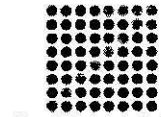

Sectilis

FOIA / PA Officer John Livornese
U.S. Securities & Exchange Commission
FOIA Office
100 F Street NE, Mail Stop 5100
Washington, DC 20549

December 29, 2017

Dear Mr. Livornese:

I request pursuant to the Freedom of Information Act (FOIA) 5 U.S.C. § 552. As Amended by Public Law No. 104-231,110 Stat. 3048, copies of the following agreements, based on the **CT Order File No. 333-120876 - CF#23552.**

Exhibit 4.21 to Form 20-F filed on 04/29/2009 by Inmarsat Finance plc.

Exhibit Title: Contract For Globalized Voice Services, User Terminal & Core Module Development

CIK: 1291396

Sectilis will pay up to $61 for research, copies and review fees for all of the abovementioned agreements. Please forward all releasable material for copying. My daytime telephone number is 202-798-8809. Please call me or e-mail at account@sectilis.com to discuss the total cost or estimated cost of this research/copies should the amount exceed the price indicated in this request.

Sincerely,

Jose Esqueda
Sectilis LLC
6931 Arlington Rd. # 580
Bethesda, MD 20814

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
STATION PLACE
100 F STREET, NE
WASHINGTON, DC 20549-2465

Office of FOIA Services

January 22, 2018

Mr. Jose Esqueda
Sectilis LLC
6931 Arlington Rd.
580
Bethesda, MD 20814

RE: Freedom of Information Act (FOIA), 5 U.S.C. § 552
Request No. 18-01596-E

Dear Mr. Esqueda:

This letter is in response to your request, dated and received in this office on December 29, 2017, for access to Exhibit 4.21 to Form 20-F filed on April 29, 2009 by Inmarsat Finance plc.

The search for responsive records has resulted in the retrieval of 131 pages of records that may be responsive to your request. They are being provided to you with this letter.

As shown on the enclosed invoice, the processing fee is $61.00 in accordance with our fee schedule. You may use our new *Online Payment* option to pay by debit or credit card. If paying by mail, checks or money orders should be made payable to the SEC and a copy of the invoice should be mailed to our new payment address: Enterprise Services Center, HQ Bldg, Room 181, AMZ-341, 6500 South MacArthur Boulevard, Oklahoma City, OK, 73169. Please refer to the following link for detailed instructions on how to remit payments. http://www.sec.gov/about/offices/ofm.htm

If you have any questions, please contact me at osbornes@sec.gov or (202) 551-8371. You may also contact me at foiapa@sec.gov or (202) 551-7900. You also have the right to seek assistance from Ray J. McInerney as a FOIA Public Liaison or contact the Office of Government Information Services (OGIS) for dispute resolution services. OGIS can be reached at 1-877-684-6448 or Archives.gov or via e-mail at ogis@nara.gov.

Sincerely,

Sonja Osborne

Sonja Osborne
FOIA Lead Research Specialist

Enclosures

Inmarsat Global Ltd
99 City Road, London EC1Y 1AX, England

Contract No. 09-4642

for

Inmarsat's Global Satellite Phone Service
User Terminal and Core Module Development

with

Sasken Communications Technologies Ltd
139 / 25 Intermediate Ring Road, Domlur, Bangalore, 560071,

INMARSAT CONTRACT TERMS AND CONDITIONS
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Annex

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Preamble

This is a Contract made this **28th** day of **January 2009** ("Effective Date of Contract") between Sasken Communication Technologies Ltd. ("Contractor"), a company incorporated in India whose principal place of business is at 139 / 25 Intermediate Ring Road, Domlur, Bangalore, 560071, and Inmarsat Global Limited, whose registered office is at 99 City Road, London EC1Y 1AX, England ("Inmarsat").

Definitions:

(1) **"Associated Company"** shall mean in relation to a Party, any company of which it is a subsidiary (its holding company) and any other subsidiary of such holding company.

(2) **"Background"** shall mean Intellectual Property Rights other than Foreground, that are used in the course of or in connection with the performance of the Work.

(3) "**CEM**" shall mean any contract equipment manufacturer designated by Inmarsat in its absolute discretion to manufacture the Core Module and/or the UT Handset, or any other product which deploys the Core Module.

(4) **"Change Request"** shall mean a written request made by one Party to the other to change one or more aspects of the Work, as permitted by Article 27: Changes.

(5) **"Confidential Information"** shall mean any and all information of a commercial, technical or financial nature which is not generally available to the public and which is disclosed by one Party to the other or to any Sub-Contractor engaged by the Contractor for the purpose of completing the Work including, without limitation, Know-how, secret formulae, processes and software programs, regardless of form, format or media and whether communicated or obtained through meetings, documents, correspondence or inspection of a tangible item.

(6) **"Contract Change Notice "** shall mean a notice in the form set out in Annex H, Change Control particularising the effect(s) of any change(s) requested to the Work by either Party subsequent to the Effective Date of Contract under a Change Request, including any effect(s) on the technical requirements, Price, performance schedule, or other terms of this Contract and, where appropriate, shall suggest such revised language of the Contract as is considered necessary to ensure a workable integration with the existing terms;

(7) **"Contract"** shall mean this agreement, including all of the Annexes, schedules, exhibits and other documents attached to this Contract or incorporated by reference into this Contract.

(8) "**Contractor Background**" shall mean Background owned by or otherwise in the control of the Contractor at the Effective Date which is used in performing any of the Work and is required for the design, development, manufacture, use or maintenance of any Deliverable under this Contract.

(9) **"Core Module"** shall mean any core module produced by the CEM or any third party manufacturer in accordance with the Core Module Reference Design

(10) **"Core Module Reference Design**" shall mean the complete set of specifications and Intellectual Property Rights required for the commercial manufacture of the Core Module to be developed and use of which shall be licensed by the Contractor under this Contract, inclusive of those elements set forth in the SOW.

(11) **"Deliverable"** shall mean those items to be delivered as specified in Annex A, **Statement of Work**, including, without limitation, the Core Module Reference Design, the User Terminal Handset Reference Design and the UT Handset Pre-production Units.

(12) **"Designee"** shall mean a natural person or other entity, which is designated by a Party at its absolute discretion.

(13) **"Effective Date of Contract"** or "EDC" shall mean the date this Contract is made as set out in the Preamble.

(14) **"EMS"** shall mean EMS Technologies Canada, Ltd.

(15) **"EMS Transfer Agreement"** shall mean the agreement dated 16 January 2009 pursuant to which EMS has agreed to make available the EMS Transferable Work to Inmarsat (or its Designee), and provide transitional support services in relation to the GSPS Handset Development Programme.

(16) **"EMS Transferable IPR"** shall mean any rights of use in (i) IPR owned by EMS and (ii) IPR owned by third parties including the Third Party IPR Licences, which arose or were obtained or developed by EMS in relation to the GSPS Handset Development Programme.

(17) **"EMS Transferable Work"** shall mean the EMS Transferable IPR and any and all data (in whatever form), documentation, assets, materials and information, hardware and software which EMS has agreed to provide to Inmarsat and which Inmarsat shall make available to Contractor on the terms set forth in Article 37

(18) **"Enjoinment"** shall mean any legal restraint or prohibition, whether by court order, under a negotiated settlement or otherwise, and "enjoined" shall be understood accordingly.

(19) **"Essential Intellectual Property Rights"** shall mean third party (but not including any Sub-Contractor or licensor of Intellectual Property Rights hereunder including those persons listed in Annex I) Intellectual Property Rights (including without limitation, rights to standards) relating to GSM and GMR2+ functionality, the infringement of which cannot be avoided by any software implementation which complies with the GSM standards and GMR2+ standards respectively.

(20) **"Final Acceptance"** shall mean the acceptance of the Work by Inmarsat in accordance with Article 5: **Final Acceptance**.

(21) **"Force Majeure"** refers to events extrinsic to this Contract that are beyond the reasonable control of, and not attributable to negligence or other fault of, the Party relying on such events to excuse its failure to perform. The term does not include strikes or other events caused by labour disputes of the Party's Personnel, unless such strikes or other events are part of national or regional disputes.

(22) **"Foreground"** shall mean any Know-how, Patentable Invention or Intellectual Property Rights that arise, are obtained or are generated in performing any Work under this Contract including, without limitation the EMS Transferable IPR and which is required for the design, development, manufacture, use or maintenance of any Deliverable under this Contract

(23) **"Further Royalties"** shall have the meaning ascribed in Article 38.

(24) **"Global Satellite Phone Services"** shall mean Inmarsat's globalised fixed and mobile, land, maritime and aero satellite phone services.

(25) **"GSPS Handset Development Programme"** shall mean the programme for designing and developing the first –generation GSPS UT Handset and Core Module.

(26) **"GSPS Product Suite"** shall mean (i) the UT Handset, (ii) the Core Module and (iii) any other product which deploys the Core Module.

(27) **"Indemnitee(s)"** shall mean a Party indemnified under specific provisions of this Contract, its Associated Companies, successors and assigns and any officer, employee or consultant (provided that such consultant performs substantially full-time services at the Party's direction) of any such entity or entities.

(28) **"Inmarsat Background"** shall mean any Background owned by or otherwise in the possession of Inmarsat at the Effective Date, which is disclosed to the Contractor for its use in performing any Work and/or provided to the Contractor as part of the Statement of Work or any Annex, but for the avoidance of doubt, does not include the EMS Transferable Work.

(29) **"Inmarsat Purposes"** shall mean the purposes of design, development, manufacture, reconstruction, modification, establishment, marketing, sale, operation or maintenance of the GSPS Product Suite and equipment, components or software capable of use, either directly or indirectly, with the GSPS Product Suite in connection with satellites and all other centralised infrastructure owned, leased or operated by or on behalf of Inmarsat (or its Associated Companies).

(30) **"Intellectual Property Rights" or "IPR"** shall mean all proprietary rights in Confidential Information, ideas, Inventions, patents and applications therefor, trademarks, unregistered designs, registered design rights and applications therefore, copyright, topography rights, all such proprietary rights in identifiable Know-how, data, software (including source code), firmware, computer programs and all other technical, commercial or financial information, whether in human or machine readable form and whether stored electronically or otherwise.

(31) **"Invention"** shall mean any invention, discovery, improvement or innovation of more than a trivial or obvious nature, whether or not patentable, which is used to design, manufacture or use any item, carry out any process of manufacture, or perform any Work under this Contract.

(32) **"Know-how"** shall mean technical information, data, Inventions whether patentable or not, including, but not limited to, all designs, manufacturing techniques, operating instructions, product specifications, drawings, blue prints and any other technical, commercial or financial information relating to research, design, development, manufacture, assembly, use or sale of the Work or any Deliverable by the Contractor under this Contract.

(33) **"LIBOR"** shall mean the US Dollar London Inter-Bank Offer Rate fixed by the British Bankers Association (BBA) in three (3) monthly intervals.

(34) **"Licensed Rights"** shall have the meaning ascribed in Article 11 H.

(35) **"Mediatek Licence"** shall mean the licence of the software listed in Annex K, Third Party IPR Licences, which is to be assigned to the Contractor or the rights under which are to be sub-licensed or otherwise transferred to the Contractor on the terms set forth in Article 37.

(36) **"Party"** or **"Parties"** shall mean the two entities having signed this Contract and being defined as Contractor and Inmarsat, singularly or collectively as the case may be.

(37) **"Patentable Invention"** shall mean any invention made in the course of performing the Work under this Contract specifically directed toward Inmarsat Purposes, whether by the Contractor or by a Sub-Contractor, which results in the filing of a patent, or which has the requisite elements necessary to protect same as a registered patent (whether or not there is an intention by either Party to file for patent protection of such invention) in any jurisdiction throughout the world.

(38) **"Personnel"** shall mean those staff supplied by Contractor to perform the Work, whether employees, agents, Sub-Contractors, individual contractors or consultants.

(39) **"Persons"** shall mean natural persons, firms, partnerships, companies, corporations, associations, organisations, governments, states, foundations and trusts and, in each case, whether or not having a separate legal personality.

(40) **"Price"** shall mean the total amount payable to the Contractor for the Work as set out in Article 4: **Price** as may be varied from time to time in accordance with the provisions of this Contract.

(41) **"Product Requirements Specification Document"** or **"PRSD"** shall mean the document attached as Annex B hereto which specifies the physical and performance characteristics and requirements of the UT Handset and Core Module together with the list of equipment that represents the customer expectation of contents of the package that contains the UT Handset or Core Module

(42) "**Repudiated License**" shall have the meaning ascribed in Article 37.

(43) **"Royalties"** shall mean those royalties specified in Annex I which shall be payable upon the sale or other transfer for value by a CEM or Value-Added Manufacturer of UT Handsets and/or Core Modules (in unmodified form).

(44) **"Source Code"** shall have the meaning ascribed in Article 11 I.

(45) **"Statement of Work"** shall mean the document attached to this Contract as Annex A, **Statement of Work** outlining the Work.

(46) **"Sub-Contract"** shall mean an agreement or contract between the Contractor and a third party involving the performance of the Work.

(47) "**Sub-Contractor**" shall mean a third party who enters into a Sub-Contract with the Contractor.

(48) **"Sub-Contractor Background"** shall mean any Background owned by or licensed by a Sub-Contractor at the Effective Date.

(49) **"Term"** shall mean the term of this Contract, being the period from the Effective Date until the expiry of Warranty Period under the Contract, unless extended by mutual consent.

(50) **"Third Party Developer"** shall mean any third party developer engaged by Inmarsat to (i) modify the Core Module and/or (ii) develop the next-generation UT Handset.

(51) **"Third Party IPR Licences"** shall mean those licences of IPR owned by third parties and licensed to EMS in relation to the GSPS Handset Development Programme, as listed in Annex K

(52) **"UT Handset"** shall mean the first-generation user terminal handset to be sold to subscribers of Inmarsat's Global Satellite Phone Services and manufactured in accordance with the UT Handset and Core Module Reference Designs.

(53) **"UT Handset Pre-production Units"** shall mean the fully-functional pre-production UT Handsets to be delivered under this Contract as specified in the Statement of Work attached as Annex A.

(54) **"UT Handset Reference Design"** shall mean the complete set of specifications and Intellectual Property Rights for the commercial manufacture of the UT Handset to be developed and use of which shall be licensed by the Contractor under this Contract, inclusive of those elements set forth in the SOW.

(55) **"Value-Added Manufacturer"** shall mean any third party manufacturer or developer engaged by Inmarsat to (i) manufacture the UT Handset and/or (ii) incorporate the Core Module (in an unmodified form) into products and services other than the UT Handset for Inmarsat Purposes.

(56) **"Warranty Period"** shall mean the time period specified in Article 9: **Warranty**.

(57) **"Work"** shall mean the work to be carried out by the Contractor under this Contract as defined in Article 1: **Scope of Work** and shall include, without limitation the delivery of all Deliverables whether items, documents or data which are deliverable pursuant to any provision of this Contract, the conduct of tests and design and progress reviews in accordance with the requirements of this Contract and the provision of all required services.

Interpretations:

Unless the context otherwise requires:

1. the headings in this Contract are for ease of reference only and shall not affect its construction;

2. references to the singular shall include the plural and vice versa;

3. "use" shall include without limitation, any use, adaptation, modification, development, reconstruction, manufacture or maintenance for Inmarsat Purposes;

4. unless otherwise stated, a reference to an Article, Paragraph or to an Annex is a reference to an article or paragraph of this Contract, or to an annex to this Contract;

5. any reference to a "Party" or "Parties" shall similarly be a reference only to a Party or Parties to this Contract; and

6. references to dollars and dollar amounts shall mean in all cases United States dollars.

Article 1: Scope of Contract and Work

The Work shall be as set out in Annex A, **Statement of Work** and the Contractor shall provide the Work in accordance with the terms and conditions of this Contract and all Annexes.

Article 2: Delivery by Contractor

A. The Deliverables to be delivered by the Contractor pursuant to this Contract are as described in Annex A, **Statement of Work**.

B. Unless otherwise notified by Inmarsat, the delivery location shall be 99 City Road, London EC1Y 1AX, United Kingdom and all Deliverables shall be delivered in accordance with Article 3: **Performance Schedule**.

Article 3: Performance Schedule

The Work shall be performed in accordance with the schedule detailed in Annex A, **Statement of Work**, and shall be completed within the time frame(s) specified therein.

Article 4: Price

The total firm fixed price (Price) payable by Inmarsat hereunder shall be the price set forth in Annex C, **Price & Payment Plan.**. This amount shall be paid in accordance with Article 7: **Payment Terms**. The Price shall not be changed except as agreed in writing by the Responsible Officers in accordance with Article 32: **Responsible Officers** and Article 27: **Changes**.

Article 5: Final Acceptance

A. All Deliverables specified in Paragraph A of Article 2: **Delivery by Contractor**, and the Contractor's entitlement to the Price specified in Article 4: **Price**, shall be subject to Final Acceptance of such items by Inmarsat in accordance with this Article 5, **Final Acceptance**.

B. If any Deliverable fails the acceptance tests or otherwise fails to meet the applicable specifications and requirements in the PRSD and the SOW within the time limits stipulated in the SOW (or, if none are stipulated, within a reasonable period), Inmarsat may in its discretion:

(1) Request a repeat test;

(2) Accept the Deliverable subject to such change of acceptance criteria, amendment of the PRSD and/or reduction of the Price as, after taking into account all relevant circumstances, is reasonable and subject to the change control procedure in Article 27; or

(3) If the Contractor is unable to correct any material defects within thirty (30) days from the start of the acceptance test, to reject such Deliverable as not being in conformity with this Contract and terminate under Article 21.

C. Final Acceptance shall be in accordance with the requirements and acceptance criteria specified in Annex A, **Statement of Work** and shall be subject to each Deliverable meeting the applicable specifications and requirements in the PRSD and the SOW. .Inmarsat shall notify the Contractor of its acceptance or rejection of the Work and any Deliverables within thirty (30) days of delivery, provided that if no notice of acceptance or rejection is made within the aforesaid thirty (30) days, the Work and Deliverables shall be deemed accepted by Inmarsat. Acceptance of the Work and Deliverables (other than when there are deemed acceptances) shall be communicated in a mutually agreeable form clearly identified as an acceptance certificate.

D. The Contractor's right to retain any progress payments made pursuant to Article 7: **Payment Terms**, shall be conditional upon Final Acceptance of the Work in accordance with the procedures and requirements referred to in Paragraph B of this Article. If any part of the Work is not accepted, Paragraph B of Article 9: **Warranty**, or in the case of termination for default Article 21: **Termination**, shall apply. Payment of progress payments shall not be construed as acceptance of any part of the Work.

Article 6: Taxes and Duties

A. The Price is exclusive of withholding taxes or deductions in UK, UK VAT due on delivery of the Work, and non-Indian customs duties, non UK VAT and non-Indian sales taxes as applicable, which will be included and itemized in the invoice at the local rates applicable. If applicable UK VAT shall also be included in the invoice at the appropriate percentage rate expressed in the amount of the subject invoice.

B. The Price is inclusive of all taxes payable in India, including but not limited to sales taxes, service taxes and Education Cess.

C. Inmarsat shall be responsible for all taxes, duties and similar liabilities, which may become due by reason of the supply of any Inmarsat equipment or other Inmarsat property to the Contractor. The Contractor shall provide all reasonable assistance to Inmarsat in connection with the import of the Inmarsat equipment (as required), to ensure that the duration of customs clearance for any Inmarsat equipment will not exceed seven (7) working days from arrival of such equipment at the port of entry.

D. The parties will work together to provide reasonable assistance to each other in their discussions with the relevant taxation authorities to minimize the amount of any withholding taxes or deductions including the provision of tax certificates to determine the amount of tax withheld, as appropriate

Article 7: Payment Terms

A. The Price shall be paid by Inmarsat in accordance with the Payment Plan specified in Annex C, **Price & Payment Plan**.

B. With respect to each amount specified in Annex C, **Price & Payment Plan**, the Contractor shall submit an invoice to Inmarsat when the corresponding milestone event has been completed. Each invoice shall contain, or be accompanied by, written confirmation from the Contractor that the relevant milestone event has been completed. The invoice shall further include, as a minimum, the Contract number – **09-4642**, the Responsible Officer for technical matters in accordance with Article 33: **Communications** and the Responsible Officer in accordance with Article 32: **Responsible Officers** ,and shall be sent directly to Inmarsat's Accounts Payable Department. The invoice shall further be in accordance with the requirements of Article 6: **Taxes and Duties**, and shall take into account any liquidated damages or early delivery incentives which have accrued under Article 21: **Termination** or Article 35: **Incentives for Early Delivery** respectively.

C. Inmarsat shall pay each amount within fifteen (15) days after Inmarsat receives the correctly presented invoice and certification that the relevant milestone event has been completed as further specified in Annex C – **Price & Payment Plan**, provided that Inmarsat has not, within fifteen (15) days after receipt of the applicable invoice, objected in good faith and in writing to the Contractor's claim that the applicable milestone event has been completed. In the event that Inmarsat has not objected to the completion of the milestones, as provided in Article 5 **Final Acceptance**, paragraph B or objected to the whole or portion of an invoice within fifteen (15) days, the invoice shall be deemed accepted provided that such invoice has been submitted in accordance with the provisions of Article 7B. Inmarsat shall not raise any objection merely for the reason that any invoice is not in the form given in Article 7 B.

D. All invoices shall be submitted in the original. Any value added tax, or other sales taxes and duties, or service tax, if applicable, shall be itemized on the invoice, in accordance with Article 6: **Taxes and Duties**.

E. With respect to each amount that becomes due from the Contractor to Inmarsat, for example where the Contractor pays damages to Inmarsat under Article 21: **Termination**, or where the Contractor pays for additional costs under Article 9: **Warranty**, such payments will be treated as a reduction in the Price as described in Article 4: **Price** and Annex C, **Price & Payment Plan**, for which the Contractor shall issue a credit note. The credit note shall separately identify any credit for taxes and duties (including VAT). Inmarsat shall be entitled to:

(1) Reduce the next payment milestone(s) accordingly, or

(2) Should the value of the remaining milestones be insufficient to cover the total amount, then for the balance of such payments due to Inmarsat, Inmarsat shall submit an invoice or

invoices to the Contractor at dates to be decided by Inmarsat. The Contractor shall pay such invoice(s) within thirty (30) days from receipt of invoice.

F. Without prejudice to the Parties' respective rights of termination under Article 21 of this Contract, in the case of late payment of any amount payable by either Party under this Contract, the exclusive remedy for the other Party shall be action to compel payment with interest on the amount outstanding at a rate of the current three (3) month US Dollar London Inter-Bank Offer Rate (LIBOR) plus three (3) percentage points per annum calculated based on each day of delay. Such interest charge shall be computed commencing on the first day following the payment due date until payment is received.

G. The Contractor may not suspend its performance of the Work if any payment is overdue unless it is entitled to terminate this Contract in accordance with the provisions of Article 21: **Termination**..

H. In the event of a dispute over the content of an invoice, Inmarsat shall pay the undisputed amount on that invoice within the period specified in paragraph C above and shall notify the Contractor in writing, within fifteen (15) days from the receipt of invoice, of the dispute. The Contractor shall respond to Inmarsat within fifteen (15) days after receipt of a written notice of dispute advising on any initial action being taken to resolve the dispute whereupon the Parties shall meet within a further seven (7) days to seek a mutually acceptable resolution to the matter. If the parties are not able to resolve the dispute within the aforesaid seven (7) days, the matter shall be taken for resolution under Art 26A (1) to (3) failing which the matter may be referred to Arbitration under Art 26 B.

I. At Inmarsat's request, the Contractor shall provide Inmarsat with a proposal to provide extended maintenance and support of the Core Module Reference Design and the UT Handset Reference Design three (3) months prior to the expiry of the Warranty Period described in Article 9. The Contractor shall detail the extent of the man hours required to support a mutually agreed specification for such maintenance and support based on the prices for such resource given in Annex C, **Price and Payment Plan**. These rates, which shall be subject to an annual escalation of five (5%) percent commencing on the anniversary of the expiry of the Warranty Period and for a period of three (3) years thereafter, shall also be the basis for man day rates by Sasken when providing any proposals to Inmarsat for further additional work.

J. Notwithstanding anything contained in this Article 7, Inmarsat shall not have the right to retrospectively dispute the Price in any invoice, with respect to which the Deliverables / Work have been accepted as per Article 5: **Final Acceptance**.

Article 8: Contractor Deliverables, Title and Assumption of Risk

A. Title to all Deliverables specified in Paragraph A of Article 2: **Delivery by Contractor**, shall pass to Inmarsat upon acceptance by Inmarsat pursuant to Article 5: **Final Acceptance**.

B. The Deliverables are offered Ex Works the Contractor's premises. However the Contractor shall arrange for transport and insurance together with other custom duties and itemize the cost on the invoice.

Article 9: Warranty

A. General Warranties:

(1) The Contractor warrants to Inmarsat that it has and will deliver good title to all tangible Deliverables and that all such tangible Deliverables will be delivered free from any claim, lien, pledge, mortgage, security interest, or other encumbrances.

(2) Notwithstanding any prior inspection or acceptance by Inmarsat, the Contractor warrants that:

(a) All Deliverables specified in the SOW shall be new and free from any defects in materials and workmanship;

(b) All services shall be performed in a skilful and workmanlike manner by suitably qualified personnel and consistent with the best practices of the industry; and

(c) All Deliverable items, including hardware, software, services and documentation shall conform to the applicable specifications and requirements set forth in the PRSD and the Statement of Work.

(3) Without prejudice to the generality of the foregoing, the Contractor warrants that:

(a) The Core Module Reference Design and the UT Handset Reference Design shall conform to and perform in accordance with the SoW and PRSD in Annex A and Annex B respectively;

(b) The UT Handset Pre-production Units shall be of satisfactory quality and conform to, and perform in accordance with the SoW and PRSD in Annex A and Annex B respectively;

(c) It has, and will continue to have, all necessary rights in and to the Intellectual Property Rights and materials made available by the Contractor (or Sub-Contractor) and which are used to perform the Contractor's obligations under this Contract, including the grant of licensed rights in accordance with Article 11;

(d) The Deliverables and the exercise of the licensed rights to be granted under Article 11 of this Contract do not and are not likely to infringe any Intellectual Property Rights, other than Essential Intellectual Property Rights

(e) To the best of the Contractor's knowledge, the Deliverables and the exercise of the licensed rights to be granted under Article 11 of the Contract shall not infringe any Essential Intellectual Property Rights.

(f) Any software to be licensed pursuant to Article 11 will be free of material defects in such that it will perform in accordance with the applicable specifications and requirements set forth in the PRSD and the Statement of Work.

(4) The warranties set forth in this Article 9 shall have different commencement dates as follows:

(a) The warranties set forth in Article 9 A (1) and (2) are given at EDC and shall continue until expiry of the Warranty Period (as defined in Article 9 A 4 (c) below);

(b) The warranties set forth in Article 9 A (3) (b) shall be given at the date of acceptance of the UT Handset Pre-Production Units and shall continue until expiry of the Warranty Period. The Contractor shall rectify any faults or defects in the UT Handset Pre-Production Units in accordance with the terms and service levels specified in this Contract and the SOW; and

(c) The remaining warranties set forth in this Article 9 shall commence from M 13 (Phase 1) as defined in Statement of Work in Annex A and run for a period of eighteen months ("Warranty Period"). With respect to the dual mode (Phase 2) Deliverable as defined in Statement of Work the aforesaid warranties shall commence from M 14 and be co-terminous with the Warranty Period for Phase 1.

(5) With respect to warranty support for hardware, the Parties agree that if design changes are required to be made due to a design fault, the Contractor will bear the cost of re-designing such hardware inclusive of the costs of material, where such design fault is detected before Phase 1. Where the design fault is detected after Phase 1, the Contractor agrees to carry out the requisite design changes in accordance with its warranty obligations, save that Inmarsat shall bear the cost of material in re-designing the hardware.

(6) The rights and remedies of Inmarsat provided in this Article 9 shall be in addition to, and without prejudice to, or forfeiture of, any other rights and remedies Inmarsat may have under this Contract, or at law or in equity.

B. Remedies in Respect of Non-Conforming Work:

(1) In the event of defective or non-conforming Work during the Warranty Period whether equipment, services, software, reports or otherwise, Inmarsat shall notify the Contractor that the Work is non-conforming, identifying those particulars in which the Work fails to conform. Inmarsat shall have the following remedies:

(a) Inmarsat may require the Contractor to correct or replace the defective or non-conforming Work at the Contractor's expense. The decision whether the non-conforming Work is to be corrected or replaced shall be the Contractor's, but the Contractor shall consult with Inmarsat and obtain Inmarsat's agreement prior to correcting or replacing the defective or non-conforming Work. If the Contractor does not, correct or replace the Work within an agreed period after notification from Inmarsat, or if the Contractor fails to do so effectively, Inmarsat may have the correction or replacement done by a third party, in which case the Contractor shall reimburse Inmarsat for all costs reasonably incurred by Inmarsat in doing so. Inmarsat shall pay to transport the equipment to Contractor and the Contractor shall be responsible to pay for the transport back.

(2) The Warranty Period shall be extended on a day for day basis at no additional cost to Inmarsat for each and every day that Contractor is unable to fix certain mutually agreed category 1 defects (as defined in Annex A, **Statement of Work**) within the SLA provided in Annex A, **Statement of Work** in circumstances where such category 1 defect cause, in Inmarsat's opinion, significant loss of revenue to Inmarsat.

(3) Without prejudice to the foregoing, the Contractor shall provide CSI (as particularised in the SOW) and warranty support in accordance with Annex J and the SOW.

Article 10: Access to Work in Progress and Data

A. As used in this Article, the term "Sub-Contractors" refers to those Sub-Contractors within the scope of Article 29: **Key Sub-Contractors**. To the extent necessary to implement this Contract, the Contractor shall pass the provisions of this Contract through into all such Sub-Contracts.

B. The Contractor shall provide for design and progress review meetings with Inmarsat, and submit reports and documentation, in accordance with Annex A, **Statement of Work**.

C. Inmarsat shall have the right, at all reasonable times during the performance of this Contract, to monitor the Work in progress at the sites of the Contractor and its Sub-Contractors, subject to the Contractor's standard operating and security procedures. Provided that whenever Inmarsat desires to visit the site of a Sub-contractor, such visit shall be together with a Sasken representative and provided further that Inmarsat shall not issue any instructions to the Sub-contractor without the prior consent of Sasken.

D. All documentation and data relating to the performance of this Contract shall, upon Inmarsat's request and at Inmarsat's election, be made available for inspection and copying at the sites of the Contractor and its Sub-Contractors, or copies shall be delivered to Inmarsat. This obligation shall apply during the period of performance of the Contract, including, but not limited to, the Warranty Period defined in Article 9: **Warranty**. With respect to any such documentation and data that is not deliverable pursuant to Paragraph A of Article 2: **Delivery by Contractor**, Inmarsat shall reimburse the reasonable costs of copying or delivery. Thereafter, to the extent that such documentation and data is of a type normally retained by the Contractor and its Sub-Contractors, it shall continue to be available for such purposes for a period of two (2) years from the date of expiry or earlier termination of this Contract.

E. Subject to reasonable arrangements commensurate with those provided in this Contract to ensure the confidential treatment of proprietary information, the same rights of access granted to Inmarsat in this Article shall be granted to any technical consultants working for Inmarsat in connection with this Contract or any projects related to the Work to be performed under this Contract.

Article 11: Licensing of Intellectual Property Rights

A. Notification of and disclosure of Foreground to Inmarsat

The Contractor shall notify Inmarsat in writing of any and all items of Foreground upon:

(a) completion of the Work to be performed under this Contract;

(b) termination of this Contract; and

(c) the written request of Inmarsat made at any time and from time to time,

and the Parties acknowledge and agree that notification shall be in the form of a report, which shall contain a list setting forth the nature of each item of Foreground, the system, sub-system, process or part thereof to which each listed item relates, and the source of each such item. The report shall be attached to this Contract as Annex E, Foreground and shall be up-dated in accordance with each new report.

B. Grant of IPR licence to Inmarsat and its Designees

(1) The Contractor hereby agrees grants or shall procure a direct grant to Inmarsat of an irrevocable, perpetual, non-exclusive, worldwide right and licence to use the Core Module Reference Design and the UT Handset Reference Design for Inmarsat Purposes, and to grant sub-licences to any Designee to use the same for Inmarsat Purposes.

(2) For the avoidance of doubt, all sub-licences granted by Inmarsat to its Designees pursuant to Article 11 B above shall be subject to the same terms as those imposed upon Inmarsat under the terms of this Contract.

(3) Subject to Article 11 B (1) above, the Contractor undertakes and agrees upon request to grant or procure a direct grant to Inmarsat of an irrevocable, non-exclusive, worldwide right and licence to use and sub-license its Designee to use of all Foreground, Contractor Background, Sub-Contractor Background and Inventions to the extent required for the purpose of manufacturing, having manufactured on its behalf, marketing, selling and using the GSPS Product Suite on terms that are fair, reasonable and non-discriminatory.

(4) The Contractor's obligation to license Inmarsat under Article 11 B (2) and (3) above shall be subject only to Inmarsat's agreement to pay the Royalties (if any) due in accordance with Annex I, and no other fees shall be levied in respect of such licence.

C. Use of Inmarsat Background

(1) The Statement of Work and/or the list of Inmarsat deliverables as listed in Annex A shall include all Inmarsat Background that is to be made available to the Contractor for the purpose of enabling or facilitating the Contractor to perform and complete the Work. Annex F shall include a non-exhaustive list of Inmarsat Background.

(2) The Contractor acknowledges and agrees that the Inmarsat Background shall remain the property of Inmarsat and the Contractor shall not make any representation or do any act or thing that may or could indicate that it has any right or title to, or interest in, the Inmarsat Background.

(3) Inmarsat hereby grants to the Contractor a non-exclusive, royalty free right and licence to use the Inmarsat Background strictly for the purpose of fulfilling its obligations under this Contract.

(4) The Contractor shall use reasonable efforts to disclose to Inmarsat as on the Effective Date all Contractor and Sub-Contractor Background relevant to the Work. This Background is listed in Annex F, Contractor and Sub-Contractor Background. The Parties acknowledge and agree that Annex F shall be updated from time to time and, in any event, upon Final Acceptance, and Inmarsat's acknowledgment of the final Annex F shall be part of the Final Acceptance requirements.

D. Licence grant to CEM and Value-Added Manufacturers

(1) The Contractor agrees and undertakes to Inmarsat that it shall, at Inmarsat's request, grant or procure the direct grant to the CEM of an irrevocable, non-exclusive, worldwide right and licence to use the Core Module Reference Design, the UT Reference Design and all Foreground, Contractor Background, Sub-Contractor Background and Inventions to the extent required for the purpose of manufacturing, having manufactured on its behalf, marketing, selling and using the GSPS Product Suite on terms and conditions that are fair, reasonable and non-discriminatory.

(2) The Contractor agrees and undertakes to Inmarsat that it shall, at Inmarsat's request, grant or procure the direct grant to one or more Value Added Manufacturers of an irrevocable, non-exclusive, worldwide right and licence to use Core Module Reference Design, the UT Reference Design and all Foreground, Contractor Background, Sub-Contractor Background, and Inventions to the extent required for the purpose of manufacturing, having manufactured on its behalf, marketing, selling and using the GSPS Product Suite on terms and conditions that are fair, reasonable and non-discriminatory

(3) The Contractor's obligation to grant a licence to any licensee(s) under Article 11 D (1) and (2) above is subject only to the licensee's agreement to pay the Royalties specified in Annex I, and no other fees shall be levied in respect of such licence.

E. Sub-Contracts

(1) The Contractor shall not sub-contract any of its obligations under this Contract without Inmarsat's prior written consent, which Inmarsat shall not unreasonably withhold or delay. In order to help Inmarsat reach a decision on a proposed Sub-Contractor, Contractor shall provide all such information as Inmarsat may reasonably require about the proposed Sub-Contractor and the impact of such Sub-Contract on this Contract

(2) Where the Contractor makes use of a Sub-Contractor in order to perform the Work (or any part thereof) the Contractor shall, unless contrary to law or unless Article 11.E (3) applies, ensure that provisions are included in the relevant sub-contracting agreement to the effect that:

(a) all Foreground shall vest with the Contractor; or

(b) where, for whatever reason, Foreground created by a Sub-Contractor will not vest in the Contractor from the outset, the Sub-Contractor shall undertake to take all necessary steps including, but not limited to, the execution of assignments, assurances or other documents, in order to effect a valid assignment of that Foreground to the Contractor.

(3) Where the Contractor makes use of a Sub-Contractor in order to perform the Work (or any part thereof) and where, for whatever reason, both (a) and (b) in Article 11.E (2) are unlawful or unattainable, the Contractor shall ensure that provisions are included in the relevant Sub-Contract which compulsorily require the Sub-Contractor to grant to the CEM, Value-Added Manufacturers or Third Party Developers an irrevocable, non-exclusive, worldwide right and licence to use all requisite Sub-Contractor Background and Foreground for the purposes specified in Article 11 D (1) and Article 11 F. Any such licence shall be subject to the Royalties specified in Annex I, but no other fees shall be payable thereon.

F. Grant of licence to Third Party Developers

If Inmarsat wishes to engage a Third Party Developer to (i) modify the Core Module and/or (ii) develop the next-generation UT Handset, Contractor agrees and undertakes to Inmarsat that it shall license, to the extent it owns, or exercise commercially reasonable efforts to sub-license or procure from such third parties direct licenses for such Third Party Developer to use, modify and develop the Core Module Reference Design, the UT Handset Reference Design and all Foreground, Contractor Background, Sub-Contractor Background and Inventions for Inmarsat Purposes on fair, reasonable and non-discriminatory terms.

G. RFP for development of Core Module/ UT Handset

Inmarsat undertakes to the Contractor that it shall invite the Contractor to tender alongside other Third Party Developers for the future (i) modification of the Core Module and/or (ii) development of the next generation UT Handset utilising the Foreground.

H. Proprietary Rights

(1) The Contractor (or, the appropriate third party rights owner(s)) shall own the Intellectual Property Rights in the Core Module Reference Design and the UT Handset Reference Design,

(2) The Contractor (or, the appropriate third party rights owner(s)) shall retain ownership of the Foreground, Contractor Background and Contractor Improvements.

(3) The Contractor agrees that, for the seven (7) year period beginning on the date of Final Acceptance, it shall not use nor grant any licences to any third parties to use any elements of the Foreground which are specifically directed towards the Core Module Reference Design, the UT Handset Reference Design or the GMR2 specifications or otherwise pertain to the look and feel of the UT Handset ("Licensed Rights") without Inmarsat's prior written consent.

I. Access to Software Source Code

(1) The Contractor shall, within twenty (20) working days after Final Acceptance deposit the source code of all software in the Core Module Reference Design and the UT Handset Reference Design ("Source Code") with the National Computing Centre (NCC).

(2) The Contractor shall ensure that the deposited version of the source code is the current version of the Source Code and that the deposited version is kept up to date as the Source Code is modified or upgraded. Inmarsat shall pay the deposit and maintenance fees under the escrow agreement with NCC.

(3) Where the Contractor is unable to procure compliance with the provisions of Article 11 I (1) in respect of any Source Code which is proprietary to a third party, it shall provide Inmarsat with written evidence of its inability to comply and shall agree with Inmarsat a suitable alternative to escrow that affords Inmarsat the nearest equivalent protection. The Contractor shall be excused from its obligations under Article 11 I (1) only to the extent that the Parties have agreed on a suitable alternative.

(4) The trigger events for release of the Source Code from escrow are:

(a) Termination of any arrangement between Inmarsat and the Contractor for the maintenance and support of the Core Module Reference Design and the UT Handset Reference Design;

(b) The Contractor refuses or is otherwise unable to maintain and support the Core Module Reference Design and the UT Handset Reference Design on an ongoing basis;

(c) Termination by the escrow agent of the escrow agreement if such termination is occasioned by any breach or default by the Contractor of its obligations under the escrow agreement; or

(d) Insolvency of the Contractor or failure to pay its debts as they fall due.

(5) In circumstances where Inmarsat obtains the release of the Source Code and material documentation from escrow, the Contractor hereby grants Inmarsat a licence to use, modify, repair, reconstruct, or develop the Source Code for the purposes envisaged by this Contract and provided always that Inmarsat continues to pay the Royalties due under Annex I.

J. Further Assurance

Notwithstanding termination of this Contract for any reason, the Contractor shall do and execute and shall procure that Personnel and any Sub-Contractor engaged in the performance of the Work and its directors, employees, agents, consultants do and execute all and any documents and do all such things as Inmarsat may reasonably require in order to give effect to the provisions of this Article 11.

K. Rights Not Granted

Notwithstanding anything in this Contract to the contrary, the license rights set forth in this Article 11 or elsewhere in this Contract do not include any license, directly or indirectly, expressly or by implication or estoppel, in or to any Essential Intellectual Property Rights, which must be obtained from third parties directly, whether by Inmarsat, the CEM or any Value Added Manufacturer. Provided always that, in the event that, after the execution of this Contract, the Contractor or any of its Sub-Contractors shall first become aware of the existence of any Essential Intellectual Property Rights, the Contractor shall forthwith notify Inmarsat of the same and thereafter (a) the Contractor shall use all reasonable efforts to provide a workaround solution for the Core Module and/or the UT Handset (as applicable) that avoids the need for either the Core Module or the UT Handset to deploy or infringe any Essential Intellectual Property Rights /or (b) Contractor will at the request of Inmarsat use all reasonable efforts to facilitate the commercialisation by Inmarsat, the CEM, or any Value Added Manufacturer, as the case may be, of a satellite-only Core Module, with the GSM component disabled or removed /or (c) the Contractor may at the request of Inmarsat use all commercially

reasonable efforts to assist Inmarsat, the CEM, or any Value Added Manufacturer, as the case may be, in obtaining a license from the owner of the Essential Intellectual Property Rights.

Article 12: Patents for Patentable Inventions

A. Secrecy of Patentable Inventions

(1) The Contractor shall take all necessary steps to preserve the secrecy of all Patentable Inventions and shall use its best endeavours not to publish, put into commercial use, offer for sale or otherwise perform acts which would or reasonably could adversely affect the patentability of any Patentable Invention in any country before an application is filed pursuant to Article 12.B below.

(2) If any publication, commercial use, offer for sale or other act is made in error, the Contractor shall immediately notify Inmarsat of all relevant details and circumstances and shall take all available steps to minimise any reasonably foreseeable adverse effects.

B. Filing of Patent Application

(1) The Contractor shall have the right to file, at its own expense, patent applications in respect of Patentable Inventions throughout the world. .

(2) The Contractor shall give prompt written notice to Inmarsat of:

(a) each patent application filed;

(b) each patent granted; and

(c) those countries in which it intends to file and, where relevant, those countries in which it intends to refrain from filing, an application for patent registration.

(3) Upon notice of foreign filings from the Contactor pursuant to Article 12.B (2)(c) above, Inmarsat shall identify any additional countries in which it would like a patent application to be filed and, within sixty (60) days of receiving Inmarsat's request, the Contractor shall advise Inmarsat whether it intends to file a patent application in the country or countries specified.

(4) For each country in respect of which the Contractor gives notice to Inmarsat that it does not intend to file an application for patent protection of a Patentable Invention, the Contractor shall, where lawful and at the written request of Inmarsat, apply for patent protection in each such country at Inmarsat's expense and promptly transfer and assign to Inmarsat all rights in such patent applications.

(5) Should the Contractor elect to abandon, assign or otherwise alienate a patent or an application therefor in respect of a Patentable Invention in any country and at any time, whether during the Term or otherwise, the Contractor shall notify Inmarsat of same in writing prior to any such action being taken and shall offer to assign absolutely all and any rights in and title to such patent(s) or application(s) therefor to Inmarsat. Where in order to keep any patent(s) or application(s) therefor registered or alive for a period of sixty (60) days from the date of notification as aforementioned, action or fees are required or payable, the Contractor shall take all such requisite action and/or pay all such fees, unless Inmarsat has advised the Contractor that it does not intend to exercise its rights to have those patent(s) or application(s) therefor assigned to it.

(6) All the costs of filing and prosecuting any application and maintaining any patent obtained pursuant to an application in respect of a Patentable Invention shall be borne by the Contractor, save that Inmarsat shall bear all such costs in respect of any patent application filed or patent obtained by Inmarsat pursuant to Article 12.B (4) and any application or patent assigned to Inmarsat pursuant to Article 12.B (5).

(7) In addition to the obligations set forth in this Article 12.B, the Contractor shall furnish Inmarsat a copy of each application (including but not limited to the full patent specification) with respect to Patentable Inventions within twenty-eight (28) days of filing such application and, at Inmarsat's request, shall keep Inmarsat advised of the progress of each application or of those applications as Inmarsat may specify from time to time.

C. Examination of Records Relating to Patentable Inventions

(1) At any time between the Effective Date, the expiry of the sixty-sixth month period after final payment is made under Article 7: Payment Terms, or (if earlier) the date this Contract terminates, the Contractor shall:

(a) permit Inmarsat, upon reasonable prior notice and subject to the Contractor's standard operating and security procedures, to examine any books, records, documents and other data and materials in the possession or control of the Contractor that Inmarsat shall reasonably deem likely to be directly pertinent to the discovery or identification of a Patentable Invention or to the compliance by the Contractor with its obligations under Article 11:Inmarsat's Rights in Technical Data and Inventions and/or Article 12 Patents for Patentable Inventions of this Contract; and

(b) at the written request of Inmarsat, promptly execute and supply Inmarsat with an irrevocable power of attorney to inspect and make copies of each patent application in relation to any Patentable Invention filed by or on behalf of the Contractor.

For the avoidance of doubt, the Contractor hereby acknowledges and agrees that the rights accruing to Inmarsat under this Article 12.C shall be in addition and without prejudice to any other rights that Inmarsat may have in relation to unreported Patentable Inventions.

Article 13: Contractor's IPR Indemnity

A. This Article 13 shall apply to all third-party claims that the Intellectual Property Rights of a third party is infringed by:

(1) the use of any Deliverable item under this Contract; or

(2) the exercise of any licensed rights under this Contract.

save that the Contractor shall have no liability where such infringement is caused solely by the use or exercise of (i) Essential Intellectual Property Rights or (ii) Inmarsat Background or (iii) Intellectual Property Rights which are assigned, sub-licensed or otherwise transferred to the Contractor under the Mediatek Licence pursuant to this Contract, provided always that the Contractor shall, on request, subrogate any rights it has under the Mediatek Licence to Inmarsat (if any) and cede sole conduct of any claim against Mediatek to enable Inmarsat to benefit from any indemnity given by Mediatek against such third party infringement claims.

B. The indemnity carve out in Article 13 A (iii) in relation to the Mediatek Licence shall not apply to the extent that the claim of IPR infringement results from any modification by the Contractor of the Intellectual Property Rights assigned, sub-licensed or otherwise transferred to the Contractor under the Mediatek Licence.

C. The Contractor undertakes to defend, at its sole expense, any and all claims within the scope of Article 13.A above and to indemnify and keep indemnified any and all Inmarsat Indemnitees against any and all losses, damages, liabilities, costs, penalties, fines and expenses (including, without limitation, legal expenses) resulting from such claims, provided always that the Indemnitee gives to the Contractor prompt notice of such claim, all necessary authority to defend or settle the claim on its behalf and, at the request and sole cost of the Contractor, reasonable cooperation and assistance and such relevant information as is available to it.

D. If, as a result of any claim to which this Article 13 applies, the use of any Deliverable or the exercise of any license rights granted by the Contractor under this Contract is Enjoined, or the sale, lease or use of any Deliverable under this Contract is Enjoined after delivery, the Contractor agrees to do the following in the order stated:

(1) to use all reasonable endeavours to negotiate a licence or other agreement with the claimant to resolve the relevant dispute or rectify the negative or undesirable consequences of the Enjoinment upon Inmarsat or any Designee; and

(2) where applicable, to modify the Deliverable or substitute a suitable item so that the modified or substituted item is not subject to the Enjoinment.

E. The Contractor acknowledges and agrees that:

(1) where neither of the alternatives particularised in Article 13.D above is suitably accomplished by the Contractor, the Contractor shall indemnify and keep indemnified Inmarsat Indemnitees from any losses, damages, liabilities, costs, penalties, fines and expenses (including without limitation, legal expenses) suffered or incurred as the result of the relevant Enjoinment; and

(2) the provisions of this Article 13.E shall apply to any Deliverable modified or substituted pursuant to Article 13. D. (2)

F. Without prejudice to the foregoing, Inmarsat agrees that it shall not enforce its rights under this Article 13 to the extent that and in the opinion of qualified legal counsel, Inmarsat is entitled to seek indemnification against the third party infringement claim from EMS on the terms set forth in the EMS Transfer Agreement.

G. The indemnity carve-out in Article 13 F shall not apply where the alleged infringement of third party IPR by the use of a Deliverable or exercise of the licensed rights under this Contract is caused by the use or exercise of the Contractor's proprietary IPR (including, without limitation, any IPR owned by the Contractor in the GSM/GPRS protocol stack and application framework).

H. The rights and remedies specified in this Article 13 shall be the exclusive remedies of Inmarsat with respect to third-party intellectual property infringement claims.

Article 14: Loss and Damage Indemnity;

A. This Article shall apply with respect to any third party (including Inmarsat employees and consultants performing substantially full-time services at Inmarsat's direction) claims of loss of or damage to tangible personal property, or personal injury or death, caused by any negligent act or omission, or willful misconduct, of a Party or any of its Personnel in the performance of the Work or otherwise in connection with this Contract.

B. Each of the Parties shall defend, hold harmless and indemnify all and any of the other Party's Indemnitees against all losses, all direct damages, liabilities, costs, penalties, fines, and expenses suffered by an Indemnitee as a result of claims within the scope of section A above of this Article 14.

C. The obligations shall be contingent upon the Indemnitee giving the indemnifying Party prompt notice of such claims, appropriate authority to defend the claims on their behalf, and, at the request of the indemnifying Party, reasonable cooperation and assistance and such relevant information as is available to them..

Article 15: Inmarsat IPR Indemnity

A. This Article 15 shall apply to all third-party claims that the Intellectual Property Rights of such third party are infringed by the use of any Inmarsat Background.

B. Inmarsat undertakes to defend, at its sole expense, any and all claims within the scope of Article 15 A above and to indemnify and keep indemnified the Contractor against any and all losses, damages, liabilities, costs, penalties, fines and expenses (including, without limitation, legal expenses) resulting from such claims, provided always that the Contractor gives to Inmarsat prompt notice of such claim, all necessary authority to defend or settle the claim on its behalf and, at the request and sole cost of Inmarsat, reasonable cooperation and assistance and such relevant information as is available to it.

C. If, as a result of any claim to which this Article 15 applies, the use of any Inmarsat Background or any license rights granted by Inmarsat under this Contract is Enjoined, or the sale, lease or use of any Inmarsat provided equipment or data under this Contract is Enjoined after delivery, Inmarsat agrees to do the following in the order stated:

(1) to use all reasonable endeavours to negotiate a licence or other agreement with the claimant to resolve the relevant dispute or rectify the negative or undesirable consequences of the Enjoinment upon the Contractor; and

(2) where applicable, to modify the Inmarsat provided equipment or data or substitute a suitable item so that the modified or substituted item is not subject to the Enjoinment.

D. Inmarsat acknowledges and agrees that:

(1) where neither of the alternatives particularised in Article 15.C above are suitably accomplished by Inmarsat, Inmarsat shall indemnify and keep indemnified the Contractor from any losses, damages, liabilities, costs, penalties, fines and expenses (including without limitation, legal expenses) suffered or incurred as the result of the relevant Enjoinment; and

(2) the provisions of this Article 15.D shall apply to any Inmarsat provided equipment or data modified or substituted pursuant to Article 15. C. (2).

E. The provisions of this Article 15 shall not apply to any third party IPR infringement claim in respect of and to the extent that:

(1) Any use by or on behalf of the Contractor of the Inmarsat Background in combination with any item not supplied by Inmarsat (including the EMS Transferable Work) gives rise to the third party IPR infringement claim; or

(2) Any modification carried out by or on behalf of the Contractor to the Inmarsat Background under this Contract, if such modification was not authorised by Inmarsat or otherwise envisaged under this Contract, gives rise to the third party IPR infringement claim.

F. The rights and remedies specified in this Article 15 shall be the exclusive remedies of the Contractor with respect to claims that the Inmarsat Background infringes any third-party Intellectual Property Rights.

Article 16: Limitation of Liability

A. Save in respect of liability for death and personal injury resulting from negligence (which shall be unlimited) the Contractor's aggregate liability to Inmarsat whether in tort, contract, misrepresentation or otherwise and in respect of its indemnity in Article 13 shall be limited to an amount equal to the Price.

B. Save in respect of liability for death and personal injury resulting from negligence (which shall be unlimited), Inmarsat's aggregate liability to the Contractor whether in tort, contract, misrepresentation or otherwise, and in respect of its indemnity in Article 15 shall not exceed US$ 3,000,000.

C. Neither Party shall be liable to the other or to any third party for any indirect, special, or consequential damages arising out of this Contract.

Article 17: Inmarsat Property and Facilities

A. With respect to all equipment, facility or other property provided to the Contractor by Inmarsat, which for the sake of clarity shall exclude the EMS Transferable Work , or any of Inmarsat's other contractors, pursuant to Annex A, **Statement of Work**, the following terms and conditions shall apply:

(1) The Contractor shall exercise due care to ensure that such equipment, property or facility is suitable for the purpose intended in connection with the performance of the Work under this Contract. If the Contractor is not so satisfied, the Contractor shall give Inmarsat written notice to that effect as soon as possible. In the case of deficiencies that should be reasonably discoverable upon receipt and examination, such notice must be given within fifteen (15) days after receiving the relevant equipment, property or facility, otherwise the equipment, property or facility shall be deemed suitable for its intended purposes.

(2) The Contractor shall ensure that such property, equipment or facility is used solely in the performance of this Contract.

(3) Title to all property and equipment and each facility provided by Inmarsat shall at all times remain with Inmarsat, and the Contractor shall ensure that no claim, lien, pledge, mortgage, security interest, or other encumbrance attaches to such property, equipment or facility as a result of any act or omission of the Contractor or any of its Sub-Contractors.

(4) The Contractor shall return such property, equipment to Inmarsat or cease use of any facility on request by Inmarsat or when it is no longer required in connection with the performance of any Work under this Contract, or in the event of termination of this Contract (whichever is sooner). The costs associated with returning the property, equipment or ceasing use of the facility shall be borne by the Contractor.

(5) The Contractor shall bear the risk of loss of or damage to such equipment or property from the time that it arrives on the premises of the Contractor or any of its Sub-Contractors and for so long as it remains in their custody or from the time of use in case of a facility. However, fair wear and tear due to efflux of time shall be excepted. When the property is returned to Inmarsat pursuant to Paragraph A (4) of this Article, the risk of loss or damage while in transit shall be borne by the Contractor.

(6) Responsibility for any taxes or duties associated with the delivery, use, or return of such property, equipment or facility shall be in accordance with Article 6: **Taxes and Duties**.

B. Any delay in delivery by Inmarsat to Contractor of any item identified in Article 17 A above shall not constitute a material breach of the Contract by Inmarsat but shall be subject to the provisions of Article 27, **Changes**.

Article 18: Documents Supplied by Inmarsat

A. This Article shall apply to any and all documents that Inmarsat is required to provide to the Contractor pursuant to this Contract, which for the sake of clarity shall exclude the EMS Transferable Work. Inmarsat does not warrant that the information it may provide under this Contract shall be accurate and any implied warranties in relation to the accuracy of such information disclosed, including, but not limited to, the implied warranties of fitness for a particular purpose, are hereby disclaimed.

B. The Contractor shall exercise due care to ensure that such documents are sufficient for the performance of this Contract, and that they contain no manifest errors or anomalies. This Article shall not apply to any errors or omissions in the documents that would not be reasonably discoverable by the Contractor exercising due care. However, if such errors or omissions are discovered, then the Contractor shall notify Inmarsat without delay.

C. With respect to documents supplied to the Contractor by Inmarsat, the Contractor shall be presumed to be satisfied that they are sufficient, that they contain no manifest errors or anomalies, and that they are timely, unless the Contractor gives Inmarsat written notice that it is not so satisfied within fifteen (15) days after the Contractor receives such documents. On a case-by-case basis, the Contractor may request a longer period to examine the documents, but such request must be made within the said fifteen (15) day period, and consent to such request shall not be unreasonably withheld.

D. In addition to the obligations in Paragraphs B and C above, if the Contractor concludes, at any time during the performance of this Contract, that there are inaccuracies or inconsistencies in any documentation supplied by Inmarsat or that it is not complete or sufficient to enable the Contractor to perform the Work, the Contractor shall immediately refer the matter to Inmarsat for resolution, or the definition of a work-around, before proceeding with any Work affected by such deficiencies.

E. For the avoidance of doubt, if Inmarsat does not receive timely notice that the Contractor is not satisfied with any of the documents supplied by Inmarsat pursuant to this Contract, or if the Contractor proceeds with any Work in contravention of this Article, the Contractor shall be neither relieved of its obligation to perform the Work as intended, nor entitled to any related increase in Price or extension of the delivery schedule.

F. If, consequent to any instance covered in paragraphs B C & D, the Contractor believes that any revised documentation supplied by Inmarsat necessitates a change to the scope or execution of the Work, the Contractor may initiate the change control process under Article 27.

G. Any delay in delivery by Inmarsat to Contractor of any item identified in Article 18 A above shall not constitute a material breach of the Contract by Inmarsat but shall be subject to the provisions of Article 27, **Changes**.

Article 19: Confidentiality

A. In consideration of each of the Parties disclosing that of their Confidential Information to the other, which is required for the performance of the Contract, each Party hereby undertakes to:

(1) use the other Party's Confidential Information exclusively for the purpose of this Contract and in accordance with the terms and conditions of this Contract; and

(2) maintain confidential all of the other Party's Confidential Information that it may acquire in any manner for a period of five (5) years from either the Effective Date or the date of disclosure, whichever is the later, by exercising the same standard of care to prevent unauthorized access and disclosure as it exercises with respect to its own confidential information of similar sensitivity, but in any event not less than a reasonable degree of care.

B. The Parties acknowledge and agree that:

(1) Inmarsat will disclose only Confidential Information which it considers, in its absolute discretion, to be required to be disclosed in order to enable the Contractor to fulfil its obligations under this Contract;

(2) the Contractor shall disclose all Confidential Information relevant to the fulfillment of its obligations under this Contract and the timely and efficient completion of the Work;

(3) in order that the Parties may identify exactly which information disclosed during the term of this Contract shall be treated under this Contract as Confidential Information, the Parties shall give notice to each other that the relevant information is confidential at the time of disclosure, and the Parties acknowledge and agree that all such notices of confidentiality may be either written or verbal;

(4) nothing in this Contract shall be construed as a waiver by either Party of its proprietary rights in any of the Confidential Information it discloses hereunder;

(5) nothing in this Contract shall be construed as a grant by either Party of any form of licence to use any of the Confidential Information it discloses hereunder other than for the purpose of this Contract, or to deal in any way with any of the intellectual property rights therein, except as expressly provided in this Contract; and

(6) notwithstanding the above, even if information belonging to the Contractor is identified as Confidential Information, disclosure to Designees shall be permitted, subject to the same restrictions referred to in this Article 19 and provided that Inmarsat shall notify Contractor of the disclosure.

(7) The Contractor shall be permitted to disclose Confidential Information to Sub-contractors to the extent that such disclosure is necessary for the purpose of this Contract.

C. The obligations of the Parties with respect to protection of Confidential Information under this Article 19 shall not be breached by the exercise of express license rights granted under this Contract.

D. The restrictions on disclosure of Confidential Information contained in this Article shall not apply to Confidential Information which:

(1) is or becomes public knowledge without breach of this Contract;

(2) is already known to the receiving Party at the time of its disclosure by the disclosing Party and was not otherwise acquired by the receiving Party from the disclosing Party under any obligations of confidence;

(3) is independently developed by the Contractor or Inmarsat, which fact can be shown by competent evidence;

(4) Inmarsat or the Contractor is compelled by legal process or government regulation or by a regulatory body or order to disclose, provided that the disclosing Party is given prompt notice

of any proposed release of information under this sub-clause and that, where legally permitted and practicable, the disclosing Party is given ample opportunity to engage in legal action to resist and/or restrict any such disclosure;

(5) Inmarsat, or an Associated Company or the Contractor, shall be required to disclose by a listing authority in connection with a stock exchange listing, or as a result of any debt financing process, or other securities filings as may be required in the UK, US or elsewhere; or

(6) a Party discloses on a confidential basis under a non-disclosure agreement containing terms no less restrictive than those contained in this Article 19 in furtherance of any proposed sale of its or, if part of a wider group of companies, its direct or indirect parent companies', assets or shares, or similar process.

E. In order to secure the confidentiality attaching to the Confidential Information, each Party shall:

(1) designate in writing one person within its organisation as the principal point for transmitting and/or receiving and for controlling the use of and access to the other Party's Confidential Information. For Inmarsat this person shall be the Responsible Inmarsat Officer for technical matters in accordance with Article 33: **Communications**;

(2) ensure that access to the other Party's Confidential Information is allowed exclusively by those of its directors, employees, agents and/or contractors who:

(a) have a reasonable need to see and use it in order to carry out their obligations in connection with this Contract;

(b) are under a written agreement as part of their employment or contract for work to preserve as confidential any information and knowledge which is entrusted to their employer or, in the case of a contractor, their client; and

(c) have been notified of, and have agreed to abide by, the specific obligations imposed by this Contract;

(3) keep separate all of the other Party's Confidential Information and all information generated by it based thereon from all of its other documents and records;

Article 20: Public Release of Information

The Contractor (including all Personnel) shall obtain prior written approval from Inmarsat before publishing or otherwise making available to the public news releases, articles, brochures, advertisements, prepared speeches or any other information releases concerning this Contract or the Work performed or to be performed hereunder. Inmarsat shall be given a reasonable time to review the proposed text prior to the date scheduled for its release and, where approval is not granted, the Contractor shall make all and any alterations thereto as Inmarsat may reasonably direct.

Article 21: Termination

A. Inmarsat shall have the right to terminate this Contract either in whole or in part, without prejudice to any of its other rights and remedies, forthwith by notice in writing to the Contractor in the event that:

(1) the Contractor fails to deliver any Deliverable on or before the applicable due date specified in the Statement of Work, and fails to remedy this breach within thirty (30) days after being notified in writing to do so..

B. Either Party shall have the right to terminate this Contract either in whole or in part, without prejudice to any of its other rights and remedies, forthwith by notice in writing to the other Party in the event that;

(1) The other Party commits a material breach of any material term of this Contract and (if such breach is remediable) fails to remedy that breach within a period of thirty (30) days after being notified in writing to do so

(2) Either Party passes a resolution or a court of competent jurisdiction makes an order that the Contractor be wound up otherwise than for the purpose of bona fide reconstruction or amalgamation,

(3) A receiver, manager or administrator on behalf of a creditor is appointed in respect of the a Party's business or any part thereof,

(4) If circumstances arise which entitle a court of competent jurisdiction or a creditor to appoint a receiver, manager or administrator or which entitle the court otherwise than for the purpose of bona fide reconstruction or amalgamation to make a winding up order, or

(5) A Party is unable to pay its debts within the meaning of section 123 of the Insolvency Act 1986 or under any other laws domestic or foreign, relating to bankruptcy, insolvency, reorganisation, winding up or adjustment of debts.

C. With respect to termination in accordance with Paragraph A and B above, Inmarsat shall have the following remedies:

(1) Inmarsat may, in its sole discretion, take over all or part of the Work affected by the termination, either itself or by use of a third party, and proceed with the same to completion, by contract or otherwise. For this purpose, Inmarsat may take possession of, and utilise in completing the Work, such materials, equipment, and information and data as may be necessary. The Contractor shall reimburse Inmarsat for any increased costs reasonably incurred in completing the Work; and

(2) with respect to any part of the Work affected by the termination that Inmarsat does not elect to take over and complete, the Contractor shall reimburse Inmarsat for all amounts previously paid for such Work, and shall also be liable for any increased costs reasonably incurred by Inmarsat in procuring completion of the Work.

D. Without prejudice to any other remedies available to Inmarsat, including termination under Paragraph A and B above, with respect to late delivery in breach of the schedule requirements in Article 3: Performance Schedule, the following procedures and remedies shall apply:

(1) For every complete calendar day from a date thirty (30) calendar days beyond the Contract scheduled M 13 (May 26, 2010) to the actual date that M 13 is completed, liquidated damages shall accrue for up to one hundred and fifty (150) days to a maximum of 5.3571% of fourteen million United States Dollars on a pro-rata daily basis. The amount stated below shall be adjusted should the total Contract Price be modified.

Days delay thirty (30) calendar days beyond the Contract scheduled M 13	Total Liquidated Damages Accrued
1	$5,000
2	$10,000
3	$15,000
4	$20,000

10	$50,000
30	$150,000
60	$300,000
90	$450,000
150	$750,000

Contract Price -
5.3571% of $14,000,000 - $750,000
Daily liquidated damages (5.3571% / 150 days) - $5,000

(2) During the period when liquidated damages are accruing, the Contractor shall not be liable for any other damages with respect to such delay, except as explicitly stated to the contrary in this Paragraph D.

(3) Both Parties acknowledge that the liquidated damages specified in this Article are a genuine pre-estimate of the loss likely to be suffered by Inmarsat and that the figures therein are reasonable.

(4) Any liquidated damages due from the Contractor to Inmarsat under this Article 21 shall be recovered by way off set off and deduction against the payment due from Inmarsat to the Contractor at Final Acceptance.

E. For any other default by the Contractor under this Contractor that is not remedied within thirty (30) days of a notice from Inmarsat requiring such remedy, Inmarsat may terminate the Contract, either in whole or as to any severable portion, and in that event the remedies set out in Article 21 C above shall apply.

F. If Inmarsat gives notice of termination pursuant to Paragraph A and it is subsequently determined that the Contractor was not in breach, the rights and obligations of the Parties shall be the same as if Inmarsat had terminated for convenience pursuant to Article 22: Termination for Convenience, unless the Parties mutually agree to reinstate the Contract.

G. The Parties acknowledge and agree that if an invoice of an undisputed sum remains unpaid for sixty (60) days or more, this shall constitute breach of a material term for the purpose of Article 21 B (1).

Article 22: Termination for Convenience

A. Inmarsat may terminate this Contract, in whole , for Inmarsat's convenience, at any time prior to Final Acceptance. In the event of termination by Inmarsat under this Article 22 A, it is agreed that the entire termination charges to be paid by Inmarsat to Contractor shall be calculated on the schedule of termination for convenience given in Annex L entitled Termination for Convenience Profile. Termination charges shall be in full and final settlement of all liabilities of Inmarsat arising out of any termination of this Contract for Inmarsat's convenience. Without prejudice to the foregoing, Inmarsat shall be liable to pay any undisputed invoices which are still unpaid at the date of termination.

B. Unless otherwise agreed, Inmarsat shall be entitled to take possession of all Work completed or in progress prior to termination under this Article, except for Work associated with any executory portion of the Contract that is not terminated.

Article 23: Consequences of Force Majeure

A. The purpose of this Article is to establish the consequences of Force Majeure events preventing either Party from complying with any of its obligations under this Contract.

B. The Contractor shall not be excused from performance due to any failure to perform by its Sub-Contractors or the Personnel unless their failure to perform is due to Force Majeure.

C. Any Party whose ability to perform its obligations under this Contract is affected by a Force Majeure event shall take all reasonable steps to mitigate the impact of such event, and to carry out its obligations under this Contract in any way that is reasonably practicable.

D. If the effect of a Force Majeure event is temporary, subject to this Article the Party so affected shall not be responsible for any consequent delay, and the relevant schedule or time period shall be extended by the amount of time of the subject delay, if and only if notice of the event is given to the other Party within seven (7) days after the event has occurred. At the time of the initial notice of the occurrence of the event, or as soon thereafter as possible, the Party affected shall inform the other Party of the extent of the delay expected as a result of the event.

E. In the case of one or more force majeure events having a temporary effect on the ability of the Contractor to comply with the schedule in Article 3: **Performance Schedule**, if the effect is, or will be, to delay such schedule by more than two weeks, or in the case of force majeure events permanently preventing the Contractor from complying with said schedule, Inmarsat may elect to:

(1) terminate this Contract either in whole or in part; and/or

(2) complete the Work either itself or through a third party and use the final results for Inmarsat Purposes as envisaged by the Contract.

F. Termination under Article 23 E shall be without prejudice to the rights of the parties in respect of any antecedent breach and the Contractor shall reimburse any sums it has received in advance for Work which was not performed.

Article 24: Governmental or Regulatory Body Authorisations

A. The Contractor shall obtain all governmental or regulatory body authorizations necessary to commence the Work at the Effective Date and to undertake the Work hereunder.

B. Certification by the Contractor to Inmarsat of the receipt of such governmental or regulatory authorisations is a condition subsequent. If the Contractor fails to secure all necessary governmental or regulatory body authorisations, Inmarsat shall have the right to terminate this Contract for default in accordance with Article 21: **Termination.**

C. Without prejudice to Paragraph A of this Article:

(1) The exercise by Inmarsat and its technical consultants of any rights under Article 10: **Access to Work in Progress and Data**; and

(2) The exercise by Inmarsat or its Designees of any rights under **Article 11: Licensing of IPR;**

shall be subject to applicable domestic laws (and US law as applicable) relating to the export of technology. The Contractor shall upon request exercise due diligence to obtain any such licence as may be necessary for the exercise by Inmarsat of any such rights.

Article 25: Applicable Law

This Contract shall be governed by and interpreted according to the laws of England and Wales excluding the conflicts of laws provisions thereof.

Article 26: Dispute Resolution and Arbitration

A. Amicable Resolution

(1) Any dispute controversy or claim arising out of or in connection with this Agreement, including any question regarding its validity, interpretation, breach or termination (a "Dispute") shall be referred by either Party, first to the Responsible Officer detailed in Article 32, **Responsible Officers**.

(2) If the Dispute cannot be resolved by the representatives identified above within a maximum of fourteen (14) days after it has been referred under Article 26 A, it shall be referred to the second level contacts listed in Article 32 for resolution within the following fourteen (14) days.

(3) If the Dispute cannot be resolved by the second level representatives identified above within a maximum of fourteen (14) days after it has been referred under Article 26 A (1), any Party may refer the Dispute to arbitration in accordance with Article 26 B (1) below, save where the Parties agree to refer the Dispute to an expert for determination in accordance with Article 26 C below.

B. Arbitration

(1) Subject to Article 24 C, any Dispute that has not been amicably resolved pursuant to Article 26 A (2) shall be referred to and finally resolved by arbitration under the London Court of International Arbitration ("LCIA") Rules, which Rules are deemed to be incorporated by reference into this clause.

(2) The place of arbitration shall be London.

(3) The language to be used in the arbitral proceedings shall be English.

(4) The Arbitral Tribunal shall consist of a single arbitrator appointed in accordance with the LCIA Rules.

(5) The Arbitral Tribunal's award shall not be subject to appeal according to Section 69 of the English Arbitration Act of 1996. The Parties hereby waive any right to apply to any court of law and/or other judicial authority to determine any preliminary point of law and/or review any question of law and/or the merits, insofar as such waiver may validly be made.

(6) The Parties agree that the Arbitral Tribunal shall have the power to order on a provisional basis any relief which it would have power to grant in a final award.

(7) Nothing in this Article 26 shall be construed as preventing either Party from seeking interim, injunctive or conservatory relief in any court of competent jurisdiction.

C. Expert Determination

(1) If the Dispute is in respect of a specific technical or financial issue the Parties may agree to refer it to an independent expert qualified in the subject matter in dispute through a trade association such as the Institute of Electrical Engineers or the Institute of Chartered Accountants (the "Expert") to rule on the Dispute for a binding determination.

(2) The Parties may within 21 days of the Expert's appointment, make written submissions to the Expert and/or send documents to him.

(3) The Expert may, but is not obliged to do so, send copies of one Party's submission to the other for comment.

(4) The Parties shall if requested make available to the Expert any documentation which the Expert, in his absolute discretion, considers necessary or helpful in reaching his decision on the issues between the Parties.

(5) The Expert shall determine all issues referred to him as an expert and not as an arbitrator.

(6) The decision of the Expert shall be made within 30 days of receiving the representations of the Parties and shall be final and binding on the Parties.

(7) The Expert shall have power by his decision to fix the reasonable amount of his fees in connection therewith and they shall be borne in equal shares between the Parties.

Article 27: Changes

A. At any time during the Term, either Party may submit a Change Request to the other, provided always that the proposed changes particularized therein are within the general scope of the Contract.

B. A Change Request from Inmarsat must be identified as such, must be made or confirmed in writing, and must be signed by the Responsible Officer identified in Paragraph A of Article 32: **Responsible Officers**. If any other conduct by the Responsible Officer or any other representative of Inmarsat is construed by the Contractor as possibly constituting a Change Request or an interpretation of the Contract requirements inconsistent with the Contractor's understanding of those requirements, the Contractor shall promptly notify Inmarsat and request clarification.

C. Within five (5) days after receiving a Change Request from Inmarsat or issuing a Change Request to Inmarsat, the Contractor shall submit to Inmarsat a Contract Change Notice as per Annex H, **Contract Change Notice Format**. The Contractor may request a longer period to prepare the Contract Change Notice, provided always that such request for an extension of time is reasonable and made to Inmarsat in writing within five (5) days after the Contractor has received or has sent (as the case may be) the relevant Change Request. A request for a longer period to prepare a Contract Change Notice shall be at Inmarsat's absolute discretion.

D. The preparation of a Contract Change Notice, whether in response to a Change Request prepared by Inmarsat or by the Contractor, shall be at the Contractor's expense.

E. Any claim by the Contractor for adjustment of the technical requirements, Price, performance schedule, or other terms of this Contract attributable to a change shall be deemed waived unless asserted in a Contract Change Notice and accepted by Inmarsat in writing.

F. If the cost of any materials that would be made obsolete as a result of a change the subject of a Change Request are included in the Contractor's claim for adjustment:

(1) to the extent that such materials have resale, reuse, or salvage value to the Contractor or its Sub-Contractors or, Inmarsat shall be entitled to a credit, and

(2) if such materials have no such resale, reuse, or salvage value, Inmarsat shall have the right to prescribe their manner of disposition.

G. After Inmarsat receives a sufficiently detailed Contract Change Notice, and after any negotiations with respect to the adjustments claimed by the Contractor, the following outcomes are possible:

(1) Inmarsat may decide not to proceed with implementation of the change.

(2) Inmarsat may decide to implement the change, in which case:

(a) if the Parties have reached agreement about the adjustments to be made in the Contract, the Contractor shall proceed with the implementation as agreed;

(b) if the Parties are unable to reach such an agreement, the provisions of Article 26: **Dispute Resolution and Arbitration**, shall apply; or

(c) pending any negotiations and/or arbitration, Inmarsat may direct the Contractor to proceed with the implementation of the change, subject to any adjustments subsequently agreed or awarded.

H. Inmarsat may also direct the Contractor to proceed with the implementation of a Change Request prior to preparation of a complete Contract Change Notice, subject to any adjustments to the Contract subsequently agreed or awarded.

I. Inmarsat's right to direct the Contractor to proceed with implementation of a change pursuant to Paragraph G (2)(c) or H of this Article 27 shall be subject to the Contractor's ability to do so, taking into account the resources, facilities, supplies, and services available to it, as well as any stipulated financial limit.

Article 28: Key Personnel

A. The Contractor agrees that those individuals identified in Annex G, Key Personnel, are necessary for the successful completion of the Work to be performed under this Contract.

B. Such Key Personnel shall not be removed from the performance of the Work under this Contract unless replaced with Personnel of substantially equal qualifications and ability. Inmarsat shall have the right to review the qualifications of any proposed replacements and, if for good and sufficient reasons Inmarsat deems such Personnel to be unsuitable, Inmarsat may require the Contractor to offer alternative candidates where such are available. Should none such suitable Personnel be available Inmarsat shall have the right to terminate this Contract in accordance with the provisions of Article 21: Termination.

C. Notwithstanding its role in approving Key Personnel and their replacements, Inmarsat shall have no supervisory control over their Work, and nothing in this Article shall relieve the Contractor of any of its obligations under this Contract, or of its responsibility for any acts or omissions of its (Key) Personnel.

Article 29: Key Sub-Contractors

A. The Contractor agrees that those Sub-Contractors identified in Annex D, **Key Sub-Contractors**, are necessary for the successful completion of the Work to be performed under this Contract.

B. The Contractor hereby agrees to use its best efforts to enter into subcontracts with these Key Sub-Contractors.

C. If, for any reason, the Contractor is unable to enter into Sub-Contracts with any of these Key Sub-Contractors, or such Sub-Contracts are entered into and are subsequently terminated, the Contractor shall replace such Key Sub-Contractors with Sub-Contractors of substantially equal qualifications and ability acceptable to Inmarsat.

D. The Contractor shall not enter into any Sub-Contracts for the performance of any of the Work without the prior written consent of Inmarsat.

E. Nothing in this Article shall relieve the Contractor of its responsibility for the performance, in accordance with this Contract, of any of the Work, whether the subject of a Sub-Contract or otherwise.

Article 30: Principles Applicable to Selection of Sub-Contractors

To the greatest extent practicable, the Contractor shall ensure that any replacement Sub-Contracts entered into pursuant to Paragraph B of Article 29: **Key Sub-Contractors**, or any new Sub-Contracts entered into pursuant to Paragraph C of said Article 29, are awarded on the basis of open competition, and to Sub-Contractors offering the best combination of quality, Price, performance and the most favourable delivery time.

Article 31: Assignment of Contract

A. The Contractor shall not assign or delegate, either in whole or in part, this Contract or any of the Contractor's rights, duties, or obligations hereunder to any person or entity without the prior written consent of Inmarsat, which consent shall be at Inmarsat's absolute discretion but which shall not be unreasonably withheld.

B. Notwithstanding any conditions under which Inmarsat may grant consent under Article 30; **Principles Applicable to Selection of Sub-Contractors**, the Contractor shall remain a guarantor to Inmarsat of the performance of the assigned or delegated duties and obligations in accordance with this Contract and all applicable laws.

C. Inmarsat shall be entitled to assign or novate this Contract, or any part thereof, and/or any rights or obligations hereunder to any Associated Company.

D. Inmarsat may assign or delegate, either in whole or in part, this Contract or any of Inmarsat's rights, duties, or obligations hereunder to any third party, person or entity with the prior written consent of Contractor, which consent shall not be unreasonably withheld or delayed by Contractor.

Article 32: Responsible Officers

The Responsible Officers of the Parties may be changed from time to time by notice to the other Party. Until further notice, the Responsible Officer for Inmarsat shall be **Roberto Nervegna** the second level contact shall be **Howard Thompson**, and for the Contractor the Responsible Officer shall be Srinivas Prasad , the second level contact shall be Dr T K Srikanth. Each Party shall notify the other Party of any change in Responsible Officer within (five) 5 working days of such change.

Article 33: Communications

A. All notices, reports, invoices and other correspondence to be provided to Inmarsat or the Contractor pursuant to this Contract shall be sent for the attention of the Responsible Officer referred to Article 32: **Responsible Officers**, and the Responsible Inmarsat Officer for Technical Matters Hok Shuen Wong, at the following addresses:

INMARSAT:	**CONTRACTOR:**
Inmarsat Global Ltd 99 City Road London EC1Y 1AX England	Sasken Communication Technologies Ltd 139 / 25 Intermediate Ring Road Domlur, Bangalore, 560071 India

B. All communications pertinent to this Contract shall be made or confirmed in writing, including confirmed e-mail, or facsimile to the above address.

C. All documentation and communications required under this Contract shall be in the English language.

Article 34: Time Limits

Any time limits to which this Contract binds the Contractor or Inmarsat shall be counted in calendar days from the day following that of the event marking the start of the time limit, and shall end on the last day of the period laid down. When the last day of a time limit is a Saturday or Sunday, or a legal holiday in the country in which the particular contractual performance is required, such time limit shall be extended to the first working day that follows. In case of conflicting time limits the UK time shall take precedence.

Article 35: Incentives for Early Delivery

In the event that M 13 occurs prior to its scheduled date set forth in the Annex A, **Statement of Work** (26 May 2010), the Contract Price and Payment Plan (as detailed in Annex A hereto) for M 13 as detailed in Annex A, entitled **Statement of Work**, shall increase by ten thousand United States Dollars (US$10,000) for every full calendar day between the date of scheduled for M 13 and actual M 13 up to a maximum of seven hundred and fifty thousand United States Dollars (US$750,000).

Completed calendar days advance from M 13	Total Incentives Accrued
1	$10,000
2	$20,000
3	$30,000
4	$40,000
10	$100,000
30	$300,000
75	$750,000

Daily incentive - $10,000

Article 36: Order of Precedence

Should any conflict arise between any Annex and the terms and conditions of this Contract, the terms and conditions of this Contract shall take precedence. Should any conflict arise between any of the Annexes of this Contract, the following order shall take precedence:

1. Annex C, Price & Payment Plan
2. Annex A, Statement of Work
3. The remaining Annexes shall be treated equally.

Article 37: Orderly Transition of the GSPS Handset Development Programme

A. EMS is no longer prime contractor on the GSPS Handset Development Programme. Inmarsat and EMS have entered into the EMS Transfer Agreement to (i) effect an orderly and efficient transition of the GSPS Handset Development Programme to the Contractor and (ii) make available to the Contractor the EMS Transferable Work for the purposes of performing its obligations under this Contract.

B. The Contractor shall use all reasonable endeavours to ensure an orderly and efficient transition of the GSPS Handset Development Programme from EMS to the Contractor.

C. The Contractor shall attend the transition workshops in Adelaide and Ottawa scheduled for the week commencing 26 January 2009 to review and evaluate the EMS Transferable Work,

D. The Contractor shall (and shall procure that its Personnel) provide all such assistance and cooperation, take all such action and deploy such resources which Inmarsat may reasonably deem necessary for an orderly and efficient transition of the GSPS Handset Development Programme to the Contractor.

E. Inmarsat shall use its reasonable endeavours (and shall procure that EMS uses its reasonable endeavours) to deliver the EMS Transferable Work to the Contractor on or before 28 February 2009. The Contractor acknowledges that the EMS Transferable Work shall be delivered "as is" and Inmarsat hereby excludes in relation to such EMS Transferable Work all representations (unless fraudulent), warranties and conditions and other contractual terms howsoever arising (whether by statute, common law or otherwise) to the maximum extent permitted by law.

F. Save only as provided in Article 37 G, the Parties agree and acknowledge that the Contractor shall be free to utilise, modify or discard the EMS Transferable Work as it sees fit to perform its obligations under this Contract.

G. Without prejudice to Article 37 F, the Contractor shall be obliged to accept, as soon as reasonably practicable, an assignment or sub-licence of the rights under the Third Party IPR Licences unless in relation to any particular Third Party IPR Licence it is properly adjudged either that (a) the proposed assignment or sub-licence grant will not suffice for the Contractor to satisfy its licensing obligations under Article 11 in relation to that item of EMS Transferable IPR; or (b) the assignment or sub-licence of the rights under such Third Party IPR Licence would have a material adverse effect on the GSPS Handset Development Programme (a "Repudiated Licence"). Subject to the Contractor obtaining Inmarsat's prior approval and the Contractor agreeing to use all reasonable efforts to secure the most economic terms, Inmarsat agrees to bear the third party licensor's fee for obtaining rights to the relevant item of EMS Transferable IPR the subject of such Repudiated Licence on terms which will avoid such impact as described at sub-paragraphs (a) or (b) above. The Parties hereby agree, in the event that the Contractor has not been granted sufficient rights of use in the Mediatek Licence to develop the Core Module and the UT Handset in accordance with its contractual obligations by 28 February 2009, the performance schedule shall be extended to place the Contractor in the position it would have been if such rights of use in the Mediatek Licence had been secured by 28 February 2009.

H. Inmarsat and the Contractor mutually undertake to use their best endeavours to enable the Contractor to promptly terminate the licences which it granted to EMS for rights of use of the "GSM/GPRS Protocol Stack" and "Application Framework" software in relation to the GSPS Handset Development Programme. Notwithstanding the foregoing, the Contractor agrees to license use of this software at no additional cost for the purposes of fulfilling its obligations under this Contract including, without limitation, its licensing obligations on the terms set forth in Article 11.

I. Inmarsat shall procure that EMS assigns, sub-licenses or otherwise transfers its rights of use in the "Physical Layer" (as referenced in the SOW) and "GMR2+ Protocol Stack" software to the Contractor as soon as reasonably practicable, and not later than 28 February 2009. Inmarsat further agrees, in the event that the Contractor has not been granted sufficient rights of use in the aforesaid software to develop the Core Module and UT Handset in accordance with its contractual obligations by 28 February 2009, the performance schedule shall be extended to place the Contractor in the position it would have been if such rights of use in the software had been secured by 28 February 2009.

J. If the Parties do not succeed in making use of any EMS Transferable Work available to the Contractor by 28 February 2009, the Contractor shall use all reasonable endeavours to eliminate or mitigate the consequences of the delay.

K. For the avoidance of doubt, the Contractor is responsible for and shall bear the cost of obtaining rights of use in any other Intellectual Property Rights falling outside the scope of the Third Party IPR Licences which the Contractor requires to perform its obligations and ensure the Deliverables conform to the specifications in the PRSD and SOW.

Article 38: Further Royalties

A. If any royalties other than the Royalties specified in Annex I shall fall due on the use of rights which are to be assigned, sub-licensed or otherwise transferred to the Contractor under the Third Party IPR Licences ("Further Royalties"), the Contractor shall immediately notify and consult with Inmarsat, and shall not agree any Further Royalties with the third party owner of the rights without Inmarsat's prior written consent. Any corresponding changes to Annex I shall be made by way of a Change Notice.

Article 39: Waiver

No relaxation, forbearance, delay or indulgence by either Party in enforcing any of the terms and conditions of this Contract or the granting of time by either Party to the other shall prejudice, affect or restrict the rights and powers of the said Party, nor shall any waiver by either Party of any breach of this Contract operate as a waiver of any subsequent or any continuing breach of this Contract.

Article 40: Trademarks

Any agreed use of any Inmarsat trademarks and service marks shall be subject to signature of the standard form Inmarsat Trademark Licence Agreement.

Article 41: Entire Agreement

This Contract constitutes the entire agreement between the Parties with respect to the subject matter hereof, and supersedes all prior or existing correspondence, representations, proposals, negotiations, understandings, or agreements of the Parties, whether oral or written. The Parties also hereby acknowledge that there are no collateral contracts between them with respect to the subject matter hereof. This Contract may be signed in counterparts and each original counterpart shall be deemed binding on each Party collectively and individually. A person who is not a Party to this Contract has no rights under the Contracts (Rights of Third Parties) Act 1999 to enforce any term of this Contract but this does not affect any right or remedy of a third party which exists or is available apart from that Act or any right of a Party to this Contract to enforce any term of this Contract for and on behalf of such third party where applicable.

IN WITNESS WHEREOF, the Parties have signed this Contract in duplicate.

CONTRACTOR	INMARSAT
BY: _____	BY: _____
Printed Name: _____	Printed Name: _____
Title: _____	Title:
Date: _____	Date: _____

GLOBAL SATELLITE PHONE SERVICE USER TERMINAL DEVELOPMENT AND PRODUCTION

CONTRACT 09-4642

ANNEX A – STATEMENT OF WORK – AS ATTACHED

STATEMENT OF WORK

INMARSAT GLOBAL SATELLITE PHONE SERVICE
USER TERMINAL DEVELOPMENT

UT HANDSET

REVISION V 3.3

REVISION HISTORY

Revision	Date/Author	Description
v 0.1	19/11/08 – JJ Santolaria	Initial Draft
v 0.2	20/11/08 – JJ Santolaria	Incorporated Johnny Nemes' initial feedback
v 0.3	20/11/08 – JJ Santolaria	Editorial Changes
v 0.4	20/11/08 – JJ Santolaria	Incorporated Erwis Sinisuka's feedback
v 0.5	21/11/08 – JJ Santolaria	Editorial Changes
v 0.6	26/11/08 – Hok Shuen Wong	Initial internal discussions at Sasken
v 0.7	27/11/08 – JJ Santolaria	Incorporated UTCM related discussion
v 0.8	27/11/08 – JJ Santolaria	Editorial Changes
v 0.9	27/11/08 – Hok Shuen Wong	Follow-on internal discussions at Sasken
v 0.10	28/11/08 – Hok Shuen Wong	Incorporated DV Ramana, Roger Wilkins' feedback on audio testing Internal review at Sasken
v 0.11	28/11/08 – JJ Santolaria	New IWT and SAT regime and initial changes after discussion with Sasken
v 1.0	28/11/08 – JJ Santolaria	Final Draft after Sasken meeting
v 1.1	01/12/08 – JJ Santolaria	Sasken's inputs and editorial changes
v 1.2	10/12/08 – JJ Santolaria	Modifications after initial internal peer review
v 1.3	16/12/08 – JJ Santolaria	Addition of NPI / CM relationship section
v 2.0	17/12/08 – JJ Santolaria	Consolidation of edits
v 2.1	19/12/08 – E. Sinisuka	Modification section II.9 and added SLA aspect for CSI and warranty phases.
v 2.2	Sasken	Updated sections II.A.2
v 2.3	04/01/09 – JJ Santolaria	Editorial changes
v 2.4	13/01/09 – JJ Santolaria	Additions and amendments after Sasken meeting
v 2.5	14/01/09 – JJ Santolaria	Editorial changes, acceptance of comments
v 2.6	15/01/09 – JJ Santolaria	Additions and editorial changes after Sasken meeting
v 2.7	15/01/09 – JJ Santolaria	Editorial changes
v 2.8	16/01/09 – JJ Santolaria	Amendments to reflect Warranty Support agreements. Minor editorial changes
v 2.9	19/01/09 – JJ Santolaria	Last updates after Sasken-Inmarsat teleconference
v 3.0	20/01/09 – JJ Santolaria	Final version – latest update on duration of CSI and Warranty Support phases
v 3.1	20/01/09 – JJ Santolaria	Final version – minor modification suggested by Sasken
v 3.2	23/01/09 – JJ Santolaria	Adjustment to reflect change of name of PRD to PRSD
v 3.3	27/01/09 – JJ Santolaria	Added baseline version of PRSD

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LIST OF FIGURES AND TABLES

ACRONYM LIST

AMBE	Advanced Multi-Band Excitation
AI	Air Interface
BPLT	BGAN Physical Layer Tester
CE	Community European/ European Community
CFI/CFE	Customer-Furnished Items/Equipment
CEM	Contract Equipment Manufacturer
CMP	Configuration Management Plan
CSI	Commercial Service Introduction
DSP	Digital Signal Processing
DVSI	Digital Voice Systems Inc.
EDC	Effective Date of Contract
ETSI	European Telecommunications Standards Institute
FAT	(UT Handset/Core Module) Factory Acceptance Test
FATR	(UT Handset/Core Module) FAT Review
FCC	Federal Communications Commission
FDR	Final Design Review
GMR-2	ETSI Geostationary Mobile Radio Release 2
GMR-2+	An enhanced version of GMR-2 used by the Global Satellite Phone Service
GMPCS	Global Mobile Personal Communications System
GPS	Global Positioning System
GSM	Global System for Mobile Communications
GSPS	Global Satellite Phone Service (GMR-2+)
HFAT	UT Handset FAT
HFATR	UT Handset FAT Review
HMI	Human Machine Interface
HRS	Hardware Requirement Specification
HW	Hardware
I4	Inmarsat-4 (Satellite System)
ICD	Interface Control Document
IDR	Industrial Design Review
IF	Intermediate Frequency
ITR	Interworking Test Review
IWT	Interworking Test
KOR	Kick-off Review
MMI	Man-Machine Interface
MPP	Manufacturing and Procurement Plan
MTFF	Mean Time for First Failure
N/A	Not Applicable
NCC/GW	Network Control Centre/Gateway
NPI	New Product Introduction
NTE	Not To Exceed
PCM	Pulse-Code Modulation
PDR	Preliminary Design Review
PLMN	Public Land Mobile Network
PMP	Project Management Plan
PRSD	Product Requirements Specifications Document
PSA	Production and Supply Agreement
PSTN	Public Switched Telephone Network
QAP	Quality Assurance Plan
RF	Radio Frequency
RID	Review Item Discrepancy

RMP	Risk Management Plan
RTB	Reference Test Bed
SAT	Satellite Acceptance Testing
SATR	SAT Review
SCCB	(GMR-2+) Specifications Change Control Board
SIM	Subscriber Identity Module
SLA	Service Level Agreement
SLIC	Subscriber Line Interface Circuit
SOW	Statement of Work
SRS	Software Requirement Specification
SW	Software
TBC	To Be Confirmed
TBD	To Be Determined
TCF	Test Construction File
TE	Terminal Equipment
TRR	Test Readiness Review
UL	Underwriters Laboratories
USB	Universal Serial Bus
UT	User Terminal
UTCM	User Terminal Core Module
UTH	User Terminal Handset
UTP	User Terminal Prototype
VCRM	Verification Cross-Reference Matrix
WBS	Work Breakdown Structure
WPD	Work Package Description

I. INTRODUCTION

A. Purpose

This document defines the requirements for the technical and industrial design, prototyping, testing, preproduction, and support for mass production of a User Terminal Core Module (UTCM) and User Terminal Handset (UTH) for the Inmarsat Global Satellite Phone Service (GSPS). It also includes requirements for warranty and maintenance of the UTCM and UTH.

B. Scope

The SOW is divided into four sections. Section I provides an introduction and program overview (this section). Section II describes the scope of work for the development of the User Terminal Handset and Core Module. Section III contains the management requirements applicable to this contract. Finally, section IV provides a description of the GMR-2+ Specifications Change Control Board (SCCB).

C. GSPS Program and UT Procurement Overview

The Global Satellite Phone Service provides handheld satellite communication services using the GMR-2+ air interface technology. GMR-2+ is a modern variant of the GMR-2 air interface (European Telecommunications Standards Institute (ETSI) Geostationary Earth Orbit Mobile Radio Release 2) that has been optimised for use with the Inmarsat-4 satellites.

The GSPS User Terminal will provide access to both GMR-2+ satellite networks ("Satellite Mode") and terrestrial GSM networks ("GSM Mode"). In the Satellite Mode, the User Terminal will communicate with the Network Control Centre/Gateway (NCC/GW) via an Inmarsat-4 satellite using L-band frequencies. The NCC/GW provides connectivity to the PSTN and PLMN.

This SOW defines the sequence of tasks and deliverables that must be performed in order to complete the development cycle of the UT. In particular, there are four prime deliverables with formal definitions as follows:

- UT Core Module (UTCM) – This refers to a hardware module and supporting physical layer and protocol software of a GMR-2+ User Terminal. It is an integral component of the UT Handset. This SOW refers only to the pre-production prototypes of the UT Core Module.
- UT Core Module Reference Design – This refers to the set of complete and detailed specifications for the UT Core Module (circuit diagrams, documentation, software, firmware, interface definitions). The level of detail shall permit a third-party manufacturer to replicate the Core Module exactly and in its entirety and then integrate the Core Module into a UT Handset (or other type of commercial product) for the purposes of mass production.
- UT Handset – This refers to a mass-market consumer product (a handset) that will be sold to subscribers to the Inmarsat Global Satellite Phone Service. This SOW refers only to the pre-production prototypes of the UT Handset.
- UT Handset Reference Design – This refers to the set of complete and detailed specifications for the UT Handset The level of detail shall permit a third-party manufacturer to replicate the UT Handset exactly and in its entirety for the purposes of mass production.

D. Transferrable Work

At the time of EDC, there will be a series of elements of the UT Core Module and UT Handset Design, Development and Testing phases available from EMS Satcom (EMS Transferable Work) and Inmarsat (Inmarsat Background). The Contractor shall be responsible for obtaining all necessary background data from EMS and, in the case where such background data is unsuitable for the intended purpose, making modifications or improvements as necessary. More details on Orderly Transfer of information are described in more detail in Article 37 of the contract. Examples of these elements available from EMS are (but are not necessarily limited to):

- Partitioning of UT Core Module and UT Handset requirements and Verification Cross Reference Matrix (VCRM).
- High Level Hardware Requirement Document (HRS)
- High Level Software Requirement Specification (SRS)
- High Level and Detailed UT Core Module Hardware Design, including RF and Baseband Design.
- High Level and Detailed UT Core Module Software Design.
- Detailed design of Layer 1 Algorithm Code.
- AIL Performance Simulations results.
- Preliminary Design and Analysis documentation for L1 (PSIL, CCL, BCL, WIOS, AIL).
- Preliminary UT Core Module Layer 1 Controller and WIOS Software Design.
- 1st Prototype of GMR-2+ Antenna and Antenna Farm.
- Layout, schematics for UTCM v0.5 and v1.0.
- Technical notes on the design and simulation.
- Preliminary UT Handset Hardware and Mechanical Design.
- Preliminary Bill of Materials of both the UT Core Module and the UT Handset.
- Layout, schematics for User Terminal Prototype (UTP) (see Section II.A.7).
- User Terminal Prototype (UTP) platform for UTCM integration with the Network Emulator.
- Network Emulator test scripts for the validation of Layer 1 SW Integration with the Protocol Stack.
- Network Emulator test scripts for the validation of basic UT Core Module (see Section II.D.3).

All these elements shall be provided to the Contractor on 'as is' basis.

The Contractor shall work together with EMS Satcom during a period no longer than three calendar months to ensure a swift transition of all existing elements in order to guarantee that there is no longer a dependency on EMS Satcom. The Contractor shall own all transitioned elements from the time no longer than EDC + 3 calendar months. A transition document will capture all the items that are required to be delivered by EMS Satcom for a smooth and effective transitioning.

E. Document Hierarchy

A number of specification documents form the basis for the UT Procurement. The overall applicability and precedence of each document is defined in Table 1.

Table 1. Document Hierarchy

Precedence	Document	[illegible]y	Content Summary
1	Statement of Work	Mandatory	Description of all programmatic requirements for work under this Contract
2	ETSI GMR-2+ Specifications	Mandatory	Specification of the satellite air interface
3	GSPS UTH and UTCM PRSD "Product Requirements Specifications Document", Issue 2.3	Mandatory	Describes the technical and operational requirements for the UT Handset and UT Core Module

Where conflicts between the requirements in the various documents occur, the document with the highest level of precedence (indicated above) shall apply. The Contractor shall inform Inmarsat of any substantive conflicts between specifications in this hierarchy.

F. Definition Methodology

The document uses the following definition of the term *"shall"*:

- *"Shall"* indicates a mandatory requirement that must be met by the Contractor.

Statements that do not contain the term *"shall"* shall be treated as informational in nature and are provided to assist the Contractor's understanding of the rationale behind requirements.

Square brackets indicate that the enclosed text is subject to further confirmation or change.

"Documents and Data Deliverables" and *"Milestones"* as described in Table 4 and Table 7 below respectively shall be treated in the same way as the *"Product Deliverables"* (see Table 5) for contractual purposes.

II. USER TERMINAL HANDSET

A. Tasks

1. UT Handset (UTH) Development and Reference Design

The Contractor shall design, develop, prototype, validate, and certify a UT Handset that is fully compatible with the Inmarsat GSPS network and complies with the technical and operational requirements in the PRSD. The UT Handset shall contain and employ the UT Core Module (conforming to the UT Core Module Reference Design).

The Contractor shall produce a Verification Cross-Reference Matrix (VCRM), which shall provide cross-reference between each requirement and its associated verification test campaign. The Contractor shall deliver the VCRM as part of the Final Design Review (FDR) documentation package (see Table 6 in section III.A.2).

The Contractor shall build a UT Handset Hardware Requirement Specification (HRS) and a Software Requirement Specification (SRS) showing appropriate differentiation between hardware and software high level and derived requirements.

The Contractor shall deliver final revisions of these two documents as part of the FDR documentation package (see Table 6 in section III.A.2).

The Contractor shall produce and deliver a UT Handset Reference Design to Inmarsat, with scope, content, and detail similar to the UT Core Module Reference Design (see Section II.A.1). The design documentation shall include, but is not necessarily limited to:

- Hardware, enclosure, circuit, and interface diagrams
- Interface Control Documents (ICD) for all interfaces provided by the UT Handset to external devices and accessories (reference to industry standards preferred whenever applicable).
- Complete set of compiled UT Handset software and firmware with supporting source code and documentation, to be licensed on the terms set out in Article 11 of the contract
- BOM (Bill of Materials) and calculation of the material cost of the UT Handset.
- Specifications for each of the components of the UT Handset including operating tolerances, MTFF (Mean Time for First Failure) estimates, and performance analysis.
- An environmental and safety analysis for each of the components of the UT Handset (hazardous material content).

2. User Terminal Core Module (UTCM) and Reference Design

The Contractor shall design prototype and test all of the hardware, software, firmware, and other supporting components that are required to produce the User Terminal Core Module (UTCM).

Those requirements that cannot be unequivocally validated in the context of the UT Handset shall be assigned to the UT Core Module and shall be demonstrated during the UT Core Module FAT phase (see section III.C.5 of this SOW).

The UTCM shall be of a suitable design such that, when integrated, satisfies all of the requirements of the PRSD.

The UTCM shall include the following components, integrated together as a single unit:

- Processors: baseband, power management, DSP, media processor
- Memory: volatile and non-volatile
- RF Module: GSM/GMR-2+ transceivers, GPS receiver, RF filters, power amplifiers, Bluetooth capability
- Software and Firmware: including, but not necessarily limited to: GSM and GMR-2+ protocol stacks, GPS processing, drivers, power management, SIM handler, AMBE+2 voice codec, echo canceller incorporating line echo cancellation (G168) and acoustic echo cancellation for hand set mode and also for speaker phone.
- Appropriate interface to support 2wire (RJ 11) interface. However 2-wire interface electronics (e.g. SLIC and associated components) need not be included on the UTCM.
- SIM Module: 1.8V, 3V.
- USB

The UTCM shall exclude but shall have defined interfaces to third-party components which are within the scope of the PRSD, including:

- Mechanics
- Housing
- Keyboard
- Display (and user MMI)
- Antennas: satellite, GSM, GPS
- Audio Peripherals: microphone, speaker
- Li Ion/Li Polymer Battery

The dimensions, weight, power consumption, and interfaces of the UTCM shall be compatible with the PRSD, such that it can be integrated into the UT Handset without the need for modification or reassembly of its components.

At the time of EDC, a preliminary design of most of the elements cited above will be available from EMS Satcom. The preliminary design and its associated design documentation will be provided to the Contractor on an 'as is' basis. The Contractor shall work together with EMS Satcom during a period no longer than 3 calendar months to ensure a swift transition of the work performed by EMS Satcom in order to guarantee that there is no longer a dependency on EMS Satcom.

In the case that areas of the current design are deemed not fit for purpose, the Contractor shall perform the necessary modifications to guarantee that the

features and interfaces detailed above are provided as part of the UT Core Module.

The UTCM shall be of a suitable design such that, when integrated, satisfies all of the requirements of the PRSD. In addition, the UTCM shall be designed to meet the following

i) Maritime environment requirement (IEC 60945 – vibration only).
ii) Capability to provide 2 wire RJ 11 interface (2-wire interface electronics (e.g. SLIC and associated components) need not be included on the UTCM); and
iii) Additional AT commands, which will have been mutually agreed between the Contractor and Inmarsat.

The UTCM hardware shall be designed to support a family of GSPS products namely, Fleetphone (maritime), Landphone (Fixed installation), and secure handset. The architecture & design of the UTCM hardware shall not limit the UTCM from further enhancements to support these new products. As a minimum, the architecture shall support future enhancements to the following:

- Different LCD displays
- Different keypad interface
- Incorporating external antennas for GSM, GPS and GMR2+
- Serial port for provisioning of NMEA output

The UTCM SW shall be customisable for the above changes, and future GSPS products, which are beyond the scope of this SoW. The default software shall be GSPS UT Handset compatible and, as a minimum, shall support future enhancements to the following:

- Additional AT commands, which will have been mutually agreed between the Contractor and Inmarsat.

The Contractor shall fully document all aspects of the design of the UT Core Module to a level of detail that would permit a third-party manufacturer to replicate it exactly and in its entirety and then integrate it into a UT Handset (or other type of commercial product). The documentation set shall include the following, but is not necessarily limited to:

- Circuit and interface diagrams.
- Interface Control Documents (ICD) for all interfaces provided by the UT Core Module to ancillary components and functions within the scope of the UT Handset.
- PRSD Compliance Table, identifying the UT Handset requirements that are directly satisfied by the UT Core Module.
- Compiled software and firmware (appropriate for the target platform) with supporting source code and documentation, to be licensed on the terms set out in Article 11 of the contract

- BOM (Bill of Materials) and estimate of the material cost of the UT Core Module.
- Specifications for each of the components of the UT Core Module including operating tolerances, MTFF (Mean Time for First Failure) estimates, and performance analysis.
- An environmental and safety analysis for each of the components of the UT Core Module (hazardous material content).

3. Industrial Design

The Contractor shall consult Inmarsat and shall respect the right of final approval of Inmarsat, on all mechanical and aesthetic aspects of the industrial design of the UT Handset. This includes the size, form, weight, housing, materials, texture, mechanics, ergonomics, audio interfaces (MMI), visual interfaces (MMI), tactile interfaces (MMI), brand marking (corporate logos), and commercial packaging.

To serve this purpose, the Contractor shall conduct a series of reviews of the Industrial Design with representatives from Inmarsat during the development process.

The Contractor shall use appropriate media (e.g. physical proof of principal prototypes, three-dimensional computer models or 2D section drawings, first off tooling samples, etc) to illustrate the industrial design as it matures throughout the development and shall make this media available to Inmarsat on request.

At PDR the contractor shall present one handset mock up resulting from the previously completed proof of principle work. After PDR sign off, the Contractor shall deliver a further four (4) samples reflecting the agreements reached in PDR.

At FDR the contractor shall present one handset mock up resulting from the previously completed detailed design work. After FDR sign off, the Contractor shall deliver a further four (4) samples of the UT Handset ("mock-ups") that accurately demonstrate the physical aspects of the approved design.

4. Bill of Materials (BOM)

The Contractor shall manage the BOM (Bill of Material) as part of hardware development work. Prices of each component will be indicated by the manufacturing partner chosen by Inmarsat.

The Contractor shall work with Inmarsat's manufacturing partner to select cost effective components and the total BOM cost shall be reviewed by Inmarsat.

Negotiations on final component price with manufacturing partner will be handled by Inmarsat.

5. Early Demonstration of Basic GMR-2+ Functionality

The Contractor shall undertake an early demonstration of Basic GMR-2+ functionality on the date defined by Milestone M4 in Table 7.

The Contractor shall demonstrate end-to-end Narrow Beam operations using UTH Stage 2 units in which the first release of the GMR-2+ Protocol Stack and Layer 1

has been integrated. This demonstration shall show basic GMR-2+ functionality against the Inmarsat supplied Network Emulator (NE). The scope of the demonstration shall be agreed with Inmarsat by FDR.

This demonstration shall be witnessed by Inmarsat representatives at the Contractor's site.

6. UTH Stage 3 Units

The Contractor shall produce and deliver to Inmarsat a total of ten (10) fully functional UTH Stage 3 Handsets and ten (10) fully functional Stage 3 UT Core Modules that are suitable for early system integration and over-the-air tests. These may also be used by Inmarsat as part of its marketing and business development activities.

UTH Stage 3 Handsets and Stage 3 UT Core Modules are considered the precursors of the final UTH and UT Core Module Pre-production units in the development phase. UTH Stage 3 Handsets and Stage 3 UT Core Modules will be the first prototypes that will be subject to full functional, feature and performance testing and validation by the contractor.

7. UT Pre-Production

The Contractor shall produce, test, and deliver to Inmarsat, a total of five hundred (500) fully-functional pre-production UT Handsets that are suitable for system integration, alpha, and beta testing.

It is understood that Material cost, mechanics tooling, production testers are excluded from the scope of the NPI and pre-production phases.

8. Testing

The Contractor shall be fully responsible for all technical and programmatic aspects of the unit/module, integration, factory acceptance, inter-working, satellite acceptance and pre-production testing of the UT Handset. The Contractor shall develop and deliver all applicable test plans, procedures, and reports. The Contractor shall also perform System Interworking and UT Handset Satellite Acceptance tests prior to Inmarsat's pre-Beta and Beta test campaigns. The Contractor shall participate and assist in all Inmarsat-led pre-Beta and Beta tests of the Inmarsat GSPS network. Section III.C contains more detailed test requirements.

For the purpose of early inter-working tests between the UTCM/UTH and the network infrastructure, e.g. Network Emulator (NE) and/or Lockheed Martin's Reference Test Bed (RTB), at the time of EDC EMS Satcom will make available a test platform denominated UTP (User Terminal Prototype) into which the UTCM can be integrated.

In the case that areas of the existing UTP design are deemed not fit for purpose, the Contractor shall perform the necessary modifications or build a completely new platform in order to guarantee that the features and interfaces detailed below are provided as part of the UTP for the purposes of early integration.

The UTP will be provided to the Contractor on an 'as is' basis. The UTP will have the following features:

- User interface that is integrated with the UTCM, including, but not limited to, a keyboard and LCD display that allows an operator to exercise the GSM and GMR-2+ protocols.
- Sufficient HMI and serial interface diagnostic capabilities to allow the Contractor, Inmarsat and any designated third party, e.g. Lockheed Martin, to exercise, test, and debug all aspects of the GMR-2+ air interface.
- Ability to collect, store, and export signalling and call event trace data.
- The UTP shall be portable and of a size and weight such that it can be carried by one person.
- Capability to operate with an antenna and without an antenna (i.e. directly connected to an RF source via a RF cable with N-type connector).
- Capability to be powered by a battery that can be recharged as well as by direct AC power. The power supply included with the UTP shall be suitable for use in the United States and Europe.

The Contractor shall work together with EMS Satcom during a period no longer than 3 calendar months to ensure a swift transition of the work performed by EMS Satcom in order to guarantee that there is no longer a dependency on EMS Satcom.

9. Voice Codec and Audio Testing

The Contractor shall undertake early design proving and prototyping of the UT Core Module as defined in this SOW and the implementation of the DVSI AMBE+2 voice codec.

At the time of EDC, the DVSI AMBE-2+ voice codec test vectors will be available from EMS Satcom and shall be provided on 'as is' basis. The Contractor shall use the AMBE+2 codec test vectors and the Inmarsat supplied DVSI Voice Codec Test Set (VCTS) to verify bit-exact implementation under fully-loaded functional conditions, and verify adequate voice quality using the VCTS "end-to-end" mode via a 4-wire analog test port which shall be provided on the UTCM, also under fully-loaded conditions.

The UT Core Module shall incorporate the following:

- The UTCM shall input and output compressed encoded and decoded voice packets via the USB port using the UDP protocol used in the VCTS. After appropriate conversion in an external PC (conversion hardware and software to be supplied by the Contractor), these packets will be routed to and from the VCTS via an Ethernet interface.
- For voice codec testing using the VCTS, the UTCM shall provide commands to enable/disable loop back of the D/A input to the A/D output.
- The UTCM shall also input and output linear 16-bit PCM speech packets via the USB port using a UDP protocol similar to that used in the VCTS. After appropriate conversion these shall be provided to the External Test equipment for end to end testing via an Ethernet interface.

The Contractor shall perform objective evaluations of voice quality using the Inmarsat supplied DVSI Voice Codec Test Set (VCTS) and the Network Emulator, in a similar manner to the early design proving tests described above, i.e. both

VCTS bit-exact, and "end-to-end" tests via the UTCM 4-wire interface. Formal subjective testing (i.e. in accordance with ITU-T Recommendation P.800) is not required.

The Contractor shall perform acoustic de-coupling tests (between the handset microphone and earpiece) according to 3GPP TS 26.132 Version 7.1.0 (Release 7) (also ETSI TS 126.132, V7.1.0, 2008-11).

The Contractor shall perform UTCM echo canceller tests conforming to ITU-T standard G.168 under fully loaded conditions, and shall provide appropriate interfaces and test modes in the UTCM to facilitate this testing with the Contractor's chosen test equipment.

Acoustic echo cancellation modes shall also be provided, both to cancel residual acoustic echo from earpiece to microphone when the UT is in handset mode, and to cancel room echo when the UT is in hands-free (speakerphone) mode. These modes shall be automatically selected from appropriate signalling within the UT. Both objective and subjective tests (not formal MOS tests) of these echo cancellation modes shall be performed.

The Contractor shall conduct tests of the UT Core Module integrated with the Lockheed Martin Reference Test Bed in Valley Forge, Pennsylvania, USA. The scope of the testing shall be agreed with Inmarsat, but at a minimum, the Contractor shall demonstrate the following (in accordance with the modified GMR-2+ specification):

- Correct bit-exact performance between the UT Core Module interface and uncoded voice data at an interface to Lockheed Martin's Reference Test Bed. The Test Set and test vectors in this case will be supplied by Lockheed Martin. Interfacing between this test set and the UTCM shall be by mutual agreement, but shall employ the linear (uncoded) 16-bit interface mode described above. Formal subjective testing (i.e. in accordance with ITU-T Recommendation P.800) is not required.

The Contractor shall develop these Interworking Test Procedures (in consultation with Inmarsat) and shall also provide on-site support in Valley Forge during the test execution.

The scope of the test activities shall be agreed with Inmarsat by FDR. The results of design proving/prototyping shall be retained and presented to Inmarsat at the appropriate milestone review meetings.

10. NPI / Relationship with Contract Equipment Manufacturer

Inmarsat shall furnish the Contractor with a Contract Equipment Manufacturer (CEM) partner for the purposes of NPI and pre-production.

The Contractor shall liaise with, coordinate and manage the relationship with Inmarsat's chosen Contract Equipment Manufacturer (CEM) partner for the purpose of NPI and pre-production.

For this purpose, as a minimum and according to a schedule agreed with Inmarsat's chosen Contract Equipment Manufacturer (CEM), the Contractor shall provide all the design information and documentation that the CEM will request for

the purpose of NPI and pre-production, including but not limited to the items listed below:

- Build and mechanics release schedule.
- Production Test specification.

Additionally, as a minimum and according to a schedule agreed with the CEM, the Contractor shall deliver to the CEM for each prototype build (Stage 1, Stage 2, Stage 3 and pre-production) as appropriate the following:

- Build Plan and Build Definition.
- Manufacturing Documentation, including, but not limited to, a list of materials.
- 3-D files and 2-D drawings.
- Visual Quality requirements.
- Mass production approving reports.
- Final assembly instructions.
- Software image.

11. Certification, Terminal Marking, Licenses, and Type Approval

The UT Handset Product Requirements Specifications Document (PRSD) contains a list of mandatory certifications for the UT Handset. It is the sole responsibility of the Contractor to follow the established certification and type approval procedures and deliver a fully-certified UT Handset to Inmarsat.

It is the sole responsibility of the Contractor to obtain GSM Type Approval for the UT Handset. GMR-2+ Type Approval is implied by the completion of the sequence of acceptance and verification test milestones described in Section III.C.

12. UT Core Module and Handset Support

The Contractor shall provide support for the UTCM and UTH for a period of 6 weeks from the date of Inmarsat's acceptance of SAT; this 6 week period shall be known as 'CSI support' and shall cover the pre-Beta and Beta Test Phase 1 as described in Section III.C.6(1). During the CSI Support phase, the Contractor shall provide bug-fix support for the issues raised during Inmarsat's pre-Beta and Beta Test Phase 1 as per the SLA's shown in Table 2 below.

The Contractor shall provide Warranty Support for a period of 18 months after successful completion of Beta Test Phase 1 as described in Section III.C.6(1). The Contractor shall provide bug-fix support for the issues raised during the first 6 weeks of this period as per the SLAs defined in Table 2 below.

After the completion of the first 6 weeks of Warranty Support, the Contractor shall provide bug-fix support for the issues raised as per the SLAs defined in Table 3 below.

Both Support phases are intended to address and resolve design faults in the hardware, software, firmware and design faults that degrades agreed manufacturing yield of the UTCM and/or UTH that reflect non-compliance with the PRSD. The Support is not intended to address faults isolated to a particular UTCM, UTH, or experience of a particular user. It is understood that Material cost, mechanics tooling, production testers are excluded from the scope of CSI & Warranty Support.

The issues would be raised as per the defect categories defined in Section III-C-2.

Table 2. SLA of Bug-fix turn around in CSI support Phase and first 6 weeks of Warranty Support

		Category 1 Defect (days)	Category 2 Defect (days)	Category 3 Defect (days)
SAF	Analysis / response	1	2	3
	Hot fix	2	NA	NA
	Bug resolution	3**	3**	6**
GSM/GMR2 Protocol Stack	Analysis / response	2	3	4
	Hot fix	2	NA	NA
	Bug resolution	3**	8**	10**
L1 Software	Analysis / response	3	4	5
	Hot fix	3	NA	NA
	Bug resolution	6**	12**	15**
Hardware #	Analysis / response	2 weeks for analysis.		
	Hot fix *)	Provide the hot fix in 5 working days time -if it's concluded as design issue and this change can be implemented by the support team in field.	Provide the hot fix in 8 working days time -if it's concluded as design issue and this change can be implemented by the support team in field.	
	Bug resolution *)	5 weeks from Analysis stage	4 weeks from the Hot fix stage.	

*) Only component change – no PCB re-design.
Cost of Material, mechanics tooling, for the hardware are excluded.
** Patch release can be made by consolidating all the fixes available. This would be decided by CCB based on the criticality and usability related issues. The release frequency can be decided by the CCB which has Inmarsat and Contractor members.

Table 3. SLA of Bug-fix turn around in Warranty support Phase

		Category 1 Defect (days)	Category 2 Defect (days)	Category 3 Defect (days)
SAF	Analysis / response	2	3	4
	Hot fix	3	NA	NA
	Bug resolution	6++	6++	8++
GSM/GMR2 Protocol Stack	Analysis / response	2	3	4
	Hot fix	3	NA	NA
	Bug resolution	6++	12++	15++
L1 Software	Analysis / response	3	4	5

	Hot fix	3	NA	NA
	Bug resolution	6	15	20
Hardware	Analysis / response	2 weeks for analysis.		
	Hot fix *)	NA	NA	NA
	Bug resolution	4 weeks from Analysis stage (assuming no evaluation spin needed and no certification-retests). 8 weeks from Analysis stage (assuming one evaluation spin needed and no certification-retests). • We assume there are no major bugs during this stage. • Only component changes are anticipated and a new spin can be created with these changes. • Assumption is that availability of possible new component is not causing delays to implementation of the bug fix		

*) Hot fix is not applicable during mass-production. All changes have to be evaluated using formal engineering change process and Certification aspects need to be taken into account.

++ Patch release can be made by consolidating all the fixes available. This release would be once a month.

The Contractor shall set manufacturing yield targets together with Inmarsat and Inmarsat's chosen Contract Equipment Manufacturer after the Pre-Production unit spin.

The Contractor shall track the established manufacturing quality (yields and other issues) during the warranty period and, in case of problems and issues, shall agree the necessary remedy actions with the Contract Equipment Manufacturer and Inmarsat on a case by case basis.

In addition, the service to be provided by the Contractor during the Warranty period is described in Annex J of this contract 09-4642.

B. Documents and Data Deliverables

The Contractor shall deliver the documents and data in Table 4 to Inmarsat (Section III.E contains a list of other document deliverables applicable):

Table 4. Documents and Data Deliverables

No.	Document	SOW Section Reference	Delivery Date
D1	UTH Kick-Off Review (KOR) Meeting Presentation Package	III.A.2	EDC + 6 weeks
D2	Verification Cross-Reference Matrix (VCRM)	II.A.1	EDC + 3 months (draft) EDC + 5 months (final)
D3	Software Requirements Specification (SRS)	II.A.1	EDC + 3 months (draft) EDC + 5 months (final)
D4	Hardware Requirements Specification (HRS)	II.A.1	EDC + 3 months (draft) EDC + 5 months (final)

D5	UTH Preliminary Design Review (PDR) Meeting Presentation Package	III.A.2	EDC + 3 months
D6	UTH/UTCM Test Plan	III.C.1	EDC + 5 months
D7	UTH/UTCM Final Design Review (FDR) Meeting Presentation Package	III.A.2	EDC + 5 months
D8	UTH/UTCM Factory Acceptance Test Plans & Procedures	III.C.4	EDC + 8 months
D9	UTH Interworking Test Plan & Procedures	III.C.5(1)	EDC + 12 months
D10	UTH Satellite Acceptance Test Plan & Procedures	III.C.5(2)	EDC + 12 months
D11	UT Handset and Core Module Production Test Specification	III.C.8	EDC + 11 months
D12.1	UTH Factory Acceptance Test Report (Phase 1)	III.C.4(1)	EDC + 13.5 months
D12.2	UTH Factory Acceptance Test Report (Phase 2)	III.C.4(2)	EDC + 16.5 months
D12.3	UTCM Factory Acceptance Test Report	III.C.4(3)	EDC + 16.5 months
D13	UTH Interworking Test Report	III.C.5(1)	EDC + 14 months
D14	UTH Satellite Acceptance Test Report	III.C.5(2)	EDC + 15 months
D15	UTH Training Manuals	III.D.1, III.D.2	EDC + 15.5 months
D16	UTH User Manuals, operating Instructions, and Other Documentation	III.D.1, III.D.2	EDC + 15.5 months
D17A	Draft UTCM Reference Design Documentation/Software Set	II.A.2	EDC + 9 months
D17B	Final UTCM Reference Design Documentation/Software Set	II.A.2	EDC + 11 months
D18A	Draft UTH Reference Design Documentation/Software Set	II.A.1	EDC + 9 months
D18B	Final UTH Reference Design Documentation/Software Set	II.A.1	EDC + 11 months
D19A	UTH CE/GMPCS/UL/FCC Certifications (as per PRSD)	II. A.10	EDC + 15 months
D19B	GSM Certifications (as per PRSD)	II.A.10	EDC + 18 months

C. Product Deliverables

The Contractor shall deliver the products in Table 5 to Inmarsat:

Table 5. Product Deliverables

No.	Product	Quantity	Delivery Date
P1	UTH Industrial Design Samples	1	EDC + 3 months
		4	EDC + 4 months
		1	EDC + 5 months
		4	EDC + 6 months
P2	UTH Stage 3 Handsets	10	EDC + 9 months
P3	UTCM Stage 3	10	EDC + 9 months
P4	UTH Pre-Production Units	500	EDC + 12 months

D. Customer-Furnished Items/Equipment

Inmarsat shall deliver the items in Table 6 to the Contractor:

Table 6. Customer-Furnished Items/Equipment

No.	Item	Delivery Date
C1	UTH Product Requirements Specifications Document (PRSD)	EDC
C2	GMR2+ Specifications, Version 2.4.0	EDC

C3	DVSI Voice Codec Test Set (VCTS) & DVSI Voice Codec Diagnostic Software (VCDS)	EDC + 1.5 month
C4	GMR-2+ Network Emulator Stage 2B with existing scripts	EDC + 2 months
C5	BGAN Physical Layer Tester (BPLT) as a fading simulator	EDC + 1.5 months
C6	GSPS SIMs	EDC + 2 months
C7	GMR-2/GMR-2+ A5 Ciphering Algorithm Software and Documentation	EDC + 3 months

Note: Delivery dates assume customs clearance is a maximum of 2 weeks.

1. GMR-2+ Specifications

The development of the GMR-2+ specifications is the responsibility of Lockheed Martin (as part of the GMR-2+ NCC/GW development contract with Inmarsat). The GMR-2+ specification have been evolving since the beginning of the GSPS programme and at the time of EDC, the current version of the specifications is Version 2.4.0, which will be made fully available to the Contractor at EDC.

The Contractor shall take an active role in the review and resolution of any identified issues (including but not limited to bugs) of the GMR-2+ specifications in order to ensure that the baseline Version (2.4.0) is suitable and sufficient for implementation in the UTCM/UTH. Representatives of the Contractor shall work closely with EMS Satcom and/or Lockheed Martin to try to understand the maturity of the specifications and to ensure that they are fit for purpose for the development work.

At the time of EDC there will be a comprehensive physical layer performance simulation and validation work available from EMS Satcom. The Contractor shall work together with EMS Satcom during a period no longer than 3 calendar months to ensure a swift transition of the work performed by EMS Satcom.

The parallel development and testing of the NCC/GW and UT may identify the need for further changes to the specifications beyond Version 2.4.0. In recognition of the specifications as a key interface control between the GMR-2+ UT and NCC/GW, and of the mutual impact of changes to the specifications, the Contractor shall be a participant of the GMR-2+ Specifications Change Control Board (SCCB) along with Lockheed Martin and Inmarsat.

The SCCB shall be responsible for approving changes to the GMR-2+ specifications beyond the baseline after evaluating the impact of those changes on this Contract and other related Contracts in progress.

The Standard Operating Procedures for the SCCB are defined in Section V.

2. DVSI Voice Codec Test Set (VCTS) & DVSI Voice Codec Diagnostic Software (VCDS)

Inmarsat shall provide to the Contractor a Voice Codec Test Set and its associated Voice Codec Diagnostic SW on loan for the duration of the programme. This test tool shall be used by the Contractor to test the compliance of the Voice Codec implementation with the specifications (see Section III.C.4).

DVSI's Voice Codec Test Set (VCTS) is a real time data recorder/player used to verify that the implementation of Inmarsat's voice codec in user terminals is correct.

The VCTS contains several interfaces for recording and playing speech and uses Ethernet as its control and channel data interface. The VCTS performs no analysis on the data it records. A PC program denominated Voice Codec Diagnostics Software (VCDS) is used in conjunction with the VCTS to analyse the data and determine whether the implementation under test passes or fails the test suite.

The VCDS is designed to test a voice codec implementation by extracting the parametric information corresponding to the Advanced Multi-Band Excitation (AMBE) speech model. The VCDS runs a suite of test tools that can be used to diagnose equipment containing the Inmarsat voice codec. The VCDS can run the test analysis on pre-recorded files or user terminals when in conjunction with the Voice Codec Test Set (VCTS).

Operation of the VCTS, the VCDS, the tests that are run, and the analysis performed for each test are described in the VCTS and VCDS manuals respectively.

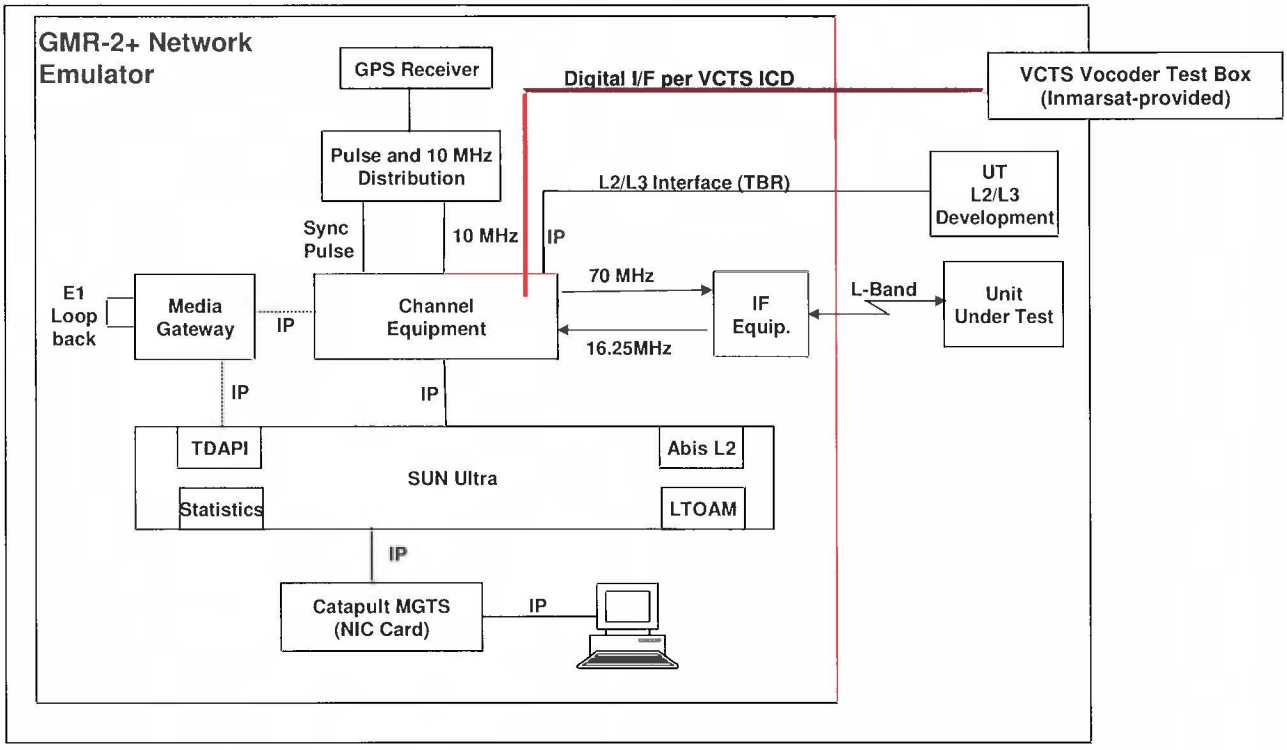
3. GMR-2+ Network Emulator

Inmarsat shall provide a GMR-2+ Network Emulator to the Contractor for development and acceptance testing purposes. The Network Emulator shall be provided on as is basis at the time of EDC + 2 months.

At the time of EDC, the Network Emulator is installed at EMS Satcom's facilities in Adelaide, South Australia. The Contractor shall allow Inmarsat a period of time of no less than 8 weeks for the complete hardware of the Network Emulator to be delivered to and re-installed at the Contractor's chosen facility.

The GMR-2+ Network Emulator is based on the GSPS Program NCC-GW equipment with the required support hardware, software and scripts to emulate the GMR-2+ Air Interface to support GMR-2+ UT development. A block diagram of the Network Emulator is shown in Figure 1.

Figure 1. GMR-2+ Network Emulator Block Diagram



The Network Emulator contains the following features:

- GMR-2+ Regional Signalling Channels
- GMR-2+ Hot Beam Signalling Channels
- GMR-2+ Enhanced Quarter Rate and Half Rate Speech Channels
- GMR-2+ 2.4 kbps enhanced data channel
- Capacity of 1 Speech Call (with Enhanced Vocoder)
- Capacity of 4 signalling channels
- L-Band Interface to support UT
- Core set of Layer 3 Scripts to support Stage1, 2 and 3 functionality
- Capability for the User to modify message contents (e.g. frequency, power level, L3 message contents, etc.)
- Capability for the User to modify/add scripts for anomaly mode scenarios
- L2/L3 Protocol Stack Interfacing capability for interfacing with UT under test at L2/L3 protocol level, bypassing layer 1

The Network Emulator consists of the following components:

- Channel Equipment
- Media Gateway (with 1 MPAC Board)
- Network Synchronization Equipment (With GPS Receiver)
- IF Equipment
- SUN Computer
- Catapult MGTS Station
- IP Switch

The features and capabilities of the Network Emulator at each stage are defined in the Network Emulator Requirements Specification (attached to this Statement of Work).

The Contractor shall provide a facility for installation and proper operation of the Network Emulator equipment as per the requirements stated in the document entitled *"Network Emulator Facility Requirements Specification"*, which shall be provided by Inmarsat.

Inmarsat shall provide necessary Network Emulator support either directly or via Lockheed Martin.

At the time of EDC, there will be two sets of Network Emulator test scripts available from EMS Satcom. The first set of test scripts was generated for the purposes of Layer 1 Integration validation and the second set of scripts was generated for Factory Acceptance Test purposes. Both test script sets were defined and developed by EMS based on Lockheed Martin's "sunny day" set of scripts, which shall also be available from Inmarsat. The Contractor shall note that the EMS test scripts are not wholly complete for all the test requirements of this contracts and neither has the scripts been fully validated. The Contractor shall work together with EMS Satcom during a period no longer than 3 calendar months to ensure a swift transition of the work performed by EMS Satcom in order to guarantee that there is no longer a dependency on EMS Satcom.

The Contractor shall be responsible for writing any additional test scripts deemed necessary for the correct validation of the implementation. Inmarsat shall provide necessary support for this activity.

E. Milestones

The progress of the Contractor's work shall be measured by the Milestones in Table 7 below.

Table 7. Milestones

No	Milestone	Completion Date
M1	UTH Kick-Off Review (KOR) Completion	EDC + 6 weeks
M2	UTCM/UTH Preliminary Design Review (PDR) Completion	EDC + 3 months
M3	UTH Final Design Review (FDR) Completion	EDC + 5 months
M4	Early GMR2+ Functionality Demonstration	EDC + 8.5 months
M5	UTCM Factory Acceptance Test	EDC + 13 months
M6	UTH Factory Acceptance Test (HFAT 1) Completion (Phase 1)	EDC + 13 months
M7	UTH Factory Acceptance Test (HFAT 2) Completion (Phase 2)	EDC + 16 months
M8	UT Handset-LM Reference Test Bed Interworking Test Completion	EDC + 13.5 months
M9	UT Handset Satellite Acceptance Test (SAT) Completion	EDC + 14.5 months
M10	Delivery of UTH Pre-Production Units	EDC + 12 months
M11A	Draft UTCM Reference Design Delivery	EDC + 9 months
M11B	Final UTCM Reference Design Delivery	EDC + 11 months
M12A	Draft UTH Reference Design Delivery	EDC + 9 months
M12B	Final UTH Reference Design Delivery	EDC + 11 months
M13	Beta Test Completion (Phase 1)	EDC + 16 months
M14	Beta Test Completion (Phase 2) / Final Acceptance	EDC + 19 months
M15	UTH Certification Process Completed	EDC + 16 months

III. MANAGEMENT REQUIREMENTS

The following requirements apply to the contractual arrangements between Inmarsat and the Contractor:

A. Project and Schedule Control

1. Project Planning

The Contractor's management and development processes shall adhere to ISO 9001 (or equivalent) processes. The Contractor shall grant Inmarsat the right to audit the management and development practices applied to this Contract.

The Contractor shall develop and maintain a Project Management Plan (PMP). The PMP shall outline the various tasks to be performed together with the control procedures that are to be applied and the schedule. The PMP shall describe the assigned management team structure and overall responsibilities. The PMP shall describe how the Contractor will manage and provide visibility of all work undertaken by any key subcontractors (if any).

The Contractor shall also maintain a Risk Management Plan (RMP). The PMP and RMP shall be issued one week prior to the Kick-Off Review meeting and soon thereafter issued as definitive. The Contractor shall provide Inmarsat with any subsequent updates to the PMP and RMP.

The Contractor shall maintain all documentation related to project planning and provide all deliverables in electronic form.

2. Milestone Review Meetings

The Contractor shall plan and conduct the milestone review meetings specified in Table 8 below. The Contractor shall agree the actual date and location of each milestone review with Inmarsat at least one month before the meeting. The Contractor shall provide an agenda for each milestone review at least five working days before the meeting to which Inmarsat may add items to discuss. The Contractor shall agree to support additional intermediate progress reviews during the design and implementation phases, if requested to do so by Inmarsat with at least two weeks notice.

Table 8. Milestone Review Meetings

Milestone Review		
Kick-Off Review (KOR) EDC + 6 weeks	• Establishing communication lines and contact points for financial, contractual and technical matters between Inmarsat and the Contractor. • Obtaining agreement on the management plan(s) review). • Presentation of the short-term work plan. • Obtaining mutual agreement on accommodation of Inmarsat staff at site premises, facilities required and operational mode of working.	• PMP • RMP • CMP • QAP • Transition Report • Existing Design Documentation • Other support documentation and presentation slides required to fulfil the purpose of the meeting

	• Enhancing the understanding of the GSPS system design and the GMR-2+ air interface. • Obtaining agreement on the functional capabilities and plan for the UT Handset. • Holding first Risk Management workshop. • Summary of transition from EMS Satcom. • Review of current status of UTCM and UTH design and agreement on the additional work and associated timelines necessary to achieve full design maturity.	
Preliminary Design Review (PDR) Up to EDC + 3 months	• Validation of the UT Handset / UT Core Module definition (including services) and operational scenarios. • Demonstration that the UT Handset requirements have been partitioned into a thorough and consistent UT Handset definition. • Reviewing the UT Handset high-level design and preliminary detailed designs • Assessing early UT Handset performance simulation work. • Reviewing test plan for UT Handset / UT Core Module • Holding second risk management workshop • Validation of the mechanical and aesthetic aspects of the handset's industrial design	• GSPS UTH Operational Scenarios Document • VCRM • HW Requirement Specification (HRS) • SW Requirement Specification (SRS) • HW High Level Design • SW High Level Design • UT Handset Test Plan • UT Performance Simulation Results • RMP • UT Handset mechanical prototypes and demonstration models – can be as sub-assemblies or high risk areas only rather than whole handset • Aesthetic model x 1, a further 4 to be produced at sign off
Final Design Review (FDR) EDC + 5 months	• Review the final high level designs for all UT Handset modules • Reviewing the final UT Handset detailed Design including mechanical componentry and assemblies and UTH colour, surface, finish details. • Review the detailed design of the other UT Handset components, including the UT Core Module. • Review the latest VCRM database and the requirement partitioning between UTCM and UTH. • Review the design and test results of early UT Core Module and UT Handset prototypes. • Review the UT Core Module Factory Acceptance Test Plan and Procedures.	• UT Handset High Level Design. • UT Handset HW Detailed Design (inc. UTCM). • UT Handset Mechanical Design. • UTCM SW Detailed Design. • UTCM and UTH early test results. • UTCM FAT Test Plan and Procedures. • UT Handset FAT Test Plan and Procedures. • UTCM / UTH Pre-Production Test Specification.

	• Agreement of scope of early GMR-2+ demonstration • Agreement of requirements to be tested during UT Core Module FAT. • Review the UT Handset Factory Acceptance Test Plan (2 stages) and Procedures. • Agreement of requirements to be tested during UT Handset FAT (2 stages). • Review of UT Core Module and Handset Pre-production Test Specification. • Review of all outstanding issues with UT Handset / Core Module Pre-Production.	• VCRM. • SW Requirements Document (SRS) (final). • HW Requirements Document (HRS) (final). • Other support documentation and presentation slides required to fulfil the purpose of the meeting. • UTH Stereolithography Mechanical Model with moving parts where applicable • Aesthetic model x 1, a further 4 to be produced at sign off
UT Core Module Factory Acceptance Test Review (UTCM FATR) EDC + 13.5 months	• Review UT Core Module FAT results. • Confirm that the UTCM satisfy the requirements allocated to the UTCM as per the requirement partitioning. • Review Draft UTCM/UTH Reference Designs.	• UTCM FAT Test Results. • UTH FAT Test Plan and Procedures. • Draft UTCM Reference Design. • Draft UTH Reference Design.
UT Handset Factory Acceptance Test Phase 1 Review (HFAT1R) EDC + 13.5 months	• Review UTH FAT Phase 1 results for the purpose of Limited Case Approval. • Confirm that the UTH meets all contractual requirements allocated to this phase. • Review the UT Handset Interworking Test Procedures. • Agreement on the requirements to be tested during Interworking Tests (IWT) • Review all outstanding issues with UTCM / UTH Pre-Production. • Review UTCM / UTH Reference Designs.	• UTH FAT Test Report (Phase 1). • UTCM/UTH Interworking Test Plan and Procedures. • UTH Satellite Acceptance Test Plan and Procedures. • UTCM Reference Design. • UTH Reference Design.
UT Handset Factory Acceptance Test Phase 2 Review (HFAT2R) EDC + 16.5 months	• Review UTH FAT Phase 2 results for the purpose of Type Approval. • Confirm that the UTH meets all contractual requirements.	• UTH FAT Test Report (Phase 2). • UTH Certification and Regulatory Test plan (as part of the UTH Test Plan)
Interworking Test Review (ITR) EDC + 14 months	• Review UT Handset – LM Reference Test Bed interworking test results. • Determine readiness of UT Handset for Satellite Acceptance testing. • Review all outstanding issues with UTCM / UTH Pre-Production.	• Results of Interworking Tests. • UTCM/UTH Interworking Test Report • Satellite Acceptance Test Plan and Procedures.

Satellite Acceptance Test Review (SATR) EDC + 15 months	• Review of test campaign results. • Determine Readiness of UT Handset for Inmarsat's pre-Beta and Beta testing.	• Results of SAT Tests. • UT Handset Training Material. • UT Handset User Manuals / Operating Instructions
Beta Test Review Phase 1 EDC + 16 months	• Review of test campaign results.	• Results of pre-Beta and Beta Phase 1 Tests.
Beta Test Review Phase 2 EDC + 19 months	• Review of test campaign results. • Review of Regulatory and Certification Test results	• Results of pre-Beta and Beta Phase 2 Tests. • UT Handset Certifications.

The Contractor shall be responsible for assembling the relevant documentation and presentation material for all milestone reviews. The Contractor shall submit documentation to be reviewed in accordance with the document delivery schedule in Section II.B , and at least 2 weeks before the associated Milestone Review Meeting,

Inmarsat intends to use Review Item Discrepancy (RID) forms (or a suitable equivalent) for providing comments on the milestone review documentation at least 3 working days before the relevant meeting. The Contractor shall incorporate the RID mechanism into the project review process.

The Contractor shall be responsible for documenting the review proceedings and monitoring actions placed until closure. Review minutes shall be produced within five working days of the meeting. The Contractor shall seek concurrence from Inmarsat for the accuracy of the review minutes. The Contractor shall track actions placed using a formally documented method.

The Contractor shall implement an internal design review process covering all design and engineering (i.e. hardware, firmware, software, mechanical, industrial) activities. The Contractor shall conduct periodic audits to confirm that design processes are being followed throughout.

3. Progress Reporting

The Contractor shall supply a Progress Report to Inmarsat by the end of the first week of each month, a minimum of one week prior to the monthly Progress Meeting. The Progress Report shall include the following:

- Management summary
- Work performed during the reporting period
- Milestones met and/or achieved
- Progress against the schedule (any slippage is to be identified together with remedial action)
- Dependencies
- Problems experienced
- Activities planned for the next period
- Risk log status

- Action log status
- Assumption log status

The format of the progress report shall be agreed with Inmarsat at the Kick-Off Review Meeting.

The Contractor shall conduct monthly Progress Meetings with Inmarsat representatives to discuss:

- Current active tasks;
- Technical and schedule aspects;
- Status and progress;
- Technical, contractual and managerial issues;
- Risks and contingency measures (in the form of a Risk Log);
- Current and potential problems;

The Contractor shall record the minutes for each Progress Meeting, capturing the key decisions and actions taken. The minutes shall be agreed with Inmarsat and produced within five working days of the meeting.

4. Scheduling

The Contractor shall maintain a detailed activity schedule of all tasks to be undertaken for this Contract.

The schedule shall reflect the following overall breakdown levels (or equivalent) within one schedule (to ensure consistency):

- Level 1: Project decomposed into phases
- Level 2: Phases decomposed into work packages
- Level 3: Work packages decomposed into tasks

The schedule shall show key dependencies and critical paths.

The Contractor shall define a suitable Work Breakdown Structure (WBS) and produce work package descriptions (WPD) for each level 2 activity. The Work Breakdown shall cover all project activities from Contract commencement to the start of production and shall clearly identify the following key phases:

- Functional analysis
- Overall design
- Detailed design and prototyping
- Implementation
- Pre-production activities and testing
- Production testing

The WBS shall be used to plan and organise the work under this Contract, including any work assigned to key sub-contractors (if any). The WBS and initial set of WPDs are to be included in the Project Management Plan (PMP) and shall be agreed at the Kick-Off Review meeting. Thereafter, the Contractor shall progressively expand the WBS and raise further WPDs as the project progresses into each phase.

The programme schedule shall be developed, maintained, and presented using Microsoft Project.

The Contractor shall include a schedule detailing work completed in the monthly progress report and total completion status. The Contractor shall also provide Inmarsat with an electronic copy of the Monthly Report including the schedule.

5. Project Management

The Contractor shall assign a suitably qualified Program Manager that is specifically charged with the responsibility for all technical and programmatic aspects of the work and maintaining open communications with Inmarsat for the duration of this Contract.

Inmarsat will designate a Subcontracts Administrator as well as an engineering team, who will monitor the activities being undertaken on this Contract and support the Contractor when necessary.

Inmarsat intends to install a maximum of two Resident Engineers/Managers at the Contractor's facility for the purpose of daily interaction with the Contractor's team. Inmarsat also intends to install a team of engineers at the Contractor's facilities when and as required by the programme. The Contractor shall provide the Resident Engineers/Managers and/or their representatives with access to the following:

- Regularly scheduled status meetings and schedules
- Engineering and technical meetings and reviews
- Risk management workshops and meetings
- Audit processes and procedures
- Test readiness reviews, dry runs and formal test conduct

The Subcontracts Administrator shall be responsible for all contractual direction under this Contract. Only the Subcontract Administrator may authorise changes to scope, cost, schedule, terms, applicable documents, or specifications. The Contractor shall designate an administrative counterpart with the authority to commit the resources of the Contractor to such changes.

6. Rights of Access

The Contractor shall allow Inmarsat representatives to visit and monitor its main work site and make the necessary security and/or regulatory arrangements (if any) for such visits.

7. Office Accommodation

The Contractor shall provide office accommodation for two Inmarsat resident staff plus up to two temporary visiting staff at the main work sites. Office accommodation shall include reasonable use of facilities including international telephone/facsimile lines, desktop PCs and printer with Internet connection and office stationary.

8. Milestone Acceptance

Approval from Inmarsat shall be required in order for the Contractor to declare any contractual milestone in Table 7 and Table 8 above successfully completed. Acceptance from Inmarsat shall be subject to the timelines defined in Article 5, Section B of the Contract.

Final acceptance of the UTH shall be based on the completion of all contractual milestones defined in this SOW.

The criteria for acceptance of review meetings shall be as follows:

- Design Review Milestone (KOR, PDR, FDR): completion of required design by the relevant milestone and completion of agreed action plan for all RIDs registered for the milestone
- Test Review Milestone (FATR, ITR, OATR, and SITR): as per Section III.A.2.
- Requirements Specifications set out in the PRSD

B. Quality and Configuration Control

1. Quality Assurance

The Contractor shall apply recognised engineering controls and practices throughout the Contract that adhere to ISO 9001 (or a suitable equivalent). These engineering controls and practices shall apply fully to the design, testing, manufacture, software development activities and sub-contract activities (if applicable). Less extensive engineering controls and practices may be applied to early prototype stages of the UTH UT Handsets due to the need to concentrate on early proof-of-concept ideals and the limited time available before these devices have to be available.

The Contractor shall issue a Quality Assurance Plan (QAP) to Inmarsat one week prior to the Kick-Off Review (KOR); this can be a separate document or form part of the PMP and thereafter finalised within two weeks. The QAP shall at all times reflect the actual practices being applied on the Contract.

The Contractor shall nominate a team member with suitable experience and training with respect to quality control, quality assurance, and their applications to be responsible for Quality Assurance for this Contract.

The Contractor shall submit, as part of the QAP, an audit schedule outlining the audits (minimum of three) to be conducted throughout various points of the project. The Contractor shall document each scheduled audit in the form of an Audit Report. The Contractor shall make all Audit Reports available to Inmarsat on request.

Inmarsat reserves the right to audit Contractor (including subcontractor) work at any point, provided that at least two weeks notice is given to the Programme Manager.

The Contractor shall be fully responsible for the quality achieved and controls applied by any sub-contractor parties.

The Contractor shall implement a mechanism for tracking corrective actions at all Contract phases and for cross-referencing requirements specified in this SOW and the PRSD to documents generated by the Contractor.

2. Quality Control

The Contractor shall clearly state or reference all quality controls to be applied during the manufacturing process in the Quality Assurance Plan (QAP), including the inspection from initial goods-inwards to final inspection and test. Specifically, the QAP shall identify the actions necessary to ensure conformity of the:

- Time to market process
- Calibration system
- Documentation
- Maintenance and support service

- Workmanship, including inspection and tests
- Incoming inspection
- Manufacturing flow
- Audits
- Improvements

All inspection and quality records shall be archived by the Contractor and shall be made available for audit at the Contractor's main facility by Inmarsat on request.

3. Reliability

The Contractor shall include a Reliability (Parts Count) Prediction in the Quality Assurance Plan (QAP) for all components of the UT Handset.

4. Configuration Management

The Contractor shall produce a Configuration Management Plan (CMP) that outlines the controls that will be applied to:

- Documentation configuration and change management
- Requirements management
- Software development, firmware, version and release control
- Core technology model development
- UT Handset prototyping
- UT Handset pre-production models
- UT Handset manufacturing and production models

The CMP may, at the discretion of the Contractor, be a separate document or form part of the PMP. The CMP shall be finalised by the Kick-Off Review (KOR) meeting.

The Contractor shall nominate a team member to be responsible for overall configuration management throughout the project and shall ensure that adherence to the CMP is maintained.

The Contractor shall identify any configuration management applied to sub-contractor work (if applicable).

The Contractor shall make configuration records for all hardware, software, and firmware developed by the Contractor available to Inmarsat on request.

C. Testing

1. Test Planning and Reporting

The Contractor shall produce and deliver a UT Handset Test Plan for review by the associated Preliminary Design Review (see Tables 2 and 6 above). This plan defines the test stages, test approach to be adopted, controls to be applied and documentation to be produced.

The Contractor shall develop and document the test procedures (and test scripts when external test equipment is used) for each stage of the testing. The scope of testing shall be agreed between Inmarsat and the Contractor by FDR. Any procedure or script that involves the use of the Inmarsat-4 satellite shall be approved by Inmarsat before the testing is conducted.

Inmarsat shall have the right to approve or request reasonable amendments to the test documentation at each test phase. The Contractor shall record and report the results from each test stage, including:

- Test method.
- Test configuration.
- Pass/Fail criteria and test results.
- Conductor of the test.
- Comments made regarding the test run.
- Reason for any failures and references to specific bug reports associated to the failures as raised in the Contractor's internal Bug Reporting and Tracking system.

The Contractor shall provide all test instruments, test tools, facilities, manpower and services necessary to complete the test stages for which they are fully responsible. All stages of testing may be witnessed by Inmarsat representatives. They shall be given full access to the primary test facilities and have the right to observe testing while it is in progress.

2. Test Acceptance Criteria

The Contractor shall be responsible for tracking all problems identified during the testing until all items have been resolved. Any problem noted during the testing shall be classified into one of the following three categories:

Category 1:

- A complete failure of a hardware, software, or firmware component making it inoperable.
- A complete mechanical failure that renders the UTH inoperable in the environmental conditions and operational scenarios defined in the PRSD.
- Loss of critical functionality, severe performance degradation or instability in operation/behaviour.
- Failure to detect report and/or recover from a failure that renders any part of the UT Handset inoperable.

Category 2:

- The problem relates to a contract requirement (i.e. incorrect) but is not critical to any component function.
- The problem occurs infrequently and can quickly be recovered by the user by following a remedial procedure.
- The problem is purely cosmetic (i.e. MMI layout, error message content) in nature and does not impact functionally.

Category 3:

- The problem is observed once but is not reproducible by repeating the test.
- The problem is isolated to the test procedure and not the UT Handset under test.

At the conclusion of the testing, any remaining Category 1 problems shall prevent Inmarsat approving successful completion of the testing milestone. Any remaining Category 2 and Category 3 problems shall not prevent Inmarsat from approving

successful completion of the testing milestone, provided that the Contractor submits a satisfactory remedial action plan. In this case, Inmarsat must agree to the action plan before the milestone is deemed completed. Corrective action can be implemented at tested in a later test stage in order not to impact the overall schedule.

The completion of each testing milestone with no Category 1 problems and agreement on the remedial action and schedule for all Category 2 problems (if applicable) shall be a prerequisite to commencement later type approval and over-the-air demonstration testing.

The Contractor shall maintain formal configuration control over the testing such that it is possible to repeat the acceptance at a later date if necessary.

These acceptance criteria shall be applicable to all formal test campaigns detailed below.

3. Unit/Module Testing

The Contractor shall perform unit/module level hardware and software testing throughout the UT Handset development process as required by its own standard processes. The Contractor shall submit evidence of unit/component level testing (hardware, firmware, and software) to Inmarsat, on request.

As an integral part of the UTH, the UTCM shall undergo its own regime of development and integration testing performed by the Contractor.

4. Factory Acceptance Testing (FAT)

The Contractor shall verify by demonstration that the UT Handset functional performance and operational requirements have been achieved, although external elements are represented by test equipment selected at the Contractor's discretion or possibly by the Lockheed Martin Reference Test Bed. The Contractor shall design the Factory Acceptance Test procedures in order to meet this objective.

The FAT shall be divided in three distinct phases:

(1) UTH Factory Acceptance Test (Phase 1) – HFAT 1

Phase 1 of the HFAT campaign aims at demonstrating GMR 2+ compliance to ensure, as a minimum, full Satellite Mode voice call including supplementary services and SMS capabilities.

The UTCM/UTH available at this stage shall demonstrate basic power management operation to ensure optimum battery power consumption together with full POST (Power On Self Test) and Diagnostics capabilities for subsequent field testing by the Contractor, Inmarsat or a designated third party. The contractor shall also demonstrate conformance to acoustic decoupling requirements as per 3GPP TS 26.132 Version 7.1.0 (Release 7) (Also ETSI TS 126.132, V7.1.0, 2008-11).

HFAT 1 shall include a radiation test campaign that shall be performed in an anechoic chamber with and without "human" phantom in order to demonstrate actual antenna performance.

The UTH at this stage shall provide firmware upgrade facilities at engineering and user levels.

HFAT 1 shall have a duration of 2 weeks.

(2) UTH Factory Acceptance Test (Phase 2) – HFAT 2

The UT Handset FAT Phase 2 platform shall provide complete compliance with all requirements specified by the PRSD to support a full GSPS service launch.

Additionally, Phase 2 of the HFAT campaign aims at demonstrating full compliance with all the Operational Scenarios defined in the Operational Scenarios Specification, including (but not limited to) Satellite Mode operation (GMR 2+ voice, SMS, circuit switched data and fax), GSM Mode operation and Dual Mode operation.

HFAT 2 shall have a duration of 2 weeks.

(3) UTCM Factory Acceptance Test

The UTCM FAT campaign comprises additional tests that validate the UTCM requirements that were not verified during the UTH FAT. These shall include, but not limited to, the following acceptance tests:

i) Maritime environment requirement (IEC 60945 – vibration only).
ii) Capability to provide 2 wire RJ 11 interface; and
iii) Additional AT commands, which will have been mutually agreed between the Contractor and Inmarsat.

The Contractor shall also be responsible to conduct acceptance tests with associated peripheral boards for the particular solution. For example, if the maritime environment requires additional interfaces via a daughter board, or otherwise, to incorporate either a higher specified oscillator or an external oscillator, the Contractor shall conduct the tests with the complete solution.

Inmarsat shall approve the FAT plan(s) and procedures. The Contractor shall hold a Test Readiness Review (TRR) with Inmarsat at least 5 days prior to the commencement of the testing.

Inmarsat representatives shall be involved in witnessing the Factory Acceptance Testing (at the Contractor's main work site) and shall determine whether the UT Handset meets the requirements in this SOW and the PRSD. Inmarsat will nominate one member within the witnessing party to have final responsibility in this regard. The Inmarsat representative will have the authority to instruct that a test be repeated or fail the entire FAT in the case of excessive failures.

UTCM FAT shall have a duration of 2 weeks.

5. Interworking Testing and Satellite Acceptance Testing

The Contractor shall conduct informal Interworking tests against the Lockheed Martin Reference Test Bed (RTB) Valley Forge, Pennsylvania, USA and/or over the air using

the I-4 satellite constellation at one of the 3 GSPS Network Gateways[1] using the UT Handset (or UT Core Module) configuration that is approved for inter-working with the Inmarsat I-4 satellite.

These tests will be run in close coordination with Inmarsat and Lockheed Martin as per the Contractor's own internal test plans, which will need to be agreed with Inmarsat and Lockheed Martin.

This phase will have two associated formal test campaigns as described below:

(1) Formal Interworking Testing (IWT)

The Contractor shall conduct formal tests of the UT Handset against the Lockheed Martin Reference Test Bed (RTB) in Valley Forge, Pennsylvania, USA. The scope of the testing shall be agreed with Inmarsat, but at a minimum, the Contractor shall demonstrate the following (in accordance with the GMR-2+ specification):

- Mobile-originated and mobile-terminated call establishment and circuit-switched voice, SMS, data, and fax transfer through the communication path in Satellite Mode as specified in the GMR 2+ specifications[2].
- Idle mode operations as specified in the GMR 2+ specifications.
- Supplementary Service interworking as specified in the GMR-2+ and GSM specifications.
- SMS transmission and reception as specified in the GMR-2+ and GSM specifications.
- Adequate objective voice quality between the UT Handset analog interface and coded voice packets at an interface to the Reference Test Bed. Formal subjective testing (i.e. in accordance with ITU-T Recommendation P.800) is not required.

The Contractor shall hold a Test Readiness Review (TRR) with Inmarsat at least 5 days prior to the commencement of the formal Interworking testing. The Contractor shall generate an Interworking Test plan, which will need to be approved by Inmarsat as a pre-requisite to commencement of the formal test campaign.

Inmarsat representatives shall be involved in witnessing the formal Interworking Test campaign The Inmarsat representative will have the authority to instruct that a test be repeated or fail the entire IWT in the case of excessive failures.

Formal Interworking Tests shall have a duration of 2 weeks.

(2) Satellite Acceptance Testing (SAT)

The Contractor shall conduct formal Satellite Acceptance Tests using the complete GSPS network infrastructure.

The main objective of the Satellite Acceptance Tests is to provide full validation of the functionality of the UT Handset using the complete over-the-air

[1] Nominally, this Gateway is anticipated to be the one installed at Subic Bay Earth Station.
[2] Circuit Switched Data and Fax transfer shall be demonstrated in a second phase after UTH FAT Phase 2 is complete.

communications path (including the I-4 satellite constellation) and demonstrate appropriate stability and reliability of the UT Handset.

Satellite Acceptance Testing shall be performed at one of the 3 GSPS Gateways[3].

Additionally, the Contractor shall perform over-the-air tests at four extra locations within the coverage of the I-4 satellite serviced by the chosen Gateway[4] to demonstrate full functionality and performance at different geographical conditions, principally at low elevation angles.

Formal Satellite Acceptance Testing (at a GSPS Gateway) and Multi-site testing (at four extra locations) shall have a total duration of 4 weeks.

The Contractor shall hold a Test Readiness Review (TRR) with Inmarsat at least 5 days prior to the commencement of the Satellite Acceptance testing. The Contractor shall generate a Satellite Acceptance Test plan, which will need to be approved by Inmarsat as a pre-requisite to commencement of the formal test campaign. The Satellite Acceptance Test Plan shall include the testing at the chosen GSPS Gateway plus the tests to be run at the four additional locations. All UT tests shall be designed to be repeatable with respect to the results obtained.

Inmarsat representatives shall be involved in witnessing the Satellite Acceptance Testing. The Inmarsat representatives at each testing site will have the authority to instruct that a test be repeated or fail the entire FAT in the case of excessive failures.

6. Support to pre-Beta and Beta Testing

The Contractor shall deliver 500 pre-production UT Handsets in order to serve Inmarsat-led pre-Beta and Beta test phases as per milestone M10 in Table 7.

The pre-Beta and Beta Test campaign will be divided in two phases to support the launch of the two UT Handset releases defined in this SOW (see section III.C.4).

(1) Pre-Beta and Beta Test Phase 1

Phase 1 of Inmarsat's pre-Beta and Beta test campaign aims at demonstrating GMR 2+ compliance to ensure, as a minimum, full Satellite Mode voice call including supplementary services and SMS capabilities to support the Commercial Service Introduction of Satellite-Mode only GSPS services, defined as CSI Phase 1.

This phase shall commence after successful completion of Satellite Acceptance Testing by the Contractor, i.e. milestone M9 in Table 7 above. on which the CSI Support phase will be entered as described in Section II.A.12 of this SOW.

During this phase, the Contractor shall commit to providing suitable UT Handset test engineering support to all pre-Beta and Beta Phase 1 testing activities. The Contractor's support shall comprise the debug, analysis and problem resolution

[3] Nominally, this Gateway is anticipated to be the CN/GW installed at Subic Bay Earth Station.
[4] As above.

activities as defined in the CSI Support terms of this contract and under the SLA terms described in Table 2 of Section II.A.12.

The pre-Beta and Beta Test Phase 1 will have a duration of 6 weeks.

(2) Pre-Beta and Beta Test Phase 2

Phase 2 of Inmarsat's pre-Beta and Beta test campaign aims at demonstrating complete compliance with all requirements specified by the PRSD to support the Commercial Service Introduction of the full suite of GSPS services, defined as CSI Phase 2.

The Contractor shall provide engineering support to all pre-Beta and Beta Phase 2 testing activities as defined in the Warranty Support terms of this contract and under the SLA terms described in Table 3 of Section II.A.12.

7. GSM Type Approval Testing

The Contractor shall be responsible for testing the compliance of the UT Handset to the GSM standards and obtaining GSM Type Approval as specified by GCF and PTCRB. The Contractor shall provide confirmation of compliance and Type Approval in the form of the Type Approval certificate as well as copies of the conformance statement and Test Construction File (TCF).

8. Pre-Production Testing

The approach and degree of pre-production testing shall be determined by the Contractor and shall be based on its established in-house production engineering and manufacturing processes. The Contractor shall produce a UT Core Module and Handset Production Test Specification (or suitable equivalent) in order to test pre-production UT Core Modules and UT Handsets in-factory. The results of pre-production testing shall be recorded and made available to Inmarsat, on request.

9. Final Acceptance

The completion of each testing milestone described above with no Category 1 problems and agreement on the remedial action and schedule for all Category 2 problems (if applicable), as described in Section III.C.2, shall be a prerequisite to Inmarsat granting Final Acceptance of the GSPS UT Handset.

Inmarsat shall grant Final Acceptance after successful completion of Beta Test Phase 2, milestone M14 in Table 7, according to the acceptance criteria outlined in Section III.C.2.

D. Engineering and User Training

1. UT Handset Engineering Training

The Contractor shall provide two UT Handset engineering training courses to engineers from Inmarsat and any Inmarsat designated third party that shall address:

- Overall design of the UT Handset.
- Protocol stack operation.

- MMI, specific software and configuration aspects.
- UT Handset components, applications and their configuration.
- UT Handset Operation.
- Fault/error codes.
- Measurements and logging.
- Documentation.

Each UT Handset engineering training course shall support up to 10 attendees and shall be held prior to the start of Beta testing. Inmarsat shall review and approve the structure of the training before it is held in London, United Kingdom. The Contractor shall be responsible for developing all training materials and shipping them to the training site.

2. UT Handset User Training

The Contractor shall provide two UT Handset user training courses that shall address:

- UT Handset product definition and operation.
- UT – TE configuration arrangements (if any).
- Supported services and applications.
- User operation and error handling.
- Presentation of the user documentation.

Each UT Handset user training course shall support up to 10 attendees and shall be held prior to the start of Beta testing. Inmarsat shall review and approve the structure of the training before it is held in London, United Kingdom. The Contractor shall be responsible for developing all training materials and shipping them to the training site.

E. Documentation

The Contractor shall deliver to Inmarsat all common management documentation listed in Table 9. The Contractor shall also deliver to Inmarsat all technical documentation listed in Section II.B. Document delivery shall be in accordance with the specified schedule.

The delivery of documentation (draft versions) shall comprise an electronic version of each file, delivered via e-mail or CD ROM, as appropriate.

The delivery of documentation (final versions) shall comprise at least one hard copy of each report and an electronic version of each file, delivered via e-mail or CD ROM, as appropriate.

At the end of the project, the Contractor shall prepare and deliver a CD ROM containing the final version of each deliverable document.

All deliverable documents shall be written in English, shall be produced using Microsoft Word, and shall be delivered (electronically) in both the Microsoft Word and Adobe Acrobat PDF formats.

The Contractor's CMP shall refer to the documentation standard and control procedure and shall be approved by Inmarsat before use. All documentation shall be retained under formal document configuration control.

Table 9. Common Document Deliverables

No.	Document	Required Delivery Date
DC-1	Project Management Plan (PMP)	KOR
DC-2	Risk Management Plan (RMP)	KOR
DC-3	Quality Assurance Plan (QAP)	KOR
DC-4	Configuration Management Plan (CMP)	KOR
N/A	Monthly Status Reports and Meeting Minutes	(monthly)

IV. GMR-2+ SPECIFICATIONS CHANGE CONTROL BOARD (SCCB)

A. Purpose and Scope

The SCCB shall be the highest configuration control authority for the GMR-2+ Specifications. It shall be responsible for:

- Managing changes to the GMR-2+ Specifications
- Evaluating the potential contractual impact of changes to the GMR-2+ Specifications
- Establishing that changes to the GMR-2+ Specifications are warranted and necessary to ensure successful operation of the GSPS system, and
- Formally approving the implementation of such changes and, if applicable, initiating the corresponding Contract Change procedure.

The SCCB shall remain effective until the work described in this SOW is completed.

B. Roles and Responsibilities

The SCCB shall be composed of a Chairperson, Administrator, and technical representatives from Inmarsat, Lockheed Martin, and the Contractor.

An Inmarsat employee shall serve the role of SCCB Chairperson. The SCCB Chairperson shall be responsible for the following:

- Establishing and chairing the SCCB.
- Approving Request for Change (RFC) items placed on the SCCB agenda for review.
- Setting the SCCB meeting schedule, agenda, and attendees.
- Approving issuance and closure of all SCCB action items and the SCCB meeting minutes.
- Establishing the SCCB position on each item reviewed by the SCCB; and
- Directing SCCB disposition through formal Contract Change Note, if applicable.

The SCCB Chairperson shall be assisted by the SCCB Administrator. A Lockheed Martin employee shall serve the role of SCCB Administrator.

The technical representatives from the Contractor and Lockheed Martin shall be responsible for determining if changes to the GMR-2+ Specifications have an impact on their respective contractual work under this and other related, but independent Statements of Work.

C. Procedures

The SCCB shall convene at the request of either Inmarsat, Lockheed Martin or the Contractor to evaluate recommended changes to the GMR-2+ Specifications. The request to convene, along with the corresponding Request for Change (RFC) items shall be submitted to all parties by the SCCB Member requesting the meeting.

A standard form or electronic system shall be used to prepare and submit RFC items. The Request for Change (RFC) shall contain, in addition to a technical description of the change to the GMR-2+ specifications itself, an assessment of the cost impact, schedule impact, requirements impact, materials impact (with or without resale, reuse, or salvage), effect if the RFC is rejected, and the date/milestone by which the SCCB must make a decision on the disposition of the RFC.

The SCCB Administrator shall coordinate with SCCB Members to schedule a board review date.

SCCB Members shall have one week to review a RFC item. SCCB Members shall provide written comments to the RFC Author within three (3) days of submittal. The SCCB meeting shall be deferred if submitted material is not reviewed by SCCB Members. The RFC Author shall provide a coordinated response to all comments prior to the scheduled SCCB meeting.

The RFC Author will present the RFC to the SCCB at the board review meeting.

The SCCB shall accept or reject each submitted RFC item, based on a consideration of the technical need for the changes to the specification and the corresponding impact on contractual baselines.

If a RFC item is rejected, the corresponding changes shall not be incorporated into the next release of the GMR-2+ Specifications. The RFC Author may find an alternative technical solution and resubmit a new RFC at a later date.

If a RFC item is accepted, the corresponding changes shall be incorporated into the next release of the GMR-2+ Specifications. If EMS and/or Lockheed Martin determine that the changes required by a RFC that has been approved by the SCCB have a significant impact on the cost and/or schedule of the associated Contract, then the SCCB shall generate the corresponding Contract Change Note in accordance with the procedures established in the Terms and Conditions of the Contract.

The SCCB Administrator will prepare minutes and actions, and submit to all SCCB Members for review prior.

While a RFC is under consideration by the SCCB, the work described in this SOW shall continue as if no change has occurred.

Decisions made by the SCCB shall be considered final and all approved RFC items shall be implemented by the Contractor. In the case where a RFC item has a contractual impact on cost and/or schedule, then the Contractor shall implement the RFC item once the corresponding Contract Change procedure is completed.

GLOBAL SATELLITE PHONE SERVICE USER TERMINAL DEVELOPMENT

CONTRACT 09-4642

ANNEX B – PRODUCT REQUIREMENTS SPECIFICATION DOCUMENT – AS ATTACHED

PRODUCT REQUIREMENTS SPECIFICATIONS DOCUMENT

INMARSAT GLOBAL SATELLITE PHONE SERVICE
USER TERMINAL DEVELOPMENT

UT HANDSET

ISSUE 2.3

1. REVISION HISTORY

Revision	Date/Author	Description
Draft 0-1	19/11/2008	Initial Draft - Using EMS PRD V4.0
Draft 0-2	20/11/2008	Inclusion of CP, ES inputs
Draft 0-3	20/11/2008	Inclusion of AC inputs
Draft 0-4	21/11/2008	Inclusion of review comments on conference call
Draft 0-5	21/11/2008	Final edit for clarity rather than additional content.
Draft 0.6	26/11/2008	Edit following conf call between Inmarsat and Sasken 26th November
Draft 0.7	27/11/2008	Clarification on section 9.4.2, 11.1.2, 11.6.14.3, 12.3, 19.0 and 9.10
Draft 0.8	02/12/2008	Change tracking kept from 0.7. Amendments in line with 'Features for discussion' document agreed with Sasken 27th Nov 08.
Draft 0.9	09/12/2008	Inclusion of peer review comments
Issue1.0	16/12/2008	Inclusion of peer review comments
Issue 1.1	19/12/2008	Input from Sasken on Section 8, 9.3, 11.6.23 and 19
Issue 1.2	13/01/2009	Editorial changes
Issue 1.3	15/01/2009	Editorial changes from Inmarsat/Sasken conference call
Issue 2.0	15/01/2009	Final Version
Issue 2.1	19/01/2009	Editorial changes from Inmarsat/Sasken conference call
Issue 2.2	22/01/2009	Input from Sasken on document name change (PRSD) and Sections 4, 9.4.2, 11.6.18, and 19.
Issue 2.3	27/01/2009	Removal of Section 11.6.10 due to duplicity with Section 11.6.18

2. TABLE OF CONTENTS

3. INTRODUCTION

The Inmarsat Global Satellite Phone Service (GSPS) is a mobile satellite voice and data communications service. The GSPS will provide satellite communication services on a global basis using the Inmarsat-4 satellite constellation and follow-on satellite constellations. The GSPS network architecture aligns closely with the ETSI specification for the GMR interface, which is a derivative of the terrestrial GSM standard, for operation in a satellite environment (e.g., increased delay, more challenging link budget, and different power specifications). More specifically, the GSPS will use an enhanced version of the ETSI GMR-2 air interface (designated "GMR-2+") over the Inmarsat-4 satellite constellation.

This document outlines the product requirements for a handheld user terminal (UT) designed to operate fully with both the GMR-2+ and GSM networks, and to provide the user with an attractive and fully functional device. It is intended to form the basis for the planned development programme by Sasken, and facilitate the creation of the next level of detailed design documents, specifically the creation of separate UTCM and UTH design documents. It is not intended to be prescriptive of the detailed design of the UTH.

The UTCM is a component of the UTH and comprises the satellite and GSM modems from air interface RF to baseband user interfaces. It is intended that the UTCM will become a stand-alone product which may be purchased by third party suppliers for inclusion in UTs serving different market segments. Requirements for the UTCM are almost entirely driven by the product requirements of the handheld UT. However, there are a small number of requirements which are derived from the needs of the UTCM as a standalone product. This document includes a section covering these UTCM specific product requirements.

Note that the features and specifications listed in this document (with the exception of the optional upgrades contained within section 13) form the mandatory minimum baseline requirements for the GSPS UTH and will be the basis for customer acceptance.

3.1 Acronyms

Acronym	Definition
CE	European Conformity
C/A	Coarse Acquisition
CUG	Closed User Group
DTE	Data Terminal Equipment
DTX	Discontinuous Transmission
DTMF	Dual Tone Multi-Frequency
EIRP	Equivalent (Effective) Isotropically Radiated Power
EDGE	Enhanced Data Rate for GSM Evolution
ETSI	European Telecommunications Standards Institute

FCC	Federal Communication Commission
GMR-2	ETSI Geostationary Mobile Radio Release 2
GMR-2+	Enhanced Variant of GMR-2 (used by the GSPS)
GMPCS	Global Mobile Personal Communications by Satellite
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSPS	Global Satellite Phone Service (formerly known as "GVS")
GSM	Global System for Mobile Communications
G/T	Gain to Noise Temperature Ratio
IMEI	International Mobile Station Equipment Identity
IP	Ingress Protection
ITU	International Telecommunications Union
MMI	Man Machine Interface
MO	Mobile Originated
MOU	Memorandum of Understanding
MSS	Mobile Satellite Service
MT	Mobile Terminated
NMEA	National Marine Electronics Association
OTA	Over the Air
RAT	Radio Access Technology
RF	Radio Frequency
ROHS	Restriction of Hazardous Substances
SAR	Specific Absorption Rate
SBAS	Satellite Based Augmentation System (GPS)
SCO	Synchronous Connection Oriented
SIM	Subscriber Identity Module for GSM
SIM-ME	SIM-Mobile Equipment
SLIC	Subscriber Line Interface Circuit
SMS	Short Message Service
TTFF	Time to First Fix (GPS)
UL	Underwriters Laboratory Authorized Label
UTH	User Terminal Handset
UTCM	UTH Core Module

4. PRODUCT OVERVIEW

The UTH will be a handheld (mobile) device that allows a subscriber to not only access the full range of services on the Inmarsat GSPS system, but also to provide roamed access to 2nd generation GSM terrestrial mobile networks. The UTH is intended to be a fully featured device, supporting a range of features and functions found on contemporary handsets.

The UTH will support the following functions:

1. 'Candy Bar' form factor
2. Inmarsat GSPS GMR-2+ service capabilities
3. GSM service capabilities
4. Short message service (SMS) capability in GSM and GMR-2+ modes.
5. Bluetooth 2.0
6. Polyphonic ring tones.
7. Data, fax, power, battery charging functions via the USB port.
8. Personal information management functions, alerts.

This product is intended for launch in 2010, and must be capable of supporting future enhancements to both the terrestrial and satellite networks, with an extended lifetime of at least 5 years.

The UTH will be developed based on industry standard chipsets using software intellectual property (IP) that is been widely available in the GSM industry. Technology from Analog Devices and software IP Sasken will be used. Use of industry proven chipsets and software IP will provide significant long term benefit, since these products will keep track of the continual innovation in the cellular telecoms industry. In addition, the programme development risks will be reduced through the use of mature technologies, specifically in the areas of conformance and validation.

5. SCOPE

This document specifies the technical, operational, and functional requirements for the GSPS User Terminal (UT) and associated User Terminal Core Module (UTCM). The UT system is composed of the following:

1. User Terminal Handset (UTH)
2. User Terminal Core Module (UTCM)
3. Power Supply
4. User Manual and Product Documentation
5. UT Commercial Packaging
6. Peripherals and Accessories

This document also documents those requirements which are applicable to the UTCM as a standalone product.

6. APPLICABLE DOCUMENTS AND DOCUMENT CONFLICTS

A number of specifications documents form the basis for the UT Procurement. The overall applicability and precedence of each document is defined in the following table

Table 1 Applicable Document Hierarchy

Priority	Document	Owner	Applicability	Content Summary
1	Statement of Work	Inmarsat	Mandatory	Description of all programmatic requirements for work under this Contract
2	ETSI GMR-2+ Specifications	Inmarsat	Mandatory	GMR-2+ v2.3.0 GEOMobile Radio Interface Specifications
3	Inmarsat SIM Specification	Inmarsat	Mandatory	Inmarsat TS 11.11 SIM Specification
4	Inmarsat MMI and Operational Scenario Specifications	Inmarsat	Mandatory	Inmarsat MMI and operational scenarios description
5	GSPS UTH Product Requirements Specification	Sasken	Mandatory	This document
6	UTH Acceptance Test Specification	Sasken	Mandatory	Defines the Sasken acceptance criteria for the UTH

The Contractor shall immediately inform Inmarsat whenever it finds conflicting requirements among these documents.
Where conflicts between the requirements in the various documents occur, the document with the highest level of precedence (indicated above) shall apply.

7. DEFINITIONS

This document uses the following definitions of terms:

"shall" indicates a mandatory requirement that must be met by the Contractor.

"Reference Documents" indicates documents which provide guidance to the design but do not constitute mandatory requirements.

"Applicable Documents" indicates documents that contain mandatory requirements.

'Satellite mode' and 'SAT mode' are equivalent to 'GMR-2+ mode'.

8. REFERENCE DOCUMENTS

[RD 1] 3GPP Digital cellular telecommunications system (Phase 2+); Mobile Station conformance specification - 3GPP TS 51.010-1.

[RD 2] Geo-Mobile Radio Interface Specifications, GMR-2 Series; GMR-2 01.201 (ETSI TS 101 377-1-2) Version 1.1.1 (March 2001) refers.

[RD 3] 3rd Generation Partnership Project Technical Specifications (GSM/GERAN), Release 1999, December 2004 with Change Notices up to and including March 2007; 3GPP TS 01.01 (ETSI TS 101 855) Version 8.18.0 (March 2007) refers.

[RD 4] SAF Product Specification v1.6 (3rd December 2007).

[RD 5] AD6900 Data Sheet v PrG (28th September 2006).

[RD 6] GSPS UTH Operational Scenarios Document (EMS-SP-1415-10004)

[RD 7] Inmarsat SIM specification GMR-2P-11-011 Version 1.5 or the latest.

[RD 8] MMI menu structure GSPS v2.1 (1 August 2008): Inmarsat

[RD 9] MMI requirements for GSPS handset 2.0 (31 July 2008): Inmarsat

[RD 10] Network connection user presentation v1.1 (4 August 2008): Inmarsat

[RD 11] MMI Icon List Issue 4.1 (18 August 2008): Inmarsat

[RD 12] SASKEN AT Commands Reference Guide version 1.8.2

[RD 13] GSPS MMI Requirements Release matrix Issue 001.xls (EMS-RD-1415-10017)

9. MOBILE HANDSET SPECIFICATIONS

The design of the GSPS UT shall support both the GMR-2+ and GSM Radio Access Technologies (RAT). Either the GMR-2+ Mode or the GSM Mode is active at any given time. There is no requirement for the GMR-2+ (satellite) and GSM (terrestrial) modes to be supported simultaneously.

9.1 Legacy GMR-2 System Interoperability

Interoperability of the GSPS UT with the legacy GMR-2 Radio Access Technology is not required.

9.2 RF Parameters

9.2.1 GSM RF Parameters

9.2.1.1 GSM Frequencies

The UT shall operate in the following frequency bands: GSM-850, GSM-900, GSM-1800, and GSM-1900. The UT shall allow for channel spacing, signal bandwidth, and duplex spacing while operating in GSM mode.

9.2.1.2 GSM Emission Category

The UT shall operate within GSM Power Class 4 (2W) Telephone specifications for GSM-850 and GSM-900.

The UT shall operate within GSM Power Class 1 (1W) for GSM-1800 and GSM-1900.

9.2.2 GMR-2+ RF Parameters

The UT shall comply with the GMR-2+ air interface specification.
In particular, the following RF parameters shall apply:

9.2.2.1 GMR-2+ Frequency Bands

Inmarsat-4 Satellite Operational Band:
The UT shall meet the relevant technical requirements over the following transmit and receive frequency bands, as defined in the GMR-2+ specifications:

- 1626.5 – 1660.5 MHz transmit (return)
- 1525.0 – 1559.0 MHz receive (forward)

Extended MSS Band:
In addition to the Inmarsat-4 Satellite Operational Band defined above, future Inmarsat satellites are planned operate in the extended band that was designated for MSS operation in WRC-03. Therefore the UT shall also meet the relevant technical requirements over the following transmit and receive frequency bands:

- 1668.0 – 1675.0 MHz transmit (return)

- 1518.0 – 1525.0 MHz receive (forward)

9.2.2.2 EIRP Requirements

The UT shall be capable of transmitting an EIRP of 5dBW within the Operational Band and 3dBW within the Extended MSS Band, and considering the following requirements:

1. The EIRP value shall be met over the coverage range of 0 to 360 degrees azimuth and 20 to 90 degrees elevation (where this coverage is obtained from a combination of antenna field of view and handset orientation).
2. The EIRP value shall be met over a solid angle of 60° from both sides of the mechanical axis of the antenna.
3. The EIRP requirement shall be met when the handset antenna is tested with a perfectly circularly polarized antenna.
4. The EIRP value shall be met over the range of UT operational conditions including (but not limited to) temperatures and battery charge state.

9.2.2.3 G/T Requirements

Overall the UT shall meet or exceed G/T of -24 dB/K within the Operational Band and -27 dB/K within the Extended MSS Band, and considering the following requirements:

1. The G/T value shall be met over the coverage range of 0 to 360 degrees azimuth and 20 to 90 degrees elevation (where this coverage is obtained from a combination of antenna field of view and handset orientation).
2. The antenna G/T requirement shall be met when the handset antenna is tested with a perfectly circularly polarized antenna
3. The G/T value shall be met over a solid angle of 60° from both sides of the mechanical axis of the antenna.
4. The G/T value shall be met over the range of UT operational conditions including temperature range.

9.2.2.4 Antenna Pattern

The antenna used will be omni-directional.

9.2.2.5 Output Modulation Spectrum

The UT shall comply with the requirements for modulated spectrum as detailed in GMR2+ 05.005.

9.2.2.6 Spectrum due to Switching Transients

The UT shall comply with the requirements for spectrum due to switching transients as detailed in GMR2+ 05.005.

9.2.2.7 Spurious Emissions

The UT shall comply with the requirements to limit spurious emissions as detailed in GMR2+ 05.005. (This must include change ID591, to be incorporated into release 2.3 of GMR-2+).

9.2.2.8 Axial Ratio

In the Operational Band the maximum receive axial ratio of the antenna shall be 4 dB over the coverage range of 0 to 360 degrees azimuth and 20 to 90 degrees elevation. In the Extended Band the maximum receive axial ratio shall be 6.0 dB over the same coverage range. The axial ratio requirement shall be met when the handset antenna is tested with a perfectly circularly polarized antenna

9.3 GPS Receiver Performance

The UT shall include a GPS receiver.

The Copernicus module (58048-00) from Trimble shall be used.

Also other models / vendors can be considered if the Copernicus module less perform or difficult to integrate.

An embedded GPS antenna (within the phone or GMR-2+ antenna housing) will be provided.

The GPS receiver shall continue to operate when the UT is in GMR-2+ or GSM active mode, and may be deactivated when UT is transmitting or in 'sleeping' or battery saving mode.

The GPS position information shall be made available to the user via the MMI as well as to the network (as required).

9.4 Core Processor

The UT shall include a Core Processor. (Also called Baseband Processor).

The baseband processor forming part of the UT shall support the following processing requirements:

1. The baseband processor shall support the full implementation of the GMR-2+ air interface, and full set of GMR-2+ services.
2. The baseband processor(s) shall support the full set of services and functions of both GSM and GMR-2+ modes, defined in this document.
3. An echo canceller conforming to the G.168 standard shall be incorporated to facilitate a future 2-wire interface (for example, for fixed or maritime installations). This echo canceller shall in addition effectively cancel both residual acoustic echo from earpiece to microphone when the UT is in (4-wire) handset mode, and room echo during UT speakerphone mode operation..
4. An analogue line level 4-wire test-point shall be included as part of the UTCM for testing the vocoder.
5. Digital test ports as defined in the "Voice Codec and Audio Testing" section II, A, 9 of the Statement of Work.

A low-rate 2.45 kbps vocoder (enhancement of AMBE +2 which is optimized for 2.4 kbps, supplied by DVSI) shall be supported by the UTCM, including enhanced pitch detection and noise suppression features for the purposes of improved link margin to minimize the level of handset pointing required for maintenance of voice calls.

9.4.1 Baseband

This shall be based upon a type approved GPRS mixed signal and baseband solution from Analogue Devices, consisting of the following chipsets

1. AD6900 "Le Mans" GSM/GPRS/EGPRS Baseband Processor
2. AD6855 "Stratos" GSM/EDGE Analogue Processor
3. AD6546 "OthelloE" RF Transceiver

In order to minimize physical size and BoM, the GMR-2+ functionality shall be built on top of this chipset. The hardware shall remain largely unchanged (at a chipset level), with the resident software (protocol stack and physical layers) being dynamically swapped dependent on the requirements of the user (i.e. from Terrestrial to Satellite mode).

9.4.2 Protocol Stack

The software architecture shall be a combination of standard (pre-approved) stacks, together with elements of bespoke developments. The software stack comprises of the following elements:

1. Applications Framework
2. GSM L2/L3
3. GMR-2+ L2/L3
4. L1 and PHY (GSM)
5. L1 and PHY (GMR-2+)

The GSM L1 and PHY shall also be used for the development of the GMR-2+ L1 + PHY.

9.4.3 Memory Subsystem

The design of the UTCM memory subsystem shall support the maximum allowable memory configuration.

Lower memory footprints may be used on the production line as needed, to reduce the BoM cost on lower functionality products.

9.5 Frame and Slot Formats (GMR-2+)

The frame and slot formats of the Handset when operating in the GMR-2+ mode shall be defined by the GMR-2+ specifications.

9.6 Modulation (GMR-2+)

The modulation rates and formats of the Handset when operating in GMR-2+ mode are defined in the GMR-2+ Specifications.

9.12 SIM Module

The UT shall accept and interface with a standard 3V GSM Subscriber Identity Module (SIM) as defined in TS 11.11 (Release 99). Reference document [RD 7] provides further details on the specific requirement for GSPS (satellite mode).

9.12.1 SIM Module Access

The removal of the battery cover to access the SIM slot shall be simple and fast for an end user.

9.13 Antennas

The UT shall include the following antennas:

1. GSM antenna (satisfying GSM industry standard antenna requirements)
2. GMR-2+ antenna (satisfying the G/T and EIRP requirements stated above)
3. GPS antenna (satisfying industry standard antenna requirements)
4. Bluetooth Antenna (satisfying industry standard antenna requirements)

External RF interfaces shall be provided to support GMR-2+ and GPS transmission and reception. This shall be for the purposes of supporting both production line testing as well as use of the product in the field with optional accessories, including in-building booster, vehicle hands-free docking, maritime cradle etc.

The connection of an external antenna must not limit the operation of the UTH in any way

9.14 Replaceable components

The design of the UTH shall be such that the following components can be replaced by the service provider:

- GMR-2+ antenna
- Screen
- Rubber bungs

The task of replacing any one component shall take no longer than 15 minutes for a skilled technician and shall not affect the IP44 rating or warranty of the UTH when undertaken by personnel with the relevant training and instructions, using simple tools, e.g. tamper proof screw driver and spanners.

9.15 Strength of GMR-2+ Antenna Hinge Area

The area of the UTH around the hinge connection of the GMR antenna shall be designed in such a way that it is more robust than the antenna and does not fail before the antenna when subjected to stress caused by the antenna being moved outside its normal axis of movement. Under standard handset drop test conditions, as defined by GSM standards, the antenna shall remain fully functional after being dropped when the antenna is deployed or stowed.

9.16 Mode Switching

The user shall have the capability, via the MMI, to switch UT settings between Satellite Only Mode (GSM Mode disabled, Satellite mode enabled), GSM Mode Only (GSM Mode enabled, Satellite mode disabled) and Dual Mode (GSM and SAT Mode enabled).

If the UT is in Dual Mode the user shall have the capability to switch the UT, via the antenna, between Terrestrial Mode and Satellite Mode. There is no requirement for the UT to be active in both modes.

If the UT is in Satellite Only Mode the user shall have the capability to switch the UT, via the antenna, between Satellite Mode and inactive. There is no requirement for the UT to be active in both modes.

When GSM only mode is selected the position of the GMR-2+ antenna shall not change mode.

As part of the mode selection process, the UTH shall be able to distinguish between home and visited GSM and GMR-2+ networks (PLMNs) based on the SIM card subscription, also as specified in the applicable GMR-2+/GSM specifications.

Although mode change shall be signified to the user via the MMI, there shall be no perceived disruption to the usage of the UTH (i.e. the display and MMI shall remain active at all times)

The default mode of operation shall be 'Satellite Only Mode', or preset in the factory.

9.17 Docking support

The UTH shall support docking as below:

- The UTH form factor shall support a user friendly, robust cradle docking solution that simultaneously connects audio, Satellite RF and USB.

  If the UTH is in Dual mode or SAT only mode, attaching connectors to the external antenna ports shall result in the handset behaving as if it is in SAT mode. There is no requirement for the handset to explicitly indicate that it is 'in docked mode'. There is also no requirement for the handset to indicate that a functioning external antenna is successfully docked.

- If the UTH is in GSM only mode the handset shall not acknowledge the presence of, nor use, the external antennas but remain in GSM mode.

10. USER TERMINAL FUNCTIONS AND SERVICES

10.1 Overview

The UTH shall support:

1. Inmarsat GSPS GMR-2+ service capabilities.
2. GSM service capabilities.
3. Short message service (SMS) capability in GSM and GMR-2+ modes.
4. Bluetooth wireless technology.
5. Polyphonic ring tones.
6. Data and fax modem functions for a computer attached via the 'USB port'.
7. Power & recharging through the 'USB port'.
8. Personal information management functions, alerts.

11. SERVICES

11.1 Tele-Services

11.1.1 Voice Calls – Mobile Originated / Mobile Terminated (MO /MT)

The UT is primarily a voice terminal. It shall support both call origination and termination on GSM and GMR-2+ networks.

In GSM mode the UT shall support the EFR and FR vocoders only.

In GMR-2+ mode the UT shall comply with the GMR-2+ vocoder requirements.

11.1.2 Emergency Calls

The UTH shall support emergency calls in Terrestrial and Satellite modes, as well as emergency call testing to verify correct location reporting of the handset. The UTH shall support location reporting in terrestrial mode and satellite mode (using either GPS functionality residing within the UTH, or relying on functionality solely within the ground network).

The ability to support maritime distress / GMDSS calls within this UTH is not required.

If Emergency numbers are present on the SIM the UTH shall display these as options to the user when they navigate through to the emergency number list. If no emergency numbers are present on the SIM, the user shall be able to dial the emergency number directly.

11.1.3 Point to Point Short Message Service (MO/MT)

The UT shall be capable of receiving, processing, and displaying Short Message Service (SMS) in GMR-2+ and GSM Modes.

11.1.4 SMS Services

While operating in GSM Mode, the UT shall conform to GSM standards for the following SMS services:

1. SMS-Mobile Terminating / Point-to-Point (SMS-MT/PP)
2. SMS-Mobile Originating / Point-to-Point (SMS-MO/PP)
3. SMS-Cell Broadcast (SMS-CB)

While operating in GMR-2+ Mode, the UT shall be capable of the following SMS services conforming to the GMR-2+ standard:

1. SMS-Mobile Terminating / Point-to-Point (SMS-MT/PP)
2. SMS-Mobile Originating / Point-to-point (SMS-MO/PP)

The UT in GMR-2+ mode shall be able to receive or send a Short Message at any time, independent of whether or not voice or data call is in progress.

11.1.5 Concatenated SMS Support

The UT shall be capable of supporting up to 10 concatenated MO and MT SMS messages in GMR-2+ and GSM Modes.

11.1.6 Emergency Alert

Emergency Alert is a broadcast civil alert text message that is sent to the UT in emergency situations via the Cell Broadcast Service.

The UT shall be capable of receiving Emergency Alert messages in GSM mode.

11.2 Bearer Services

11.2.1 Automatic G3 Fax

In Satellite mode, the UTH shall support standard class 1 G3 (transparent) facsimile service at 2.4 kbps.

The user shall be able to execute the AT command set defined in TS 27.007 (Release 99) to enable the system to transmit and receive facsimile documents using the UTH as a fax modem.

The UTCM G3 Fax service adapter shall be designed to account for the typical latency that is expected from a geostationary satellite communications system.

AT commands supporting FAX over USB are defined in section 14.

The handset shall not be required to support Group 3 FAX in GSM mode.

11.2.2 Circuit Switched Data

Two modes of operation shall be supported:

- **Terrestrial Mode**: 9.6kbs (Non-Transparent, Asynchronous)
- **Satellite Mode**: 2.4kbps (Transparent, Synchronous)

The user shall be able to connect a computer to the UTH using a cable connected to the USB port. The user shall be able to execute the AT command set defined in TS 27.007 (Release 99) to enable the system to transmit and receive data using the UTH as a data modem in both asynchronous and synchronous modes as applicable for terrestrial and satellite.

The UTCM Circuit Switched Data service adapter shall be designed to account for the typical latency that is expected from a geostationary satellite communications

system.

AT commands supporting DATA over USB are defined in section 14.

11.3 Location Services

Terrestrial Mode: The UTH shall support the GSM GPS positioning procedure for Location Services (LCS) without network assistance data as defined in 3GPP TS 03. 71 and 3GPP TS 04.71 Release 99.

Satellite Mode: The UTH shall support the GMR-2+ GPS positioning procedure for Location Services (LCS) without network assistance data as defined in GMR-2+ 44.018 S3.4.15.

Both the GSM and GMR-2+ positioning procedure allow the network to command the UT to report its current GPS position. The GMR-2+ positioning procedure also include support for dark beam activation, where the UT determines the narrow spot beam it is located based on its current GPS position and a spot beam map broadcast by the NCC/GW. The UT reports the ID of the narrow spotbeam to the NCC/GW in the S-RACH; Channel Request Message.

11.4 Discreet Mode

The UTH shall support the option to operate in Satellite Mode without disclosing its GPS position information to the network ("Discreet Mode"). Discreet Mode is enabled by the presence of a proprietary elementary file on the SIM. In this mode the UT deliberately withholds its GPS position and reports only the identifier of the spot beam it is located in (derived from a broadcast spot beam map and the current GPS position).

Discrete mode operation shall be signalled to the user via an icon on the MMI. The user will be able to view full GPS information.

11.5 GPS display policy support

The UTH shall support the Inmarsat's GPS display policy network management. If the policy setting in the user's location is negative for a specific location, when the network informs the UTH the handset shall stop the user from viewing GPS data by means of an appropriate information message.

11.6 Functions

11.6.1 Call Handling

The call handling capabilities of the UT in GMR-2+ mode are defined in the GMR 2+ Specifications

11.6.2 Voice Mail

11.6.2.1 Voice Mail Alerting

The UT shall receive and process voice mail alerting signals to the extent supported by the voice mail system.

11.6.2.2 Voice Mail Retrieval

The UT shall use standard DTMF signalling tones. In response to the user pressing a dedicated "one-touch" voice mail retrieval button or numbers pre-programmable by the user, access shall be obtained to voice mail that is received and stored in the supporting infrastructure (gateway or base station).

11.6.3 Phonebook

The UTH shall support a phonebook that shall store a minimum of 300 phone numbers (minimum of 20 digit) for display and use in either GSM or GMR-2+ Mode, with capability to copy and move between this database and the SIM contacts list.

The memory shall also provide sufficient capacity for storing fifty 160-character SMS messages.

Sync of the UTH phonebook contents with MS Outlook 2007 contacts on PC (running Windows XP PRO SP3 and Windows Vista SP1) shall be supported (via the USB interface).

11.6.4 Short Message Handling

The UTH shall be able to create, store, view and edit current and historical text messages.

11.6.5 Advice of Charge

The UT, when operating in the GSM Mode, shall receive, process, and display standard GSM supplementary Advice of Charge (AOC) service indication, when enabled by the network operator.

11.6.6 Network Selection

The UT shall provide a menu selection for the following modes:

1. Satellite Only (GMR-2+)
2. Terrestrial Cellular Only (GSM)
3. Dual Mode (Terrestrial Cellular (GSM) or GMR-2+).

The RBCCH frequencies in the handset shall be updated by those stored on the SIM if they are more recent.

The RBCCH frequencies on the SIM shall be updated with those stored in the handset if they are more recent.

The network shall broadcast the latest RBCCH frequencies and the UTH shall update its register according to the operational scenarios document.

11.6.7 Supplementary Services

The transmission control codes for the following supplementary services (as per GSM specification) shall be supported in the GSM and GMR-2+ modes:

1. Caller ID (Calling Line Identity Party (CLIP) and Connected Line Identification Presentation (CoLP))
2. Call Waiting
3. Call Forwarding – Unconditional, Not reachable, Busy, No reply
4. Call Hold
5. Multi Party Service
6. USSD (Unstructured Supplementary Service Data)
7. Barring all Outgoing Calls (BAOC)
8. Barring all Incoming Calls (BAIC)
9. Barring Outgoing International Calls (BOIC)
10. BOIC – except home country
11. Explicit Call Transfer
12. Closed User Group (CUG)

11.6.8 Encryption

In the GSM the UT shall implement the A5/1 and A5/2 GSM encryption standards, while in GMR-2+ the UT shall implement VGE-64 Encryption Algorithm from Lockheed Martin.

11.6.9 IMEI

The UT shall have a common IMEI for both the GMR-2+ and GSM modes. The format and protections of the IMEI shall be in accordance with TS 22.016 (Release 99). The IMEI feature shall facilitate identifiers to differentiate between

1. Terminal types (handheld, maritime, etc.)
2. Antenna types that are compatible with these terminals
3. Terminal manufacturer

Display of the IMEI shall be possible through entry of a standard GSM short code through the keypad..

11.6.10 MMI

This section has been intentionally removed and superseded by Section 11.6.18 below.

11.6.11 Numeric Keypad

The UTH shall have a backlit numeric (under MMI control) keypad for normal handset operation, as well as for integration and end-to-end testing purposes. The keypad shall be large enough to cope with the extremes of operation, to facilitate the use by gloved users, and to work well under extended operating scenarios.

The key pad shall be interchangeable by service providers after manufacture and prior to distribution, without affecting the warranty or IP44 rating. This activity may require specialist tools.

As well as the standard Latin language only keypad, dual language keypads shall be provided in the following character sets:

- Arabic and Latin characters
- Chinese Mandarin and Latin characters

11.6.12 Function Keys

The following functions shall be included as a minimum:

1. Turning the UTH on and off (power on/off combined with 'end' key).
2. Initiating and terminating a call ("send" and "end" buttons).
3. Audio volume
4. Menu navigation
5. Voice mail retrieval (combined with '1' key).
6. Activate speakerphone (soft key only available in call)
7. MMI shortcuts (controlled by navigation key)

11.6.13 Display Screen

11.6.13.1 Display Screen Ergonomics

The display shall be suitable to support the functions on the UTH, as well as providing an aesthetically pleasing look and feel. The display screen shall be suitable for operation in strong sun light, with minimum power consumption.

The following display features shall be supported in order of priority:

1. Adjustable screen brightness (to facilitate viewing in strong sunlight)
2. Mechanically robust to support envisaged use cases.
3. QVGA resolution
4. LCD
5. 2" (diagonal) display size or larger
6. Greyscale or colour

The display shall be backlit, under user control (via the MMI).

11.6.13.2 Display Format

The UT shall support the functionality of modern cellular handset displays, and as a minimum, display five rows of twelve English alpha-numeric characters. The display and menu of the UT shall support a multiple languages as defined below. The display shall be capable of accommodating at least four lines of SMS text.

11.6.13.3 Clock Display

The UT shall provide real-time clock and alarm functions. The clock shall synchronize with GPS or the GSM network (NITZ) when those signals are available.

11.6.13.4 Signal Strength Indication

The UT shall provide a visual display of received signal level (received signal strength indicator, RSSI) in all modes.

For the GSM mode the technique for calculating RSSI is specified by TS 05.08 (Release 99).

For the GMR-2+ mode, RSSI shall be calculated in accordance with the GMR-2+ specification.

11.6.13.5 Battery Indicator

The UT shall provide a visual display of battery condition in all modes.

11.6.13.6 Short Message Receipt Notification

The UT shall provide a visual display of short message receipt.

11.6.13.7 Voice Mail Message Receipt Notification (Message Waiting Indication)

The UTH shall provide a visual display of Voice Mail message receipt, including numeric indication of the number of voicemail messages waiting. The purpose of this indication is to alert the user that one or more voice mail messages were recorded and are waiting to be retrieved.

11.6.13.8 Supplementary Service Indicators

The UT shall display specific indicators that are required for certain supplementary services and other GSM phone display features including:

1. CLI
2. Call waiting
3. Call on hold
4. Call forwarding
5. Conference / three party call in progress

11.6.13.9 Service Provider Information

The UT shall display the following service provider information stored on the SIM:

- Name
- Telephone number
- Email address

11.6.14 Audio

11.6.14.1 Polyphonic Ring Tones

The UTCM shall support multi ring tone types capabilities, including polyphonic (64 channels).

11.6.14.2 Earphone / Speakerphone

The UTCM shall support the provision of audio output from an earphone and a speakerphone (For hands-free full duplex phone conversations) integrated into the UTH. The UTCM shall include echo cancelation for proper hands-free operation.

The handset's acoustic properties, i.e. speaker phone and microphone, shall be adequate for use when the handset is placed on its side and the user's ear is up to 1m away from the handset.

In call activation of the speakerphone via the MMI shall be supported.

11.6.14.3 Transducer

The UT shall emit acoustic signals, which shall be separate from the earphone and originate from the top of the phone. Distinct audible tones shall, at a minimum, include the following:

1. Incorrect key depression
2. Low battery warning or alarm
3. Minute minder
4. Network availability
5. Normal ring signal (GSM or GMR-2+ mode)
6. SMS receipt signal
7. Voice mail message receipt
8. Key clicks

As a minimum the normal signal ring shall be audible in the Bluetooth headset.

11.6.14.4 Signal Strength Indicator

The UT shall provide an audible assistance tone to the user in obtaining advantaged service while operating in GMR-2+ Mode. The pointing assist audio may be driven by signal strength measurement.

11.6.14.5 Silent Mode

The UT shall support silent mode.

The MMI shall provide a mechanism in silent mode to disable all audio alerting, key click and error tones emitted by the handset. In this mode the vibrator shall be disabled.

The UT shall support vibrator mode.

The MMI shall provide a mechanism to alert the user to incoming calls (voice, FAX, Data, SMS) by activating a vibrator contained within the UTH. In this mode audio alerting tones are disabled.

11.6.14.6 Microphone

The UT shall include a microphone for voice calls.

11.6.14.7 Audio volume control

The UT shall include means of controlling ring tone volume, standard earpiece volume and speaker phone volume from single manual volume control on handset

11.6.15 Power

The UT shall be able to be powered by a Li-Ion battery pack. The talk and standby times below (measured to the appropriate ITU specifications) shall be achievable when the handset is used in a typical end user scenario.

The design shall maximize talk and standby times with a goal of 1.2 times the minimum figures below.

Terrestrial Mode:

1. Talk time not less than 5 hours.
2. Standby time not less than 2.5 weeks.

Satellite Mode:

1. Talk time not less than 4 hours.
2. Standby time not less than 94 hours.

Recharging times for a battery satisfying the above talk time requirements shall be less than 5 hours using a mains powered external charger. Charging via the USB cable when attached to a PC shall be possible but it is understood that this will be at a slower rate.

11.6.16 Hearing-aid Accessibility

Not required.

11.6.17 User Features

This lists a set of user features that are also required:

1. Call history
2. Handset SIM PIN lock
3. Keypad lock
4. Battery charge display (and low power warning)
5. Calendar
6. Address book
7. Alarm Clock
8. Silent (vibrating) Alert
9. Teleconference (speaker) mode
10. Microphone muting
11. Speed dialling
12. Predictive Text Entry (SMS and Phonebook)

11.6.18 Man Machine Interface

The UTH MMI shall support all required functions and services, as outlined here in GMR-2+ and GSM modes, as needed to ensure full GSM and GMR-2+ compliance. A basis for this MMI specification can be found in ETSI TS 22.030 (Release 99) and also within the document SP-1415-10009 GSPS Operational Scenarios Requirements Matrix Issue 002. In all areas, the requirements for the MMI shall be

driven by the corresponding GSM recommendations – including but not limited to:

1. Call Management
2. Supplementary Services
3. Advice of Charge (Terrestrial Mode only)
4. IMEI
5. Display icons (including battery strength, call display, supplementary services, voice mail, GPS service, etc.)
6. RSSI level
7. Speed Dialling
8. Profiles (audio, ring tones)
9. Specific start up screens
10. Built-in instructional displays (as per MMI specification only, for example 'deploy antenna' icon and text)
11. Dialled/Received/Missed call display (30 each)

11.6.19 Multiple Languages

The UT shall support English, Simplified Chinese, French, Spanish, and Arabic languages (character sets, MMI text-string translations, text entry, and phonebook) as a minimum.

Additional language packs shall be able to be added, as an optional software and/or firmware upgrade following product launch.

11.6.20 Error Handling

The UT shall display sufficient error handling to allow the user to interpret and manage all usual and unusual events to do with normal handset operation.

11.6.21 Debug Log

It shall be possible to access trace and event logging data via the USB serial interface connector.

A document describing the method of error log extraction shall be produced.

11.6.22 Firmware Updating

There shall be a capability to upgrade the firmware/software of the UT by a trusted party, e.g. Distributor, Service Provider and user. This shall be via the USB port.

Display of the software version to the end user shall be possible through MMI navigation and display.

11.6.23 USB services and operating system support

The following operating systems and services shall be supported via the USB port:

Operating systems supported via the USB port using a PC installable software driver:

- Windows Vista SP1
- Windows XP SP3

Services to be supported on all the above operating systems:

- Fax
- Data
- Firmware upgrade

Services to be supported on limited set of operating systems:

- Phonebook synching (Windows Vista SP1 and Windows XP SP2 and SP3

Services supported irrespective of operating systems:

- Charging via USB port shall not require installation of a software driver
- A suitable driver solution shall be chosen such that support for extended operating system support (for example to Mac operating systems) and future operating system support (e.g. future Windows releases) is easily managed and sustainable.

12. ENVIRONMENTAL REQUIREMENTS

12.1 Temperature

The UT shall be capable of operation in temperatures of -20 to +55 degrees Celsius.

12.2 Humidity

The UT shall be capable of operation in humidity of 0 to 95%.

12.3 Vibration

The UT shall be capable of operation following exposure to the following random vibrations:

Frequency	ASD (Acceleration Spectral Density)	Duration
5 Hz to 20 Hz	0.96 m^2/s^3	30 minutes per axis
20 Hz to 500 Hz	0.96 m^2/s^3 at 20 Hz, thereafter -3 dB/octave	30 minutes per axis

The UTCM shall support operation during maritime vibration conditions classified in reference document 'IEC-60945' without any malfunction, degradation of performance.

12.4 Shock

The UT shall be capable of operation following a shock with a duration 6 ms and acceleration of 300 m/s^2.

12.5 Solar Radiation

The UT shall be capable of operation following solar radiation of 1120 $W/(m^2s^2)$.

12.6 Anti Spark

Suitable techniques and processes shall be used to protect the UTCM and other electrical components against sparks.

12.7 Ingress Protection

The UT shall have an ingress protection rating of IP44 or better. Ingress protection bungs shall be designed such that the form discourages users from permanently removing bungs thus rendering the ingress protection void.

13. UT ERGONOMICS AND AESTHETICS

13.1 UT and Antenna balance

The handset must be balanced in the user's hand, i.e. the weight of the antenna must not pull the handset off balance.

13.2 UT and Antenna side position

It shall be possible to operate the handset lying on its side on a flat surface with the antenna inclined towards the satellite. Performance criteria in this side position shall be the same as when the handset is used in its typical position in the user's hand, adjacent to the head.

13.3 Buttons and function keys

The handset shall have large buttons, possibly rugged in aesthetic, and definitely rugged in performance.

13.4 Tether Hook

The UTH case shall include a tether hook which shall be capable of supporting the weight of the UTH.

14. UT BEHAVIOR

An overview of the expected UT behaviour and requirements is outlined in Ref 6 and the Operational Scenarios document Ref 8. Detailed requirements will be defined in the formal design specifications produced as part of this development.

15. RELIABILITY

The UT shall be developed and manufactured in accordance with standard manufacturing practices to provide reliability which is the same or exceeds of commercial cellular phones.

15.1 Handset Life Time

The lifetime of the UT shall be at least 5 years with an MTBF of at least 43800 hrs.

16. UT PACKAGE AND ACCESSORIES

16.1 Accessories

The following accessories form the UT "basic accessory kit":

1. USB AC charger
2. USB cable (charging/data)
3. Wired earpiece
4. Battery
5. 12v car charger

The UT shall be designed to work with an optional Bluetooth headset.

The design of the UT shall be based on industry standards so as not to prohibit the development of accessories by third-parties or prohibit the use of third-party accessories with the UT.

16.2 User Documentation

The following user documentation shall be developed and provided with each UT:

1. User Manual, available in all languages supported by the phone (see Section 4.3.19) A printed English version with other language variants available on CD.
2. Printed A7 size Quick Reference Guide, available in all languages supported by the phone. All languages shall be within the same printed document.
3. CD ROM containing user documentation in electronic form

The documentation shall also declare the approvals that the UT has received.

16.3 UT Basic Package Content

The UT basic package shall include:

1. User Terminal handset
2. UT basic accessory kit as defined in section 16.1 above
3. User documentation and software installer
4. Commercial sales packaging
5. USB drivers (for Windows XP PRO SP3 and Windows Vista SP1)
6. INF file for DUN operation

17. BATTERY AND POWER SUPPLY

The UT shall be powered by a lithium-ion cell battery with built-in charger. The UT shall support battery charging via the external USB port. The power supply shall be universal, capable of operation at 90-260 V and 50-60 Hz, and compatible with the following electrical mains plug standards:

1. NEMA 1-15 (North America)
2. CEE 7/16 (Europe)
3. CEE 7/7 (Europe)
4. BS 546 (primarily India, Sri Lanka, Nepal and Namibia)
5. BS 1363 (primarily United Kingdom, Ireland, Cyprus, Malta, Malaysia, Singapore and Hong Kong)
6. AS 3112 (primarily Australia, New Zealand, Papua New Guinea and Argentina)

18. REGULATORY APPROVALS

18.1 Electrical Compliance

The vendor shall deliver documentation to prove that the system conforms to the following regulations:

1. FCC Part 15
2. CE

The UT shall be marked with the FCC Part 15 Equipment Authorization Number and other symbols of regulatory and safety approvals as are generally required for this class of equipment.

The vendor shall design and support Inmarsat assigned manufacturer for the product to conform to the following regulations:

1. UL
2. GMPCS MOU Mark (ITU)

The vendor shall assist Inmarsat and the Inmarsat assigned manufacturer to get the conformance certification.

18.2 RoHS conformance

The UT shall comply with the European Union on the "Restriction of the Use of Certain Hazardous Substances" (RoHS) that limits the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers in electronic products.

18.3 Specific Absorption Rate (SAR) Compliance

The UT shall require demonstration of SAR Standards compliance according to at least the following:

1. FCC SAR Requirements (FCC Test Procedure OET65 Supplement C)
2. CE SAR Requirements (EN 50360:2001)

19. UTCM AS A PRODUCT REQUIREMENTS

The UTCM hardware shall be architecturally designed to support a family of GSPS products namely, Fleetphone (maritime), Landphone (Fixed installation), and secure handset. The architecture & design of the UTCM hardware shall not limit the UTCM from further enhancements to support these new products. As a minimum, the architecture shall support future enhancements to the following:

- Different LCD displays
- Different keypad interface
- Incorporating external antennas for GSM, GPS and GMR2+
- Serial port for provisioning of NMEA output

The UTCM SW shall be customisable for the above changes, and future GSPS products. The default software shall be GSPS UT Handset compatible and, as a minimum, shall support future enhancements to the following:

- Additional AT commands

Further customisation and feature development of future FleetPhone and LandPhone products are out of the scope of this PRSD and will be the subject of a future statement of work.

It shall be possible to set the UTCM power class appropriate to the target end user terminal category. The UTCM power class shall be signalled to the network elements as per GMR2+ specification.

A detailed specification and ICD for the UTCM as a product shall be produced by Contractor.

20. OPTIONAL UPDATES

Optional updates do not form part of the mandatory requirements.

21. AT COMMANDS

The commands defined below shall be supported over the USB interface. The baseline set represents the minimum set of commands required to support FAX and DATA. This baseline set of AT commands also includes the mandatory GSM AT commands defined in TS 27.007 (Release 99) to support data and AT commands and the mandatory AT commands from TS 27.005 (Release 99).

In addition to the baseline set of commands Inmarsat has requested commands to output the GPS position and support test and fault finding. The commands are contained in the table 'Inmarsat Additional Commands'.

21.1 Baseline Commands

Command	Description
ATD <n>	Dials the number in the string
ATA <n>	Answer incoming call
ATH	Hung up the call
ATO	Moved on-line data state
ATS0	automatic Answer
ATS7	Connection Completion Timeout
ATS8	Comma Dial Modifier Time
AT+CPAS	Phone activity status
AT+CPIN	Enter PIN
AT+CSCS	Select TE character set
AT+CMOD	Call Mode
AT+CHUP	Hang Up Call
AT+CBST	Select Bearer Service Type
AT+CRLP	Radio Link Protocol
AT+CR	Service Reporting Control
AT+FCLASS	Select service class
AT+FTM	Transmit Data
AT+FRM	Receive Data
AT+FTH	Transmit Data with HDLC Framing
AT+FRH	Receive Data with HDLC Framing
AT+FTS	Stop Transmission and Wait
AT+FRS	Receive Silence
AT+FCL	Carrier Loss Timeout
AT+FAR	Adaptive Reception Control
ATZ	Reset to default configuration
ATS3	Command line termination character
ATS4	Response formatting character
ATS5	Command line editing character
ATE	Command Echo
ATV	DCE response format
ATL	Monitor speaker loudness
ATM	Monitor speaker mode
ATX	Result code selection and call progress monitoring control
AT&C	Select DCD options
AT&D	Select DTR options
AT&F	Fetch factory default
AT+CMEE	Report Mobile Termination error
AT+CRC	Cellular Result Code
AT+GCAP	Request Complete Capabilities List
AT+GMI	Request manufacturer identification
AT+GMM	Request model identification
AT+GMR	Request revision identification
ATE	Command Echo
ATP	Select Pulse Dial
ATQ	Result Code Suppression
ATS6	pause before blind dialling
ATS10	automatic disconnect delay
AT&T	Set Tone Dial
RING	Incoming Ring
AT	Interrogation to UT

21.2 Inmarsat Additional Commands

Command	Description
AT+ _IGPS	**The _IGPS command returns the GPS information**
AT+CCFC	Call Forwarding Number and Conditions
AT+CGSN	Request for serial number
AT+CLIP	Calling Line Identification Presentation
AT+CLIR	Calling Line Identification Restriction
AT+CCFC	Call Forwarding Number and Conditions
AT+CCWA	Call Waiting
AT+CUSD	Unstructured Supplementary Service Data
AT+CSSN	Supplementary Service Notifications
AT+CHLD	Call related supplementary service (Call Hold)
AT+SKCCS	Current Call State Indication
AT+SKCPI	More Call Progress Information
AT+CREG	Network Registration
AT+SKCNL	Network Location information
AT+SKENR	Enable for Engineering Mode Information
AT+SKRSTENR	Reset for Engineering Mode Information
AT+SKERRLOG	Read Error Log from NVM
AT+CMER	Error Mobile Equipment Error Result Code
AT+SKERR	Indicate error
AT+CLCC	List the current calls

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ANNEX C – PRICE & PAYMENT PLAN

The Parties hereby agree to a firm and fixed price of US$ Fourteen Million (14,000,000 US Dollars) for the development and pre-production of the UT Handset and Core Module.

This sum shall not be exceeded without the prior written consent of Inmarsat.

The agreed Payment Plan is as follows:

No.	Milestones	Milestone Descriptions	Scheduled Completion Dates	Actual Dates	% payment	Amount payable (USD)
1	EDC	Contract Signature	EDC	28th Jan 2009	10%	1,400,000
2	M1	UTAH Kick-Off Review (KOR) Completion	EDC + 6 weeks	16th March 2009	5%	700,000
3	M2	UTCM/UTH Preliminary Design Review (PDR) Completion	EDC + 3 Months	Apr 30th, 2009	10%	1,400,000
4	M3	UTH Final Design Review (FDR) Completion	EDC + 5 months	June 30th, 2009	10%	1,400,000
5	M4	Early GMR2+ Functionality Demonstration	EDC + 8.5months	October 16th, 2009	15%	2,100,000
6	M12B	Final UTH Reference Design Delivery	EDC + 11 months	January 15th, 2010	10%	1,400,000
7	M6	UTH Factory Acceptance Test (HFAT 1) Completion (Phase 1)	EDC + 13 months	March 15th, 2010	10%	1,400,000
8	M9	UT Handset Satellite Acceptance Test (SAT) Completion	EDC+14.5	April 15th, 2010	5%	700,000
9	M13	Beta Test Completion (Phase 1)	EDC + 16 months	May 26th, 2010	10%	1,400,000
10	M14	Beta Test Completion (Phase 2)	EDC+19 Months	September 01st, 2010	15%	2,100,000

For any additional work beyond the current scope of Work, Sasken is open to execute using either a fixed price or Time and Material (T&M) model. T&M engagements are governed by the following monthly rates. The rates proposed are for calendar year 2009. For calendar year 2010 onwards, an annual increase of 5% applies to these rates.

- For work done in India, lasting less than 30 consecutive days:
  1. USD 5,500/person month for engineers
  2. USD 8,000/person month for architects

- For activities by Sasken India engineers working overseas beyond 30 consecutive days and for activities by Sasken Finland employees
  1. Sasken India engineers: USD 12,000/person month for engineers and USD 16,000 for architects
  2. Sasken Finland staff: USD 16,000/person month anywhere in the world

- Travel expense: Subject always to obtaining Inmarsat's prior written approval, Inmarsat will pay travel expenses as described below for any activity under Annex H that requires travel. The Travel fee below is also applicable for any travel undertaken by Sasken other than the ones already planned in Annex A, Statement of Work in section C (Testing).

  1. For any overseas travel by Sasken staff, air fare would be charged at USD 2,500 for each return ticket and during the period of travel a per diem of USD 250 would be charged for each day of travel out of office.
  2. For travel within Europe and within, India, travel expenses will be recovered at actuals (economy return fares) and per diem will be the same as described in (1) above..

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ANNEX D – KEY SUB-CONTRACTORS

The Key Sub-Contractors are: None at EDC

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ANNEX E – FOREGROUND

Physical Layer Software
GMR2+ Protocol Stack Software
All EMS Transferable IPR

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ANNEX F – Background

Part A – Inmarsat Background

GMR 2+ Specification

PART B – Contractor Background

GSM/GPRS Protocol Stack
Sasken Application Framework

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ANNEX G – KEY PERSONNEL

Name	Role
Srinivas Prasad	Program Director
Ravi TVS	Program Manager
Aravind Hanglur	SW Architect
Vijay Krishna	Product Manager
Juha Aitta	HW Project Manager
Risto U.	HW Architect
Girish B V S	L1 Project Manager
Sumantha Lakshminarayana	SW Architect
Galvin Viego	L1 Lead
Sharanasunil Lekkad	Integration Manager
Thomas Block	System Architect

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ANNEX H – CONTRACT CHANGE NOTICE FORMAT

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CONTRACT CHANGE NOTICE

PROJECT *[Project Name]*	CCN NO.	DATE
CONTRACT *[Contract Number]*	*xxx*	*DD-MM-YY*

(1) **TITLE OF CHANGE** *[Title]*

(2) **DESCRIPTION OF CHANGE**
[Description]

(3) **RECOMMENDED INTRODUCTION POINT** *DD-MM-YY*

(4) **DRAWINGS AND SPECS. AFFECTED**

NUMBER	ISSUE

(7) **REASON FOR CHANGE** *[Reasons]*

(8) **RELATED FACTORS**

FACTOR	Y	N	FACTOR	Y	N	FACTOR	Y	N
Performance			Testing			Other factors		
Reliability			Materials and processes					
Interface			Spare parts					
Weight			Agency furnished equipment					
Dimensions			Packaging					
Electrical parameters			Publications					

(9) **ESTIMATED INFLUENCES ON CONTRACT PROVISIONS**

1. **TOTAL PRICE INFLUENCE**

TOTAL HOURS	LABOUR COSTS	MATERIALS	TAXES	OTHER COSTS	TOTAL COSTS
0	0	0	0	0	0

2. **SCHEDULE INFLUENCE**

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ON FINAL DELIVERY	ON PERT-NETWORK
INFLUENCE ON OTHER PROVISIONS	

CONTRACTOR'S SIGNATURES	INITIATOR [*INMARSAT*] DATE: *D*
PROJECT MANAGER *[Name]* DATE: *DD-MM*	
CONTRACT MANAGER *[Name]* DATE: *DD-MM*	

DATE OF REJECTION	DATE OF APPROVAL	INTRODUCTION POINT
CUSTOMER'S SIGNATURES		
PROGRAMME MANAGER	DATE:	
CONTRACTS MANAGER	DATE:	

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ANNEX I - ROYALTIES

ANNEX I – ROYALTIES

In consideration of the licensed rights granted under Article 11 D of the Contract, the Royalties payable by the Contract Equipment Manufacturer (CEM) or Value-Added Manufacturer (VAM) (as applicable) upon the commercial sale or other transfer for value of each unit (either Core Module or UT Handset) are as follows:

Payee	US$
Digital Voice Services Inc. (DVSI)	$9.75
Sasken Communications	$5.00
Lockheed Martin	$5.00
Telefonaktiebolaget LM Ericsson	[TBD]*
Inmarsat	[TBD]**
MCCI	$0.20
iAnywhere Solutions:	
Data Sync Client Software	$0.20
MT OBEX Software	$1.00

Provided always that, in respect of any UT Handset incorporating a Core Module, a single Royalty shall be payable in accordance with the provisions of this Annex I.

* Telefonaktiebolaget LM Ericsson will require a Royalty in respect of background technology and IPR associated with the GSM and GMR-2 standards, to be licensed on fair, reasonable and non-discriminatory terms.

** Such Royalty as Inmarsat may specify in its absolute discretion.

In addition to the Royalties specified above, a further Royalty of US$15 shall be payable to EMS upon the commercial sale or other transfer for value of a UT Handset (but, **NOT** a Core Module). The Royalties due to EMS shall cease upon payment of US$5,000,000 in aggregate Royalty payments. Furthermore, no Royalties shall be due to EMS on any units sold for GSPS programme or product development purposes, including alpha/beta test units or any units purchased by Inmarsat and/or its channel partners for marketing purposes.

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ANNEX J - WARRANTY SUPPORT

1.0 *SERVICES*

1.1 Direct product support services shall be provided to Inmarsat on UT Handset and UT Core Module product issues that could, for example, be impacting service or product integrity in which Inmarsat's direct involvement in the troubleshooting is required for its full resolution. The need for such direct product support relationship may arise when Inmarsat becomes aware through our direct monitoring of the operation of the services, through feedback from our service and product partners that there is a service issue that could be attributed the UTH or CM design or there is a product issue that requires Inmarsat's direct involvement for a satisfactory and timely resolution. Such issues may be identified during the system trial period following Phase 1 CSI and Final Acceptance, or at any time within the Warranty period.

Third level product support services shall be provided to Inmarsat's selected global exclusive distribution partner for the UT Handset, and direct product support, in the same fashion as applicable to Inmarsat, shall be provided to the Contract Equipment Manufacturer (CEM) and Inmarsat appointed VAMs.

1.2 Direct and third-level product design warranty support services, to be provided by the Contractor, shall comprise the following

a) Investigation of problem reports from Inmarsat, CEM or VAMs related to the UT Handset or UT Core Module functionality, to identify any non-compliance of the UT Handset Reference Design and/or the UT Core Module Reference Design with the UT Handset Specification;

b) Implementation of software, firmware and/or hardware design changes necessary to rectify design defects so identified.

c) Issuance of an Engineering Change Notice (ECN) to the UT Core Module Reference Design and/or the UT Handset Reference Designs, to the CEM and Value Added Manufacturers (VAM) (as applicable) to implement requisite design changes.

1.3 Problem reports shall be sent to the Contractor, in accordance with the Contractor's standard problem reporting system.

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3.0 SUPPORT SCHEDULE

Support Hours Bangalore, India	Type of Support	Means
Standard Business Hours: 8:30 a.m. to 5:00 p.m. Monday through Friday, excluding India or State Statutory Holidays or their replacement days should any holiday fall on a weekend.	(a) (b) Standard Support	Telephone Support, Email
Outside Standard Business Hours	(c) Standard Support Delivered Next Business Day	Telephone Support, Email

During Standard Business Hours other than the last hour thereof, Inmarsat, CEM or VAM will be contacted by the Contractor's support personnel on the same business day. If a Support call is placed outside Standard Business Hours, the Contractor's specialist personnel will contact Inmarsat promptly on the next business day. The Contractor shall use reasonable efforts to correct notified defects as soon as possible and shall keep Inmarsat informed of progress towards correction of the defect.

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ANNEX K – THIRD PARTY IPR LICENCES

This Annex K contains a list of Third Party IPR Licences granted to EMS in respect of the GSPS UT Handset Development Programme. They are to be assigned, or the rights are to be sub-licensed or otherwise transferred to the Contractor on the terms set forth in Article 37.

GSPS - Terminal Device - IP status	
Licensed Software	IP Ownership
1. Arial Font used in the SAF	Ascender Corporation
2. BT	CSR
3. GPS	Trimble
4. USB	MCCI
5. SyncML and OBEX	iAnywhere
6. AMX	Kadak
7. WASP	MediaTek
8. Mediatek GSM/GPRS Baseband - PHY, L1C, WIOS, Cryptography Engine, FR and EFR Codecs	MediaTek
9. AMBE +2 Vocoder	DVSI
10. Echo Canceller	Vocal
11. Mediatek DSP side software - VDK, AOS, drivers	MediaTek
12. Mediatek Tools - ATEC, GSM Calibration tool, AOS Simulator, test harness, etc.,	MediaTek
13. LeMans Baseband (details about the base band and the Anvil platform)	MediaTek

* All Mediatek software listed above is licensed pursuant to the umbrella Mediatek Licence

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ANNEX L – Termination For Convenience Profile

Termination for Convenience - occurrence point	Amount (United States Dollars)
Between EDC and M1	$ 700,000
Between M1 and M2	$ 700,000
Between M2 and M3	$ 1,100,000
Between M3 and M4	$ 1,000,000
Between M 4 and 12B	$ 1,000,000
Between M12B and M6	$ 925,000
Between M6 and M9	$ 650,000
Between M9 and M13	$ 600,000
Between M13 and M14	$ 600,000