not in and of itself be deemed to constitute degradation of service under this Article 13, and use of such redundancy shall be deemed normal operating procedure so long as the Performance Specifications are met by such Satellite.

13.12 Orbital Storage

If the Purchaser places any Satellite in Orbital Storage following Acceptance, the Contractor shall continue to earn Orbital Performance Incentives at the same daily rate as the Contractor was earning prior to the Satellite being placed in orbital storage, for the period of time the Satellite remains in orbital storage. If the Satellite is returned to operational service following a period of orbital storage, the daily Orbital Performance Incentive Amount shall be based on the performance of the Satellite consistent with the requirements of this Article.

13.13 Satellite Degradation, Failure, Loss or Damage Caused by Purchaser

If, at any time after Launch, an act or omission of the Purchaser causes a Satellite to be lost or damaged, or causes a Satellite Failure or other degradation in Satellite performance, then the Contractor shall continue to earn Orbital Performance Incentives with respect to such Satellite at the rate that applied prior to the act or omission resulting in degraded performance.

## ARTICLE 14 — WARRANTY PAYBACK

Purchaser may invoice Contractor no more frequently than monthly for Warranty Payback payments payable pursuant to Article 13. Contractor shall make Warranty Payback payments to Purchaser within [CONFIDENTIAL] days after receipt of Purchaser's invoice for such Warranty Payback payments. In the event that Contractor does not make Warranty Payback payments due to Purchaser within such [CONFIDENTIAL] day period, Contractor shall pay Purchaser interest at the rate of LIBOR (30 day rate) plus 3% on the unpaid balance thereof from the date that is [CONFIDENTIAL] days after delivery of the invoice therefor to such time as payment is made by Contractor.

## ARTICLE 15 — WARRANTY

15.1 Terms and Period of Warranty

15.1.1 Satellites.

Contractor warrants that each Satellite to be delivered under this Contract shall be manufactured free of defects in material and workmanship and in conformity with the Satellite Performance Specification (as may be waived pursuant to Article 9.4) applicable to the Satellite. The Contractor's only liability under the preceding sentence shall be as and to the extent set forth in Article 9.8 hereof (which Article 9.8 only applies prior to Intentional Ignition of the Launch Vehicle for such Satellite).

AFTER INTENTIONAL IGNITION OF THE LAUNCH VEHICLE FOR A SATELLITE, NEITHER CONTRACTOR NOR ITS SUPPLIERS OR AGENTS AT ANY TIER SHALL INCUR ANY LIABILITY WHATSOEVER WITH RESPECT TO THE SATELLITE'S DESIGN, WORKMANSHIP, CONFORMITY TO SPECIFICATIONS OR IN-ORBIT PERFORMANCE, INCLUDING ANY ASSISTANCE OR ADVICE (ACTUAL OR ATTEMPTED) PROVIDED OR OMITTED AS CONTEMPLATED BY ARTICLE 15.2 HEREOF, ARISING FROM ANY CAUSE OR LEGAL THEORY, INCLUDING NEGLIGENCE OF ANY DEGREE, WHETHER ARISING BEFORE OR AFTER INTENTIONAL IGNITION, EXCEPT AS SPECIFICALLY PROVIDED IN ARTICLES 10, 13, 14, 15.2 AND 19 HEREIN.

15.1.2 Deliverable Items of Hardware Other Than Satellites.

A. Contractor warrants that each Deliverable Item of hardware other than Satellites delivered under this Contract shall be manufactured in conformity with the Performance Specification applicable to such Deliverable Item (as may be waived pursuant to Article 11.3) and will be free from defects in materials and workmanship during the period commencing on the date of Acceptance of such Deliverable Item pursuant to Article 11 and ending on the completion date of all required launch activities under this Contract.

B. During the period specified in Article 15.1.2 (A) for any Deliverable Item of hardware other than a Satellite, as Purchaser's sole and exclusive

GLP S
SS/L S

remedy, any defect discovered in such Deliverable Item and notified to Contractor shall be remedied by Contractor at Contractor's expense by repair or replacement of the defective component (at Contractor's election). For any such Deliverable Item, Contractor shall determine if repair or replacement is required to be performed at Contractor's plant. If required, Purchaser shall ship to Contractor's designated facility any such Deliverable Item. Contractor shall be responsible for the cost of shipment to such facility in accordance with its reasonable commercial practice (including any taxes and/or duties) of any such Deliverable Item, and the cost of return shipment, in accordance with its reasonable commercial practice, of any such Deliverable Item once repaired or replaced to Purchaser at the location designated therefor in Article 3.1. Risk of loss for such Deliverable Item shall transfer to Contractor upon delivery of such Deliverable Item to the shipping carrier by Purchaser, and risk of loss shall transfer to Purchaser for any such Deliverable Item once repaired or replaced pursuant to this Article 15.1.2 (B) upon receipt thereof by Purchaser at the location designated therefor in Article 3.1.

15.1.3 Disclaimer. EXCEPT AND TO THE EXTENT EXPRESSLY PROVIDED IN ARTICLE 15.1.1, ARTICLE 15.1.2 AND ARTICLE 15.4, CONTRACTOR HAS NOT MADE NOR DOES IT HEREBY MAKE ANY REPRESENTATION OR WARRANTY, WHETHER WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF DESIGN, OPERATION, CONDITION, QUALITY, SUITABILITY OR MERCHANTABILITY OR FITNESS FOR USE OR FOR A PARTICULAR PURPOSE, ABSENCE OF LATENT OR OTHER DEFECTS, WHETHER OR NOT DISCOVERABLE, WITH REGARD TO ANY SATELLITE OR ANY OTHER DELIVERABLE ITEM. CONTRACTOR MAKES NO WARRANTY WITH RESPECT TO THE PERFORMANCE OF ANY LAUNCH VEHICLE.

15.2 Satellite Anomalies and Corrective Measures in Unlaunched Satellites

15.2.1 Contractor shall investigate at its sole expense any Satellite Anomaly in any Satellite delivered on-orbit arising during the Orbital Life of the Satellite and known to it or as notified in writing by Purchaser. If for any reason any such Satellite Anomaly cannot be or is not corrected as set forth in the immediately preceding sentence, and as a result thereof, such Satellite suffers any loss, including Total Failure, Purchaser's sole and exclusive remedies with respect to such loss and any consequences therefrom shall be those set forth in Article 13 and 14, as applicable, subject to the conditions and limitations of such Articles and in all cases subject to the limitations of liability stated in Article 15.1 and Article 30. .

15.2.2 If the data available from any in-orbit Satellite manufactured by Contractor show that the performance of such Satellite deviates materially during the life thereof from that specified in the applicable performance specification for such Satellite, Contractor shall, at Contractor's sole expense, take appropriate corrective measures, in all unlaunched Satellites so as to eliminate therefrom the causes of such material deviation. If required, Contractor shall be entitled to a reasonable extension in the Delivery schedule for each such unlaunched Satellite to effect the required corrective measures.

15.3 Use Conditions Not Covered by Warranty

With respect to Deliverable Items of hardware other than a Satellite, the warranty under this Article 15 shall not apply if adjustment, repair or parts replacement is required as a result, directly or indirectly, of accident, unusual physical or electrical stress, negligence, misuse, failure of environmental control prescribed in operations and maintenance manuals, repair or alterations by any party other than Contractor, or by causes other than normal and ordinary use. The warranty provided pursuant to this Article 15 is conditioned upon Contractor being given access, if required, to Deliverable Items delivered at Purchaser's facility in order to effect any repair or replacement thereof. If the defect repaired or remedied by Contractor is not covered by the warranty provided pursuant to this Article 15, Purchaser shall pay Contractor the cost of such repair or replacement, transportation charges, and a reasonable profit as determined by Contractor. Such repair costs shall be invoiced to Purchaser pursuant to the provisions of Article 5.

15.4 Warranty for Training and Services

Contractor warrants that the training and other services it provides to Purchaser pursuant to this Contract will conform to reasonable industry standards at the time such training or other services are provided. In the event Contractor breaches this warranty, as Purchaser's sole remedy, Contractor shall apply all reasonable efforts to correct the deficiencies in the provision of such training and other services where it is practicable to do so.

## ARTICLE 16 — CHANGES

16.1 Change Procedure

The Purchaser may, from time to time during the period of performance, by written change order, make changes within the general scope of work, require additional work, or modify the whole or any part of the work provided for herein. If any such change causes an increase or decrease in the cost of, or the time required for, the performance of the work hereunder, an equitable adjustment shall be made in the price or delivery date, or both, and in other such provisions as may be affected, and the Contract shall be modified accordingly. Upon contractor's presentation of the claim, the Parties shall endeavor in good faith to negotiate an equitable adjustment to the Contract price and/or an amendment of the affected terms and conditions of the Contract.

16.2 Contractor's Obligation to Proceed

Notwithstanding the above, upon receipt of a change order from the Purchaser during Phase I or Phase II work, the Contractor shall promptly proceed with the changes as directed by the Purchaser. In the event that the Parties are unable to reach a negotiated settlement of the claim by the Contractor, then the issue shall be subject to Arbitration, pursuant to Article 25 - ARBITRATION. The Contractor shall not on its own initiative, suspend or stop work on the performance of this Contract for reasons of changes, disputes or arbitration proceedings. Contractor shall have no obligation to proceed pursuant to a change request during Phase III prior to execution of an amendment setting forth the revised terms of the Contract change.

## ARTICLE 17 — FORCE MAJEURE

Contractor shall not be responsible for late Delivery, delay of the final completion date or nonperformance of its contractual obligations due to Force Majeure. Force Majeure shall be any event beyond the reasonable control of Contractor or its suppliers and subcontractors and shall include, but not be limited to: (1) acts of God; (2) acts of a public enemy; (3) acts of a government in its sovereign or contractual capacity as long as Contractor has applied for, and diligently pursued, such governmental authority as may be required under Article 7; (4) war and warlike events; (5) catastrophic weather conditions such as hurricanes, tornadoes and typhoons; (6) fire, earthquakes, floods, epidemics, quarantine restrictions, strikes, lockouts and other industrial disputes, sabotage, riot and embargoes; (7) non-availability of a Launch Vehicle or Launch Site because of circumstances beyond Contractor's control; and (8) other unforeseen and extraordinary events, which in every case are beyond the reasonable control and without fault or negligence of Contractor or its suppliers and subcontractors ("Force Majeure"). For the purpose of this Article 17, delays in on-orbit Delivery of a Satellite due to launch delays caused by the Launch Agency, whether relating to any Satellite or any other satellite to be launched by the Launch Agency, or due to the failure of a Launch Vehicle (subject to Purchaser's exclusive remedies under Article 10) or any other launch vehicle of the Launch Agency, shall be deemed Force Majeure events. Upon the occurrence of Force Majeure, an equitable adjustment shall be negotiated in the schedule and other portions of this Contract affected by Force Majeure; provided that, there shall be no adjustment to the Firm Fixed Price due solely to Force Majeure. Contractor shall provide reasonable notice to Purchaser of a Force Majeure event.

## ARTICLE 18 — STOP WORK ORDER

18.1 Stop Work Order

The Purchaser may, at any time during the performance of each phase of work hereunder, direct the Contractor, in writing, to temporarily stop all or any portion of the work. Upon receipt of such an order, the Contractor will immediately stop work to the extent specified in the stop work order and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order. If the Purchaser exercises this right, the stop work order shall be for a maximum duration of twenty-six (26) weeks. At the conclusion of this period, the Purchaser must either (1) direct the Contractor to resume its work, or (2) terminate the Contract or the portion of work to which the stop work order applied, for convenience pursuant to Article 21, or (3) request the Contractor to accept a further delay in the work. Any such further delay shall be at the sole discretion of the Contractor, subject to the equitable adjustment provided for in this Article.

18.2 Order to Resume Work

The Purchaser shall have the right to direct the Contractor to resume the work at any time during the stop work period specified in Article 26.1 above, and the Contractor shall be entitled to an equitable adjustment in the price, time for delivery and other affected terms of the Contract.

18.3 Additional Expenses Incurred by the Contractor

It is recognized by the Parties that the Contractor may incur additional expenses due to the Stop Work Order. While it is incumbent on the Contractor to mitigate and minimize those costs to the extent practicable, the Contractor may submit a monthly claim for costs incurred during the period of the Stop Work Order.

18.4 Additional Start-Up Costs

In the event that the delay in the work is longer than thirteen (13) weeks, then the Contractor may also submit a claim for additional start-up costs, if any, associated with the resumption of work on the Satellites.

18.5 Delivery Schedules

In the event that the delay in work is less than eight (8) weeks, then delivery schedules will be adjusted on a week for week basis. In the event that the delay is longer than 8 weeks, then new delivery schedules will be negotiated between the Parties.

18.6 Order to Delay Launches

Purchaser recognizes that special costs and penalties may accrue to the Contractor in the event that a Stop Work Order directs or causes the delay or postponement or results in the cancellation of a contracted Launch Service. It is further recognized by the Parties that the extent of these costs will be determined in large part by proximity of a scheduled Launch to the date of the Stop Work Order. Any Stop Work Order which directs the delay or postponement or results in the cancellation of a Launch or Launches, will be the subject of specific negotiations of the Parties in good faith for an equitable adjustment in the price under Article 4.2, Phase III, of this Contract and shall not be considered as part of the equitable adjustment provided for under this Article 18.

GLP S
SS/L S

## ARTICLE 19 — PATENT INDEMNITY

19.1 Indemnification

Contractor, at its own expense, hereby agrees to defend or, at Contractor's sole option, to settle, and to indemnify and hold harmless Purchaser, and its officers and directors, from and against any claim or suit based on an allegation that the manufacture of any Deliverable Item or the normal intended use, lease or sale of any Deliverable Item infringes U.S. letters patent ("Intellectual Property Claim"), and shall pay any royalties and other liabilities adjudicated to be owing to the claimant (or, in Contractor's sole discretion, provided in settlement of the matter) as well as costs incurred in defending (including court costs and reasonable attorneys' fees) such Intellectual Property Claim; provided that Purchaser promptly notifies Contractor in writing of any such Intellectual Property Claim and gives Contractor the authority and all such assistance and information as may be requested from time to time by Contractor for the defense or settlement of such Intellectual Property Claim.

19.2 Infringing Equipment

If the manufacture of any Deliverable Item or the normal intended use, lease or sale of any Deliverable Item under this Contract is enjoined as a result of an Intellectual Property Claim or is otherwise prohibited, Contractor shall at its option and expense (i) resolve the matter so that the injunction or prohibition no longer pertains, (ii) procure for Purchaser the right to use the infringing item and/or (iii) modify the infringing item so that it becomes non-infringing while remaining in compliance with the Performance Specification (as may be modified or waived pursuant to Article 9.4). Purchaser shall reasonably cooperate with Contractor to mitigate or remove any infringement. If Contractor is unable to accomplish (i), (ii) or (iii) as stated above, Purchaser shall have the right to terminate this Contract with respect to such Deliverable Item, return such Deliverable Item to Contractor (in space, with respect to an in-orbit Satellite), and receive a refund of the price for such Deliverable Item (less amounts unpaid for such item plus a reasonable allowance for use and depreciation, as applicable).

19.3 Combinations and Modifications

Contractor shall have no liability under this Article 19 for any Intellectual Property Claim arising solely from (i) use of any Deliverable Item in combination with other items, unless such Deliverable item is specifically identified as forming the basis of such Claim, or was sold by Contractor as a combination intended to be so used or (ii) modifications of Deliverable Items after Delivery, unless Contractor made or authorized such modifications or (iii) the manufacture, delivery or use of any Deliverable Item in compliance with the design, specifications or instructions of Purchaser, to the extent such Intellectual Property Claim results from such design, specifications or instructions.

19.4 Sole Remedies

The remedies set forth in this Article 19 are Purchaser's sole and exclusive remedies for or related to any Intellectual Property Claim.

## ARTICLE 20 — INDEMNITY FOR BODILY INJURY AND PROPERTY DAMAGE

20.1 Contractor's Indemnity

Contractor shall defend, indemnify and hold harmless Purchaser and its directors, officers, employees, shareholders, agents, from and against any losses, damages, liabilities, suits and expenses (including reasonable attorneys' fees) (collectively, "Losses") attributable to third party claims for bodily injury or property damage, but only if such Losses were caused by, or resulted from, negligent acts or omission or willful misconduct of Contractor or its employees or representatives. Contractor shall have no indemnity obligations pursuant to this Article 20 for any Losses with respect to a Satellite after Intentional Ignition, regardless of cause or legal theory.

20.2 Purchaser's Indemnity

Purchaser shall defend, indemnify and hold harmless Contractor, and its directors, officers, employees, shareholders and agents, from and against any Losses attributable to third party claims for bodily injury or property damage, but only if such Losses were caused by, or resulted from, negligent acts or omission or willful misconduct of Purchaser or its employees or representatives.

20.3 Conditions to Indemnification

The right to any indemnity specified in Article 20.1 and Article 20.2 shall be subject to the following conditions:

a. The Party seeking indemnification shall promptly advise the other Party in writing of the filing of any suit or of any written or oral claim for indemnification upon receipt thereof and shall provide the other Party, at its request, with copies of all documentation relevant to such suit or claim.

b. The Party seeking indemnification shall not make any admission nor shall it reach a compromise or settlement without the prior written approval of the other Party, which approval shall not be unreasonably withheld or delayed.

c. The indemnifying Party shall assist and shall have the right to assume, when not contrary to the governing rules of procedure, the defense of any claim or suit in settlement thereof and shall satisfy any judgments rendered by a court of competent jurisdiction in such suits and shall make all settlement payments. The Party seeking indemnification may participate in any defense at its own expense, using counsel reasonably acceptable to the indemnifying Party, provided there is no conflict of interest and that such participation would not adversely affect the conduct of the proceedings.

20.4 General Liability Insurance

Each Party shall procure at its own expense and maintain in place comprehensive general liability insurance with such limits and on such terms and conditions with insurers of recognized reputation in order to provide for the payment of claims arising from the liabilities for which such Party has agreed to indemnify against under this Article 20. Each Party shall obtain a waiver of subrogation and release of any right of recovery against the other Party and its contractors and subcontractors at any tier (including suppliers of any kind) and the respective directors, officers, employees, shareholders and agents of each of the foregoing, that are involved in the performance of this Contract from any insurer providing coverage for the risks such Party has agreed to indemnify against under this Article 20. Each Party shall further procure at its own expense and maintain in place Worker's Compensation insurance for such Party's employees involved in the performance of this Contract.

## ARTICLE 21 — TERMINATION FOR CONVENIENCE

21.1 Termination Without Cause

Purchaser may terminate this Contract without cause, in whole or in part, by giving Contractor written notice [CONFIDENTIAL] days (during Phase I), or [CONFIDENTIAL] days (during Phase II or Phase III) prior to the date of such termination. In the event of such termination, Contractor will cease work as directed in the termination notice and use its best efforts to minimize the further incurrence of costs.

21.2 Allowable Termination Costs

In the event of termination pursuant to Article 21.1, Contractor shall be entitled to the following:

21.2.1 Termination during Phase I

a. Actual costs incurred by Contractor to the date of termination.

b. Actual costs incurred by Contractor in completing the termination process.

c. Actual cost incurred in settling claims of subcontractors, provided that any proposed subcontractor settlements in excess of [CONFIDENTIAL] dollars ($CONFIDENTIAL) shall be first submitted to and be approved in writing by the Purchaser.

d. A [CONFIDENTIAL] percent (CONFIDENTIAL %) fee on items (a), (b) and (c) above.

e. A termination penalty of [CONFIDENTIAL] dollars ($CONFIDENTIAL).

f. The funding limits set forth in Attachment 1 shall be the basis for calculating actual costs incurred (inclusive of fee) on a cumulative basis for the period indicated and are to reflect the maximum liability of the Purchaser in the event of Termination for Convenience, exclusive of the termination penalty set forth in item e. above for termination through EDC + [CONFIDENTIAL] months and inclusive of the termination penalty for termination after EDC + [CONFIDENTIAL] months.

g. Notwithstanding any other provision or Article in the Contract, Contractor shall refund any balance of the [CONFIDENTIAL] dollars ($CONFIDENTIAL) First Payment paid pursuant to Article 4.2 less the above allowable termination

GLP S
SS/L S

costs within [CONFIDENTIAL] business days from receipt of a termination notice under Phase I.

21.2.2 Termination during Phase II

a. Actual costs incurred by Contractor to the date of termination.

b. Actual costs incurred by Contractor in completing the termination process.

c. Actual cost incurred in settling claims of subcontractors, provided that any proposed subcontractor settlements in excess of [CONFIDENTIAL] Dollars ($CONFIDENTIAL) shall be first submitted to and be approved in writing by the Purchaser.

d. A [CONFIDENTIAL] percent (CONFIDENTIAL %) fee on items (a), (b) and (c) above.

e. The funding limits set forth in Attachment 2 shall be the basis for calculating actual costs incurred on a cumulative basis (inclusive of fee) for the period indicated and are to reflect the maximum liability of the Purchaser in the event of Termination for Convenience

21.2.3 Termination during Phase III

a. Milestone amounts associated with Items completed prior to the termination and Accepted before or after termination.

b. Actual costs incurred by Contractor in performance of work on terminated items not accepted under subparagraph (a) above.

c. Actual costs incurred by Contractor in completing the termination process.

d. Actual cost incurred in settling claims of subcontractors, provided that any proposed subcontractor settlements in excess of [CONFIDENTIAL] Dollars ($CONFIDENTIAL) shall be first submitted to, and be approved in writing by, the Purchaser.

e. A profit of [CONFIDENTIAL] percent (CONFIDENTIAL %) on items (b), (c) and (d) above.

21.3 Termination Claim

Contractor shall submit a termination claim to Purchaser within [CONFIDENTIAL] days (for Phase I) or [CONFIDENTIAL] days (for Phase II and Phase III) of the notification of termination by Purchaser. The Purchaser shall have the right to appoint an independent mutually acceptable auditing firm to audit said claim. A termination settlement meeting shall be held at a mutually agreed time and place no later than [CONFIDENTIAL] days after submission of a claim by Contractor. At or prior to the date of such termination settlement meeting, Contractor shall provide Purchaser with such documentation of the costs set forth in Articles 21.1 and 21.2 as Purchaser may reasonably request. Upon completion of the termination settlement meeting, Contractor may submit an invoice to Purchaser for payment in accordance with the terms of Article 5.2.

21.4 Long Lead Parts

In the event of termination during Phase I or Phase II, Purchaser shall not be responsible for reimbursing the cost of long lead items purchased for Phase III unless Purchaser has previously authorized Contractor to order such long lead parts.

21.5 Title Transfer

Upon payment by Purchaser to Contractor of the sums invoiced, subject to applicable U.S. Government export laws and license conditions, Contractor shall, at Contractor's or subcontractor's plant, transfer title and risk of loss to Purchaser of all Deliverable Items completed prior to such termination, and all other partially completed or incomplete Deliverable Items for which Contractor is paid under this Article 21. Purchaser may direct Contractor to undertake to reallocate to other uses items subject to termination under this Article 21 for the purpose of receiving a price refund or offset against Contractor's termination claim. Upon receipt of such direction, Contractor shall, on a reasonable efforts basis, attempt to reallocate the items and provide a refund to Purchaser or an offset against Contractor's termination claim, less any reasonable selling expenses.

## ARTICLE 22 — LIQUIDATED DAMAGES FOR LATE SATELLITE DELIVERY

If each of the Schedule Milestone does not occur on or before the date specified hereof other than as a result of (i) a Force Majeure event, (ii) any cause or causes solely or substantially attributable to Purchaser, or (iii) corrective actions being performed by or on behalf of Contractor pursuant to Article 9.8 or Article 15.2.2, then Contractor shall pay Purchaser liquidated damages.

GEO Launch #1 - 3 July 2006

GEO Launch #2 - 2 July 2007

GEO Launch #3 - 1 July 2008

GEO Launch #4 - 5 January 2009

LEO Launch #1 - 2 April 2007

Delivery of Final Operating LEO Constellation - 2 July 2009 (This date subject to a grace period of [CONFIDENTIAL] days.

The amount and period of Liquidated Damages shall be determined by the Parties upon confirmation of the FFP in accordance with Article 5.3.

Such damages shall be Purchaser's sole remedy and compensation for Contractor delays with respect to the Delivery of a Satellite during the time period set forth above.

GLP S
SS/L S

## ARTICLE 23 — DEFAULT

23.1 Failure to Perform by Contractor

Subject to Article 23.4 below, if Contractor (i) fails 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), or (ii) fails to perform any other material provision of this Contract, and in each case does not cure such failure, with respect to a Satellite on or before the last day specified for liquidated damages in Article 22 (or such longer time as may be agreed to in writing by Purchaser), or with respect to any other failure to perform a material provision of this Contract within [CONFIDENTIAL] days (or such longer period as may be agreed to in writing by Purchaser) after receipt from Purchaser of written notice of such failure, Purchaser may terminate this Contract in whole or in part by written notice to Contractor. Purchaser shall have no right or remedy with respect to a claim of breach or default by Contractor under or in connection with this Contract other than or in addition to the rights and remedies set forth in this Article 23.

23.2 Termination Liability

In the event of termination of Phase I and/or II pursuant to Article 23.1, Contractor shall be entitled to retain all monies paid and owed to it up to the time of termination, except that Contractor shall only be entitled to receive actual and reasonable costs for work-in-process and any Deliverable Item prior to Acceptance thereof. In the event of termination of Phase III pursuant to Article 23.1, Contractor shall refund all payments (not-to-exceed [CONFIDENTIAL] dollars ($CONFIDENTIAL) made by Purchaser for the terminated work except with respect to items referred to in Article 23.3. Such refund shall be made no later than [CONFIDENTIAL] days after Contractor's receipt of Purchaser's written notice requesting such refund. Such refund shall be Purchaser's sole remedy in case of a termination pursuant to Article 23.1.

23.3 Contractor's Reimbursement for Terminated Work

In the event of termination of Phase III pursuant to 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, 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 cost incurred by Contractor, plus a reasonable profit, for (a) such items for which no itemized price is set forth herein and (b) partially completed items or services and work-in-progress.

GLP S
SS/L S

23.4 Limited Purchaser's Remedies

Purchaser shall have no right to terminate this Contract pursuant to Article 23.1 above with respect to any Satellite: (i) after completion of PSR for such Satellite or (ii) with respect to which Contractor, with reasonable diligence, is undertaking corrective action pursuant to Article 9.8 or Article 15.2.2. If any Satellite fails to meet the applicable Delivery Schedule as a result of a Total Failure with respect to such Satellite after Intentional Ignition of the Launch Vehicle for the Satellite, Purchaser's sole remedy shall be as specified in Article 13.7. Purchaser's sole remedy with respect to delays in Delivery of such Satellite shall be as specified in Article 22 and this Article 23.

23.5 Invalid Default Termination

If, after termination pursuant to this Article 23.1, it is finally determined by arbitration pursuant to Article 25 that Contractor was not in default of its obligations under this Contract, the rights and obligations of the Parties shall be the same as if the termination had occurred under 21; provided, that Contractor shall be entitled to recover its additional direct damages that would not have been incurred but for such invalid default termination of this Contract (subject to the limitation of liability set forth in Article 30).

23.6 Contractor Termination

Contractor may terminate this Contract upon Purchaser's failure to comply with any material provision of this Contract by giving written notice to Purchaser of its intention to so terminate. Such notice shall set forth the provision or provisions with which Purchaser has failed to comply and a reasonably detailed description of such failure. Such termination shall become effective upon Purchaser's failure to correct such nonperformance within [CONFIDENTIAL] days after receipt of such notice from Contractor (or such longer period as may be agreed to in writing by Contractor).

In the event of termination pursuant to this Article 23.6, Contractor shall be paid as if such termination were for convenience pursuant to Article 21. Further, and without limiting Contractor's other rights or remedies, if Purchaser fails to pay Contractor invoiced amounts when due, Contractor shall be entitled to late payment interest pursuant to Article 5.3 and may elect immediately upon termination to take possession of all Delivered Items and Contract work-in-progress not paid by Purchaser and to use or dispose of the same in any manner. In such case, the fair market value of any Deliverable Items or Contract work-in-process retained by Contractor shall be set off against Purchaser's termination liability. If, after termination pursuant to this Article 23.6, it is finally determined by arbitration pursuant to Article 25 that Purchaser did not fail in the performance of its obligations under this Contract, 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 Articles 23.2 and Article 23.3, and subject to the limitation of liability set forth in Article 30).

## ARTICLE 24 — OPTIONS FOR ADDITIONAL SATELLITES, LONG LEAD ITEMS AND OTHER SERVICES

24.1 Long Lead Items (LLI) Option

The Purchaser may, at its option, order the Contractor to procure Long Lead Items for the purpose of expediting the Delivery and Acceptance of additional Optional Satellites that may be ordered pursuant to Article 24.2 hereof. Contractor shall propose the procurement and funding requirements for such LLI.

24.2 Order for Optional Satellites

The Purchaser may, at its option, order one (1) additional GEO Satellite and up to sixteen (16) additional LEO Satellites, identical in design to those procured under this Contract. Any exercise of this option shall be in writing within [CONFIDENTIAL] years from the start of Phase III work but no later than [CONFIDENTIAL] years from the EDC.

24.2.1 Price and Payment

The Firm Fixed Price for each additional Satellite ordered pursuant to 24.2 shall be the Firm Fixed Price provided in Article 4.2 increased by a percentage not to exceed the Producer Price Index for Finished Goods-Capital Equipment, calculated annually by the U.S. Bureau of Labor Statistics for the immediately preceding calendar year. Payment shall be made consistent with the Payment Plan and procedures under this Contract. The Parties shall negotiate an equitable adjustment in the Firm Fixed Price for use of LLI ordered under 24.1.

24.2.2 Delivery Schedule

For additional Optional Satellites ordered, the PSR shall be completed thirty (30) months following the exercise of this option for GEO Satellites and/or for LEO Satellites. If Purchaser directs Contractor to use the long lead effort to expedite the Acceptance of an Additional Satellite ordered pursuant to Article 24.1 hereof, the delivery schedule for the Additional Satellite to be delivered to the Launch Site shall be reduced by six (6) months.

24.3 Optional Ground Storage

The Purchaser may at its option request the Contractor to store unlaunched Satellites beyond the Contractor's contractual obligations under this Contract. In that event, Contractor may charge a reasonable per month storage price subject to acceptance by the Purchaser plus costs and a reasonable fee for Satellite refurbishment and or testing, as reasonably determined by Contractor to be necessary due to the storage.

24.3 Optional In-Orbit Satellite Performance Insurance

If requested by the Purchaser, the Contractor shall use reasonable efforts to quote and provide insurance for on-orbit Satellite performance during the Orbital Life or a portion of the Orbital Life of GEO Satellites to be Delivered under this Contract.

## ARTICLE 25 — ARBITRATION

Any dispute arising between the Parties with respect to the performance of obligations or interpretation of this Contract that cannot be settled by negotiation between the Parties within [CONFIDENTIAL] days of written notice from one Party to the other stating such first Party's intent to resort to arbitration ("Notice of Arbitration"), shall be submitted for settlement by arbitration in accordance with the rules of conciliation and arbitration of the American Arbitration Association. Any such arbitration shall be conducted in Northern California by a panel of three (3) arbitrators who shall be selected within [CONFIDENTIAL] days of such Notice of Arbitration: one selected by each Party and the third selected by the arbitrators chosen by the Parties. In resolving any dispute, the arbitrators shall apply the laws of the State of New York without reference to its conflicts of laws rules and shall take into account usage, customs and practices in the performance of contracts for the purchase and sale of commercial communications satellites. Proceedings and documents provided and generated in connection with any arbitration hereunder shall be in the English language. Each Party shall bear its own expenses (including the expenses of the arbitrator it selected) and one-half of the expenses of the third arbitrator, unless otherwise determined in the arbitral award. The arbitrators' decision shall be final and binding on the Parties and enforceable in any court of competent jurisdiction. Any monetary award made by the arbitrators shall be subject to the limitation of liability set forth in Article 30.

## ARTICLE 26 — INTER-PARTY WAIVER OF LIABILITY FOR A LAUNCH

Purchaser hereby agrees to be bound by the no-fault, no-subrogation inter-party waiver of liability and related indemnity provisions provided in the Launch Services Agreement with respect to each Launch and to cause its suppliers and subcontractors at any tier that are involved in the performance of this Contract and any other person having an interest in the Satellite or any Transponder thereon (including customers of Purchaser) ("Purchaser Parties") to accede to such waiver and indemnity, which in every case shall include claims against the Launch Agency, Contractor, and the contractors and subcontractors of each of them that are involved in the performance of this Contract. Purchaser shall execute and deliver any instrument that may be required by the Launch Agency to evidence its agreement to be bound by such waiver and indemnity. Purchaser shall also cause its insurers and insurers of Purchaser Parties to waive rights of subrogation with respect to claims that are waived pursuant to this Article 26. Purchaser shall indemnify against and hold Contractor harmless from any claim that Purchaser is required to waive or cause to be waived pursuant to this Article 26. The obligations set forth herein shall survive termination or expiration of this Contract.

## ARTICLE 27 — RIGHTS IN INVENTION

27.1 Definitions

"Subject Invention" means any invention, discovery, improvement or innovation of more than a trifling or routine nature, whether or not patentable, conceived or first actually reduced to practice in the performance of work under this Contract.

"Background Invention" means any invention, discovery, improvement or innovation, other than a Subject Invention, whether or not patentable, which invention is directly incorporated or utilized in any work performed under this Contract.

27.2 Subject Inventions

Contractor shall have title to Subject Inventions. Contractor agrees to and does hereby grant to Purchaser an irrevocable, royalty-free, nonexclusive license, with right of sublicense, to practice and have practiced Subject Inventions in connection with the Globalstar System; provided that, Purchaser shall not sublicense to competitors of Contractor.

27.3 Background Inventions

The Contractor agrees to grant to Purchaser, an irrevocable, royalty-free, nonexclusive license, with right of sublicense to third parties who are not competitors of the Contractor, to practice and have practiced throughout the world any Background Invention to the extent that such practice is reasonably necessary to enable the Purchaser to maintain and operate the Globalstar System.

27.4 Invention Disclosures

The Contractor shall furnish to the Purchaser a written disclosure of each Subject Invention promptly, and in no event more than six (6) months, after its conception or first actual reduction to practice, sufficiently complete in technical detail to convey to one skilled in the art to which the Subject Invention pertains a clear understanding of the nature, purpose, operation, and, to the extent known, the physical, chemical or electrical characteristics of the Invention.

27.5 Filing of Patent Applications

Except as otherwise provided in this Article 27, the Contractor shall have the exclusive right, worldwide, to file patent applications on Subject Inventions. The

GLP S
SS/L S

Contractor shall, within six (6) months after the Contractor's disclosure of a Subject Invention or such longer period as it may elect, file or cause to be filed a patent application in due form. All patent applications filed by the Contractor shall be at the Contractor's sole expense. The Contractor shall promptly notify the Purchaser of the filing of each patent application and the issuance of each and every patent on a Subject Invention. Should the Contractor elect not to file for patent protection of any Subject Invention, title to such Subject Invention shall revert to the Purchaser at the Purchaser's request provided (1) the Purchaser agrees to file for patent protection of the Subject Invention, (2) the Purchaser shall grant to the Contractor a paid-up, worldwide, non-exclusive, irrevocable license, with right of sublicense, under such Subject Invention.

27.6 Subcontracts

The Contractor shall use reasonable efforts to include the substance of this clause, granting rights directly to the Purchaser as provided above, in all subcontracts in excess of [CONFIDENTIAL] Dollars ($CONFIDENTIAL) hereunder that involve research and development effort.

## ARTICLE 28 — SECURITY INTEREST

The Parties shall mutually negotiate at confirmation of the FFP in accordance with Article 5.3 for the application of a security interest, if any, to cover items to be delivered, or any component of such items to be delivered under the Contract for which payments have been made for a security interest to be release only at the time when the applicable item is delivered to and accepted by Purchaser.

## ARTICLE 29 — LIMITATION OF FUNDS

During Phase I and Phase II of the Contract, the payment of invoices submitted by the Contractor for work performed shall be limited to the funds specified in Attachment 1 for Phase I and Attachment 2 for Phase II on a cumulative basis for the periods indicated. The funding limits set forth in these Attachments shall be used as reference to cover the maximum liability of the Purchaser in the event of Termination for convenience.

## ARTICLE 30 — LIMITATION OF LIABILITY

Limitation of Liability

NEITHER PARTY SHALL BE LIABLE DIRECTLY OR INDIRECTLY TO THE OTHER, TO THEIR OFFICERS, DIRECTORS, EMPLOYEES, CONTRACTORS OR SUBCONTRACTORS AT ANY TIER (INCLUDING SUPPLIERS OF ANY KIND), AGENTS OR CUSTOMERS, TO ITS PERMITTED ASSIGNEES OR SUCCESSOR OWNERS OF ANY SATELLITE OR OTHER DELIVERABLE ITEM OR TO ANY OTHER PERSON CLAIMING BY OR THROUGH PURCHASER FOR ANY AMOUNTS REPRESENTING LOSS OF PROFITS, LOSS OF BUSINESS, OR INDIRECT, SPECIAL, INCIDENTAL, EXEMPLARY, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING WITHOUT LIMITATION COSTS OF EFFECTING COVER, LOST PROFITS, LOST REVENUES OR COSTS OF RECOVERING A SATELLITE, ARISING FROM OR RELATING TO THE PERFORMANCE OR NONPERFORMANCE OF THIS CONTRACT OR ANY ACTS OR OMISSIONS ASSOCIATED THEREWITH OR RELATED TO THE USE OF ANY ITEMS DELIVERED OR SERVICES FURNISHED HEREUNDER, WHETHER THE BASIS OF SUCH LIABILITY IS BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE OF ANY TYPE AND STRICT LIABILITY), STATUTE OR OTHER LEGAL OR EQUITABLE THEORY. PURCHASER SHALL INDEMNIFY CONTRACTOR AND HOLD CONTRACTOR HARMLESS FOR AND AGAINST ANY CLAIM ASSERTED DIRECTLY OR INDIRECTLY AGAINST CONTRACTOR THAT IS WITHIN THE SCOPE OF THE FOREGOING LIMITATION OF LIABILITY AND DISCLAIMER. IN NO EVENT SHALL CONTRACTOR'S TOTAL LIABILITY UNDER OR IN CONNECTION WITH THIS CONTRACT EXCEED AMOUNTS PAID TO CONTRACTOR HEREUNDER OR [CONFIDENTIAL]), WHICHEVER IS LOWER. THIS ARTICLE 30 SHALL SURVIVE THE EXPIRATION OR TERMINATION OF THIS CONTRACT FOR WHATEVER CAUSE.

## ARTICLE 31 — DISCLOSURE AND HANDLING OF PROPRIETARY INFORMATION

31.1 Definition of Proprietary Information

For the purpose of this Contract, "Proprietary Information" means all information (other than Deliverable Data, which is subject to the provisions of Article 32), in whatever form transmitted, that is disclosed by a Party (the "disclosing party") to the other Party (the "receiving party") relating to the performance by the disclosing party of this Contract and: (i) is identified as proprietary by means of a written legend thereon, or (ii) if disclosed orally, is identified as proprietary at the time of initial disclosure and then summarized in a written document, with the Proprietary Information specifically identified, that is supplied to the receiving party within [CONFIDENTIAL] days of initial disclosure. Proprietary Information shall not include any information disclosed by a Party that (i) is already known to the receiving party at the time of its disclosure, as evidenced by written records of the receiving party, without an obligation of confidentiality at the time of disclosure; (ii) is or becomes publicly known through no wrongful act of the receiving party; or (iii) is independently developed by the receiving party as evidenced by written records of the receiving party.

31.2 Terms for Handling and Use of Proprietary Information

For a period of ten (10) years after receipt of any Proprietary Information (or until such time as such Proprietary Information becomes publicly known as provided in Article 31.1), the receiving party shall not disclose Proprietary Information that it obtains from the disclosing party to any person or entity except its employees and agents who have a need to know, who have been informed of and have agreed to abide by the receiving party's obligations under this Article 31, and who are authorized pursuant to applicable U.S. export control laws and licenses or other approvals to receive such information. The receiving party shall use not less than the same degree of care to avoid disclosure of such Proprietary Information as it uses for its own Proprietary Information of like importance, but in no event less than a reasonable degree of care. Proprietary Information shall be used only for the purpose of performing the obligations under this Contract, or as the disclosing party otherwise authorizes in writing.

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. 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. DEPARTMENT OF STATE.

31.3 Disclaimer of Representations and Warranties

Each Party makes no representation or warranty regarding the accuracy or completeness of, or absence of defects in, the Proprietary Information disclosed hereunder, or with respect to infringement of any rights, including intellectual property rights of others, arising from its disclosure of Proprietary Information hereunder. Neither Party shall not be liable for damages of whatever kind as a result of the other Party's reliance on or use of the Proprietary Information provided under this Article 31.

31.4 Legally Required Disclosures

31.4.1 Generally. Notwithstanding anything else in this Article 31, in the event that the receiving party becomes legally compelled to disclose Proprietary Information of the disclosing party, including this Contract or other supporting document(s), the receiving party shall, to the extent practicable under the circumstances, provide the disclosing party with written notice thereof so that the disclosing party may seek a protective order or other appropriate remedy, or to allow the disclosing party to redact such portions of the Proprietary Information as the disclosing party deems appropriate. In any such event, the receiving party will disclose only such information as is legally required, and will cooperate with the disclosing party (at the disclosing party's expense) to obtain proprietary treatment for any Proprietary Information being disclosed.

31.4.2 Exceptions. Purchaser may provide the Contract to the Federal Communications Commission (FCC), U.S. Bankruptcy Court (State of Delaware) and /or the official Committee of Creditors without obtaining Contractor's prior written approval, provided that, in each case, the Contract is subject to a protective order and is "under seal" to preclude further disclosure.

## ARTICLE 32 — RIGHTS IN DATA

32.1 Definitions

"Technical Data" means recorded information, regardless of form or the media on which it may be recorded, of a scientific or technical nature. The term includes computer software. The term does not include information incidental to contract administration, such as financial or management information.

"Foreground Data" means Technical Data which is first produced and paid for under the Contract and which is identified in the Statement of Work as a Deliverable Item under the Contract.

"Background Data" means Technical Data, other than Foreground Data, which is directly used or applied in the performance of this Contract, and with respect to which the Contractor now has or may hereafter acquire the right to authorize use by others in the manner specified by this Article.

32.2 Rights in Foreground Data

Contractor shall have all right, title and interest in and to all Foreground Data. Contractor hereby grants to Purchaser an irrevocable, royalty-free, nonexclusive license, with right of sublicense, to use and have used Foreground Data throughout the world in connection with the Globalstar System; provided that, Purchaser shall not sublicense to competitors of Contractor.

32.3 Rights in Background Data

Contractor hereby grants to Purchaser an irrevocable, royalty-free, nonexclusive license, with right of sublicense, to use and have used Background Data for purposes of (i) use by other contractors participating in the Globalstar System as necessary for performance under such other contracts, (ii) operating and maintaining the Globalstar System, or (iii) such uses as are necessary to the use of Foreground Data or any Subject Invention for the sole purpose of operating and maintaining the Globalstar System. Purchaser shall not disclose Background Data to any third party for any other purpose without Contractor's prior written consent.

## ARTICLE 33 - PUBLIC RELEASE OF INFORMATION

Either Party intending to disclose publicly, whether through the issuance of news releases, articles, brochures, advertisements, prepared speeches or other information releases concerning this Contract or the transactions contemplated herein shall obtain the prior written approval of the other Party with respect to the content and timing of such issuance, which approval shall not be unreasonably delayed or denied.

## ARTICLE 34 — NOTICES

34.1 Written Notification

Each notice or correspondence required or permitted to be given or made hereunder shall be in writing (except where oral notice is specifically authorized) to the respective addresses, facsimile and telephone numbers and to the attention of the individuals set forth below, and any such notice shall be deemed given on the earlier to occur of (i) actual receipt, irrespective of whether sent by post, facsimile transmission (followed by mailing of the original copy), overnight courier or other method, and (ii) [CONFIDENTIAL] days after mailing by registered or certified mail, return receipt requested, postage prepaid.

In the case of Purchaser:

Globalstar L.P.
3200 Zanker Road
San Jose, California 95134
Attn: Kelly Rose
Telephone No.: (408) 933-4552
Facsimile No.: (408) 933-4943

In the case of Contractor:

Space Systems / Loral
3825 Fabian Way
Palo Alto, California 94303
Attn.: Nick Pound
Telephone No.: (650) 852-6606
Facsimile No.: (650) 852-4631

34.2 Change of Address

Either Party may from time to time change its notice address or the persons to be notified by giving the other Party written notice (as provided above) of such new information and the date upon which such change shall become effective.

GLP S
SS/L S

## ARTICLE 35 — RISK MANAGEMENT SERVICES

35.1 Notwithstanding the fact that risk of loss to the Satellites passes at Intentional Ignition, the Parties agree that the Contractor will use reasonable efforts to procure Launch risk insurance to cover the full replacement costs for Four (4) GEO Satellites and Fifty-Six (56) LEO Satellites and Launch Vehicles from Intentional Ignition through deployment from the dispenser mechanism and initial ground station telemetry beacon receipt to verify signal acquisition and telemetry processing for initial confirmation of Satellite bus health. The Contractor shall invoice the Purchaser for the cost of such insurance, plus a fee of [CONFIDENTIAL] percent (CONFIDENTIAL %). Any proceeds the Contractor realizes from claims against the insurance coverage shall be paid to the Purchaser not later than [CONFIDENTIAL] business days following receipt of such proceeds from the insurance carrier. In no event will Contractor be liable for non-payment by insurers or for any deductible or other offset required by the insurers. In the event there is a Launch Vehicle failure for which the Contractor has obtained relaunch insurance from the Launch Agency, the Contractor will advise the Purchaser immediately of the condition and afford the Purchaser the opportunity to direct the Contractor to utilize the replacement Launch Services for a designated launch load. Purchaser agrees to provide the Contractor with reasonable notice of the intended relaunch. The cost of relaunch insurance (if available) shall be included in amounts invoiced to Purchaser.

35.2 Contractor shall use reasonable efforts to cause the Launch Agency to name, as additional insured under any third party liability insurance procured by the Launch Agency under the Launch Services Agreement for the Launch of any Satellite, Purchaser and any other person identified by Purchaser in writing to Contractor no later than days before such Launch.

35.3 All Launch Service Agreements, Launch risk insurance Contracts and/or related agreements for Risk Management Services shall be furnished to Purchaser with reasonable time for Purchaser review and approval prior to execution, which approval shall not be unreasonably denied or delayed. Purchaser may, at its own expense, participate in meetings between Contractor and Launch Services and/or insurance providers. In addition to proceeds the Contractor realizes from insurance claims in 35.1, all other claims, proceeds, refunds or recoveries related to Launch Services and Launch Service Agreements shall be paid to the Purchaser not later than [CONFIDENTIAL] business days following receipt of such payment.

## ARTICLE 36 — ORDER OF PRECEDENCE

In the event of conflict among the terms of the Preamble and Articles 1 to 38 of this Contract and the Exhibits, the following order of decreasing precedence shall apply:

- This Contract (Preamble and Articles 1 through 38)
- Exhibit A Statement of Work
- Exhibit B Satellite Performance Specifications
- Exhibit C Satellite Program Test Plans
- Exhibit D Product Assurance Plan

## ARTICLE 37 — GENERAL

37.1 Binding Effect; Assignment

This Contract shall be binding upon and inure to the benefit of the Parties and their respective successors and permitted assigns. This Contract may not be assigned, either in whole or in part, by either Party without the express written approval of the other Party. Such approval shall not be unreasonably withheld or delayed. Notwithstanding the foregoing, either Party may by written notice to the other Party, assign this Contract in whole or in part to its wholly-owned subsidiary or, in the case of Purchaser, to any successor entity that is formed in furtherance of its financial restructuring and its discharge from Chapter 11 by the U.S. bankruptcy court for the District of Delaware.] Either Party, upon prior written notice to the other Party, may grant security interests in its rights to lenders that provide financing for the performance by such Party of its obligations under this Contract, and such security interests shall not be deemed and assignment. In the event that either Party is sold to or merged into another entity, the other Party's approval of the assignment of this Contract in connection therewith shall not alter the assigning Party's obligations, and the successor organization shall be liable for performance of such Party's obligations under this Contract.

37.2 Severability

If any provision of this Contract is declared or found to be illegal, unenforceable or void, the Parties shall negotiate in good faith to agree upon a substitute provision that is legal and enforceable and is as nearly as possible consistent with the intentions underlying the original provision. If the remainder of this Contract is not materially affected by such declaration or finding and is capable of substantial performance, then the remainder shall be enforced to the extent permitted by law.

37.3 Captions

The captions contained herein are for purposes of convenience only and shall not affect the construction of this Contract.

37.4 Relationships of the Parties

It is expressly understood that Contractor and Purchaser intend by this Contract to establish the relationship of independent contractors only, and do not intend to undertake the relationship of principal and agent or to create a joint venture or partnership or any other relationship, other than that of independent contractors, between them or their respective successors in interests. Neither Contractor nor Purchaser shall have any authority to create or assume, in the name or on behalf of the other Party, any obligation, expressed or implied, or to act or purport to act as the agent or the legally empowered representative of the other Party, for any purpose whatsoever.

37.5 Entire Agreement

This Contract, including all Exhibits and the Attachments hereto, represents the entire understanding and agreement between the Parties hereto with respect to the subject matter hereof, and supersedes all prior negotiations and agreements with respect to the subject matter hereof.

37.6 Standard of Conduct

Both Parties agree that all their actions in carrying out the provisions of this Contract shall be in compliance with applicable laws and regulations and neither Party will pay or accept bribes, kickbacks or other illegal payments, or engage in other unlawful conduct.

37.7 Counterparts

This Contract may be signed in any number of counterparts with the same effect as if the signature(s) on each counterpart were upon the same instrument.

37.8 Applicable Law

This Contract shall be interpreted, construed and governed, and the rights of the Parties shall be determined, in all respects, according to the laws of the State of New York without reference to its conflicts of law rules.

37.9 Survival

Termination or expiration of this Contract for any reason shall not release either Party from any liabilities or obligations set forth in this Contract that (i) the Parties have expressly agreed shall survive any such termination or expiration or (ii) remain to be performed or by their nature would be intended to be applicable following any such termination or expiration.

GLP S
SS/L S

37.10 U.N. Convention on the International Sales of Goods

The U.N. Convention on the International Sales of Goods shall not apply or otherwise have any legal effect with respect to this Contract.

GLP S
SS/L S

## ARTICLE 38 — ATTACHMENTS

The following Attachments are incorporated in this Contract:

Attachment 1- Phase I Funding Plan and Limitation

Attachment 2- Phase II Funding Plan and Limitation

Attachment 3 - Phase III Payment Plan

- Attachment 3A-1 - GEO Time Payments
- Attachment 3A-2 - LEO Time Payments
- Attachment 3B-1 - GEO Milestone Payments
- Attachment 3B-2 - LEO Milestone Payments
- Attachment 3C-1 - GEO Orbital Incentive Payments
- Attachment 3C-2 - LEO Orbital Incentive Payments
- Attachment 4D-1 - GEO Launch Services and Risk Management
- Attachment 4D-2 - LEO Launch Services and Risk Management

Attachment 4 - Criteria for Qualified Acceptance of a Satellite

IN WITNESS THEREOF, the Parties have executed this Contract by their duly authorized officers as of the date set forth in the Preamble.

| **Globalstar L.P.** | **Space Systems/Loral, Inc.** |
|---|---|
| By: _____S_____ | By: _____S_____ |
| Name: _____ | Name: _____ |
| Title: _____ | Title: _____ |

GLP S
SS/L S

Contract GS-C-02-0612

## ATTACHMENT 1

### Phase I Funding Plan and Limitation

The following funding limitation for the period indicated is on a cumulative basis inclusive of the Base Fee:

| | |
|---|---|
| **EDC + 1 Month** | $[CONFIDENTIAL] |
| **EDC + 2 Months** | $[CONFIDENTIAL] |
| **EDC + 3 Months** | $[CONFIDENTIAL] |
| **EDC + 4 Months** | $[CONFIDENTIAL] |
| **EDC + 5 Months** | $[CONFIDENTIAL] |
| **EDC + 6 Months** | $[CONFIDENTIAL] |
| **EDC + 9 Months** | $[CONFIDENTIAL] |
| **EDC + 12 Months** | $[CONFIDENTIAL] |

GLP S
SS/L S

Contract GS-C-02-0612

# ATTACHMENT 2

## Phase II Funding Plan and Limitation

[To be determined by the Parties at the conclusion of Critical Design Review]

GLP S
SS/L S

Contract GS-C-02-0612

# ATTACHMENT 3

## Phase III Payment Plans

## (to include Time Payments, Milestone Payments, Orbital Incentive payments and Launch Services and Risk Management Payments)

[To be determined by the Parties upon confirmation of the FFP in accordance with Article 5.3]

GLP S
SS/L S

Contract GS-C-02-0612

# ATTACHMENT 4

## Criteria for Qualified Acceptance of a Satellite

[To be determined by the Parties upon confirmation of the FFP in accordance with Article 5.]

GLP S
SS/L S

# EXHIBIT A-1

## GLOBALSTAR GS-2 Contract

## GS-02-0798

# GEO SPACE SEGMENT

# STATEMENT OF WORK

## July 17, 2002

# CONTENTS

# ACRONYM LIST

| | |
|---|---|
| AI | Action Item |
| AIT | Assembly, Integration and Test |
| AOCS | Attitude and Orbit Control Subsystem |
| CDR | Critical Design Review |
| CDRL | Contract Data Requirements List |
| CI | Configuration Item |
| CPTB | [Satellite] Communications Payload Test Bed |
| CS | Contract Service |
| CSTB | [Satellite] Control Subsystem Test Bed |
| DVR | Design Verification Report |
| EAGE | Electrical Assembly Ground Equipment |
| EDC | Effective Date of Contract |
| FDR | Final Design Review |
| FM | Flight Model |
| FMECA | Failure Modes and Effects Criticality Analysis |
| FOCR | Final Operational Constellation Review |
| FSW | Flight Software |
| GEO | Geostationary Orbit |
| IAW | In Accordance With |
| ICD | Interface Control Document |
| IDL | Interface Design Layout |
| IOTE | In-orbit Test Equipment |
| ISCN | Interim Specification Change Notices |
| LCF | Launch Control Facility (within SOCC) |
| LRR | Launch Readiness Review |
| MAGE | Mechanical Assembly Ground Equipment |

| | |
|---|---|
| O&M | Operations and Maintenance |
| PAP | Product Assurance Plan |
| PQM | [Satellite Communications] Payload Qualification Model |
| PSR | Pre-Shipment Review |
| PTP | Program Test Plan |
| QTRR | Qualification Test Results Review |
| RMR | Request for Material |
| RR&DCR | Requirements Review and Design Concept Review |
| SCN | Specification Change Notices |
| SCOH | Satellite and Constellation Operation Handbook |
| SDS | Satellite Dynamic Simulator |
| SOCC | Satellite Operations Control Center |
| SOW | Statement of Work |
| SQM | Satellite Qualification Model |
| SSTM | Satellite Structural Test Model |
| T&C | Telemetry and Control |
| TFR | Trouble Failure Report |
| TT&C | Telemetry, Tracking and Control |
| WBS | Work Breakdown Structure |

# 1.0 — BASIC PROGRAM CONTENT

This Statement of Work (SOW) defines all hardware, services, data, and documentation to be furnished by "Contractor" to Globalstar Limited Partnership, (hereinafter referred to as the "Purchaser") for the GEO Space Segment satellites and associated services procured for the Globalstar 2 GHz System (hereinafter referred to as "the GEO Segment"). The GEO Segment is comprised of four (4) satellites.

## 1.0.1 DOCUMENT ORGANIZATION

This document is comprised of six sections and four annexes, defined as follows:

1. **Section 1** – Overall Program work content and applicable contract documents
2. **Section 2** – Phase I, non-recurring Requirements and Design Concept work content
3. **Section 3** – Phase II, non-recurring Development work content
4. **Section 4** – Phase III, recurring Production and Deployment work content
5. **Section 5** – Deliverable Documentation and Deliverable Services work content
6. **Section 6** – Purchaser Furnished Items
7. **Annex A** – Hardware and Software to be delivered to the Purchaser
8. **Annex B** – Documentation to be delivered to the Purchaser
9. **Annex C** – Services to be delivered to the Purchaser
10. **Annex D** – Program Schedule

## 1.0.2 DELIVERABLE ITEM DESIGNATION

This SOW includes designations to identify specific deliverable products. These designations are paragraph unique parenthetical suffixes as follows: Hardware (CI #x.x.x), Services (CS #x.x.x) and Data and Documentation (CDRL #x.x.x). "CI" is a Configuration Item (i.e. hardware), "CS" is a Contract Service and "CDRL" is a Contract Data Requirements List.

## 1.1 WORK CONTENT

Work to be performed by the Contractor in support of this SOW will be defined under three distinct Phases:

1. Phase I for the non-recurring GEO Space Segment Requirements and Design Concept effort
2. Phase II for the non-recurring Development activity

3. Phase III for the recurring Production to supply the GEO Segment hardware and the Launch of the GEO Satellites.

## 1.2 PHASE I – GENERAL DESCRIPTION

This non-recurring, definition phase commences with Contract start and concludes with the GEO Segment Critical Design Review (CDR). In this phase, in order to validate the architectural approach, confirm design requirements, and define the approach for validating the GEO Segment performance, the Contractor shall perform the following effort focused in two areas as shown:

### Program Planning

1. Develop Cost Data for the non-recurring development and the recurring price of production satellites
2. Develop Program Master Schedule for development, production and deployment of the GEO Space Segment
3. Develop initial Program Management Plan
4. Develop preliminary Spacecraft Launch Base Authorizing Document
5. Develop preliminary Mission Profile Description

### Satellite Design and Verification Requirements

1. Conduct key cost/performance trades to satisfy Purchaser's GEO Segment architectural requirements
2. Confirm Satellite Performance Specification (Contract Exhibit B)
3. Develop Preliminary Interface Requirements
4. Demonstrate a viable, integrated technical solution to Purchaser GEO Segment requirements
5. Demonstrate viability or develop plans for validating critical, non-heritage, subsystem designs and technologies
6. Update Satellite Program Test Plan (PTP, Contract Exhibit C)
7. Develop Preliminary GEO Segment Interface Test Requirements (IAW PTP and Section 5.1.10)
8. Develop Preliminary Test Bed Design Requirements (IAW PTP and Sections 3.2.6 and 3.2.7)

9. Develop Preliminary In-Orbit Test Equipment Design Requirements (IAW PTP and Section 4.2.1.4)

The Phase I effort will include the combined GEO Segment Requirements Review and Design Concept Review (RR&DCR) (IAW Section 2.1) at Effective Date of Contract (EDC) + 6 months. Phase I will conclude with the GEO Segment Critical Design Review (CDR) (IAW Section 2.2) at EDC + 12 months. These reviews shall encompass the entire GEO Segment including the GEO satellites and respective interfaces.

## 1.3 PHASE II – GENERAL DESCRIPTION

This non-recurring, development phase commences with closure of the Phase I CDR and concludes with the GEO Segment Final Design Review (FDR). In this phase, the Contractor shall produce governing specifications (segment, satellite and subsystem), plans, and interface documents which will be used to control the detailed design and validate the manufacturing and testing of the GEO Segment. Breadboard and/or engineering models of components and/or subsystems will be completed during this phase. Development of major ground test articles, critical test beds and simulation tools will be initiated and potentially completed during this phase. Satellite qualification/protoflight testing should initiate during this phase. If the satellite qualification/protoflight testing is not completed at the time of the FDR, a separate Satellite Qualification/Protoflight Test Results Review shall be required. In this Phase of the Contract, the Contractor will develop plans necessary to successfully manage both the Phase II and Phase III segments of the program.

Following completion of the CDR, the Contractor shall flow down the Satellite requirements to develop a technical design solution including the following activities:

### Program Planning and Management

1. Update Cost Data (non-recurring development and recurring production)
2. Update Program Master Schedule including major subsystem procurements
3. Update Spacecraft Launch Base Authorizing Document
4. Update Mission Profile Description

### Satellite Design and Verification Requirements

1. Complete detailed design and analysis tasks
2. Integrate Product Assurance Requirements into hardware design
3. Confirm Satellite Program Test Plan (PTP)

4. Complete test planning (including In-Orbit testing)
5. Complete Engineering models/breadboards
6. Initiate and potentially complete production of Satellite Structural Test Model (SSTM)
7. Initiate and potentially complete Satellite Structural Test Model Testing
8. Reserved [For reference only – Contractor's bid price does not include this activity: Initiate and potentially complete production of Satellite Qualification Model (SQM)]
9. Initiate and potentially complete Satellite Qualification/Protoflight Testing

### Production Readiness

1. Define Manufacturing Requirements and Plans
2. Verify Assembly, Integration and Test (AIT) readiness (facility, process and Data Management System)
3. Complete tooling
4. Complete MAGE/EAGE design/procurement and test
5. Complete final procurement

### Intersegment (GEO Space Segment-Ground Segment and GEO Space Segment–Launch Segment) Interface Definition and Verification

1. Update Space-Ground and Spacecraft-Launch Vehicle Interface Control Documents
2. Participate in Space-Ground Interface Verification Development Tests, including:
   a. Satellite to Purchaser-provided Ground Control Network Telemetry and Command Interface Unit
   b. Space-Ground Communications Interface to Purchaser-provided Ground Network User Terminals and Gateways
   c. Data Generator simulator script for Satellite Operations Control Center (SOCC) interface testing

During this phase the Contractor shall design and initiate and potentially complete manufacture, integration, and validation of the following test and simulation tools. These tools shall be completed consistent with completion of satellite qualification and no later than Launch – 6 months:

1. Satellite Communications Payload Test Bed (IAW Section 3.2.6)

2. Satellite Control Subsystem Test Bed (Digital and Controls/Attitude and Orbit Control Subsystem [AOCS]/Flight Software) (IAW Section 3.2.7)

During this phase the Contractor shall initiate design and manufacture of the following launch and mission operations support tools. These tools shall have completed integration and validation no later than Launch –12 months:

1. Satellite Dynamic Simulator (SDS) (IAW Section 3.2.8)
2. In-Orbit Test Equipment (IOTE) (IAW Section 4.2.1.4)

The Subsystem Test Beds shall be located in the Contractor's facility. The test beds will remain located in the Contractor's facility, fully operational, and accessible to both Contractor- and Purchaser-designated personnel for the contractual life of the GEO Segment.

The Satellite Dynamic Simulator for the GEO satellite shall be installed in the Purchaser's Satellite Operations Control Center (SOCC) in support of the first GEO launch and be delivered to the Purchaser at the completion of the first GEO launch.

The Phase II effort concludes with the Final Design Review (FDR) (IAW Section 3.1) to be held no later than EDC + 30 months. If the satellite qualification/protoflight testing is not completed at the time of the FDR, a separate Satellite Qualification/Protoflight Test Results Review (IAW Section 3.1.1) shall be held no later than 6 months following the FDR or EDC + 36 months.

Subject to the terms of Phase II of the Contract, initial procurement in preparation for the Phase III manufacturing effort may be initiated during Phase II.

## 1.4 PHASE III – GENERAL DESCRIPTION

The Contractor shall manufacture, integrate, and test the required number of Satellites, deliver the Satellites to the Launch site, and provide Launch Services (including Satellite Dispensers, Launch Vehicles, Launch Base Operations, and Launch Insurance) and Mission Operations Support Services from launch through in-orbit test.

For the Four (4) GEO Satellites, the Purchaser will provide the Satellite Operations Control Center (SOCC) and TT&C Ground Control Network for the in-orbit test and operation of the satellites in their specified final orbital positions. With the exception of the Purchaser's obligations specifically defined in Section 6.0, the Contractor shall be responsible for providing the necessary ground support equipment and services to support launch and orbit raising to the specified geostationary slots. Following completion of the first GEO satellite launch, the Contractor will deliver the GEO satellite In-orbit Test Equipment (IOTE) to the Purchaser at the Purchaser's defined locations. The Purchaser shall be responsible for maintaining the operability

of the IOTE for the subsequent three (3) GEO launches. The Contractor shall have full access to the GEO IOTE for each subsequent GEO launch for purposes of in-orbit test and satellite acceptance.

## 1.5 CONTRACTUAL DOCUMENTATION

### 1.5.1 Satellite Performance Specification – Contract Exhibit B

The Preliminary GEO Satellite Performance Specification is provided as Exhibit B to the Contract. This specification shall be updated at the RR&DCR. This specification shall be completed and approved by the Purchaser no later than the CDR.

The Contractor may release Interim Specification Change Notices (ISCNs) at any time after Purchaser authentication (Class II) or approval (Class I) occurs.

Purchaser will normally authenticate Class II changes within twenty-four (24) hours and Class I within ten (10) days after receipt of the change package.

Purchaser will formally issue Specification Change Notices (SCNs) or Revisions to the Satellite Specification for all changes, regardless of classification.

### 1.5.2 Satellite Program Test Plans (PTP) – Contract Exhibit C

The Preliminary GEO Satellite Program Test Plan is provided as Exhibit C to the Contract. The PTP shall be updated at the RR&DCR. The PTP shall describe testing to be performed on the Structural Test Model, the Qualification/Protoflight and Flight Satellites (including units and subsystems as required), Launch Base testing, In-Orbit Testing and any satellite post-storage, pre-shipment testing. At the combined GEO Segment Requirements Review and Design Concept Review for the GEO satellite, the Contractor shall present a program test plan assessment that compares the benefits and risks of a Protoflight test approach with that of a full qualification program. The PTP shall be updated and approved by the Purchaser no later than the CDR.

### 1.5.3 Product Assurance Plan (PAP) – Contract Exhibit D

The Contractor shall submit a Product Assurance Plan to the Purchaser at Start of Contract. The Purchaser will review and approve the Contractor's PAP at the RR&DCR. Following the RR&DCR, the Product Assurance Plan (PAP)(CDRL #1.5.3) will be revised to incorporate any changes that result from subcontract activities or product structure, and to completely describe Product Assurance as an integral part of the Assembly, Integration and Test (AIT) approach. The Purchaser will approve the PAP at closure of the CDR. Contractor reserves the right to change internal product assurance operating procedures and methods where greater efficiency, accuracy, or cost savings can be achieved, provided such change does not materially affect the quality of the effort to be performed under the PAP.

### 1.5.4 Contractor Reference Documents

The Contractor shall follow best practices in executing the effort defined in this Contract. Where applicable, Contractor may reference existing Contractor and accepted industry standards in lieu of developing Contract specific plans, policies and procedures. At Purchaser's request, Contractor shall allow Purchaser review of such referenced documents. Specifically, Contractor shall perform system engineering activities in support of this Contract consistent with Contractor Reference Document E20.

# 2.0 — PHASE I EFFORT

Consistent with the work content described in Section 1.2, the Contractor shall conduct two formal reviews during this phase:

1. The combined GEO Segment Requirements Review and Design Concept Review (RR&DCR), and
2. The GEO Segment Critical Design Review (CDR).

Closure of the RR&DCR action items shall signify confirmation of the architectural requirements and design feasibility for the GEO Segment. It shall also signify agreement by both the Purchaser and the Contractor that the selected approach represents a cost-effective and risk-managed approach for meeting the GEO Segment performance requirements and deployment schedule.

Closure of the CDR action items shall signify confirmation of performance requirements, test requirements for verifying performance compliance, and agreement by both the Purchaser and the Contractor that the selected technical approach represents a compliant solution to GEO Segment performance requirements.

## 2.1 COMBINED GEO SEGMENT REQUIREMENTS REVIEW AND DESIGN CONCEPT REVIEW (RR&DCR)

The Contractor shall conduct a combined GEO Segment RR&DCR at its facility, no later than EDC + 6 months. The Contractor shall provide to the Purchaser the following: RR&DCR Agenda (CDRL #2.1.1), RR&DCR Presentation Material (CDRL #2.1.2), and RR&DCR Data Package (CDRL #2.1.3). The review and the associated data package shall describe the requirements-based solution through the following elements.

### Program Planning

1. Preliminary Cost Data (IAW Section 5.1.1)
2. Preliminary Program Management Plan (IAW Section 5.1.2)
3. Preliminary Configuration and Data Management Plan (IAW Section 5.1.3)
4. Preliminary Spacecraft Launch Base Authorizing Document (IAW Section 5.1.4)
5. Preliminary Mission Profile Description Plan (IAW Section 5.1.5)
6. Preliminary Program Master Schedule (IAW Section 5.1.6)
7. Preliminary Satellite Product Structure

8. Satellite Program Test Plan Cost and Risk Assessment (IAW Section 5.1.7)
9. Assembly, Integration, and Test Concept (IAW Section 5.1.8)

### Satellite Design and Verification Requirements

1. Preliminary GEO Satellite Performance Specification (IAW Section 1.5.1)
2. Preliminary Environmental Requirements Specification
3. Preliminary Design Verification Report (IAW Section 5.1.9)
4. Draft Interface Control Documents (IAW Section 5.1.10)
5. Draft Interface Layout Drawings (IAW Section 5.1.11)
6. Preliminary GEO Satellite Program Test Plan (IAW Section 1.5.2)
7. Preliminary Satellite Reliability Model
8. Draft GEO Segment portion of Space-Ground Communications Interface Specification

The approved RR&DCR Report (CDRL #2.1.4) comprised of Review meeting minutes and Action Item responses will constitute completion of the Review. The RR&DCR action item responses shall be provided no later than 3 months following the RR&DCR or EDC + 9 months.

## 2.2 GEO SEGMENT CRITICAL DESIGN REVIEW (CDR)

The Contractor will conduct a CDR at its facility not later than EDC + 12 months. The Contractor shall provide to the Purchaser the following: CDR Agenda (CDRL #2.2.1), CDR Presentation Material (CDRL #2.2.2), CDR Data Package (CDRL #2.2.3). The review and the associated data package shall describe the design approach and production plan through the following elements.

### Updated RR&DCR Elements

### Program Planning

1. Cost Data (IAW Section 5.1.1)
2. Final Program Management Plan (IAW Section 5.1.2)
3. Final Configuration and Data Management Plan (IAW Section 5.1.3)
4. Spacecraft Launch Base Authorizing Document (IAW Section 5.1.4)
5. Mission Profile Description (IAW Section 5.1.5)
6. Program Master Schedule (IAW Section 5.1.6)

6. Satellite Product Structure

8. Preliminary Assembly, Integration, and Test Plan (IAW Section 5.1.8)

### Satellite Design and Verification Requirements

1. Final GEO Satellite Performance Specification (IAW Section 1.5.1)
2. Final Environmental Requirements Specification
3. Updated Design Verification Report (IAW Section 5.1.9)
4. Preliminary Interface Control Documents (IAW Section 5.1.10)
5. Preliminary Interface Layout Drawings (IAW Section 5.1.11)
6. Final GEO Satellite Program Test Plan (IAW Section 1.5.2)
7. Satellite Reliability Model
8. Preliminary GEO Segment portion of Space-Ground Communications Interface Specification

## Additional Elements

### Program Planning

1. Subcontractor Progress Review (IAW Section 5.2.2)
2. Software Management Plan (flight and test software) (IAW Section 5.1.12)
3. Final Product Assurance Plan (IAW Section 1.5.3)

### Satellite Design and Verification Requirements

1. GEO Segment Technical Risk Assessment Summary (IAW Section 5.1.13)
2. Preliminary Satellite design
   a. Spacecraft Configuration Requirements Drawing (including internal and external configuration descriptions, stowed and deployed) (IAW Sections 5.1.10 and 5.1.11)
   b. Preliminary mass, power, and fuel budgets
3. Performance models (IAW Section 5.1.14)
4. Preliminary results of engineering and breadboard models
5. Reserved
6. Design Specifications and Test Plans

a. Satellite Communications Payload Test Bed (IAW Section 3.2.6)

b. Satellite Control Subsystem Test Bed (Digital and Controls/AOCS/Flight Software) (IAW Section 3.2.7)

c. Satellite Dynamic Simulator (IAW Section 3.2.8)

d. Satellite In-Orbit Test Equipment (IAW Section 4.2.1.4)

e. Factory and Launch Base EAGE/MAGE (IAW Section 3.2.9)

The Purchaser approved CDR Report (CDRL #2.2.4) combined with the presentation of the Subsystem CDRs will constitute completion of the Review. The GEO Segment CDR actions shall be closed no later than 6 months following the CDR or EDC + 18 months.

Contractor shall invite Purchaser, as an observer, to attend all major subsystem CDRs, including those conducted by Subcontractors. Purchaser shall be provided with the full set of CDR documentation for each major subsystem CDR. Major subsystems include the following: payload, power, propulsion, structure, thermal, digital and controls, and AOCS.

## 2.3 RESERVED

### 2.3.1 Reserved

# 3.0 — PHASE II EFFORT

Consistent with the work content described in Section 1.3, the Contractor shall conduct one formal review during this phase – the GEO Segment Final Design Review (FDR). This phase completes the hardware and software design, and focuses on preparation for full initiation of the Phase III recurring production effort.

For the duration of the qualification/protoflight test for both the communications payload subsystem and for the satellite, the Purchaser shall have a Technical Representative resident full-time in the Contractor's facility. This Technical Representative shall have full access to view qualification/protoflight tests and to review test procedures and results.

If the satellite and major subsystem qualification/protoflight testing is not completed at the time of the GEO Segment FDR, an additional formal review shall be required to complete the Phase II effort.

Successful completion of the FDR shall signify joint agreement between the Contractor and the Purchaser that the detailed design represents a compliant and producible product. It shall also establish manufacturing readiness and reconfirm that the selected approach represents a cost-effective and risk-managed approach for meeting the GEO Segment deployment schedule. Closure of the FDR actions signifies verification of the design and validation of its compliance to the Purchaser's requirements.

## 3.1 FINAL DESIGN REVIEW (FDR)

The Contractor will conduct a GEO Segment FDR at its facility no later than EDC + thirty (30) months. The Contractor will complete all development testing, other than life testing and potentially satellite qualification testing, prior to conducting the FDR. The Contractor shall provide to the Purchaser the following: FDR Agenda (CDRL #3.1.1), FDR Presentation Material (CDRL #3.1.2), FDR Data Package (CDRL #3.1.3) The review and associated data package shall describe the design solution and present supporting data to substantiate the product definition through the following elements:

### Program Planning

1. Final Satellite Product Structure and Drawing Trees
2. Program Plans
   a. Final Spacecraft Launch Base Authorizing Document (IAW Section 5.1.4)
   b. Final Mission Profile Description (IAW Section 5.1.5)

c. Confirm Final Satellite Program Test Plans (IAW Section 1.5.2)

d. Assembly, Integration and Test (AIT) Plan and Demonstrated Readiness (IAW Section 5.1.8)

e. Subcontractor Logistic plans

f. Data Management System verification

g. Satellite Transportation and Handling Plan (IAW Section 5.1.15)

h. Satellite Long-Term Storage Plan (IAW Section 5.1.16)

## Satellite Design and Verification Requirements

1. Design Description (IAW Sections 5.1.10 and 5.1.11)
   a. Description of Satellite system design
   b. Description of Satellite "subsystem" design and arrangement
   c. Electrical schematics and Functional Block Diagrams
2. Design Verification.
   a. Design Verification Report (IAW Section 5.1.9)
   b. Design analyses that support the design solution including assumptions, test, trade study results, etc., which provided the basis for the results
   c. Development test results
   d. Satellite Structural Test Model (SSTM) Test Results (IAW Section 3.2.2)
   e. Satellite and Major Subsystem Qualification/Protoflight test results (as available) (IAW Sections 3.2.3, 3.2.4, and 3.2.5)
3. Reliability Analysis results
   a. Results of FMECA analyses
4. Satellite Interface Verification
   a. Responsibilities/plans
   b. Planned fit checks
5. Completed Test and Simulation Tools and Test Reports
   a. Satellite Communications Payload Test Bed (IAW Section 3.2.6)

b. Satellite Control Subsystem Test Bed (Digital and Controls/AOCS/Flight Software) (IAW Section 3.2.7)

6. In-process development of Launch and Mission Operations Support Tools
   a. Satellite Dynamic Simulator (IAW Section 3.2.8)
   b. In-Orbit Test Equipment (IOTE) (IAW Section 4.2.1.4)

**Launch Segment Planning**

1. Launch Vehicle Description
   a. Interface definitions and verification plans
   b. Dispenser and satellite separation device design features
   c. Satellite Separation and Collision Avoidance analyses
2. Launch Base Operations
   a. Fuel loading plan
   b. Transportation
   c. Launch Base Flow
   d. EAGE/MAGE
   e. Staffing
   f. Testing
   g. Battery Maintenance

The Purchaser approved FDR Report (CDRL #3.1.4) together with the presentation of Subsystem FDRs will constitute completion of the FDR. The GEO Segment FDR action items shall be closed no later than 3 months following the FDR or EDC + 33 months.

Contractor shall invite Purchaser, as an observer, to attend all major subsystem FDRs, including those conducted by Subcontractors. Purchaser shall be provided with the full set of FDR documentation for each major subsystem FDR. Major subsystems include the following: payload, power, propulsion, structure, thermal, digital and controls, and AOCS.

### 3.1.1 Satellite Qualification/Protoflight Test Results Review

In the event that the Contractor has not completed Satellite Qualification/Protoflight Testing or Subsystem Qualification Testing at the time of the FDR, the Contractor shall conduct a separate Satellite Qualification/Protoflight Test Results Review (QTRR). The Contractor shall provide to

the Purchaser the following: QTRR Agenda (CDRL #3.1.1.1), QTRR Presentation Material (CDRL #3.1.1.2), QTRR Data Package (CDRL #3.1.1.3). The Purchaser approved QTRR Data Package (CDRL #3.1.1.3) together with the Major Subsystem Qualification Test Reports (IAW Section 3.2.5) shall constitute completion of the Qualification/Protoflight Test program.

The QTRR shall be held no later than 6 months following the FDR or EDC + 36 months.

## 3.2 PHASE II – DEVELOPMENT HARDWARE AND RELATED DATA AND SERVICES

It is anticipated that the Purchaser may require access to developmental hardware for the purpose of early inter-segment element testing. Purchaser will work with the Contractor to identify a mutually agreeable schedule for access to specific hardware items, as required.

### 3.2.1 Component Development and Test

For components that do not have previous flight heritage, the Contractor will design, manufacture and conduct tests as described in the Satellite Program Test Plan (IAW Section 1.5.2).

### 3.2.2 Satellite Structural Test Models (SSTM)

The Contractor will develop, manufacture, and test one (1) Satellite Structural Test Model (SSTM) for structural qualification (CI #3.2.2). This model will not be refurbished for flight.

The SSTM Test Report (CDRL #3.2.2) is deliverable. The report shall be provided to the Purchaser within four (4) weeks following completion of the tests.

### 3.2.3 Satellite Communications Payload Qualification Models (PQM)

The Contractor will develop, manufacture, and test one (1) Satellite Communications Payload Qualification Model (PQM) (CI #3.2.3). This model will be used to demonstrate payload performance to qualification requirements as defined in the Program Test Plan. The PQM will be assembled into the Satellite Qualification Model for completion of the qualification test program.

The PQM Test Report (CDRL #3.2.3) is deliverable. The report shall be provided to the Purchaser within four (4) weeks following completion of the tests. Purchaser shall be notified within 24 hours of any Class I discrepancies noted during qualification testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their resolution.

### 3.2.4 Satellite Qualification Model (SQM) [Contractor's bid price assumes Protoflight approach]

[For reference only – Contractor's bid price does not include this activity: The Contractor will develop, manufacture, and test one (1) Satellite Qualification Model (SQM). This model will be

used to demonstrate Satellite performance to qualification requirements as defined in the Program Test Plan. It is not anticipated that this Satellite will be refurbished for flight readiness. – end reference]

The SQM/Protoflight Test Report (CDRL #3.2.4.1) is deliverable. The report shall be provided to the Purchaser within four (4) weeks following completion of the tests. Purchaser shall be notified within 24 hours of any Class I discrepancies noted during qualification testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their resolution.

### 3.2.5 Major Subsystem Qualification Test Reports

The qualification test reports for the major subsystems are deliverable to the Purchaser prior to the GEO Segment FDR. It is envisioned that the major subsystems shall include the propulsion, power, thermal, attitude and orbit control, and digital and controls subsystems. The Contractor, upon request, shall provide to the Purchaser for review, any requested qualification test report.

Purchaser shall be notified within 24 hours of any Class I or Class II discrepancies noted during subsystem qualification testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their resolution.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

### 3.2.6 Satellite Communications Payload Test Beds (CPTB)

The Contractor shall develop, manufacture, and validate through test one (1) Satellite Communications Payload Test Bed. This flight equivalent Test Bed shall consist of the communications payload portion of the GEO Segment Satellite and be useable for ground system interface development and communications payload diagnostic testing. This Test Bed shall be provided with all Software (including source code or software license for duration of the GEO Segment design life), Ground Support Equipment and an Operational Manual (CRDL #3.2.6.4). The Contractor shall be obligated for the GEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements. The Contractor shall also supply the spare parts necessary to keep the test bed fully functional for the design life of the GEO Segment. The Contractor shall provide Training Services on the Test Bed (CS #3.2.6)

The Specification (CRDL #3.2.6.1) and Test Plan (CRDL #3.2.6.2) for the Test Bed shall be presented at the GEO Segment CDR. The test bed shall be completed no later than Launch – six (6) months.

The Satellite Communications Payload Test Bed Operations Validation Report (CRDL #3.2.6.3) is deliverable to the Purchaser after the first GEO satellite launch.

### 3.2.7 Satellite Control Subsystem Test Beds (CSTB)

The Contractor shall develop, manufacture, and validate through test one (1) Satellite Control Subsystem Test Bed (Digital and Controls/Attitude and Orbit Control Subsystem [AOCS]/Flight Software). This flight equivalent Test Bed shall consist of the controls portion of the GEO Segment Satellite and be useable for ground system interface development and controls subsystem diagnostic testing. This Test Bed shall be provided with all Software (including source code or software license for duration of GEO Segment design life), Ground Support Equipment and an Operational Manual (CRDL #3.2.7.4). The Contractor shall be obligated for the GEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements. The Contractor shall also supply the spare parts necessary to keep the test bed fully functional for the design life of the GEO Segment. The Contractor shall provide Training Services on the Test Bed (CS #3.2.7).

The Specification (CRDL #3.2.7.1) and Test Plan (CRDL #3.2.7.2) for the Test Bed shall be presented at the GEO Segment CDR. The test bed shall be completed no later than Launch – six (6) months.

The Satellite Control Subsystem Test Bed Operations Validation Report (CRDL #3.2.7.3) is deliverable to the Purchaser after the first GEO satellite launch.

### 3.2.8 Satellite Dynamic Simulators (SDS)

The Contractor shall develop, manufacture, and validate through test one (1) Satellite Dynamic Simulators (CI #3.2.8). This simulator shall emulate the critical controls functions of the satellite and shall incorporate the flight computer, its flight interfaces and all operational versions of the flight software. This Simulator shall be delivered with all Software (including source code or software license for duration of the specified GEO Segment design life) and an Operational Manual (CDRL #3.2.8.4). If the Contractor elects to deliver the software executable instead of the source code due to proprietary data considerations, the Contractor shall be obligated for the GEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements. The Contractor shall also supply the spare parts necessary to keep the simulator fully functional for the design life of the GEO Segment. The Contractor shall provide Training Services on the Simulator (CS #3.2.8).

The Specification (CDRL #3.2.8.1) and Test Plan (CDRL #3.2.8.2) for the Satellite Dynamic Simulator shall be presented at the GEO Segment CDR. The Simulator shall be completed (installed and validated) by Launch – 12 months. The Simulator Test Report (CDRL #3.2.8.3 #) shall be provided at the FDR.

The Satellite Dynamic Simulator is deliverable to the Purchaser following the first launch of the GEO satellite.

### 3.2.9 Launch Site Test Set

The Contractor shall develop, manufacture, and test Mechanical and Electrical Ground Support Equipment to demonstrate proper functioning of the Satellite and the integrated Satellite/Dispenser assembly.

This equipment may be developed in conjunction with other equipment used at the final Integration and Test facility, but must be capable of supporting operations at the Launch Site. The equipment shall support the launch activities for all launch vehicles and sites proposed in the Launch and Constellation Establishment Plans including contingency schedule scenarios.

# 4.0 — PHASE III EFFORT

The following are tasks to be performed by the Contractor during the planned Phase III Manufacturing and Delivery Phase, which, due to schedule needs, may include the purchase of long lead parts, prior to the conclusion of Phase II with the approval of the Purchaser.

Tasks as described above shall be accomplished in segments as follows:

4.1 Training and Rehearsal

4.2 Flight Model (FM) Delivery and Pre-Launch Acceptance

4.3 Launch and Orbit Raising

4.4 In-Orbit Acceptance

For the duration of the production, assembly, integration and acceptance testing for both the communications payload subsystem and the satellite, the Purchaser shall have a Technical Representative resident full-time in the Contractor's facility. This Technical Representative shall have full access to review manufacturing progress, to observe acceptance tests and to review acceptance test procedures and results. Access shall be subject to Contractor's proprietary and safety rules and regulations.

## 4.1 TRAINING AND REHEARSALS

### 4.1.1 Satellite and Constellation Operation Handbook (SCOH)

The Contractor shall prepare a Satellite and Constellation Operation Handbook (SCOH)( CDRL # 4.1.1) describing the operation of the Satellite. The information contained in the SCOH will be the basis for the command instructions required to operate, control, and maintain the satellite's performance throughout the mission.

The SCOH shall consist of four (4) volumes:

1. **Volume I, Satellite Systems Summary** — An overview of the satellite and its systems and payload as related to on-orbit operations
2. **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
3. **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

4. **Volume IV, Satellite Parameters Handbook** — Specific quantitative, satellite parameters (calibration data) as related to on-orbit operations

The SCOH, with an initial release at FDR, will be updated and delivered to the Purchaser at Launch minus twelve (12) months [preliminary release] and again at Launch minus six (6) months [final release].

### 4.1.2 Training

#### 4.1.2.1 Training Plan

The Contractor shall provide the Purchaser with a Training Plan (CDRL #4.1.2.1) for the training of the Purchaser's Operations and Maintenance (O&M) personnel.

The Training Plan, with an initial release at FDR, will be updated and delivered to the Purchaser at Launch minus twelve (12) months.

#### 4.1.2.2 Training Materials

The Contractor shall provide the necessary Training Materials (CDRL #4.1.2.2) to train the Purchaser's O&M personnel. These manuals shall be described in the Training Plan.

#### 4.1.2.3 Training Services

The Contractor shall provide Training Services (CS #4.1.2.3) on the Satellite systems to the Purchaser's O&M personnel. Training shall be accomplished at a location to be confirmed by the Purchaser and will be based on a training content agreed to within the Training Plan.

### 4.1.3 Rehearsals

#### 4.1.3.1 Rehearsal Plan

The Contractor shall provide a Rehearsal Plan (CDRL #4.1.3.1) to the Purchaser at FDR. The Rehearsal Plan will address the following:

1. Rehearsal Objectives
2. Preparation Activities
3. Schedule
4. Staffing Plan
5. Facilities and Equipment Plan
6. Critique Plan

The Rehearsal Plan, with an initial release at FDR, will be updated and delivered to the

Purchaser at Launch minus twelve (12) months.

## 4.2 FLIGHT MODEL DELIVERY AND PRE-LAUNCH ACCEPTANCE

### 4.2.1 Satellite Flight Model (FM) Delivery

#### 4.2.1.1 GEO Satellites

The Contractor shall manufacture and test four (4) geostationary (GEO) Satellites (CI #4.2.1.1) in accordance with the Satellite Performance Specification (Exhibit B to the Contract), the Program Test Plan (Exhibit C to the Contract), and the Product Assurance Plan (Exhibit D to the Contract).

Delivery of the four (4) GEO Satellites is on-orbit, in the designated operational orbital slots and fully tested and ready for operation.

#### 4.2.1.2 Flight Software

Contractor shall deliver to the Purchaser all versions of the Satellite Flight Software (CDRL #4.2.1.2) as implemented in the launched and ground stored satellites. Contractor shall deliver the flight software source code or grant a flight software operational license for the duration of the realizable in-orbit life of the satellites (may exceed design life). If the Contractor elects to deliver the software executable instead of the source code due to proprietary data considerations, the Contractor shall be obligated for the GEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements.

#### 4.2.1.3 In-Orbit Test Equipment

Contractor shall develop, manufacture, and validate through test Satellite In-Orbit Test Equipment (CI #4.2.1.3) to validate the health and to characterize the performance of the satellite communications payload. The Contractor shall deliver and permanently install four (4) GEO Satellite IOT equipment suites at Purchaser's designated Earth Station locations. Contractor shall also deliver and permanently install two (2) sets of IOT interface management and control equipment in the Purchaser's designated primary and alternate SOCC.

This equipment shall be provided with all Software (including source code or a software license for duration of GEO Segment design life), Ground Support Equipment and an Operational Manual (CDRL #4.2.1.3.4 ). If the Contractor elects to deliver the software executable instead of the source code due to proprietary data considerations, the Contractor shall be obligated for the GEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements. The Contractor shall also supply the spare parts necessary to keep the IOTE fully functional for the design life of the GEO Segment. The Contractor shall provide Training Services on the IOTE (CS #4.2.1.3)

The Specification (CDRL #4.2.1.3.1) and Test Plan (CDRL #4.2.1.3.2) for the IOTE shall be presented at the GEO Segment CDR. The equipment shall be completed (installed and validated) by Launch – 12 months for each respective GEO launch. The IOTE Test Report (CDRL #4.2.1.3.3) shall be provided at the FDR.

The Contractor shall deliver the In-Orbit Test Equipment to the Purchaser at the Purchaser's identified ground network location. The IOTE shall be delivered at completion of satellite acceptance for each respective GEO launch.

### 4.2.2 Satellite Level – Required Documents

#### 4.2.2.1 Satellite Log Books

The Contractor shall maintain a separate log book for each Satellite. Each Satellite Log Book (CDRL #4.2.2.1) shall contain a complete history of the manufacture of the Satellite and shall contain such information as:

1. Tests conducted, results, failures, failure corrections and test waivers
2. Discrepancies, deviations and Specification requirements waivers
3. Repair, maintenance, and modification records
4. Satellite movements, shipments, and storage

The log book, or a copy, will be provided to the Purchaser at the Launch Readiness Review (LRR) for each Satellite. Electronic format is acceptable.

#### 4.2.2.2 Payload Subsystem Flight Model Acceptance Test Reports

Acceptance Test Reports (CDRL #4.2.2.2.) for each flight model satellite payload (FM #1-4) are deliverable. Test Reports must be provided to the Purchaser within four (4) weeks following the tests.

Purchaser shall be notified within 24 hours of any Class I discrepancies noted during acceptance testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their resolution.

#### 4.2.2.3 Satellite Flight Model Acceptance Test Reports

Acceptance Test Reports (CDRL #4.2.2.3) for each flight model satellite (FM #1-4) are deliverable. Test Reports must be provided to the Purchaser within four (4) weeks following the tests.

Purchaser shall be notified within 24 hours of any Class I discrepancies noted during acceptance testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their

resolution.

### 4.2.3 Satellite Pre-Shipment Review (PSR)

A Pre-Shipment Review will be held for each satellite at the AIT facility.

The Contractor shall provide to the Purchaser a Satellite Specific PSR Report (CDRL #4.2.3.1). The PSR Report will summarize the following:

1. Summary Overview
   a. Program Test Plan compliance statement
   b. Unique hardware list
   c. Open NCR list
   d. Unit Failure History
2. Listing of applicable Configuration Change Notices
3. Hardware Configuration
4. Software Configuration
5. As Built Configuration
6. End-Item Data Package Status
7. Data Review Summary and Compliance Validation
8. Non-Conformance Report Status and Closure Plans
9. Open Waiver Summary
10. Satellite Unique Parameters Summary
11. Mission Operations Notification Summary
12. Work Deferred to Launch Base
13. Concurrence to Ship/Store

The As Built/As Designed Data (CDRL #4.2.3.2) shall be prepared in accordance with the Configuration and Management Plan and delivered to the Purchaser at PSR – 2 weeks.

All Requests for Waivers (Class I) will be approved by the Purchaser prior to shipment of the satellite to the launch base or to storage.

The report shall contain a Purchaser approval/rejection block. The Purchaser will approve or

notify the Contractor of rejection and rationale, and required corrective action within Twenty-four (24) hours after the review. The approved PSR Report constitutes approval of the Purchaser to ship the satellite to the Launch base.

## 4.3 LAUNCH, ORBIT RAISING AND RELATED SERVICES

### 4.3.1 General

The Contractor shall provide for all launch, launch base services, mission planning, integration of the Satellites/Dispenser with the Launch Vehicle, on-pad launch operations, and coordination with the Launch Vehicle supplier.

The Contractor shall be responsible for orbit-raising of the Satellites (4 GEO). Contractor will provide tracking and command facilities for GEO orbit raising.

### 4.3.2 Launch Services

The Contractor shall provide Launch Services (CS #4.3.2) for the Satellites. Launch Services will be consistent with the Spacecraft Launch Base Authorizing Document (IAW Section 5.1.4) and the Mission Profile Description (IAW Section 5.1.5).

Purchaser shall be invited to participate with the Contractor in all Launch Service Provider program reviews.

### 4.3.3 Contractor Provided Insurance

#### 4.3.3.1 Satellite Insurance

The Contractor shall provide Satellite Insurance (CS #4.3.3.1) for Four (4) GEO Satellites from intentional ignition, through deployment from the dispenser and initial ground station telemetry beacon receipt (signal acquisition and telemetry processing for initial confirmation of satellite bus health). The Insurance shall be for full replacement cost.

#### 4.3.3.2 Launch Vehicle Insurance

The Contractor shall provide Launch Vehicle Insurance (CS #4.3.3.2) for all Launches required under this Contract.

### 4.3.4 Launch Readiness Review (LRR)

A Launch Readiness Review will be held at the Launch Base after testing and final integration with the launch vehicle. The review shall demonstrate that the Satellites and Launch Vehicle systems are ready for Launch.

The Contractor will conduct a LRR at the Launch Base facility. The Contractor shall provide to the Purchaser the following: LRR Agenda (CDRL #4.3.4.1), LRR Presentation Material (CDRL

#4.3.4.2). The LRR Presentation Material will include:

1. Summary of the Launch Base test results for the Satellites and Launch Vehicle
2. Final Mass and Fuel Load
3. Launch Vehicle/Dispenser Readiness
4. Battery Status
5. COMSEC and Vehicle ID assignments
6. Final Launch Vehicle Sequence of Events
7. Launch Vehicle Contingency Plans
8. Launch Vehicle TT&C tracking station status
9. SOCC, Launch Control Facility (LCF) and In-Orbit Test (IOT) facility status
10. Ground Control Network Status
11. Review of countdown and launch procedures

The approved Launch Readiness Review (LRR) Minutes (CDRL #4.3.4.3) will constitute approval of the Purchaser to Launch. The Minutes will be recorded during the LRR and Purchaser is expected to provide approval immediately upon completion of the review.

## 4.4 IN-ORBIT SATELLITE ACCEPTANCE AND REVIEWS

An In-Orbit Test Review (IOTR) will be held for each satellite upon having completed In-Orbit Tests (IOT). The Contractor shall provide to the Purchaser the following: IOTR Agenda (CDRL #4.4.1.2), IOTR Presentation Material (CDRL #4.4.1.3) and IOTR Minutes (CDRL #4.4.1.4).

The review will demonstrate that the satellite meets the acceptance criteria defined in the Contract and IOT section of the Satellite Program Test Plan. Upon successful completion of the review the Purchaser shall formally accept or reject the satellite for purposes of Operation and Maintenance (O&M). Purchaser rejection shall provide specific details of contractual non-compliance.

For each Satellite, the approved IOTR Minutes (CDRL #4.4.1.4) shall result in Purchaser confirmation of Delivery of the GEO Satellite for purposes of assessing Liquidated Damages for Late Delivery.

### 4.4.1 In-Orbit Test Reports

All Satellite IOT Reports (CDRL #4.4.1) are deliverable. The reports shall be provided to the

Purchaser within four (4) weeks following the tests.

# 5.0 — DOCUMENTATION AND SERVICES

The following are tasks to be performed by the Contractor during all Phases of the Program (IAW Annex B) and will be accomplished in segments as follows:

5.1 Deliverable Documentation

5.2 Deliverable Services and Related Documentation

## 5.1 DELIVERABLE DOCUMENTATION

The following are documents to be developed and maintained by the Contractor during the Program.

### 5.1.1 Cost Data

The Contractor will provide the Cost Data (CDRL #5.1.1) for the proposed Satellite, to confirm both the non-recurring and the recurring cost target. The cost data shall be a means to demonstrate to the Purchaser at any time during Phase I and II that the Contractor is able to develop and produce the Satellite for the unit price agreed in the Contract. The cost data shall be initially delivered at the combined GEO Segment Requirements Review and Design Concept Review. Following the RR&DCR, the Cost Data shall be delivered monthly. Purchaser acceptance of the Contractor's GEO Satellite price at closure of FDR signifies completion of this activity with respect to recurring costing.

### 5.1.2 Program Management Plan

The Contractor shall develop a Program Management Plan (CDRL #5.1.2) which will provide detailed planning of the overall management of the Program in both Phase II and Phase III. It will show the following:

1. Organizational philosophy and structure and any transitional changes between Phases
2. Organization and staffing plan, with particular emphasis on subcontractor relationships
3. All Contractor and subcontract roles and responsibilities
4. Role of Systems Engineering
5. Role of Producibility and Production control
6. Concurrent Engineering Philosophy encompassing design, manufacture and AIT
7. Program Master Schedule (IAW Section 4.1.2)
8. Producibility, Quality Assurance and Cost Management Philosophies
9. Risk Mitigation philosophy and approach

10. Work Breakdown Structure (WBS)

11. Description of Launch Vehicle Supplier Management

This Plan will also provide detailed planning of the management of the Subcontractors. It will include the following:

1. Subcontract management tools for oversight of alliance members and sub-tier suppliers
2. Reporting requirements of major Subcontractors
3. Technical assistance and technology transfers where applicable and how such transfers are to be managed without interruption of the Program schedule

The Program Management Plan, with an initial release at the GEO Segment RR&DCR, will be finalized prior to CDR.

### 5.1.3 Configuration and Data Management Plan

The Contractor shall establish a system of configuration and data management which assures configuration identification, configuration control, historical traceability, performance of configuration audits, and compliance with GEO Segment performance requirements. Provisions for Configuration Control Board (CCB) activity will be addressed in this Configuration and Data Management Plan (CDRL #5.1.3). The Contractor shall develop this Plan in conjunction with the AIT approach with initial approval by the Purchaser no later than closure of the Critical Design Review (CDR).

### 5.1.4 Spacecraft Launch Base Authorizing Document

The Contractor shall provide a Spacecraft Launch Base Authorizing Document (CDRL #5.1.4) to the Purchaser prior to contracting with Launch Service Providers, which defines the Contractor's recommended launch vehicle selection, the proposed launch sequence, and launch options to mitigate risk in the event of launch vehicle failure.

### 5.1.5 Mission Profile Description

The Contractor shall prepare a Mission Profile Description (CDRL #5.1.5) which will address the following:

1. **Pre-Launch Plans**
   a. Short-term Ground Storage plans/Refurbishment plans
2. **Launch Related Plans**
   a. Support personnel deployment
   b. Readiness criterion

c. Injection

3. **Orbit Raising Plans**

   a. Orbit Raising and Constellation Population plans

   b. Orbital storage plans

4. **Orbit Analysis and Planning Tools**

   a. Description

   b. Platform Requirements

   c. Verification

   d. Operation and Maintenance plans

5. **Risk and Failure Management**

   a. Plans in the event of a launch failure or delay in launch vehicle availability

   b. Plans for replacement of a failed satellite

6. **Facility Requirements and Plans**

   a. Number, capability, predicted satellite coverage and location of facilities required to perform the following functions:

      (1) Launch

      (2) Orbit Raising

      (3) In-Orbit Testing

      (4) Failure Diagnosis and Recovery

      (5) De-Orbit

The Mission Profile Description shall be delivered at RR&DCR (Draft), CDR (Preliminary) and at FDR (Final).

### 5.1.6 Program Master Schedule

The Contractor will develop the Program Master Schedule for all activities covered by the Contract including proposed launch schedules that are projected to be part of the production contract. While schedule hierarchy shall be in accordance with the Contractor CSM practices, it is necessary to provide the Purchaser with visibility into those activities that define and potentially affect performance. This shall be provided through the development of appropriate Intermediate and Supporting Detail Schedules that show the dependencies among the activities. The critical paths for the Program and each subsystem shall be clearly marked.

Schedule status reporting, including all Subcontractor schedules and update requirements shall be made on a bimonthly basis and may be included in the Bimonthly Report. (The Contractor is expected to transmit to the Purchaser the same schedules being used to manage the Program so that minimum additional effort is necessary.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

### 5.1.7 Satellite Program Test Plan Cost and Risk Assessment

The Contractor shall prepare a Cost and Risk Assessment (CDRL #5.1.7) of the Satellite Program Test Plan to include considerations of technical risk, development cost and schedule for system qualification and production cost and schedule for system acceptance testing.

For the GEO satellite, the Contractor shall evaluate Protoflight test strategies.

### 5.1.8 Assembly, Integration and Test (AIT) Plan

The Contractor shall prepare an AIT Plan describing satellite assembly, integration and test beginning at the AIT facility and culminating at the launch base. The AIT Plan, with an initial release at CDR, will be updated and delivered to the Purchaser two (2) weeks prior to FDR.

### 5.1.9 Design Verification Report

All requirements verification information shall be included in a Design Verification Report (DVR) (CDRL #5.1.9). The DVR shall consist of three sections:

**Section I** – Performance Compliance Matrix listing requirements to be verified from top-level Specifications and Interface Control Documents (ICDs). These requirements shall be identified with requirement traceability numbers (REQIDS) and assigned to their respective subsystems.

**Section II** – Verification Plan defines the means of verification to a sufficient level of detail for Purchaser audit. The requirements from Section I are restated with the level that verification takes place (component, unit, subsystem, satellite or system). The method is defined (inspection, test, demonstration, analysis/simulation) and the period defined in which this verification data shall be produced.

**Section III** – Verification Data in the form of Engineering Memorandum (EM). The requirements are again shown in a matrix with the associated verification method identified. The capability determined from test or simulation is then provided to permit assessment of the available margin. The matrix also references the EMs which are included in the document.

### 5.1.10 Interface Control Documents

Interface Control Documents shall be provided to the Purchaser at the System CDR, as part of the CDR Data Package. Final ICD's shall be provided at FDR unless specifically defined as deliverable at Launch – 12 months (L-12). CDRL numbering is defined in Annex B. The Contractor shall develop and maintain the following Interface Control Documents (ICDs):

1. **Intrasatellite ICDs**
   a. Satellite Electrical Schematics (CDRL #5.1.10.1)
2. **Intersegment ICDs**
   a. Satellite Telemetry and Command Database (CDRL #5.1.10.2)
   b. Launch Service Requirements Document (CDRL #5.1.10.3)
   c. Satellite to Launch Vehicle ICD (CDRL #5.1.10.4)
   d. Launcher (or Launch Base) to SOCC ICD (CDRL #5.1.10.5).
   e. TT&C Space to Ground ICD (CDRL #5.1.10.8)
   f. Satellite Dynamic Simulator to SOCC/LCF ICD (CDRL #5.1.10.10)
   g. Gateway to IOTE ICD (CDRL #5.1.10.6) (final at L – 12)
   h. SOCC/LCF to AIT Facility ICD (CDRL #5.1.10.7) (final at L-12)

The Contractor shall provide inputs to the following ICDs that are the responsibility of the Purchaser:

1. **External ICDs**
   a. Satellite portion of Globalstar Space-Ground Communications Interface Document

### 5.1.11 Interface Design Layout (IDL)

The Contractor shall provide to the Purchaser Interface Design Layout (IDL) drawings (CDRL #5.1.11) for the Satellite and subsystems. The drawings shall fully describe both stowed and operational (deployed) configurations and shall clearly indicate dimensions, reference axes, and equipment labels. Drawings shall include plan view, front and side elevations and an isometric view.

The Interface Design Layout (IDL) shall be provided to the Purchaser at the System FDR, as part of the FDR Data Package.

### 5.1.12 Software Management Plan

The Contractor shall prepare a Software Management Plan (CDRL #5.1.12) defining the processes, management approach and quality assurance measures implemented to ensure timely, performance compliant software for the Satellites, other deliverable Configuration Items and the ground support equipment.

### 5.1.13 GEO Segment Technical Risk Assessment Summary

The Contractor shall prepare a GEO Segment Technical Risk Assessment Summary (CDRL #5.1.13) which identifies the critical path development, production, integration and test technical risk items and the Contractor's plan for risk mitigation to ensure performance, cost and schedule compliance.

### 5.1.14 Performance Models

The Contractor shall produce Performance Models to the degree necessary to define, analyze, or confirm performance of the Satellite against GEO Segment requirements. Model descriptions shall first be provided to the Purchaser at the combined GEO Segment Requirements Review and Design Concept Review (RR&DCR), as part of the Data Package. Update status will be included in the Bimonthly Report to maintain current prediction of performance against requirements. Reports and results will be provided to the Purchaser following these updates. The following models will be developed, maintained and updated at CDR and FDR.

1. Attitude and Orbit Control Subsystem (AOCS) Pointing Error Model
2. Alignment Plan
3. Spacecraft Thermal Dissipation Model
4. Command and Telemetry Model
5. Size and Mass Property Model
6. Payload Performance Model
7. Electrical Power Performance Model
8. Computer Memory and Processing Model
9. Propulsion System Performance Model

The final software models for the Spacecraft Thermal Dissipation Model and for the Electrical Power Performance Model shall be delivered at FDR (including algorithms, source code and an operations manual). The Purchaser will integrate these satellite subsystem performance models with the Purchaser's system planning software resource allocation model. During the design life of the GEO Segment, the Contractor shall assist the Purchaser at a reasonably negotiated future price in updating the models as required to best correlate with observed in-orbit satellite

performance.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

### 5.1.15 Satellite Transportation and Handling Plan (including Test Equipment)

The Contractor shall provide for use during production and launch operations, all necessary Satellite Transportation, Handling and Test equipment, including container(s) to transport the Satellites to the Launch Site and equipment for handling and testing the Satellite(s) at the launch base.

The Contractor shall prepare and make available to the Purchaser a Satellite Transportation and Handling Plan (CDRL #5.1.15). The plan shall include transportation of the integrated satellites to the applicable launch sites. This plan with an initial release at FDR, will be updated and delivered to the Purchaser at Launch minus six (6) months.

### 5.1.16 Satellite Long-Term Storage Plan

The Contractor shall prepare a Satellite Long-Term Storage Plan (CDRL #5.1.16) for the GEO Satellites consistent with the Purchaser's Program Schedule for the launch of the four (4) geostationary satellites followed by an additional two (2) years. The plan shall define the required ground support equipment for storage and post-storage recovery. The plan shall be consistent with the Satellite Program Test Plan requirements for storage and pre- and post-storage test requirements.

## 5.2 DELIVERABLE SERVICES AND RELATED DATA

The following are tasks to be performed by the Contractor during all three (3) Phases of the Program.

### 5.2.1 Configuration Control Board (CCB)

The Contractor will schedule CCB meetings (CS #5.2.1) on an as required basis. For Class I changes the Purchaser will be invited to attend. The Purchaser shall be informed at least 24 hours in advance of any Class I related CCB meetings. The Purchaser shall receive a copy of the Minutes of the Contractor's CCB Proceedings.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

### 5.2.2 Subcontractor Review Meetings – Notification

The Purchaser will be invited, as an observer to attend major Subcontractor Review Meetings. Notification of major subcontractor review meetings will be at least one week in advance of the meeting.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

### 5.2.3 Design Review Action Item Tracking/Closure Process

The Contractor shall provide an Action Item Tracking/Closure System (CS #5.2.3) for the action items resulting from Purchaser's review of the data packages and generated during the review.

Action Items (AI's) may be generated during the course of the review but not submitted until the end of that day's presentations. Action items will be jointly reviewed by the Purchaser and the Contractor and after a thirty (30) minute period presented to the collected authors of the AI's and dispositioned as 1) a formal action item, 2) re-classified as a Request-for-Information (RFI) or 3) rejected. The Contractor will arrange for the formal AI's and RFI's to be entered into the Action Item Tracking/Closure System.

The Review Report (i.e. RR&DCR, CDR and FDR) will contain copies of all formal AI's. Copies of all "closed" AI's and a commitment date for closure of the remaining "open" AI's will be included.

### 5.2.4 Request for Material Review (RMR) and Trouble/Failure Report (TFR)

The Contractor will provide RMR/TFR Reports on failures or material problems on the QM or FM Satellites. Notification of pending RMR/TFR reports should be provided to the Purchaser as soon as possible following the event. Copies of these reports should be provided to the Purchaser when the RMR/TFR has been closed.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

Upon request, the Purchaser shall be provided with any RMR or TFR (or similar document) that is supplied to the Contractor in the performance of the work under this Contract.

### 5.2.5 Bimonthly Progress Report

The Contractor will provide a Bimonthly Progress Report that will cover the following topics:

1. **Program Status Overview**
    a. Staffing

b. Work share development/team formation

c. Highlights from each Major Subcontractor's report

d. Launch service update

2. **Program Schedule Status**

a. Redlined working schedules highlighting changes

b. Critical Path updates

3. **Program Contract Status**

a. Claims

b. Proposals

c. Task Orders

4. **Technical Accomplishments**

a. CCB actions

b. Configuration Changes

c. Systems Engineering

d. Major Subsystems

e. Intersegment Interfaces

f. Technical Performance Measurands for Critical Parameters

5. **Milestone Status**

a. CDRLs

b. Programmatic

c. Technical

6. **Objectives and Milestones for Next Period**

a. CDRLs

b. Programmatic

c. Technical

7. **Risk Management**

a. Development (Technical problems encountered and actions taken to mitigate. Potential problems, risks and plans to minimize effect on schedule).

b. Launch and Insurance risk

c. Production

Where appropriate, the Contractor may substitute in whole or in part, the Subcontractor Periodic Reports provided to the Contractor by its major subcontracts and periodic program office reports (e.g. SWAP, Staffing Profiles, Technical Review Minutes).

### 5.2.6 Monthly Cost Report

The Contractor will provide a Monthly Cost Report (CDRL #5.2.6) that will cover the following:

1. **Program Cost Status (Phase I and II only)**

   a. Cost performance by WBS

   b. Earned value assessment

   c. Cost data development and updates

# 6.0 — PURCHASER FURNISHED ITEMS

The Contractor and Purchaser shall meet in a Technical Interchange Meeting to review and mutually agree upon the availability and adequacy of the equipment, facilities and services listed below.

## 6.1 EQUIPMENT, FACILITIES AND SERVICES

Contractor and Purchaser shall meet in a Technical Interchange Meeting to review and mutually agree upon the availability and adequacy of the equipment, facilities and services listed below.

1. Contractor shall be allowed access to four (4) Purchaser-provided Earth Stations that are within the proper look angle of the GEO satellites at their on-station orbital location. Such access shall include RF communications equipment, TC&R facilities and equipment, standard communications test equipment and support services and shall be limited to those items already in place, functioning and available at Purchaser's facilities. Contractor shall be responsible for any additional required items to support launch, IOT, and/or on-orbit operation of the satellite. With the exception of launch support equipment, Contractor shall permanently install said equipment at each of the four Purchaser designated Earth Stations. Associated control equipment shall be installed at the Purchaser's primary and alternate SOCCs.

2. After the satellite has been successfully positioned in its final orbital slot, for the purpose of IOT, the Contractor shall operate the satellites from the Purchaser's SOCC and ground control network.

3. Contractor shall be allowed access to and use of Purchaser's test and support technicians during on-site installation, integration and test activities of IOTE.

4. Purchaser shall provide reasonable office space, conference room, and administrative areas for Contractor personnel during installation activities (if applicable) and during operational activities as defined. These locations shall be equipped with telephones, fax, and copier.

5. Purchaser shall provide appropriate personnel to participate in two technical reviews at before launch, for compatibility testing and for one (1) mission rehearsal. Reviews and rehearsals will be conducted at the applicable facilities.

6. Purchaser shall provide the following personnel to support IOT:

   a. **SOCC Manager** — One (1) SOCC Manager who shall be stationed at the Purchaser's SOCC (IOT Coordination Center) and work with Contractor's IOT Director to support day-to-day IOT operations

b. **Earth Station Coordinators** — Two (2, TBR) Earth Station Coordinators who shall be stationed at the Purchaser's SOCC (IOT Coordination Center), work with Contractor's Payload IOT Coordinators and operate Purchaser-provided antennas and RF equipment. One (1) Coordinator is required to support one (1) of two (2) work shifts.

c. **Bus Technical Representative** — One (1, TBR) Bus Technical Representative who shall be stationed at Purchaser's SOCC (IOT Coordination Center), and review and approve Bus IOT data with Contractor's Bus IOT Coordinator. Purchaser's technical representatives shall also be stationed at the Contractor's GEO MCC for GEO launch activities prior to IOT.

d. **Payload Technical Representatives** — Two (2, TBR) Payload Technical Representatives who shall be stationed at the Purchaser's SOCC (IOT Coordination Center), and review and approve payload IOT data with Contractor's Payload IOT Coordinator. One (1) representative shall be responsible for approving transponder test data, and the other, antenna pattern data.

7. Purchaser shall provide documentation that supports calibration of Purchaser-furnished items. Certification of calibration satisfactory to Contractor shall be provided.

## 6.2 DATA

Purchaser shall provide:

1. Telemetry and command RF frequencies at CDR.
2. Monthly reports in-orbit status of the satellites
3. Documentation to support calibration of Purchaser-provided equipment for IOT listed in Paragraph 6.1.

# ANNEX A — DELIVERABLE HARDWARE AND SOFTWARE

| Item | Delivery Date |
|---|---|
| Satellite Dynamic Simulator (CI #3.2.8)<br>(Hardware, Software and Spares)<br>Flight Model Satellites (CI #4.2.1) | work completed by 1st Launch –12 months<br>To be delivered after 1st GEO Launch<br>per Annex D |
| In-Orbit Test Equipment (CI #4.2.1.4)<br>[4 sets for Earth Station installation and 2 mgmt and control sets for SOCC installation]<br>(Hardware, Software and Spares) | work completed by 1st Launch –12 months<br>To be delivered after each GEO Launch |

# ANNEX B — CDRL DELIVERY FREQUENCY

| # | CDRL # | CDRL Name | RR&DCR | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 1 | 1.5.1 | Satellite Specification<br>***Preliminary Specification provided by Purchaser in RFP as Contract Exhibit B*** | Preliminary | Final | Confirm | |
| 2 | 1.5.2 | Satellite Program Test Plan<br>***Preliminary Test Plan provided by Purchaser in RFP as Contract Exhibit C*** | Preliminary | Final | Confirm | |
| 3 | 1.5.3 | Product Assurance Plan (PAP)<br>***Contractor provides Preliminary PAP at Start-of-Contract*** | Preliminary | Final | | |
| 4 | 2.1.1 | Combined GEO Segment Requirements Review and Design Concept Review (RR&DCR) Agenda | RR&DCR – 2 weeks | | | |
| 5 | 2.1.2 | RR&DCR Presentation Material | RR&DCR | | | |
| 6 | 2.1.3 | RR&DCR Data Package | RR&DCR – 2 weeks | | | |
| 7 | 2.1.4 | RR&DCR Report | RR&DCR + 4 weeks | | | |
| 8 | 2.2.1 | GEO Segment Critical Design Review (CDR) Agenda | | CDR – 2 weeks | | |
| 9 | 2.2.2 | CDR Presentation Material | | CDR | | |
| 10 | 2.2.3 | CDR Data Package | | CDR – 2 weeks | | |
| 11 | 2.2.4 | CDR Report | | CDR + 4 weeks | | |
| 12 | 3.1.1 | GEO Segment Final Design Review (FDR) Agenda | | | FDR - 2 weeks | |
| 13 | 3.1.2 | FDR Presentation Material | | | FDR | |
| 14 | 3.1.3 | FDR Data Package | | | FDR - 2 weeks | |
| 15 | 3.1.4 | FDR Report | | | FDR + 4 weeks | |
| 16 | 3.1.1.1 | Satellite Qualification/Protoflight Test Results Review (QTRR) (as required) Agenda | | | QTRR - 2 weeks | |
| 17 | 3.1.1.2 | QTRR Presentation Material | | | QTRR | |
| 18 | 3.1.1.3 | QTRR Data Package | | | QTRR - 2 weeks | |
| 19 | 3.1.1.4 | QTRR Report | | | QTRR + 4 weeks | |
| 20 | 3.2.2 | Satellite Structural Test Model (SSTM) Test Report | | | Test + 4 weeks but no later than FDR | |

| # | CDRL # | CDRL Name | RR&DCR | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 21 | 3.2.3 | Satellite Communication Payload Qualification Model (PQM) Test Report | | | Test + 4 weeks but no later than FDR | |
| 22 | 3.2.4 | Satellite Qualification/Protoflight Model (SQM) Test Report | | | Test + 4 weeks but no later than FDR | |
| 23 | No CDRL # IAW SOW Para. 3.2.5 | Major Satellite Subsystem Qualification Test Reports<br>Power subsystem<br>Digital and Controls subsystem<br>Attitude and Orbit Control subsystem<br>Propulsion subsystem | | | Test + 4 weeks but no later than FDR | |
| 24 | 3.2.6.1 | Satellite Communications Payload Test Bed (CPTB) Requirements Specification | | Final | | |
| 25 | 3.2.6.2 | CPTB Test Plan | | Final | | |
| 26 | 3.2.6.3 | CPTB Test Report | | | Final | |
| 27 | 3.2.6.4 | CPTB Operations Manual | | | Final | |
| 28 | 3.2.7.1 | Satellite Control Subsystem Test Bed (CSTB) Requirements Specification | | Final | | |
| 29 | 3.2.7.2 | CSTB Test Plan | | Final | | |
| 30 | 3.2.7.3 | CSTB Test Report | | | Final | |
| 31 | 3.2.7.4 | CSTB Operations Manual | | | Final | |
| 32 | 3.2.8.1 | Satellite Dynamic Simulator (SDS) Requirements Specification | | Final | | |
| 33 | 3.2.8.2 | SDS Test Plan | | Final | | |
| 34 | 3.2.8.3 | SDS Test Report | | | | Final L-12 |
| 35 | 3.2.8.4 | SDS Operations Manual | | | | Final L-12 |
| 36 | 4.1.1 | Satellite and Constellation Operation Handbook (SCOH) | | | Preliminary | Final L-12<br>Updates as Required |
| 37 | 4.1.2.1 | Training Plan | | | Preliminary | Final L-12<br>Updates as Required |
| 38 | 4.1.2.2 | Training Materials | | | Preliminary | Final L-12<br>Updates as Required |
| 39 | 4.1.3.1 | Rehearsal Plan | | | Preliminary | Final L-12<br>Updates as Required |

| # | CDRL # | CDRL Name | RR&DCR | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 40 | 4.2.1.3 | Satellite Flight Software (all operational versions) | | | Preliminary | Final L-12<br>Updates as Required |
| 41 | 4.2.1.4.1 | In-Orbit Test Equipment (IOTE) Specification | | Final | | |
| 42 | 4.2.1.4.2 | IOTE Test Plan | | Final | | |
| 43 | 4.2.1.4.3 | IOTE Test Report | | | | Final L-12 |
| 44 | 4.2.1.4.4 | IOTE Operations Manual | | | | Final L-12<br>Updates as Required |
| 45 | 4.2.2.1 | Satellite Log Book | | | | LRR |
| 46 | 4.2.2.2 | Communications Payload FM1-FM4 Acceptance Test Reports | | | | Test + 4 weeks |
| 47 | Reserved | | | | | |
| 48 | 4.2.2.3 | Satellite FM1-FM4 Acceptance Test Reports | | | | Test + 4 weeks |
| 49 | Reserved | | | | | |
| 50 | 4.2.3.1 | Pre-Shipment Review (PSR) Report | | | | PSR - 2 weeks |
| 51 | 4.2.3.2 | As Built/As Designed Data | | | | PSR - 2 weeks |
| 52 | 4.3.4.1 | Launch Readiness Review (LRR) Agenda | | | | LRR - 2 weeks |
| 53 | 4.3.4.2 | LRR Presentation Materials | | | | LRR |
| 54 | 4.3.4.3 | LRR Minutes | | | | LRR + 24 hrs |
| 55 | 4.4.1.2 | Satellite In-Orbit Acceptance Review Agenda | | | | Review - 1 week |
| 56 | 4.4.13 | Satellite In-Orbit Acceptance Review Presentation Material | | | | Review - 1 week |
| 57 | 4.4.1.1 | Satellite In-Orbit Acceptance Review Data Package (IOT Reports) | | | | Review - 1 week |
| 58 | 4.4.1.4 | Satellite In-Orbit Acceptance Review Minutes | | | | Review + 1 week |
| 59 | Reserved | | | | | |
| 60 | Reserved | | | | | |
| 61 | Reserved | | | | | |
| 62 | Reserved | | | | | |
| 63 | 5.1.1.1 | Cost Model | Preliminary | Updated | Final (Recurring) | Updated Monthly after RR&DCR |
| 64 | 5.1.2 | Program Management Plan | Preliminary | Final | | |

| # | CDRL # | CDRL Name | RR&DCR | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 65 | 5.1.3 | Configuration and Data Management Plan | Preliminary | Final | | |
| 66 | 5.1.4.1 | Spacecraft Launch Base Authorizing Document | Preliminary | Update | Final | |
| 67 | 5.1.5 | Mission Profile Description | Preliminary | Update | Final | |
| 68 | 5.1.6 | Integrated Master Schedule | Preliminary | Update | Update | Updated Monthly after RR&DCR |
| 69 | 5.1.7 | Satellite Program Test Plan Cost and Risk Assessment | Final | | | |
| 70 | 5.1.8 | Assembly, Integration and Test (AIT) Plan | | Preliminary | Final | |
| 71 | 5.1.9 | Design Verification Report | Preliminary | Update | Final | |
| 72 | 5.1.10.1 | Satellite Electrical Schematics | Draft | Preliminary | Final | Update as Required |
| 73 | 5.1.10.2 | Satellite Telemetry and Command Database | Draft | Preliminary | Final | Update as Required |
| 74 | 5.1.10.3 | Launch Service Requirements Document | Draft | Preliminary | Final | Update as Required |
| 75 | 5.1.10.4 | Satellite to Launch Vehicle ICD | Draft | Preliminary | Final | Update as Required |
| 76 | 5.1.10.5 | Launcher (or Launch Base) to SOCC ICD | Draft | Preliminary | Final | Update as Required |
| 77 | 5.1.10.6 | Gateway to IOT Equipment ICD | Draft | Preliminary | Update | Final no later than L-12 |
| 78 | 5.1.10.7 | SOCC/LCF to AIT ICD (TBD) | Draft | Preliminary | Update | Final no later than L-12 |
| 79 | 5.1.10.8 | TT&C Space to Ground ICD | Draft | Preliminary | Final | Update as Required |
| 80 | 5.1.10.9 | reserved | | | | |
| 81 | 5.1.10.10 | Satellite Dynamic Simulator to Satellite Operations Control Center (SOCC)/Launch Control Facility (LCF) ICD | Draft | Preliminary | Final | Update as Required |
| 82 | 5.1.11 | Interface Design Layout (IDL) | Draft | Preliminary | Final | Update as Required |
| 83 | 5.1.12 | Software Management Plan | | Final | | |
| 84 | 5.1.13 | GEO Segment Technical Risk Assessment Summary | | Final | Update | |
| 85 | 5.1.14.1 | Performance Models (except thermal and power) | | Preliminary | Final | Update as Required |
| 86 | 5.1.14.2 | Performance Model Software, Source Code and Operations Manual for Spacecraft Thermal Dissipation | | Preliminary | Final | Update as Required |
| 87 | 5.1.14.3 | Performance Model Software, Source Code and Operations Manual for Spacecraft Electrical Power | | Preliminary | Final | Update as Required |

| # | CDRL # | CDRL Name | RR&DCR | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 88 | 5.1.15 | Satellite Transportation Plan | | | Final | |
| 89 | 5.1.16 | Satellite Long-Term Storage Plan | | | Final | |
| 90 | 5.2.1 | Minutes of the Contractor's CCB Proceedings | | | | As Required |
| 91 | 5.2.2 | Notification of major subcontractor review meetings | | | | As Required |
| 92 | 5.2.4.1 | RMR/TFR Reports | | | | As Issued |
| 93 | 5.2.4.2 | Notification of pending RMR/TFR reports | | | | As Issued |
| 94 | 5.2.5 | Bimonthly Progress Report (every 2 months) | | | | Bimonthly |
| 95 | 5.2.6 | Monthly Cost Report | | | | Monthly through FDR |

**Applicable Notes (DRAFT Table will be amended to indicate the following):**

**Contractor Document Notes:**

(1) Transmitted via contracts letter.

(2) Released using CDRL # or designation other than contractor document number. Specific number if required will be available from Contractor's configuration manager.

(3) Item to be released in the future using CDRL #.

(4) Included as part of a Design Review Data Package or Recurring Delivery. Contractor's documents may be transmitted as written, no unique CDRL identification number will be required on the document. Contractor will reference the corresponding CDRL # in the Data Package Transmittal Letter.

**Delivery Frequency Notes:**

(5) For all CDRLs, seven (7) hard copies or an electronic formatted document shall be delivered to the Purchaser. Submission of a disc or direct transmission via data lines in lieu of hard copy is acceptable.

**Purchaser Action Notes:**

(6) Purchaser shall be obligated to approve submitted documents within three (3) weeks of their submission or identify changes required.

Failure by the purchaser to notify the Contractor within the three (3) week period shall constitute approval.

# ANNEX C — DELIVERABLE SERVICES

| Item | Delivery Date |
|---|---|
| Launch Services (CS #4.3.2) | per Annex D |
| Satellite Insurance (CS #4.3.3.1) | per Annex D |
| Launch Vehicle Insurance (CS #4.3.3.2) | per Annex D |
| CCB meetings (CS #5.2.1) | As Required |
| Action Item Tracking/Closure System (CS #5.2.3) | As Required |
| Operations Training (CS #4.1.2.3) | starting at 1st Launch – 12 months |
| Test Bed Training (CS #3.2.6) and (CS #3.2.7) | no later than Launch - 6 months |
| Satellite Simulator Training (CS #3.2.8) | no later than 1st Launch – 6 months |
| In-Orbit Test Equipment Training (CS #4.2.1.4) | no later than 1st Launch – 6 months |

# ANNEX D — PROGRAM SCHEDULE

| Schedule Milestone | Start | Finish |
|---|---|---|
| Contract Award | 7/17/02 | N/A |
| Effective Date of Contract | 7/17/02 | N/A |
| Phase I – GEO Segment Definition | 7/17/02 | 1/17/03 |
| Combined GEO Segment Requirements Review and Design Concept Review (EDC + 6 months) | 1/16/03 | 1/17/03 |
| Phase I – Initial Design | 1/20/03 | 7/18/03 |
| GEO Segment Critical Design Review (EDC + 12 months) | 7/17/03 | 7/18/03 |
| Phase II – Development and Verification | 7/19/03 | 1/21/05 |
| GEO Segment Final Design Review (EDC + 30 months) | 1/20/05 | 1/21/05 |
| Qualification/Protoflight Test Results Review (EDC + 36 months, As Required) | 7/22/05 | 7/22/05 |
| Phase III – Production | 1/22/05 | 1/5/09 |
| GEO Launch Campaign | | |
| GEO Launch #1 (EDC + 48 months) | 7/3/06 | In-Orbit Acceptance Review/Delivery |
| GEO Launch #2 (EDC + 60 months) | 7/2/07 | In-Orbit Acceptance Review/Delivery |
| GEO Launch #3 (EDC + 72 months) | 7/1/08 | In-Orbit Acceptance Review/Delivery |
| GEO Launch #4 (EDC + 78 months) | 1/5/09 | In-Orbit Acceptance Review/Delivery |

# EXHIBIT A-2

## GLOBALSTAR GS-2 Contract

## GS-02-0800

# LEO SPACE SEGMENT

# STATEMENT OF WORK

## July 17, 2002

# CONTENTS

**Section** **Page**

# ACRONYM LIST

| | |
|---|---|
| AI | Action Item |
| AIT | Assembly, Integration and Test |
| AOCS | Attitude and Orbit Control Subsystem |
| CDR | Critical Design Review |
| CDRL | Contract Data Requirements List |
| CI | Configuration Item |
| CPTB | [Satellite] Communications Payload Test Bed |
| CS | Contract Service |
| CSTB | [Satellite] Control Subsystem Test Bed |
| DVR | Design Verification Report |
| EAGE | Electrical Assembly Ground Equipment |
| EDC | Effective Date of Contract |
| FDR | Final Design Review |
| FM | Flight Model |
| FMECA | Failure Modes and Effects Criticality Analysis |
| FOCR | Final Operational Constellation Review |
| FSW | Flight Software |
| IAW | In Accordance With |
| ICD | Interface Control Document |
| IDL | Interface Design Layout |
| IOTE | In-orbit Test Equipment |
| ISCN | Interim Specification Change Notices |
| LCF | Launch Control Facility (within SOCC) |
| LEO | Low Earth Orbit |
| LRR | Launch Readiness Review |
| MAGE | Mechanical Assembly Ground Equipment |

| | |
|---|---|
| O&M | Operations and Maintenance |
| PAP | Product Assurance Plan |
| PQM | [Satellite Communications] Payload Qualification Model |
| PSR | Pre-Shipment Review |
| PTP | Program Test Plan |
| QTRR | Qualification Test Results Review |
| RMR | Request for Material |
| SCN | Specification Change Notices |
| SCOH | Satellite and Constellation Operation Handbook |
| SDS | Satellite Dynamic Simulator |
| SOCC | Satellite Operations Control Center |
| SOW | Statement of Work |
| SQM | Satellite Qualification Model |
| SSTM | Satellite Structural Test Model |
| T&C | Telemetry and Control |
| TFR | Trouble Failure Report |
| TT&C | Telemetry, Tracking and Control |
| WBS | Work Breakdown Structure |

# 1.0 — BASIC PROGRAM CONTENT

This Statement of Work (SOW) defines all hardware, services, data, and documentation to be furnished by "Contractor" to Globalstar Limited Partnership, (hereinafter referred to as the "Purchaser") for the LEO Space Segment satellites and associated services procured for the Globalstar 2 GHz System (hereinafter referred to as "the LEO Segment"). The LEO Segment is comprised of forty-eight (48) satellites in eight (8) orbital planes inclined at 52 degrees, at an altitude of approximately 1414 kilometers. The LEO Segment will include eight (8) spares in addition to the constellation of forty-eight (48) satellites. The eight (8) spares shall be launched within two (2) years of establishment of the forty-eight (48) satellite constellation of the LEO Segment. The eight (8) spare satellites shall be launched to and held until required at an in-orbit storage altitude of approximately 920 kilometers.

## 1.0.1 DOCUMENT ORGANIZATION

This document is comprised of seven (7) sections and four (4) annexes, defined as follows:

1. **Section 1** – Overall Program work content and applicable contract documents
2. **Section 2** – Phase 0, Reserved
3. **Section 3** – Phase I, non-recurring Requirements and Design Concept work content
4. **Section 4** – Phase II, non-recurring Development work content
5. **Section 5** – Phase III, recurring Production and Deployment work content
6. **Section 6** – Deliverable Documentation and Deliverable Services work content
7. **Section 7** – Purchaser Furnished Items
8. **Annex A** – Hardware and Software to be delivered to the Purchaser
9. **Annex B** – Documentation to be delivered to the Purchaser
10. **Annex C** – Services to be delivered to the Purchaser
11. **Annex D** – Program Schedule

## 1.0.2 DELIVERABLE ITEM DESIGNATION

This SOW includes designations to identify specific deliverable products. These designations are paragraph unique parenthetical suffixes as follows: Hardware (CI #x.x.x), Services (CS #x.x.x) and Data and Documentation (CDRL #x.x.x). "CI" is a Configuration Item (i.e. hardware), "CS" is a Contract Service and "CDRL" is a Contract Data Requirements List.

## 1.1 WORK CONTENT

Work to be performed by the Contractor in support of this SOW will be defined under four (4) distinct Phases:

1. Phase 0 - Reserved
2. Phase I for the non-recurring LEO Space Segment Requirements and Design Concept effort
3. Phase II for the non-recurring Development activity
4. Phase III for the recurring Production to supply the LEO Segment hardware, the Launch of the LEO Satellites, and the Establishment of the LEO Constellation.

## 1.2 PHASE 0 – RESERVED

## 1.3 PHASE I – GENERAL DESCRIPTION

This non-recurring, definition phase commences at EDC and concludes with the LEO Segment Critical Design Review (CDR). In this phase, in order to validate the architectural approach, confirm design requirements, and define the approach for validating the LEO Segment performance, the Contractor shall perform the following effort focused in two areas as shown:

### Program Planning

1. Develop Cost Data for the non-recurring development and the recurring price of production satellites
2. Develop Program Master Schedule for development, production and deployment of the LEO Space Segment
3. Develop initial Program Management Plan
4. Develop preliminary Spacecraft Launch Base Authorizing Document
5. Develop preliminary Mission Profile Description

### Satellite Design and Verification Requirements

1. Conduct key cost/performance trades to satisfy Purchaser's LEO Segment architectural requirements
2. Confirm Satellite Performance Specification (Contract Exhibit B)
3. Develop Preliminary Interface Requirements
4. Demonstrate a viable, integrated technical solution to Purchaser LEO Segment requirements

5. Demonstrate viability or develop plans for validating critical, non-heritage, subsystem designs and technologies
6. Update Satellite Program Test Plan (PTP, Contract Exhibit C)
7. Develop Preliminary LEO Segment Interface Test Requirements (IAW PTP and Section 6.1.10)
8. Develop Preliminary Test Bed Design Requirements (IAW PTP and Sections 4.2.6 and 4.2.7)
9. Develop Preliminary In-Orbit Test Equipment Design Requirements (IAW PTP and Section 5.2.1.4)

For the establishment of the LEO satellite constellation, the Contractor shall recommend Launch Services that simultaneously launch no more than six (6) satellites on one (1) launch vehicle. The Contractor shall perform a launch services trade study to evaluate performance, reliability, constellation establishment time, cost, and risk in the event of a launch failure.

The Phase I effort will conclude with the LEO Segment Critical Design Review (CDR) (IAW Section 3.2) at EDC + 12 months. This review shall encompass the entire LEO Segment including the LEO satellites and respective interfaces.

## 1.4 PHASE II – GENERAL DESCRIPTION

This non-recurring, development phase commences with closure of the Phase I CDR and concludes with the LEO Segment Final Design Review (FDR). In this phase, the Contractor shall produce governing specifications (segment, satellite and subsystem), plans, and interface documents which will be used to control the detailed design and validate the manufacturing and testing of the LEO Segment. Breadboard and/or engineering models of components and/or subsystems will be completed during this phase. Development of major ground test articles, critical test beds and simulation tools will be initiated and potentially completed during this phase. Satellite qualification testing should initiate during this phase. If the satellite qualification testing is not completed at the time of the FDR, a separate Satellite Qualification Test Results Review shall be required. In this Phase of the Contract, the Contractor will develop plans necessary to successfully manage both the Phase II and Phase III segments of the program.

Following completion of the CDR, the Contractor shall flow down the Satellite requirements to develop a technical design solution including the following activities:

### Program Planning and Management

1. Update Cost Data (non-recurring development and recurring production)

2. Update Program Master Schedule including major subsystem procurements
3. Update Spacecraft Launch Base Authorizing Document
4. Update Mission Profile Description

### Satellite Design and Verification Requirements

1. Complete detailed design and analysis tasks
2. Integrate Product Assurance Requirements into hardware design
3. Confirm Satellite Program Test Plan (PTP)
4. Complete test planning (including In-Orbit testing)
5. Complete Engineering models/breadboards
6. Initiate and potentially complete production of Satellite Structural Test Model (SSTM)
7. Initiate and potentially complete Satellite Structural Test Model Testing
8. Initiate and potentially complete production of Satellite Qualification Model (SQM)
9. Initiate and potentially complete Satellite Qualification Testing

### Production Readiness

1. Define Manufacturing Requirements and Plans
2. Verify Assembly, Integration and Test (AIT) readiness (facility, process and Data Management System)
3. Complete tooling
4. Complete MAGE/EAGE design/procurement and test
5. Complete final procurement

### Intersegment (LEO Space Segment–Ground Segment and LEO Space Segment–Launch Segment) Interface Definition and Verification

1. Update Space-Ground and Spacecraft-Launch Vehicle Interface Control Documents
2. Participate in Space-Ground Interface Verification Development Tests, including:
   a. Satellite to Purchaser-provided Ground Control Network Telemetry and Command Interface Unit
   b. Space-Ground Communications Interface to Purchaser-provided Ground Network User Terminals and Gateways

c. Data Generator simulator script for Satellite Operations Control Center (SOCC) interface testing

During this phase the Contractor shall design and initiate and potentially complete manufacture, integration, and validation of the following test and simulation tools. These tools shall be completed consistent with completion of satellite qualification and no later than Launch – 6 months:

1. Satellite Communications Payload Test Bed (IAW Section 4.2.6)
2. Satellite Control Subsystem Test Bed (Digital and Controls/Attitude and Orbit Control Subsystem [AOCS]/Flight Software) (IAW Section 4.2.7)

During this phase the Contractor shall initiate design and manufacture of the following launch and mission operations support tools. These tools shall have completed integration and validation no later than Launch –12 months:

1. Satellite Dynamic Simulator (SDS) (IAW Section 4.2.8)
2. In-Orbit Test Equipment (IOTE) (IAW Section 5.2.1.4)

The Subsystem Test Beds shall be located in the Contractor's facility. The test beds will remain located in the Contractor's facility, fully operational, and accessible to both Contractor- and Purchaser-designated personnel for the contractual life of the LEO Segment.

The Satellite Dynamic Simulator for the LEO satellite shall be installed in the Purchaser's SOCC in support of the first LEO launch and shall be delivered to the Purchaser at the delivery of the LEO constellation. Prior to Constellation Delivery, the Purchaser shall have access, as required, to the LEO SDS to support safe operations of the accepted LEO satellites.

The Phase II effort concludes with the Final Design Review (FDR) (IAW Section 4.1) to be held no later than EDC + 30 months. If the satellite qualification testing is not completed at the time of the FDR, a separate Satellite Qualification Test Results Review (IAW Section 4.1.1) shall be held no later than 6 months following the FDR or EDC + 36 months.

Subject to the terms of Phase II of the Contract, initial procurement in preparation for the Phase III manufacturing effort may be initiated during Phase II.

## 1.5 PHASE III – GENERAL DESCRIPTION

The Contractor shall manufacture, integrate, and test the required number of Satellites, deliver the Satellites to the Launch site, and provide Launch Services (including Satellite Dispensers,

Launch Vehicles, Launch Base Operations, and Launch Insurance) and Mission Operations Support Services from launch through in-orbit test.

For the Fifty-six (56) LEO Satellites, the Purchaser will provide the Satellite Operations Control Center (SOCC) and T&C Ground Control Network for orbit raising and in-orbit testing to establish and replenish a Forty Eight (48) satellite constellation. To achieve this Constellation, a total of fifty six (56) satellites shall be manufactured and launched by the Contractor. The eight (8) spare LEO satellites shall be launched within two (2) years of completing Constellation Establishment and maintained in their storage orbit following in-orbit test. The Purchaser will perform the necessary orbit raising for the eight (8) in-orbit spares. Following completion of the LEO forty-eight (48) satellite constellation, the Contractor will deliver the LEO satellite In-orbit Test Equipment (IOTE) to the Purchaser at the Purchaser's defined locations.

## 1.6 CONTRACTUAL DOCUMENTATION

### 1.6.1 Satellite Performance Specification – Contract Exhibit B

The Preliminary LEO Satellite Performance Specification is provided as Exhibit B to the Contract. The LEO specification shall be completed and approved by the Purchaser no later than the CDR.

The Contractor may release Interim Specification Change Notices (ISCNs) at any time after Purchaser authentication (Class II) or approval (Class I) occurs.

Purchaser will normally authenticate Class II changes within twenty-four (24) hours and Class I within ten (10) days after receipt of the change package.

Purchaser will formally issue Specification Change Notices (SCNs) or Revisions to the Satellite Specification for all changes, regardless of classification.

### 1.6.2 Satellite Program Test Plan (PTP) – Contract Exhibit C

The Preliminary LEO Satellite Program Test Plan is provided as Exhibit C to the Contract. The PTP shall describe testing to be performed on the Structural Test Model, the Qualification and Flight Satellites (including units and subsystems as required), Launch Base testing, In-Orbit Testing and any satellite post-storage, pre-shipment testing. The PTP shall be updated and approved by the Purchaser no later than the CDR.

### 1.6.3 Product Assurance Plan (PAP) – Contract Exhibit D

The Contractor shall submit a Product Assurance Plan to the Purchaser at Start of Contract. The Product Assurance Plan (PAP)(CDRL #1.6.3) shall be revised to incorporate any changes that result from subcontract activities or product structure, and to completely describe Product

Assurance as an integral part of the Assembly, Integration and Test (AIT) approach. The Purchaser will approve the PAP at closure of the CDR. Contractor reserves the right to change internal product assurance operating procedures and methods where greater efficiency, accuracy, or cost savings can be achieved, provided such change does not materially affect the quality of the effort to be performed under the PAP.

### 1.6.4 Contractor Reference Documents

The Contractor shall follow best practices in executing the effort defined in this Contract. Where applicable, Contractor may reference existing Contractor and accepted industry standards in lieu of developing Contract specific plans, policies and procedures. At Purchaser's request, Contractor shall allow Purchaser review of such referenced documents. Specifically, Contractor shall perform system engineering activities in support of this Contract consistent with Contractor Reference Document E20.

# 2.0 — PHASE 0 - RESERVED

# 3.0 — PHASE I EFFORT

Consistent with the work content described in Section 1.3, the Contractor shall conduct one formal review during this phase – the LEO Segment Critical Design Review (CDR).

Closure of the CDR action items shall signify confirmation of the architectural requirements and design feasibility for the LEO Segment. It shall also signify agreement by both the Purchaser and the Contractor that the selected approach represents a cost-effective and risk-managed approach for meeting the LEO Segment performance requirements and deployment schedule.

Closure of the CDR action items shall further signify confirmation of performance requirements, test requirements for verifying performance compliance, and agreement by both the Purchaser and the Contractor that the selected technical approach represents a compliant solution to LEO Segment performance requirements.

## 3.1 RESERVED

## 3.2 LEO SEGMENT CRITICAL DESIGN REVIEW (CDR)

The Contractor will conduct a CDR at its facility not later than EDC + 12 months. The Contractor shall provide to the Purchaser the following: CDR Agenda (CDRL #3.2.1), CDR Presentation Material (CDRL #3.2.2), CDR Data Package (CDRL #3.2.3). The review and the associated data package shall describe the design approach and production plan through the following elements.

### Program Planning

1. Cost Data (IAW Section 6.1.1)
2. Final Program Management Plan (IAW Section 6.1.2)
3. Final Configuration and Data Management Plan (IAW Section 6.1.3)
4. Spacecraft Launch Base Authorizing Document (IAW Section 6.1.4)
5. Mission Profile Description (IAW Section 6.1.5)
6. Program Master Schedule (IAW Section 6.1.6)
7. Satellite Product Structure
8. Satellite Program Test Plan Cost and Risk Assessment (IAW Section 6.1.7)
9. Preliminary Assembly, Integration, and Test Plan (IAW Section 6.1.8)
10. Subcontractor Progress Review (IAW Section 6.2.2)

11. Software Management Plan (flight and test software) (IAW Section 6.1.12)
12. Final Product Assurance Plan (IAW Section 1.6.3)

### Satellite Design and Verification Requirements

1. Final LEO Satellite Performance Specification (IAW Section 1.6.1)
2. Final Environmental Requirements Specification
3. Updated Design Verification Report (IAW Section 6.1.9)
4. Preliminary Interface Control Documents (IAW Section 6.1.10)
5. Preliminary Interface Layout Drawings (IAW Section 6.1.11)
6. Final LEO Satellite Program Test Plan (IAW Section 1.6.2)
7. Satellite Reliability Model
8. Preliminary LEO Segment portion of Space-Ground Communications Interface Specification
9. LEO Segment Technical Risk Assessment Summary (IAW Section 6.1.13)
10. Preliminary Satellite design
    a. Spacecraft Configuration Requirements Drawing (including internal and external configuration descriptions, stowed and deployed) (IAW Sections 6.1.10 and 6.1.11)
    b. Preliminary mass, power, and fuel budgets
11. Performance models (IAW Section 6.1.14)
12. Preliminary results of engineering and breadboard models
13. Design Specifications and Test Plans
    a. Satellite Communications Payload Test Bed (IAW Section 4.2.6)
    b. Satellite Control Subsystem Test Bed (Digital and Controls/AOCS/Flight Software) (IAW Section 4.2.7)
    c. Satellite Dynamic Simulator (IAW Section 4.2.8)
    d. Satellite In-Orbit Test Equipment (IAW Section 5.2.1.4)
    e. Factory and Launch Base EAGE/MAGE (IAW Section 4.2.9)

The Purchaser approved CDR Report (CDRL #3.2.4) combined with the presentation of the Subsystem CDRs will constitute completion of the Review. The LEO Segment CDR actions

shall be closed no later than 6 months following the CDR or EDC + 18 months.

Contractor shall invite Purchaser, as an observer, to attend all major subsystem CDRs, including those conducted by Subcontractors. Purchaser shall be provided with the full set of CDR documentation for each major subsystem CDR. Major subsystems include the following: payload, power, propulsion, structure, thermal, digital and controls, and AOCS.

## 3.3 RESERVED

### 3.3.1 Reserved

# 4.0 — PHASE II EFFORT

Consistent with the work content described in Section 1.4, the Contractor shall conduct one formal review during this phase – the LEO Segment Final Design Review (FDR). This phase completes the hardware and software design, and focuses on preparation for full initiation of the Phase III recurring production effort.

For the duration of the qualification test for both the communications payload subsystem and for the satellite, the Purchaser shall have a Technical Representative resident full-time in the Contractor's facility. This Technical Representative shall have full access to view qualification tests and to review qualification test procedures and results.

If the satellite and major subsystem qualification testing is not completed at the time of the LEO Segment FDR, an additional formal review shall be required to complete the Phase II effort.

Successful completion of the FDR shall signify joint agreement between the Contractor and the Purchaser that the detailed design represents a compliant and producible product. It shall also establish manufacturing readiness and reconfirm that the selected approach represents a cost-effective and risk-managed approach for meeting the LEO Segment deployment schedule. Closure of the FDR actions signifies verification of the design and validation of its compliance to the Purchaser's requirements.

## 4.1 LEO SEGMENT FINAL DESIGN REVIEW (FDR)

The Contractor will conduct a LEO Segment FDR at its facility no later than EDC + 30 months. The Contractor will complete all development testing, other than life testing and potentially satellite qualification testing, prior to conducting the FDR. The Contractor shall provide to the Purchaser the following: FDR Agenda (CDRL #4.1.1), FDR Presentation Material (CDRL #4.1.2), FDR Data Package (CDRL #4.1.3) The review and associated data package shall describe the design solution and present supporting data to substantiate the product definition through the following elements:

### Program Planning

1. Final Satellite Product Structure and Drawing Trees
2. Program Plans
   a. Final Spacecraft Launch Base Authorizing Document (IAW Section 6.1.4)
   b. Final Mission Profile Description (IAW Section 6.1.5)
   c. Confirm Final Satellite Program Test Plans (IAW Section 1.6.2)

d. Assembly, Integration and Test (AIT) Plan and Demonstrated Readiness. (IAW Section 6.1.8)

e. Subcontractor Logistic plans

f. Data Management System verification

g. Satellite Transportation and Handling Plan (IAW Section 6.1.15)

h. Satellite Long-Term Storage Plan (IAW Section 6.1.16)

## Satellite Design and Verification Requirements

1. Design Description (IAW Sections 6.1.10 and 6.1.11)
   a. Description of Satellite system design
   b. Description of Satellite "subsystem" design and arrangement
   c. Electrical schematics and Functional Block Diagrams
2. Design Verification.
   a. Design Verification Report (IAW Section 6.1.9)
   b. Design analyses that support the design solution including assumptions, test, trade study results, etc., which provided the basis for the results
   c. Development test results
   d. Satellite Structural Test Model (SSTM) Test Results (IAW Section 4.2.2)
   e. Satellite and Major Subsystem Qualification test results (as available) (IAW Sections 4.2.3, 4.2.4, and 4.2.5)
3. Reliability Analysis results
   a. Results of FMECA analyses
4. Satellite Interface Verification
   a. Responsibilities/plans
   b. Planned fit checks
5. Completed Test and Simulation Tools and Test Reports
   a. Satellite Communications Payload Test Bed (IAW Section 4.2.6)
   b. Satellite Control Subsystem Test Bed (Digital and Controls/AOCS/Flight Software) (IAW Section 4.2.7)

6. In-process development of Launch and Mission Operations Support Tools
    a. Satellite Dynamic Simulator (IAW Section 4.2.8)
    b. In-Orbit Test Equipment (IOTE) (IAW Section 5.2.1.4)

### Launch Segment Planning

1. Launch Vehicle Description
    a. Interface definitions and verification plans
    b. Dispenser and satellite separation device design features
    c. Satellite Separation and Collision Avoidance analyses
2. Launch Base Operations
    a. Fuel loading plan
    b. Transportation
    c. Launch Base Flow
    d. EAGE/MAGE
    e. Staffing
    f. Testing
    g. Battery Maintenance

The Purchaser approved FDR Report (CDRL #4.1.4) together with the presentation of Subsystem FDRs will constitute completion of the FDR. The LEO Segment FDR action items shall be closed no later than 3 months following the FDR or EDC + 33 months.

Contractor shall invite Purchaser, as an observer, to attend all major subsystem FDRs, including those conducted by Subcontractors. Purchaser shall be provided with the full set of FDR documentation for each major subsystem FDR. Major subsystems include the following: payload, power, propulsion, structure, thermal, digital and controls, and AOCS.

### 4.1.1 Satellite Qualification Test Results Review

In the event that the Contractor has not completed Satellite Qualification Testing or Subsystem Qualification Testing at the time of the FDR, the Contractor shall conduct a separate Satellite Qualification Test Results Review (QTRR). The Contractor shall provide to the Purchaser the following: QTRR Agenda (CDRL #4.1.1.1), QTRR Presentation Material (CDRL #4.1.1.2), QTRR Data Package (CDRL #4.1.1.3). The Purchaser approved QTRR Data Package (CDRL

#4.1.1.3) together with the Major Subsystem Qualification Test Reports (IAW Section 4.2.5) shall constitute completion of the Qualification Test program.

The QTRR shall be held no later than 6 months following the FDR or EDC + 36 months.

## 4.2 PHASE II – DEVELOPMENT HARDWARE AND RELATED DATA AND SERVICES

It is anticipated that the Purchaser may require access to developmental hardware for the purpose of early inter-segment element testing. Purchaser will work with the Contractor to identify a mutually agreeable schedule for access to specific hardware items, as required.

### 4.2.1 Component Development and Test

For components that do not have previous flight heritage, the Contractor will design, manufacture and conduct tests as described in the Satellite Program Test Plan (IAW Section 1.6.2).

### 4.2.2 Satellite Structural Test Models (SSTM)

The Contractor will develop, manufacture, and test one (1) Satellite Structural Test Model (SSTM) for structural qualification (CI #4.2.2). This model will not be refurbished for flight.

The SSTM Test Report ( CDRL #4.2.2) is deliverable. The report shall be provided to the Purchaser within four (4) weeks following completion of the tests.

### 4.2.3 Satellite Communications Payload Qualification Models (PQM)

The Contractor will develop, manufacture, and test one (1) Satellite Communications Payload Qualification Model (PQM) (CI #4.2.3). This model will be used to demonstrate payload performance to qualification requirements as defined in the Program Test Plan. The PQM will be assembled into the Satellite Qualification Model for completion of the qualification test program.

The PQM Test Report (CDRL #4.2.3) is deliverable. The report shall be provided to the Purchaser within four (4) weeks following completion of the tests. Purchaser shall be notified within 24 hours of any Class I discrepancies noted during qualification testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their resolution.

### 4.2.4 Satellite Qualification Models (SQM)

The Contractor will develop, manufacture, and test one (1) Satellite Qualification Model (SQM). This model will be used to demonstrate Satellite performance to qualification requirements as defined in the Program Test Plan. It is not anticipated that this Satellite will be refurbished for flight readiness.

The SQM Test Report (CDRL #4.2.4) is deliverable. The report shall be provided to the

Purchaser within four (4) weeks following completion of the tests. Purchaser shall be notified within 24 hours of any Class I discrepancies noted during qualification testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their resolution.

### 4.2.5 Major Subsystem Qualification Test Reports

The qualification test reports for the major subsystems are deliverable to the Purchaser prior to the LEO Segment FDR. It is envisioned that the major subsystems shall include the propulsion, power, thermal, attitude and orbit control, and digital and controls subsystems. The Contractor, upon request, shall provide to the Purchaser for review, any requested qualification test report.

Purchaser shall be notified within 24 hours of any Class I or Class II discrepancies noted during subsystem qualification testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their resolution.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

### 4.2.6 Satellite Communications Payload Test Beds (CPTB)

The Contractor shall develop, manufacture, and validate through test one (1) Satellite Communications Payload Test Bed. This flight equivalent Test Bed shall consist of the communications payload portion of the LEO Segment Satellite and be useable for ground system interface development and communications payload diagnostic testing. This Test Bed shall be provided with all Software (including source code or software license for duration of LEO Segment design life), Ground Support Equipment and an Operational Manual (CDRL #4.2.6.4). The Contractor shall be obligated for the LEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements. The Contractor shall also supply the spare parts necessary to keep the test bed fully functional for the design life of the LEO Segment. The Contractor shall provide Training Services on the Test Bed (CS #4.2.6)

The Specification (LEO CDRL #4.2.6.1) and Test Plan (CDRL #4.2.6.2) for the Test Bed shall be presented at the LEO Segment CDR. The test bed shall be completed no later than six (6) months prior to the first LEO Satellite Launch.

The Satellite Communications Payload Test Bed Operations Validation Report (CDRL #4.2.6.3) is deliverable to the Purchaser at Constellation Delivery.

### 4.2.7 Satellite Control Subsystem Test Beds (CSTB)

The Contractor shall develop, manufacture, and validate through test one (1) Satellite Control Subsystem Test Bed (Digital and Controls/Attitude and Orbit Control Subsystem [AOCS]/Flight

Software). This flight equivalent Test Bed shall consist of the controls portion of the LEO Segment Satellite and be useable for ground system interface development and controls subsystem diagnostic testing. This Test Bed shall be provided with all Software (including source code or software license for duration of LEO Segment design life), Ground Support Equipment and an Operational Manual (CDRL #4.2.7.4). The Contractor shall be obligated for the LEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements. The Contractor shall also supply the spare parts necessary to keep the test bed fully functional for the design life of the LEO Segment. The Contractor shall provide Training Services on the Test Bed (CS #4.2.7).

The Specification (LEO CDRL #4.2.7.1) and Test Plan (CDRL #4.2.7.2) for the Test Bed shall be presented at the LEO Segment CDR. The test bed shall be completed no later than six (6) months prior to the first LEO Satellite Launch.

The Satellite Control Subsystem Test Bed Operations Validation Report (CDRL #4.2.7.3) is deliverable to the Purchaser at Constellation Delivery.

### 4.2.8 Satellite Dynamic Simulators (SDS)

The Contractor shall develop, manufacture, and validate through test one (1) Satellite Dynamic Simulators (CI #4.2.8). This simulator shall emulate the critical controls functions of the satellite and shall incorporate the flight computer, its flight interfaces and all operational versions of the flight software. This Simulator shall be delivered with all Software (including source code or software license for duration of the specified LEO Segment design life) and an Operational Manual (CDRL #4.2.8.4). If the Contractor elects to deliver the software executable instead of the source code due to proprietary data considerations, the Contractor shall be obligated for the LEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements. The Contractor shall also supply the spare parts necessary to keep the simulator fully functional for the design life of the LEO Segment. The Contractor shall provide Training Services on the Simulator (CS #4.2.8).

The Specification (CDRL #4.2.8.1) and Test Plan (CDRL #4.2.8.2) for the Satellite Dynamic Simulator shall be presented at the LEO Segment CDR. The Simulator shall be completed (installed and validated) by Launch – 12 months. The Simulator Test Report (CDRL #4.2.8.3) shall be provided at the FDR.

The Satellite Dynamic Simulator is deliverable to the Purchaser at Constellation Delivery.

### 4.2.9 Launch Site Test Set

The Contractor shall develop, manufacture, and test Mechanical and Electrical Ground Support Equipment to demonstrate proper functioning of the Satellite and the integrated Satellite/Dispenser assembly.

This equipment may be developed in conjunction with other equipment used at the final Integration and Test facility, but must be capable of supporting operations at the Launch Site. The equipment shall support the launch activities for all launch vehicles and sites proposed in the Launch and Constellation Establishment Plans including contingency schedule scenarios.

# 5.0 — PHASE III EFFORT

The following are tasks to be performed by the Contractor during the planned Phase III Manufacturing and Delivery Phase, which, due to schedule needs, may include the purchase of long lead parts, prior to the conclusion of Phase II with the approval of the Purchaser.

Tasks as described above shall be accomplished in segments as follows:

5.1 Training and Rehearsal

5.2 Flight Model (FM) Delivery and Pre-Launch Acceptance

5.3 Launch and Orbit Raising

5.4 In-Orbit Acceptance

For the duration of the production, assembly, integration and acceptance testing for both the communications payload subsystem and the satellite, the Purchaser shall have a Technical Representative resident full-time in the Contractor's facility. This Technical Representative shall have full access to review manufacturing progress, to observe acceptance tests and to review acceptance test procedures and results. Access shall be subject to Contractor's proprietary and safety rules and regulations.

## 5.1 TRAINING AND REHEARSALS

### 5.1.1 Satellite and Constellation Operation Handbook (SCOH)

The Contractor shall prepare a Satellite and Constellation Operation Handbook (SCOH)(CDRL # 5.1.1) describing the operation of the Satellite. The information contained in the SCOH will be the basis for the command instructions required to operate, control, and maintain the satellite's performance throughout the mission.

The SCOH shall consist of four (4) volumes:

1. **Volume I, Satellite Systems Summary** — An overview of the satellite and its systems and payload as related to on-orbit operations
2. **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
3. **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

4. **Volume IV, Satellite Parameters Handbook** — Specific quantitative, satellite parameters (calibration data) as related to on-orbit operations

The SCOH, with an initial release at FDR, will be updated and delivered to the Purchaser at Launch minus twelve (12) months [preliminary release] and again at Launch minus six (6) months [final release].

### 5.1.2 Training

#### 5.1.2.1 Training Plan

The Contractor shall provide the Purchaser with a Training Plan (CDRL #5.1.2.1) for the training of the Purchaser's Operations and Maintenance (O&M) personnel.

The Training Plan, with an initial release at FDR, will be updated and delivered to the Purchaser at Launch minus twelve (12) months.

#### 5.1.2.2 Training Materials

The Contractor shall provide the necessary Training Materials (CDRL #5.1.2.2) to train the Purchaser's O&M personnel. These manuals shall be described in the Training Plan.

#### 5.1.2.3 Training Services

The Contractor shall provide Training Services (CS #5.1.2.3) on the Satellite systems to the Purchaser's O&M personnel. Training shall be accomplished at a location to be confirmed by the Purchaser and will be based on a training content agreed to within the Training Plan.

### 5.1.3 Rehearsals

#### 5.1.3.1 Rehearsal Plan

The Contractor shall provide a Rehearsal Plan (CDRL #5.1.3.1) to the Purchaser at FDR. The Rehearsal Plan will address the following:

1. Rehearsal Objectives
2. Preparation Activities
3. Schedule
4. Staffing Plan
5. Facilities and Equipment Plan
6. Critique Plan

The Rehearsal Plan, with an initial release at FDR, will be updated and delivered to the

Purchaser at Launch minus twelve (12) months.

## 5.2 FLIGHT MODEL DELIVERY AND PRE-LAUNCH ACCEPTANCE

### 5.2.1 Satellite Flight Model (FM) Delivery

#### 5.2.1.1 LEO Satellite Constellation

The Contractor shall manufacture and test fifty-six (56) low Earth orbit (LEO) Satellites (CI #5.2.1) in accordance with the Satellite Performance Specification (Exhibit B to the Contract), the Program Test Plan (Exhibit C to the Contract), and the Product Assurance Plan (Exhibit D to the Contract).

Delivery of the forty-eight (48) of the LEO Satellites is on-orbit, in the designated operational orbital slots and fully tested and ready for operation.

When satellite IOT has been completed (whether it be in the Phasing Orbit (for spares) or in the Operational Slot), the Contractor shall submit to the Purchaser the test results, together with certification that the satellite meets the acceptance criteria, and Purchaser shall at the Acceptance Review either accept the satellite in writing or reject the satellite. Purchaser rejection shall provide specific details of contractual non-compliance. If orbit raising is delayed by the Purchaser, the Contractor shall be permitted to submit to the Purchaser satellites for acceptance in their Phasing Orbits.

#### 5.2.1.2 LEO Spare Satellites

The eight (8) LEO spare satellites shall be launched within two (2) years of the completion of Constellation Establishment. Launch of the eight (8) remaining LEO satellites is required to locations approved by the Purchaser. The eight (8) spare satellites are to be used at the discretion of the Purchaser to replace failed satellites or satellites which do not meet the criteria for acceptance. The Contractor shall be responsible for Satellite Storage (CS #5.2.1.2) (IAW Section 1.6.2) for satellites that are not required to establish the Final LEO Satellite Constellation of Forty-eight (48) Satellites. Spare Satellites, if launched during Constellation Establishment, shall be accepted upon successful testing at their assigned position, whether in the Phasing Orbit or in the Operational Slot.

#### 5.2.1.3 Flight Software

Contractor shall deliver to the Purchaser all versions of the Satellite Flight Software (CDRL #5.2.1.3) as implemented in the launched and ground stored satellites. Contractor shall deliver the flight software source code or grant a flight software operational license for the duration of the realizable in-orbit life of the satellites (may exceed design life). If the Contractor elects to deliver the software executable instead of the source code due to proprietary data considerations,

the Contractor shall be obligated for the LEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements.

#### 5.2.1.4 In-Orbit Test Equipment

Contractor shall develop, manufacture, and validate through test Satellite In-Orbit Test Equipment (CI #5.2.1.4) to validate the health and to characterize the performance of the satellite communications payload. The Contractor shall deliver and permanently install two (2) LEO Satellite IOT equipment suites at Purchaser's designated Earth Station locations. Contractor shall also deliver and permanently install two (2) sets of IOT interface management and control equipment in the Purchaser's designated primary and alternate SOCC.

This equipment shall be provided with all Software (including source code or a software license for duration of LEO Segment design life), Ground Support Equipment and an Operational Manual (CDRL #5.2.1.4.4). If the Contractor elects to deliver the software executable instead of the source code due to proprietary data considerations, the Contractor shall be obligated for the LEO Segment design life, for a reasonably negotiated future price, to provide to the Purchaser software maintenance and requested enhancements. The Contractor shall also supply the spare parts necessary to keep the IOTE fully functional for the design life of the LEO Segment. The Contractor shall provide Training Services on the IOTE (CS #5.2.1.4)

The Specification (CDRL #5.2.1.4.1) and Test Plan (CDRL #5.2.1.4.2) for the IOTE shall be presented at the LEO Segment CDR. The equipment shall be completed (installed and validated) by Launch – 12 months. The IOTE Test Reports (CDRL #5.2.1.4.3) shall be provided at the FDR.

The IOTE shall be delivered at Constellation Delivery.

### 5.2.2 Satellite Level – Required Documents

#### 5.2.2.1 Satellite Log Books

The Contractor shall maintain a separate log book for each Satellite. Each Satellite Log Book (CDRL #5.2.2.1) shall contain a complete history of the manufacture of the Satellite and shall contain such information as:

1. Tests conducted, results, failures, failure corrections and test waivers
2. Discrepancies, deviations and Specification requirements waivers
3. Repair, maintenance, and modification records
4. Satellite movements, shipments, and storage

The log book, or a copy, will be provided to the Purchaser at the Launch Readiness Review (LRR) for each Satellite. Electronic format is acceptable.

### 5.2.2.2 Payload Subsystem Flight Model Acceptance Test Reports

Acceptance Test Reports (CDRL #5.2.2.2) for each flight model satellite payload (FM #1-56) are deliverable. Test Reports must be provided to the Purchaser within four (4) weeks following the tests.

Purchaser shall be notified within 24 hours of any Class I discrepancies noted during acceptance testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their resolution.

### 5.2.2.3 Satellite Flight Model Acceptance Test Reports

Acceptance Test Reports (CDRL #5.2.2.3) for each flight model satellite (FM #1-56) are deliverable. Test Reports must be provided to the Purchaser within four (4) weeks following the tests.

Purchaser shall be notified within 24 hours of any Class I discrepancies noted during acceptance testing. Contractor shall also fully disclose to the Purchaser all Class II discrepancies and their resolution.

### 5.2.3 Satellite Pre-Shipment Review (PSR)

A Pre-Shipment Review will be held for each satellite at the AIT facility.

The Contractor shall provide to the Purchaser a Satellite Specific PSR Report (CDRL #5.2.3.1). The PSR Report will summarize the following:

1. Summary Overview
    a. Program Test Plan compliance statement
    b. Unique hardware list
    c. Open NCR list
    d. Unit Failure History
2. Listing of applicable Configuration Change Notices
3. Hardware Configuration
4. Software Configuration
5. As Built Configuration
6. End-Item Data Package Status

7. Data Review Summary and Compliance Validation
8. Non-Conformance Report Status and Closure Plans
9. Open Waiver Summary
10. Satellite Unique Parameters Summary
11. Mission Operations Notification Summary
12. Work Deferred to Launch Base
13. Concurrence to Ship/Store

The As Built/As Designed Data (CDRL #5.2.3.2) shall be prepared in accordance with the Configuration and Management Plan and delivered to the Purchaser at PSR – 2 weeks.

All Requests for Waivers (Class I) will be approved by the Purchaser prior to shipment of the satellite to the launch base or to storage.

The report shall contain a Purchaser approval/rejection block. The Purchaser will approve or notify the Contractor of rejection and rationale, and required corrective action within Twenty-four (24) hours after the review. The approved PSR Report constitutes approval of the Purchaser to ship the satellite to the Launch base.

## 5.3 LAUNCH, ORBIT RAISING AND RELATED SERVICES

### 5.3.1 General

The Contractor shall provide for all launch, launch base services, mission planning, integration of the Satellites/Dispenser with the Launch Vehicle, on-pad launch operations, and coordination with the Launch Vehicle supplier.

The Contractor shall be responsible for orbit-raising of the 48 LEO Satellites as required for Constellation Delivery. Purchaser will provide tracking and command facilities for LEO orbit raising.

### 5.3.2 Launch Services

The Contractor shall provide Launch Services (CS #5.3.2) for the Satellites. Launch Services will be consistent with the Spacecraft Launch Base Authorizing Document (IAW Section 6.1.4) and the Mission Profile Description (IAW Section 6.1.5).

Purchaser shall be invited to participate with the Contractor in all Launch Service Provider program reviews.

### 5.3.3 Contractor Provided Insurance

#### 5.3.3.1 Satellite Insurance

The Contractor shall provide Satellite Insurance (CS #5.3.3.1) for Fifty-six (56) LEO Satellites from intentional ignition, through deployment from the dispenser and initial ground station telemetry beacon receipt (signal acquisition and telemetry processing for initial confirmation of satellite bus health). The Insurance shall be for full replacement cost.

#### 5.3.2.2 Launch Vehicle Insurance

The Contractor shall provide Launch Vehicle Insurance (CS #5.3.3.2) for all Launches required under this Contract.

### 5.3.4 Launch Readiness Review (LRR)

A Launch Readiness Review will be held at the Launch Base after testing and final integration with the launch vehicle. The review shall demonstrate that the Satellites and Launch Vehicle systems are ready for Launch.

The Contractor will conduct a LRR at the Launch Base facility. The Contractor shall provide to the Purchaser the following: LRR Agenda (CDRL #5.3.4.1), LRR Presentation Material (CDRL #5.3.4.2). The LRR Presentation Material will include:

1. Summary of the Launch Base test results for the Satellites and Launch Vehicle
2. Final Mass and Fuel Load
3. Launch Vehicle/Dispenser Readiness
4. Battery Status
5. COMSEC and Vehicle ID assignments
6. Final Launch Vehicle Sequence of Events
7. Launch Vehicle Contingency Plans
8. Launch Vehicle TT&C tracking station status
9. SOCC, Launch Control Facility (LCF) and In-Orbit Test (IOT) facility status
10. Ground Control Network Status
11. Review of countdown and launch procedures

The approved Launch Readiness Review (LRR) Minutes (CDRL #5.3.4.3) will constitute approval of the Purchaser to Launch. The Minutes will be recorded during the LRR and Purchaser is expected to provide approval immediately upon completion of the review.

## 5.4 IN-ORBIT SATELLITE ACCEPTANCE AND REVIEWS

An In-Orbit Test Review (IOTR) will be held for each satellite or group of satellites, including spares upon having completed In-Orbit Tests (IOT). The Contractor shall provide to the Purchaser the following: IOTR Agenda (CDRL #5.4.1.2), IOTR Presentation Material (CDRL #5.4.1.3) and IOTR Minutes (CDRL #5.4.1.4).

The review will demonstrate that the satellite(s) meet the acceptance criteria defined in the Contract and IOT section of the Satellite Program Test Plans. Upon successful completion of the review the Purchaser shall formally accept or reject the satellite(s) for purposes of Operation and Maintenance (O&M). Purchaser rejection shall provide specific details of contractual non-compliance.

### 5.4.1 In-Orbit Test Reports

All Satellite IOT Reports (CDRL #5.4.1.1) are deliverable. The reports shall be provided to the Purchaser within four (4) weeks following the tests.

Test results shall be presented at the In-Orbit Satellite Acceptance Reviews and summarized at the Constellation Delivery Review.

### 5.4.2 Final Operational Constellation Review (FOCR)

When forty eight (48) LEO satellites have been placed in the Final Operational Constellation, the Contractor shall hold a FOCR at the Purchaser's facility, to review final constellation performance, discuss any anomalies which have occurred, and discuss plans for launches of any remaining spares.

The Contractor shall provide to the Purchaser the following: FOCR Agenda (CDRL #5.4.2.1), FOCR Data Package (CDRL #5.4.2.2), FOCR Presentation Material (CDRL #5.4.2.3). The FOCR Data Package and/or Presentation Material will include:

1. Summary of Satellites State of Health, including consumables
2. Summary of the In-Orbit Test Results
3. Summary /Status of any anomalies
4. Final Orbital Position
5. Future Launch and Constellation Plans

The approved FOCR Report (CDRL #5.4.2.4) shall result in Purchaser confirmation of Delivery of the Final Constellation for purposes of assessing Liquidated Damages for Late Delivery.

# 6.0 — DOCUMENTATION AND SERVICES

The following are tasks to be performed by the Contractor during all Phases of the Program (IAW Annex B) and will be accomplished in segments as follows:

6.1 Deliverable Documentation

6.2 Deliverable Services and Related Documentation

## 6.1 DELIVERABLE DOCUMENTATION

The following are documents to be developed and maintained by the Contractor during the Program.

### 6.1.1 Cost Data

The Contractor will provide the Cost Data (CDRL #6.1.1) for the proposed Satellite, to confirm both the non-recurring and the recurring cost target. The cost data shall be a means to demonstrate to the Purchaser at any time during Phase I and II that the Contractor is able to develop and produce the Satellite for the unit price agreed in the Contract. Following the start of Phase I, the Cost Data shall be delivered monthly. Purchaser acceptance of the Contractor's LEO Satellite price at closure of FDR signifies completion of this activity with respect to recurring costing.

### 6.1.2 Program Management Plan

The Contractor shall develop a Program Management Plan (CDRL #6.1.2) which will provide detailed planning of the overall management of the Program in both Phase II and Phase III. It will show the following:

1. Organizational philosophy and structure and any transitional changes between Phases
2. Organization and staffing plan, with particular emphasis on subcontractor relationships
3. All Contractor and subcontract roles and responsibilities
4. Role of Systems Engineering
5. Role of Producibility and Production control
6. Concurrent Engineering Philosophy encompassing design, manufacture and AIT
7. Program Master Schedule (IAW Section 6.1.6)
8. Producibility, Quality Assurance and Cost Management Philosophies
9. Risk Mitigation philosophy and approach
10. Work Breakdown Structure (WBS)

11. Description of Launch Vehicle Supplier Management

This Plan will also provide detailed planning of the management of the Subcontractors. It will include the following:

1. Subcontract management tools for oversight of alliance members and sub-tier suppliers
2. Reporting requirements of major Subcontractors
3. Technical assistance and technology transfers where applicable and how such transfers are to be managed without interruption of the Program schedule

The Program Management Plan will be finalized prior to CDR.

### 6.1.3 Configuration and Data Management Plan

The Contractor shall establish a system of configuration and data management that assures configuration identification, configuration control, historical traceability, performance of configuration audits, and compliance with LEO Segment performance requirements. Provisions for Configuration Control Board (CCB) activity will be addressed in this Configuration and Data Management Plan (CDRL #6.1.3). The Contractor shall develop this Plan in conjunction with the AIT approach with initial approval by the Purchaser no later than closure of the Critical Design Review (CDR).

### 6.1.4 Spacecraft Launch Base Authorizing Document

The Contractor shall provide a Spacecraft Launch Base Authorizing Document (CDRL #6.1.4) to the Purchaser prior to contracting with Launch Service Providers, which defines the Contractor's recommended launch vehicle selection, the proposed launch sequence, and launch options to mitigate risk in the event of launch vehicle failure. The Contractor shall only propose launch services that limit the number of LEO satellites simultaneously launched to six or less ($\leq$6).

### 6.1.5 Mission Profile Description

The Contractor shall prepare a Mission Profile Description (CDRL #6.1.5) which will address the following:

1. **Pre-Launch Plans**
   a. Short-term Ground Storage plans/Refurbishment plans
2. **Launch Related Plans**
   a. Support personnel deployment
   b. Readiness criterion
   c. Injection

3. **Orbit Raising Plans**

   a. Orbit Raising and Constellation Population plans

   b. Orbital storage plans

4. **Orbit Analysis and Planning Tools**

   a. Description

   b. Platform Requirements

   c. Verification

   d. Operation and Maintenance plans

5. **Risk and Failure Management**

   a. Plans in the event of a launch failure or delay in launch vehicle availability

   b. Plans for replacement of a failed satellite

6. **Facility Requirements and Plans**

   a. Number, capability, predicted satellite coverage and location of facilities required to perform the following functions:

      (1) Launch

      (2) Orbit Raising

      (3) In-Orbit Testing

      (4) Failure Diagnosis and Recovery

      (5) De-Orbit

The Mission Profile Description shall be delivered at CDR (Preliminary) and at FDR (Final).

### 6.1.6 Program Master Schedule

The Contractor will develop the Program Master Schedule for all activities covered by the Contract including proposed launch schedules that are projected to be part of the production contract. While schedule hierarchy shall be in accordance with the Contractor CSM practices, it is necessary to provide the Purchaser with visibility into those activities that define and potentially affect performance. This shall be provided through the development of appropriate Intermediate and Supporting Detail Schedules that show the dependencies among the activities. The critical paths for the Program and each subsystem shall be clearly marked.

Schedule status reporting, including all Subcontractor schedules and update requirements shall be made on a bimonthly basis and may be included in the Bimonthly Report. (The Contractor is

expected to transmit to the Purchaser the same schedules being used to manage the Program so that minimum additional effort is necessary.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

### 6.1.7 Satellite Program Test Plan Cost and Risk Assessment

The Contractor shall prepare a Cost and Risk Assessment (CDRL #6.1.7) of the Satellite Program Test Plan to include considerations of technical risk, development cost and schedule for system qualification and production cost and schedule for system acceptance testing.

For the LEO satellite, the Contractor shall perform the assessment consistent with the factory flow defined in the Assembly, Integration and Test (AIT) Plan (IAW Section 6.1.8)

### 6.1.8 Assembly, Integration and Test (AIT) Plan

The Contractor shall prepare an AIT Plan (CDRL #6.1.8) describing satellite assembly, integration and test beginning at the AIT facility and culminating at the launch base. The AIT Plan, with an initial release at CDR, will be updated and delivered to the Purchaser two (2) weeks prior to FDR.

### 6.1.9 Design Verification Report

All requirements verification information shall be included in a Design Verification Report (DVR) (CDRL #6.1.9). The DVR shall consist of three sections:

**Section I** – Performance Compliance Matrix listing requirements to be verified from top-level Specifications and Interface Control Documents (ICDs). These requirements shall be identified with requirement traceability numbers (REQIDS) and assigned to their respective subsystems.

**Section II** – Verification Plan defines the means of verification to a sufficient level of detail for Purchaser audit. The requirements from Section I are restated with the level that verification takes place (component, unit, subsystem, satellite or system). The method is defined (inspection, test, demonstration, analysis/simulation) and the period defined in which this verification data shall be produced.

**Section III** – Verification Data in the form of Engineering Memorandum (EM). The requirements are again shown in a matrix with the associated verification method identified. The capability determined from test or simulation is then provided to permit assessment of the available margin. The matrix also references the EMs which are included in the document.

### 6.1.10 Interface Control Documents

Interface Control Documents shall be provided to the Purchaser at the System CDR, as part of the CDR Data Package. Final ICD's shall be provided at FDR unless specifically defined as deliverable at Launch – 12 months (L-12). CDRL numbering is defined in Annex B. The Contractor shall develop and maintain the following Interface Control Documents (ICDs):

1. **Intrasatellite ICDs**
   a. Satellite Electrical Schematics (CDRL #6.1.10.1)
2. **Intersegment ICDs**
   a. Satellite Telemetry and Command Database (CDRL #6.1.10.2)
   b. Launch Service Requirements Document (CDRL #6.1.10.3)
   c. Satellite to Launch Vehicle ICD (CDRL #6.1.10.4)
   d. Launcher (or Launch Base) to SOCC ICD (CDRL #6.1.10.5).
   e. TT&C Space to Ground ICD (CDRL #6.1.10.8)
   f. Satellite Dynamic Simulator to SOCC/LCF ICD (CDRL #6.1.10.10)
   g. Gateway to IOTE ICD (CDRL #6.1.10.6) (final at L – 12)
   h. SOCC/LCF to AIT Facility ICD (CDRL #6.1.10.7) (final at L-12)

The Contractor shall provide inputs to the following ICDs that are the responsibility of the Purchaser:

1. **External ICDs**
   a. Satellite portion of Globalstar Space-Ground Communications Interface Document

### 6.1.11 Interface Design Layout (IDL)

The Contractor shall provide to the Purchaser Interface Design Layout (IDL) drawings (CDRL #6.1.11) for the Satellite and subsystems. The drawings shall fully describe both stowed and operational (deployed) configurations and shall clearly indicate dimensions, reference axes, and equipment labels. Drawings shall include plan view, front and side elevations and an isometric view.

The Interface Design Layout (IDL) shall be provided to the Purchaser at the System FDR, as part of the FDR Data Package.

### 6.1.12 Software Management Plan

The Contractor shall prepare a Software Management Plan (CDRL #6.1.12) defining the processes, management approach and quality assurance measures implemented to ensure timely, performance compliant software for the Satellites, other deliverable Configuration Items and the ground support equipment.

### 6.1.13 LEO Segment Technical Risk Assessment Summary

The Contractor shall prepare a LEO Segment Technical Risk Assessment Summary (CDRL #6.1.13) which identifies the critical path development, production, integration and test technical risk items and the Contractor's plan for risk mitigation to ensure performance, cost and schedule compliance.

### 6.1.14 Performance Models

The Contractor shall produce Performance Models to the degree necessary to define, analyze, or confirm performance of the Satellite against LEO Segment requirements. Model descriptions shall first be provided to the Purchaser at CDR as part of the Data Package. Update status will be included in the Bimonthly Report to maintain current prediction of performance against requirements. Reports and results will be provided to the Purchaser following these updates. The following models will be developed by CDR and maintained and updated at FDR.

1. Attitude and Orbit Control Subsystem (AOCS) Pointing Error Model
2. Alignment Plan
3. Spacecraft Thermal Dissipation Model
4. Command and Telemetry Model
5. Size and Mass Property Model
6. Payload Performance Model
7. Electrical Power Performance Model
8. Computer Memory and Processing Model
9. Propulsion System Performance Model

The final software models for the Spacecraft Thermal Dissipation Model and for the Electrical Power Performance Model shall be delivered at FDR (including algorithms, source code and an operations manual). The Purchaser will integrate these satellite subsystem performance models with the Purchaser's system planning software resource allocation model. During the design life of the LEO Segment, the Contractor shall assist the Purchaser at a reasonably negotiated future price in updating the models as required to best correlate with observed in-orbit satellite performance.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

### 6.1.15 Satellite Transportation and Handling Plan (including Test Equipment)

The Contractor shall provide for use during production and launch operations, all necessary Satellite Transportation, Handling and Test equipment, including container(s) to transport the Satellites to the Launch Site and equipment for handling and testing the Satellite(s) at the launch base.

The Contractor shall prepare and make available to the Purchaser a Satellite Transportation and Handling Plan (CDRL #6.1.15). The plan shall include transportation of the integrated satellites to the applicable launch sites. This plan with an initial release at FDR, will be updated and delivered to the Purchaser at Launch minus six (6) months.

### 6.1.16 Satellite Long-Term Storage Plan

The Contractor shall prepare a Satellite Long-Term Storage Plan (CDRL #6.1.16) for the LEO Satellites consistent with an expected storage period of up to two (2) years following Constellation Establishment. The plan shall define the required ground support equipment for storage and post-storage recovery. The plan shall be consistent with the Satellite Program Test Plan requirements for storage and pre- and post-storage test requirements.

## 6.2 DELIVERABLE SERVICES AND RELATED DATA

The following are tasks to be performed by the Contractor during all three (3) Phases of the Program.

### 6.2.1 Configuration Control Board (CCB)

The Contractor will schedule CCB meetings (CS #6.2.1) on an as required basis. For Class I changes the Purchaser will be invited to attend. The Purchaser shall be informed at least 24 hours in advance of any Class I related CCB meetings. The Purchaser shall receive a copy of the Minutes of the Contractor's CCB Proceedings.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

### 6.2.2 Subcontractor Review Meetings – Notification

The Purchaser will be invited, as an observer to attend major Subcontractor Review Meetings. Notification of major subcontractor review meetings will be at least one week in advance of the meeting.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique

CDRL identification number.

### 6.2.3 Design Review Action Item Tracking/Closure Process

The Contractor shall provide an Action Item Tracking/Closure System (CS #6.2.3) for the action items resulting from Purchaser's review of the data packages and generated during the review.

Action Items (AI's) may be generated during the course of the review but not submitted until the end of that day's presentations. Action items will be jointly reviewed by the Purchaser and the Contractor and after a thirty (30) minute period presented to the collected authors of the AI's and dispositioned as 1) a formal action item, 2) re-classified as a Request-for-Information (RFI) or 3) rejected. The Contractor will arrange for the formal AI's and RFI's to be entered into the Action Item Tracking/Closure System.

The Review Report (i.e. CDR and FDR) will contain copies of all formal AI's. Copies of all "closed" AI's and a commitment date for closure of the remaining "open" AI's will be included.

### 6.2.4 Request for Material Review (RMR) and Trouble/Failure Report (TFR)

The Contractor will provide RMR/TFR Reports on failures or material problems on the QM or FM Satellites. Notification of pending RMR/TFR reports should be provided to the Purchaser as soon as possible following the event. Copies of these reports should be provided to the Purchaser when the RMR/TFR has been closed.

Contractor's documents may be transmitted as written, the Purchaser will not require a unique CDRL identification number.

Upon request, the Purchaser shall be provided with any RMR or TFR (or similar document) that is supplied to the Contractor in the performance of the work under this Contract.

### 6.2.5 Bimonthly Progress Report

The Contractor will provide a Bimonthly Progress Report that will cover the following topics:

1. **Program Status Overview**
    a. Staffing
    b. Work share development/team formation
    c. Highlights from each Major Subcontractor's report
    d. Launch service update
2. **Program Schedule Status**
    a. Redlined working schedules highlighting changes

b. Critical Path updates

3. **Program Contract Status**
   a. Claims
   b. Proposals
   c. Task Orders
4. **Technical Accomplishments**
   a. CCB actions
   b. Configuration Changes
   c. Systems Engineering
   d. Major Subsystems
   e. Intersegment Interfaces
   f. Technical Performance Measurands for Critical Parameters
5. **Milestone Status**
   a. CDRLs
   b. Programmatic
   c. Technical
6. **Objectives and Milestones for Next Period**
   a. CDRLs
   b. Programmatic
   c. Technical
7. **Risk Management**
   a. Development (Technical problems encountered and actions taken to mitigate. Potential problems and risks and plans to minimize effect on schedule).
   b. Launch and Insurance risk
   c. Production

Where appropriate, the Contractor may substitute in whole or in part, the Subcontractor Periodic Reports provided to the Contractor by its major subcontracts and periodic program office reports (e.g. SWAP, Staffing Profiles, Technical Review Minutes).

### 6.2.6 Monthly Cost Report

The Contractor will provide a Monthly Cost Report (CDRL #6.2.6) that will cover the following:

1. **Program Cost Status (Phase I and II only)**
   a. Cost performance by WBS
   b. Earned value assessment
   c. Cost data development and updates

# 7.0 — PURCHASER FURNISHED ITEMS

The Contractor and Purchaser shall meet in a Technical Interchange Meeting to review and mutually agree upon the availability and adequacy of the equipment, facilities and services listed below.

## 7.1 EQUIPMENT, FACILITIES AND SERVICES

Contractor and Purchaser shall meet in a Technical Interchange Meeting to review and mutually agree upon the availability and adequacy of the equipment, facilities and services listed below.

1. Contractor shall be allowed access to two (2) Purchaser-provided Earth Stations for IOT of the LEO satellites. Such access shall include RF communications equipment, T&C facilities and equipment, standard communications test equipment and support services and shall be limited to those items already in place, functioning and available at Purchaser's facilities. Contractor shall be responsible for any additional required items to support launch, IOT, and/or on-orbit operation of the satellite. With the exception of launch support equipment, Contractor shall permanently install said equipment at each of the two Purchaser designated Earth Stations. Associated control equipment shall be installed at the Purchaser's primary and alternate SOCCs.

2. Purchaser shall provide Contractor access to Purchaser's existing primary SOCC and ground control network. Contractor shall operate the satellites from Purchaser's primary SOCC for launch, orbit raising and IOT.

3. Contractor shall be allowed access to and use of Purchaser's test and support technicians during on-site installation, integration and test activities of IOTE.

4. Purchaser shall provide reasonable office space, conference room, and administrative areas for Contractor personnel during installation activities (if applicable) and during operational activities as defined. These locations shall be equipped with telephones, fax, and copier.

5. Purchaser shall provide appropriate personnel to participate in two technical reviews at before launch, for compatibility testing and for one (1) mission rehearsal. Reviews and rehearsals will be conducted at the applicable facilities.

6. Purchaser shall provide the following personnel to support IOT:

   a. **SOCC Manager** — One (1) SOCC Manager who shall be stationed at the Purchaser's SOCC (IOT Coordination Center) and work with Contractor's IOT Director to support day-to-day IOT operations

b. **Earth Station Coordinators** — Two (2, TBR) Earth Station Coordinators who shall be stationed at the Purchaser's SOCC (IOT Coordination Center), work with Contractor's Payload IOT Coordinators and operate Purchaser-provided antennas and RF equipment. One (1) Coordinator is required to support one (1) of two (2) work shifts.

c. **Bus Technical Representative** — One (1, TBR) Bus Technical Representative who shall be stationed at Purchaser's SOCC (IOT Coordination Center), and review and approve Bus IOT data with Contractor's Bus IOT Coordinator. Purchaser's technical representatives shall also be stationed at the Contractor's GEO MCC for GEO launch activities prior to IOT.

d. **Payload Technical Representatives** — Two (2, TBR) Payload Technical Representatives who shall be stationed at the Purchaser's SOCC (IOT Coordination Center), and review and approve payload IOT data with Contractor's Payload IOT Coordinator. One (1) representative shall be responsible for approving transponder test data, and the other, antenna pattern data.

7. Purchaser shall provide documentation that supports calibration of Purchaser-furnished items. Certification of calibration satisfactory to Contractor shall be provided.

## 7.2 DATA

Purchaser shall provide:

1. Telemetry and command RF frequencies at CDR.
2. Monthly reports in-orbit status of the satellites
3. Documentation to support calibration of Purchaser-provided equipment for IOT listed in Section 7.1.

# ANNEX A — DELIVERABLE HARDWARE AND SOFTWARE

| Item | Delivery Date |
|---|---|
| Satellite Dynamic Simulator (CI #4.2.8)<br>(Hardware, Software and Spares) | work completed by 1st Launch –12 months<br>To be delivered at LEO Constellation Delivery |
| Flight Model Satellites (CI #5.2.1) | per Annex D |
| In-Orbit Test Equipment (IOTE) (CI #5.2.1.4)<br>[2 sets for Earth Station installation and 2 mgmt and control sets for SOCC installation]<br>(Hardware, Software and Spares) | work completed by 1st Launch –12 months<br>To be delivered at LEO Constellation Delivery |

# ANNEX B — CDRL DELIVERY FREQUENCY

| # | CDRL # | CDRL Name | RESERVED | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 1 | 1.6.1 | Satellite Specification<br>***Preliminary Specification provided by Purchaser in RFP as Contract Exhibit B*** | | Final | Confirm | |
| 2 | 1.6.2 | Satellite Program Test Plan<br>***Preliminary Test Plan provided by Purchaser in RFP as Contract Exhibit C*** | | Final | Confirm | |
| 3 | 1.6.3 | Product Assurance Plan (PAP)<br>***Contractor provides Preliminary PAP at Start-of-Contract*** | | Final | | |
| 4 | 3.1.1 | Reserved | | | | |
| 5 | 3.1.2 | Reserved | | | | |
| 6 | 3.1.3 | Reserved | | | | |
| 7 | 3.1.4 | Reserved | | | | |
| 8 | 3.2.1 | LEO Segment Critical Design Review (CDR) Agenda | | CDR – 2 weeks | | |
| 9 | 3.2.2 | CDR Presentation Material | | CDR | | |
| 10 | 3.2.3 | CDR Data Package | | CDR – 2 weeks | | |
| 11 | 3.2.4 | CDR Report | | CDR + 4 weeks | | |
| 12 | 4.1.1 | LEO Segment Final Design Review (FDR) Agenda | | | FDR - 2 weeks | |
| 13 | 4.1.2 | FDR Presentation Material | | | FDR | |
| 14 | 4.1.3 | FDR Data Package | | | FDR - 2 weeks | |
| 15 | 4.1.4 | FDR Report | | | FDR + 4 weeks | |
| 16 | 4.1.1.1 | Satellite Qualification Test Results Review (QTRR) (as required) Agenda | | | QTRR - 2 weeks | |
| 17 | 4.1.1.2 | QTRR Presentation Material | | | QTRR | |
| 18 | 4.1.1.3 | QTRR Data Package | | | QTRR - 2 weeks | |
| 19 | 4.1.1.4 | QTRR Report | | | QTRR + 4 weeks | |
| 20 | 4.2.2 | Satellite Structural Test Model (SSTM) Test Report | | | Test + 4 weeks but no later than FDR | |
| 21 | 4.2.3 | Satellite Communication Payload Qualification Model (PQM) Test Report | | | Test + 4 weeks but no later than FDR | |

| # | CDRL # | CDRL Name | RESERVED | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 22 | 4.2.4 | Satellite Qualification Model (SQM) Test Report | | | Test + 4 weeks but no later than FDR | |
| 23 | No CDRL # IAW SOW Para. 4.2.5 | Major Satellite Subsystem Qualification Test Reports<br>Power subsystem<br>Digital and Controls subsystem<br>Attitude and Orbit Control subsystem<br>Propulsion subsystem | | | Test + 4 weeks but no later than FDR | |
| 24 | 4.2.6.1 | Satellite Communications Payload Test Bed (CPTB) Requirements Specification | | Final | | |
| 25 | 4.2.6.2 | CPTB Test Plan | | Final | | |
| 26 | 4.2.6.3 | CPTB Test Report | | | Final | |
| 27 | 4.2.6.4 | CPTB Operations Manual | | | Final | |
| 28 | 4.2.7.1 | Satellite Control Subsystem Test Bed (CSTB) Requirements Specification | | Final | | |
| 29 | 4.2.7.2 | CSTB Test Plan | | Final | | |
| 30 | 4.2.7.3 | CSTB Test Report | | | Final | |
| 31 | 4.2.7.4 | CSTB Operations Manual | | | Final | |
| 32 | 4.2.8.1 | Satellite Dynamic Simulator (SDS) Requirements Specification | | Final | | |
| 33 | 4.2.8.2 | SDS Test Plan | | Final | | |
| 34 | 4.2.8.3 | SDS Test Report | | | | Final L-12 |
| 35 | 4.2.8.4 | SDS Operations Manual | | | | Final L-12 |
| 36 | 5.1.1 | Satellite and Constellation Operation Handbook (SCOH) | | | Preliminary | Final L-12<br>Updates as Required |
| 37 | 5.1.2.1 | Training Plan | | | Preliminary | Final L-12<br>Updates as Required |
| 38 | 5.1.2.2 | Training Materials | | | Preliminary | Final L-12<br>Updates as Required |
| 39 | 5.1.3.1 | Rehearsal Plan | | | Preliminary | Final L-12<br>Updates as Required |
| 40 | 5.2.1.3 | Satellite Flight Software (all operational versions) | | | Preliminary | Final L-12<br>Updates as Required |
| 41 | 5.2.1.4.1 | In-Orbit Test Equipment (IOTE) Specification | | Final | | |

| # | CDRL # | CDRL Name | RESERVED | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 42 | 5.2.1.4.2 | IOTE Test Plan | | Final | | |
| 43 | 5.2.1.4.3 | IOTE Test Report | | | | Final L-12 |
| 44 | 5.2.1.4.4 | IOTE Operations Manual | | | | Final L-12<br>Updates as Required |
| 45 | 5.2.2.1 | Satellite Log Book | | | | LRR |
| 46 | Reserved | | | | | |
| 47 | 5.2.2.2 | Communications Payload FM1-FM56 Acceptance Test Reports | | | | Test + 4 weeks |
| 48 | Reserved | | | | | |
| 49 | 5.2.2.3 | Satellite FM1-FM56 Acceptance Test Reports | | | | Test + 4 weeks |
| 50 | 5.2.3.1 | Pre-Shipment Review (PSR) Report | | | | PSR - 2 weeks |
| 51 | 5.2.3.2 | As Built/As Designed Data | | | | PSR - 2 weeks |
| 52 | 5.3.4.1 | Launch Readiness Review (LRR) Agenda | | | | LRR - 2 weeks |
| 53 | 5.3.4.2 | LRR Presentation Materials | | | | LRR |
| 54 | 5.3.4.3 | LRR Minutes | | | | LRR + 24 hrs |
| 55 | 5.4.1.2 | Satellite In-Orbit Acceptance Review Agenda | | | | Review - 1 week |
| 56 | 5.4.1.3 | Satellite In-Orbit Acceptance Review Presentation Material | | | | Review - 1 week |
| 57 | 5.4.1.1 | Satellite In-Orbit Acceptance Review Data Package (IOT Reports) | | | | Review - 1 week |
| 58 | 5.4.1.4 | Satellite In-Orbit Acceptance Review Minutes | | | | Review + 1 week |
| 59 | 5.4.2.1 | Final Operational Constellation Review (FOCR) Agenda | | | | FOCR - 2 weeks |
| 60 | 5.4.2.2 | FOCR Data Package | | | | FOCR - 2 weeks |
| 61 | 5.4.2.3 | FOCR Presentation Materials | | | | FOCR |
| 62 | 5.4.2.4 | FOCR Report | | | | FOCR + 1 week |
| 63 | 6.1.1 | Cost Model | | Updated | Final (Recurring) | Updated Monthly after Phase I start |
| 64 | 6.1.2 | Program Management Plan | | Final | | |
| 65 | 6.1.3 | Configuration and Data Management Plan | | Final | | |
| 66 | 6.1.4 | Spacecraft Launch Base Authorizing Document | | Preliminary | Final | |
| 67 | 6.1.5 | Mission Profile Description | | Preliminary | Final | |
| 68 | 6.1.6 | Integrated Master Schedule | | Update | Update | Updated Monthly after Phase I start |

| # | CDRL # | CDRL Name | RESERVED | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 69 | 6.1.7 | Satellite Program Test Plan Cost and Risk Assessment | | Final | | |
| 70 | 6.1.8 | Assembly, Integration and Test (AIT) Plan | | Preliminary | Final | |
| 71 | 6.1.9 | Design Verification Report | | Preliminary | Final | |
| 72 | 6.1.10.1 | Satellite Electrical Schematics | | Preliminary | Final | Update as Required |
| 73 | 6.1.10.2 | Satellite Telemetry and Command Database | | Preliminary | Final | Update as Required |
| 74 | 6.1.10.3 | Launch Service Requirements Document | | Preliminary | Final | Update as Required |
| 75 | 6.1.10.4 | Satellite to Launch Vehicle ICD | | Preliminary | Final | Update as Required |
| 76 | 6.1.10.5 | Launcher (or Launch Base) to SOCC ICD | | Preliminary | Final | Update as Required |
| 77 | 6.1.10.6 | Gateway to IOT Equipment ICD | | Preliminary | Update | Final no later than L-12 |
| 78 | 6.1.10.7 | SOCC/LCF to AIT ICD (TBD) | | Preliminary | Update | Final no later than L-12 |
| 79 | 6.1.10.8 | TT&C Space to Ground ICD | | Preliminary | Final | Update as Required |
| 80 | 6.1.10.9 | Reserved | | | | |
| 81 | 6.1.10.10 | Satellite Dynamic Simulator to Satellite Operations Control Center (SOCC)/Launch Control Facility (LCF) ICD | | Preliminary | Final | Update as Required |
| 82 | 6.1.11 | Interface Design Layout (IDL) | | Preliminary | Final | Update as Required |
| 83 | 6.1.12 | Software Management Plan | | Final | | |
| 84 | 6.1.13 | LEO Segment Technical Risk Assessment Summary | | Final | Update | |
| 85 | 6.1.14.1 | Performance Models (except thermal and power) | | Preliminary | Final | Update as Required |
| 86 | 6.1.14.2 | Performance Model Software, Source Code and Operations Manual for Spacecraft Thermal Dissipation | | Preliminary | Final | Update as Required |
| 87 | 6.1.14.3 | Performance Model Software, Source Code and Operations Manual for Spacecraft Electrical Power | | Preliminary | Final | Update as Required |
| 88 | 6.1.15 | Satellite Transportation Plan | | | Final | |
| 89 | 6.1.16 | Satellite Long-Term Storage Plan | | | Final | |
| 90 | 6.2.1 | Minutes of the Contractor's CCB Proceedings | | | | As Required |
| 91 | 6.2.2 | Notification of major subcontractor review meetings | | | | As Required |
| 92 | 6.2.4.1 | RMR/TFR Reports | | | | As Issued |
| 93 | 6.2.4.2 | Notification of pending RMR/TFR reports | | | | As Issued |

| # | CDRL # | CDRL Name | RESERVED | CDR | FDR | Other Updates |
|---|---|---|---|---|---|---|
| 94 | 6.2.5 | Bimonthly Progress Report (every 2 months) | | | | Bimonthly |
| 95 | 6.2.6 | Monthly Cost Report | | | | Monthly through FDR |

**Applicable Notes (DRAFT Table will be amended to indicate the following):**

**Contractor Document Notes:**

(1) Transmitted via contracts letter.

(2) Released using CDRL # or designation other than contractor document number. Specific number if required will be available from Contractor's configuration manager.

(3) Item to be released in the future using CDRL #.

(4) Included as part of a Design Review Data Package or Recurring Delivery. Contractor's documents may be transmitted as written, no unique CDRL identification number will be required on the document. Contractor will reference the corresponding CDRL # in the Data Package Transmittal Letter.

**Delivery Frequency Notes:**

(5) For all CDRLs, seven (7) hard copies or an electronic formatted document shall be delivered to the Purchaser. Submission of a disc or direct transmission via data lines in lieu of hard copy is acceptable.

**Purchaser Action Notes:**

(6) Purchaser shall be obligated to approve submitted documents within three (3) weeks of their submission or identify changes required.

Failure by the purchaser to notify the Contractor within the three (3) week period shall constitute approval.

# ANNEX C — DELIVERABLE SERVICES

| Item | Delivery Date |
|---|---|
| Launch Services (CS #5.3.2) | per Annex D |
| Satellite Insurance (CS #5.3.3.1) | per Annex D |
| Launch Vehicle Insurance (CS #5.3.3.2) | per Annex D |
| CCB meetings (CS #6.2.1) | As Required |
| Action Item Tracking/Closure System (CS #6.2.3) | As Required |
| Operations Training (CS #5.1.2.3) | starting at 1st Launch – 12 months |
| Test Bed Training (CS #4.2.6) and (CS #4.2.7) | no later 1st Launch – 6 months |
| Satellite Simulator Training (CS #4.2.8) | no later than 1st Launch – 6 months |
| In-Orbit Test Equipment Training (CS #5.2.1.4) | no later than 1st Launch – 6 months |
| Satellite Storage (CS #5.2.1.2) | As Required, Constellation Delivery + 2 Years |

# ANNEX D — PROGRAM SCHEDULE

| Schedule Milestone | Start | Finish |
|---|---|---|
| Contract Award | 7/17/02 | N/A |
| Effective Date of Contract | 7/17/02 | N/A |
| Phase I – LEO Segment Definition and Initial Design | 7/17/02 | 7/18/03 |
| LEO Segment Critical Design Review (EDC + 12 months) | 7/17/03 | 7/18/03 |
| Phase II – Development and Verification | 7/19/03 | 1/21/05 |
| LEO Segment Final Design Review (EDC + 30 months) | 1/20/05 | 1/21/05 |
| Qualification Test Results Review (EDC + 36 months, As Required) | 7/22/05 | 7/22/05 |
| Phase III – Production | 1/22/05 | 7/2/9 |
| Launch Campaign | | |
| Launch #1 (2-6 satellites) (EDC + 57 months) | 4/2/07 | In-Orbit Acceptance Review (typical) |
| Constellation Established | 4/2/07 | 7/2/9 |
| Final Operating Constellation Review (Delivery) (EDC + 84 months) | 7/2/9 | 7/2/9 |
| Spares Launch Window (2 years) | 7/2/9 | 7/1/11 |

# EXHIBIT B - 1

## GEO Satellite Specification

[CONFIDENTIAL]

GLP S
SS/L S

# EXHIBIT B - 2

## LEO Satellite Specification

[CONFIDENTIAL]

GLP S
SS/L S

# EXHIBIT C- 1

## GEO Satellite Program Test Plan

[CONFIDENTIAL]

# EXHIBIT C - 2

## LEO Satellite Program Test Plan

[CONFIDENTIAL]

GLP S
SS/L S

# EXHIBIT D

## Commercial Programs Product Assurance Plan

[CONFIDENTIAL]

GLP S
SS/L S