INTERNATIONAL CIVIL AVIATION ORGANIZATION
South American Regional Office

REGIONAL PROJECT RLA/03/901
REDDIG Management System and Satellite Segment Administration

ELEVENTH MEETING OF THE COORDINATION COMMITTEE (RCC/11)

(Lima, Peru, 5 - 6 May 2008)

Agenda
Item 2: Report of 2007 Activities

REPORT OF RELEVANT ACTIVITIES CARRIED OUT UP TO DATE SINCE THE LAST MEETING OF THE COORDINATION COMMITTEE

(Presented by the Secretariat)

Summary

This working paper presents information related to the activities carried out by the Project since the last meeting of the REDDIG coordination committee, carried out on 5-7 March 2007, up to date.

1. Background

1.1 The principal activities agreed upon during the last meeting of the Coordination Committee (RCC/10, 5 - 6 March 2007), to be included in the 2007 Work Plan, additionally to those of operation, support and maintenance provided to the network, are the following: operation of the network NCC, training programme, implementation of the MEVA II/REDDIG interconnection, Linkway system hardware/software improvement and future administration of the REDDIG. Logistic operations and spare parts administration issue is also included.

2. Description

Network NCC operation

2.1 REDDIG Administration continues managing the network from Manaus NCC, providing aeronautical telecommunications services through the REDDIG under highest quality and availability standards.

2.2 In RCC/10 Meeting it was agreed that, with the purpose that Ezeiza NCC be prepared to assume REDDIG operations in case necessary, the REDDIG Administrator be transferred to Ezeiza during the periods in which the NCC operation was transferred to Ezeiza, in order to provide on-the-job training to

technical personnel in Ezeiza. In this regard, during the period 1/17 November 2007, NCC operation was transferred temporarily to Ezeiza, jointly with the REDDIG Administrator, initiating in this way the operational training to Ezeiza technical personnel. During referred period, NCC operation was carried out in a normal way.

2.3 The REDDIG Administration recommends to continue during the present year with the alternancy between the NCC, including the on-the-job operational training for technical personnel assigned to Ezeiza NCC in order to have operational redundancy with both of the REDDIG NCC.

2.4 Regarding the evaluation of technical personnel, NCC Operators, in terms of the progress obtained up to December 2007 in agreement with the *REDDIG Operation and Maintenance from the NCC* training programme, following are the results:

Personal assigned to Manaus NCC:	Intermediate Average Level
Personal assigned to Ezeiza NCC:	Basic Average Level

2.5 It is important to point out the excellent disposition and best of intentions to carry out their respective responsibilities, as well as the high collaborative spirit, demonstrated by the technical personnel of both NCC.

2.6 With respect to the hiring of network specialized support technician, the Administration of Project RLA/03/901, giving follow up to conclusion RCC 10/04, completed the process which is described below:

a) Publication of convening ad published in the newspaper that has widest circulation in Manaus. **Appendix A** (29 April 2007)
b) First selection of documents and sending of ICAO application form (Personal History Statement) to selected candidates. (31 May 2007)
c) Personal interview and evaluation in Manaus to short-list of five candidates. (25 and 26 June 2007)
d) Selection of the candidate to the post who showed the closest profile to the one established for the network specialized support. (28 June 2007)
e) Request to ICAO TCB in Montreal to carry out regular administrative procedures for the hiring of selected personnel. (3 July 2007)

2.7 Before that the administrative process was concluded, the selected candidate informed to the REDDIG Administration that he was no longer available for the post. In this regard, REDDIG Administration considered that, for the time being, the network specialized support will be hired on a temporary basis, to attend specific needs when this specialized support is required.

Training programme

2.8 During the RCC/10 Meeting, the course on IP technology and its use in aeronautical applications was approved, which was successfully held in the facilities of the Aeronautical Studies Centre (Centro de Estudios Aeronáuticos-CEA) of the Civil Aviation Authority in Bogotá, Colombia, from 26 to 30 November 2007. History and agenda of the course are being presented in **Appendix B** to this working paper.

2.9 Also, delegates of RCC/10 Meeting agreed to prepare an integral training plan for technical personnel of all the REDDIG nodes, and an Ad-hoc group was created for this purpose. Within this context, the REDDIG Administration presented the competence-level objective required for the technical

personnel of the REDDIG nodes and prepared a technical survey that was distributed to all member States (17 May 2007) in order to obtain information concerning the present training level of REDDIG nodes technical personnel, and, based on this, an integral training plan would be prepared. The competence level required as well as the technical survey are being presented in **Appendix C** to this working paper. Based on this survey, the training plan being presented in **Appendix D** to this working paper was prepared.

Implementation of MEVA II / REDDIG interconnection

2.10 Following RCC/10 Meeting, the Fourth MEVA II/REDDIG Coordination Meeting was held (MR/4, 7 – 9 March 2007, Lima). Additional aspects on the implementation of the MEVA II/REDDIG interconnection will be presented in WP/04. In this meeting, communications requirements to be implemented through the interconnection of the MEVA II/REDDIG networks were reviewed and updated, as well as the necessary additional equipment to be installed in the nodes matter of this interconnection. Also, technical aspects that should be attended for the implementation of the interconnection were discussed.

2.11 The MR/4 Meeting agreed to elaborate a Proposal Request (RFP) for the MEVA II/REDDIG interconnection, and entrusted the Task Force with the responsibility of finishing the RFP elaboration, establishing that the MEVA II service supplier, AGS, and the REDDIG Administration present their respective proposals to the RFP for 16 July 2007. Also, MR/4 Meeting agreed to adopt the Memorandum of Understanding (MoU) revised by the Meeting, as well as the Action Plan prepared for the network interconnection implementation.

2.12 The REDDIG Administration prepared and presented a response to the RFP on the established deadline, regarding the supply of services and the provision of equipment required for the MEVA II/REDDIG interconnection.

2.13 During the third meeting of the Task Force, carried out on 2 October 2007 in Mexico City, the response of the RFP by the MEVA II service supplier, AGS, and of the REDDIG Administration were reviewed, and technical remarks were made to AGS proposal. Also, details of costs of respective economical proposals were requested to the two bidders.

2.14 The Fifth MEVA II/REDDIG Coordination Meeting was held following the third meeting of the Task Force, (MR/5, 3 - 5 October 2007, Mexico City). The response of the RFP by MEVA II service supplier and REDDIG Administration were also presented to this meeting.

2.15 The MR/5 Meeting, based in the analysis of technical and economical considerations of responses received by the RFP, reviewed the responses of the RFP to the MEVA II service supplier and the REDDIG Administration. In this regard, the Meeting considered that the answers did not contained all the required information and urged the MEVA II service supplier to revise its answer to the RFP based on remarks presented during the Meeting, with deadline 19 October 2007. In the same way, the REDDIG Administration received information on some remarks on its answer, which were explained and delivered during the Meeting. AGS new answer was presented in November 2007. The Meeting also mentioned the corresponding considerations in case REDDIG Administration purchase the respective equipment on own account, and made the recommendation on the need to establish a contingency satellite plan coordinated by MEVA II/REDDIG.

2.16 Also, MR/5 Meeting having in consideration MoU amendment proposal agreed to adopt the revised MoU in view that it maintained the basic technical-administrative content of the initial version without modifying the essential aspects, as well as to urge the Administrations member of the MEVA II

and the REDDIG networks to adopt this last revision of the MoU. Finally, the Meeting adopted an updated Action Plan for the implementation of the interconnection of the MEVA II/REDDIG, and requested the MEVA II supplier to provide a proposal in the form of a contract between the REDDIG Administration and AGS for the implementation of the MEVA II/REDDIG interconnection. The contract was received in November 2007 and forwarded to Technical Cooperation Bureau in Montreal in December 2007.

Linkway system hardware and software improvement

2.17 In the RCC/9 Meeting, note was taken that the cost of Linkway system hardware and software improvement had a cost of USD 45,530. This quotation was obtained from information provided from suppliers.

2.18 In the RCC/10 Meeting, information that the purchase of corresponding equipment and services would be done during year 2007 once available the network specialized support technician.

2.19 In July 2007 a quotation was requested from ViaSat, Linkway system manufacturer, for the equipment and services involved in hardware and software improvement of the mentioned system. The present quotation of the manufacturer, attached as **Appendix E** to this working paper has a cost of USD119,400. This quotation contemplates a total change of hardware platform and of the operational system, compatible with a Linkway system new software.

2.20 It is worth to mention that the recommendation to carry out the Linkway system hardware and software improvement (satellite network platform) was proposed by the REDDIG Administration as a common used procedure with last technology systems in terms of obsolescence, and not due to a network operational need, which can continue operating and providing services as being done up to date.

2.21 Having in consideration what has been above mentioned, the REDDIG Administration recommends to have a provision of funds, in one or two annual periods, until completing the estimated budget for the migration of the Linkway system hardware and software.

Logistic operations and spare parts administration

2.22 Logistic operations, principally originated due to equipment failure, include the shipment of parts and equipment of the REDDIG spare lot from warehouse located in the Lima Regional Office to the nodes, coordinations with factories involved for the repair of equipment, payment of equipment transportation when applicable, payment to factories for the repair of equipment, coordination and support to the States for importing/exporting equipment in the nodes.

2.23 During year 2007 twenty seven logistic operations were carried out, besides from other three originated in 2006. Up to March of the present year, six logistic operations have take place in year 2008.

2.24 Summary of parts and equipment failure statistics:

FRAD – Memotec

(2) Motherboard:	1 SGAS – 1 SVMI
(2) Multi I/O Card:	1 SGAS – 1 SLLP
(3) Power Supply Module:	1 SVMI – 1 SBCT – 1 SYGC
(2) Universal I/O Card:	1 SMPM – 1 SAEZ
(9) Internal Fans:	2 SCEL – 3 SYGC – 1 SMPM – 1 SGAS – 2 SAEZ

MODEM – ViaSat

(7) Linkway 2100: 1 Adm – 2 SKED – 1 SGAS – 2 SYGC – 1 SLLP

SSPA - Paradise Datacom

(4) SSPA: 1 SEGU – 1 SKED – 2 SBMN
(2) External Fans: 2 TTZP

2.25 Since period of time used to complete logistic operations is too long, mainly due to administrative procedures delay in respective States, and, also, having in consideration that REDDIG equipment was manufactured in year 2002 or before, which increases possibilities of failure, REDDIG Administration recommends the States purchase a own lot of spare parts.

2.26 In **Appendix F** to this working paper, year 2007 statistics on the number of principal occurrences in the network Nodes, as well as their distribution according to type of equipment originating the occurrence.

New Channel in the REDDIG

2.27 In order to carry out links and network trials to the AMHS service, FRAD an additional PVC FR circuit has been configured in SAEZ, Argentina, and SGAS, Paraguay, for this service. Trials held in November 2007 between routers of both nodes were satisfactory. In the case of SAEZ, simultaneous PVC FR have been configured toward nodes SPIM-Peru, SLLP-Bolivia and, now, SGAS-Paraguay, using only one physical port to give course to AMHS services (or any other based in IP protocol).

2.28 Regarding aeronautical applications based on IP protocol, it is very important to know the IP addresses allotment that States are doing for the referred new services.

REDDIG future administration

2.29 The REDDIG Administration under project RLA/03/901 is an institutional agreement established by the States and ICAO technical cooperation, while States participating in this network are able to find the definite institutional scheme under which the REDDIG will be administered. This definite scheme is being searched since long time in the light of regional agreements of institutional type, not only to administer installation such as REDDIG but other installations of multinational type, such as CARSAMMA and other emergent ones. In this regard, GREPECAS, through the Institutional Aspects Task Force, has recommended (Con.14/5) that States having the interest consider the use of an administrative document, elaborated by GREPECAS, for the constitution of a regional multinational mechanism (OMR) to consolidate, manage and implement multinational installations/services. During the first week of June 2008, a High Level Group on Institutional Aspects, activated by Civil Aviation Authorities Meetings, will meet in Lima to analyze the referred document and to examine feasibility of te OMR implementation, under an initial technical cooperation scheme. It is expected that as result of this meeting concrete action is agreed to initiate the implementation of the OMR in the SAM region. This Organization will administer the REDDIG in the future under a new International Organization system that would represent the States' interest.

3 Suggested actions

3.1 The Meeting is invited to:

a) take note of information supplied;

b) analyze actions carried out for the network NCC operations described in section 2, paragraphs 2.1 through 2.7, and Appendix A;

c) analyze actions carried out by the ad-hoc group for the elaboration of the integral training plan presented in section 2 from paragraph 2.8 to 2.9 and Appendixes B and C, and examine and complete the plan being presented as Appendix D to this working paper;

d) take note of activities carried out for the implementation of MEVA II/REDDIG interconnection described in section 2, paragraphs 2.10 to 2.16;

e) analyze actions presented regarding Linkway system hardware and software improvement presented in section 2, paragraphs 2.17 to 2.21 and Appendix E, and make recommendations in this respect;

f) analyze logistic operations handled by the REDDIG Administration, presented in section 2, paragraphs 2.22 to 2.26 and Appendix F, and make recommendations in this respect;

g) take note of the implementation of new PVC FR circuit between REDDIG nodes of Ezeiza and Asunción, and inform about the use of IP addresses in aeronautical applications implemented in REDDIG member Status, paragraphs 2.27 and 2.28 of section 2 of this working paper;

h) take note of the actions carried out for the future administration of the REDDIG, paragraph 2.29 of section 2 of this working paper;

i) analyze any other consideration related to the activities of REDDIG Project RLA/03/901 for year 2007 that the Meeting deems necessary.

****

RLA/03/901 Technical Cooperation Project

The International Civil Aviation Organization (ICAO) Regional Technical Cooperation Project RLA/03/901 requires the services of an electronic engineer or systems/computing technician, with specialization in communications with intermediate level of English and Spanish languages knowledge, with minimum 4 years of experience in configuring routers, multiplexers or similar; use and development of IP-based applications; use of support tools and software; and satellite-based communications. The post will be based in the city of Manaus-Amazonas.

Required technical abilities

- Advanced knowledge on data transmissions and voice communications (analogical and digital)
- Advanced knowledge on IP and FR protocols
- Advanced knowledge on networks (LAN, WAN, VPN)
- Advanced knowledge on UNIX OS
- Advanced knowledge on Database
- Basic knowledge on satellite communications
- Domain on Windows OS and MS Office applications at user level

Interested persons should send their professional data sheet through email to tc_vacancy_posts@lima.icao.int, requesting the application form corresponding to **NCC-SER NETWORK SPECIALIZED SUPPORT**. This form will be sent to applicants fulfilling requirements, and should be completed and sent by mail only, not later than 15 May 2007, to Apartado Postal 4127, Lima 100, Peru, indicating in the envelop the same post reference.

Course on IP Aeronautical Applications

History of the Course

1. Place and duration

The course on IP Aeronautical Applications was held in the facilities of the Civil Aviation Aeronautical Studies Centre (Centro de Estudios Aeronáuticos--CEA) in Bogotá, Colombia, from 26 to 30 November 2007.

2. Opening ceremony

Mr. José Fermín Niño Galeano, Telecommunications Director of the Civil Aviation Specialized Administrative Unit of Colombia (UAEAC), welcome the participants of this course, emphasizing the importance of updating knowledge in technologies applied to aviation.

3. Instructors

The course was dictated by Mr. Elkin Benavides and Mr. Jimmy Romero from the Civil Aeronautic of Colombia with the collaboration of Mr. Luis Alejos, REDDIG Administrator. Likewise, Mr. Cristian Javier Vittor from Argentina presented the experience of the AMHS system implementation in Argentina.

4. Languages used in the course

The course languages were Spanish and English, with simultaneous interpretation.

5. Course content

At the end of the course a CD of 687 MB was handed to each State, containing presentations and lab practices of developed issues, as well as complementary technical information such as applications protocols, specialized software, IP enrouting simulators and others.

6. Participants

The course conted with the participation of 25 delegates pertaining to the following Status: Argentina, Bolivia, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad & Tobago and Uruguay.

Course Agenda

DAY / TIME	ITEM
Day 1 – 26 November 2007 (9:30 – 17:00)	
9:30 AM – 10:30 AM	Registry of participants, reception and general presentation of the instructors, course and trainees. Participants expectative.
10:45 AM – 12:30 PM	Introduction - Networking basic concepts - OSI reference model - Communications protocols architecture - TCP/IP model and architecture
12:30 PM – 2:00 PM	Lunch
2:00 PM – 3:30 PM	Physical layer protocols - Types of transmission media - Cables specification - Connectors and cables types - TIA/EIA protocols - Direct cable – crossed cable – rollover - Optical fibre, radio links. - LAN and WAN protocols
3:45 PM – 5:00 PM	Laboratory introductions - General sample of tools to be used - Description of programmes and scopes - First laboratory interactions - Useful Windows commands – cmd, ping, tracert, telnet, dxdiag, ipconfig, ftp, route add. - Practice No. 1 – physical means
Day 2 – 27 November 2007 (9:30 – 17:00)	
8:00 AM – 9:45 AM	Link layer protocols - General description of WAN protocols: HDLC, X.25, Frame Relay, etc. - General description of LAN protocols: CSMA/CD, LAPB, LAPD, LLC, etc. - IEEE 802.XX family - MAC address
10:00 AM – 11:45 AM	Link layer laboratory - The switch - Switches basic considerations - MAC address - Behaviour of local network packages - ARP protocol - VLAN configuration

DAY / TIME	ITEM
11:45 AM – 1:30 PM	Lunch
1:30 PM – 3:00 PM	Network layer protocols (IP) - Basic concepts - Network layer protocols fields - IP concepts - Network and host addressing - IP Addressing – structure
3:15 PM – 5:00 PM	Basic network layer laboratory - Router concept - Router basic configuration - Networks interconnection
Day 3 – 28 November 2007 (9:30 – 17:00)	
8:00 AM – 9:45 AM	Network layer protocols (IP) - IP addresses classes - Network subdivision - IP addresses – masks exercises - IPV4 vs IPV6 - Routing basic concepts
10:00 AM – 11:45 AM	Routing laboratory - Static Routing - Dynamic Routing
11:45 AM – 1:30 PM	Lunch
1:30 PM – 3:00 PM	Transportation layer protocols - Flux control - Connection establishment - Three tracks signal interchange - Sliding basic window - TCP protocol structure - UDP protocol structure - Winsok functions - Programme design client-server
3:15 PM – 5:00 PM	Transportation layer laboratory - TCP / UDP plot analysis - Ports view Datagrams enrooting
Day 4 – 29 November 2007 (9:30 – 17:00)	
8:00 AM – 9:45 AM	Upper layer protocols - General description of DNS, FTP, http, SMTP, SNMP, Telnet standard protocols
10:00 AM – 11:45 AM	VoIP upper layers protocols - Telephony basic concepts (FXS, FXO, E&M) - VoIP basic concepts
11:45 AM – 1:30 PM	Lunch
1:30 PM – 3:00 PM	- Laboratory and voice concept on IP
3:15 PM – 5:00 PM	- Laboratory and voice concept on IP

DAY / TIME	ISSUE
Day 5 – 30 November 2007 (9:30 – 14:00)	
8:00 AM – 9:45 AM	ASTERISK upper layers protocols - ASTERISK protocol definition - Protocol structure - Protocol uses
10:00 AM – 11:45 AM	Upper layer protocols: AMHS - Basic concepts of messaging systems - AMHS basic concepts - ITU-400 and ITU-500 protocol
11:45 AM – 1:30 PM	Lunch
1:30 PM – 3:15 PM	Practical cases analysis within a complete architecture.
3:30 PM – 4:00 PM	Course closure

APÉNDICE C

COMPETENCE OF A REDDIG NODE TECHNICIAN

1. Definition

Technical competence is a required knowledge on Technologies and systems to attend and maintain in operation the REDDIG Node and aeronautical communications services processed through it.

2. Technical Competence Areas:

a) Data Transmission and Communicationss Networks
b) Via Satellite Communications
c) REDDIG System

3. Solid Technical Knowledge on:

a) Data Transmission

a.1) OSI Model
a.2) Standards and Interfaces
a.3) Multiplexation
a.4) LAN Networks
a.5) Frame Relay
a.6) Networks Interconnection Devices
a.7) TCP/IP Protocols
a.8) IP Aeronautical Applications

b) Via Satellite Communications

b.1) Satellites – Fundaments and Parameters
b.2) Multiple Access and Allotment
b.3) Land Stations and its Components
b.4) REDDIG Stations
b.5) Service Quality (QoS)

c) REDDIG System

c.1) Theory and Operation Mode
c.2) NCC/NMS
c.3) REDDIG Station
- Indoor Equipment
- Outdoor Equipment
c.4) Station Operation
c.5) Diagnosis and Faults Resolution
c.6) Station Maintenance

4. Complementary Competences (recommended)

a) Domain at user level of Windows operative system and MS Office programmes
b) Intermediate level of English language (for non-native persons in English language)

TECHNICAL SURVEY

A. Objective

Obtain information concerning present training level of technical personnel of all the REDDIG Nodes and, based on this, prepare an integral training plan that would be developed in three stages according to actual knowledge level on the matters indicated in the questionnaire.

B. Instructions to complete the survey

- At the end of each **Chapter** three selection options will be found (A, B and C), mark only one, the one that better represents the present knowledge average level.
- Each one of the options means the following

  A : Basic knowledge or general information fundaments.
  B : Intermediate knowledge on the matter
  C : Solid knowledge or domain on the matter

Data Transmission and Communication Networks

Chapter I

1. Communications systems generalities

a. Data transmission
b. Networks and their criteria
c. Protocols and Standards

A B C

2. Basic Concepts

a. Link configuration
b. Topology
c. Transmission Mode
d. Network Classes
e. Communication between networks

A B C

3. OSI Model

a. Architecture and model levels
b. Functions and interconnection levels

A B C

4. Signals, Coding and Modulation

a. Digital signals
b. Digital to digital conversion
c. Analogical to digital conversion
d. Digital to analogical conversion
e. Analogical to analogical conversion

A B C

5. Data transmission interfaces

A B C

6. Data transmission media

a. Guided media (Plait pair cable, coax cable, wave guide and optical fibre)
b. Non-guided media (radio frequency and propagation, microwaves, via satellite))
c. Transmission deterioration
d. Media comparison

A B C

7. Multiplexation

a. Frequency division (FDM)
b. Time division (TDM)
c. Applications and ranks

A B C

8. Correction of errors and link control

a. Error types
b. Detection and correction of errors
c. Flux control
d. Error control

A B C

9. Data Link Protocols

a. Asynchronical and Synchronic Protocols
b. Character-oriented protocols
c. Bit-oriented protocols (HDLC)

A B C

10. LAN Networks

a. Architecture types
b. Access methods
c. 802 project and standards
d. Network comparison

A B C

11. Commuting

a. Circuit commuting
b. Packages commuting
c. Messages commuting

A B C

12. Telephone network applications

a. PPP protocol
b. ISDN service

A B C

13. Frame Relay (Plot retransmission)

a. Operation
b. Congestion levels and control
c. Traffic control
d. REDDIG applications and use

A B C

14. Network devices and networks interconnection

a. Repeaters
b. Bridges
c. Routers and algorithms
d. Protocols converter (Gateways)

A B C

15. TCP/IP protocols set

a. TCP/IP – Internet – OSI
b. Network level – IP Protocol
c. Addressing and sub-networks
d. Other protocols at network level
e. Transportation level
f. Client - server model
g. TELNET, FTP, SMTP, SNMP client – server applications
h. Routers programming
i. REDDIG applications and uses

A B C

16. IP aeronautical applications

a. AMHS
b. Radar data exchange
c. GNSS
d. CNS/ATM applications integration

A B C

Via Satellite Communications

Chapter II

17. Satellites

a. Fundaments
b. Orbits
c. Geostationary satellites – Parameters
d. Radiation pattern
e. Frequency bands and services

A B C

18. Types of Multiple Access

a. By frequency division (FDMA)
b. By time division (TDMA)
   REDDIG application
c. By code division (CDMA)

A B C

19. Allotment types

a. Permanent (PAMA)
b. By demand (DAMA)
c. REDDIG application

A B C

20. Land Stations

a. Antennas (Teleports, VSAT)
b. Power amplifiers (HPA, SSPA)
c. Conversers - increase (BUC) and decrease (LNB)
d. Modulators/Demodulators (MODEM)
e. Base band (MULTIPLEXORS) and User Interfaces
f. Monitoring and Control (M&C)
g. Energy system
h. Land system
i. REDDIG station

A B C

21. Design model

a. Parameters and equations
b. Link Budget
c. Technical performance
d. Service Quality (QoS)

A B C

REDDIG Digital Network

Chapter III

22. Network description

a. Services
b. Operation theory
c. Operation mode
    Topology
    Frequencies Plan
    Communications Sub-network (FR-based)
    Monitoring and control Sub-network (IP-based)
d. Management Control Centre (NCC/NMS)
e. REDDIG Stations

A B C

23. NCC/NMS

a. Linkway System Generalities and functions
b. Commands mainly used
c. Stations Remote Monitoring and Control (M&C)

A B C

24. REDDIG Station

a. Equipment rack
b. Indoors equipment (IDU)
    Linux PC
    Voice and data Interfaces
    Base band commuter
    Memotec FRAD (also as dedicated course)
    Linkway 2100 MODEM (also as dedicated course)
c. Outdoor equipment (ODU)
    Antenna 3.7M
    Paradise Datacom SSPA
    LNB
    Wave guide commuters
    Interconnection cables

A B C

25. Station Operation

a. Local Monitoring and Control (M&C)
    Control cabling
b. Station “Status” Page
c. Control pages: SSPA, Chain and Redundancy
d. PC Linux: Commands and direct access
e. Minicom Programme vía PC Linux and console port
    FRAD
    MODEM
f. TELNET, FTP applications use
g. Support Software: CxAccess, CxTool

h. PROC-FRD procedures
i. PROC-MOD procedures
k. PROC-SSP procedures

A B C

26. Fault diagnosis

a. Actions and procedures
b. Simulations

A B C

27. Station Maintenance

a. AC power feeding system
b. Land system
c. IDU y ODU equipment cleaning plan

A B C

APPENDIX D

INTEGRAL TRAINING PLAN PROGRAMME

COURSE I July / October 2008

REDDIG Digital Network

1.1 Network description

a. Services
b. Operation theory
c. Operation mode
    Topology
    Frequencies Plan
    Communications sub-network (FR-based)
    Monitoring and control sub/network (IP-based)
d. Management and Control Centre (NCC/NMS)
e. REDDIG stations

1.2 REDDIG station

a. Equipment rack
b. Indoors equipment (IDU)
    Linux PC
        - Hardware
        - Software
    Voice and data interfaces
    Band base commuter
    Memotec FRAD
        - Hardware: MPS/MUX; Cards
        - Software
    Linkway 2100 MODEM
        - Hardware: MODEM Modules, FR, IP
        - Software
c. Outdoor equipment (ODU)
    Antenna 3.7M
    Paradise Datacom SSPA
        - M&C Software
    LNB
    Wave guide commuters
        - Interconnection cables

1.3 Station maintenance

a. AC power feeding system
b. Earth system
c. IDU and ODU equipment clearing plan

INTEGRAL TRAINING PLAN PROGRAMME

COURSE II July 2009

REDDIG station operation

2.1 NCC/NMS

a. Linkway system generalities and functions
b. Commands principally used
c. Stations remote monitoring and control (M&C)

2.2 Station operation

a. Local monitoring and control (M&C)
   - Control cabling
b. Station "Status" page
c. Control pages:
   - SSPA, Chain and Redundancy
d. Linux PC :
   - Direct access command
e. Minicom programme via Linux PC and console port
   FRAD
   MODEM
f. TELNET, FTP applications use
g. CxAccess, CxTool support software
h. PROC-FRD procedures
i. PROC-MOD procedures
k. PROC-SSP procedures

2.3 Fault diagnosis

a. Procedures and actions
b. Simulations

INTEGRAL TRAINING PLAN PROGRAMME

COURSE III October 2009

Via Satellite Communications

3.1 Satellites

a. Fundaments
b. Orbits
c. Geostationary satellites – Parameters
d. Radiation pattern
e. Frequency and service bands

3.2 Earth stations

a. Antennas (Teleports, VSAT)
b. Power amplifiers (HPA, SSPA)
c. Converters - increase (BUC) and decrease (LNB)
d. Modulators/Demodulators (MODEM)
e. Base band (MULTIPLEXORS) and user interfaces
f. Monitoring and control (M&C)
g. Power system
h. Earth system
i. REDDIG station

3.3 Types of multiple access

a. By frequency division (FDMA)
b. By time division (TDMA) – REDDIG application
c. By code division (CDMA)

3.4 Types of allotment

a. Permanent (PAMA)
b. By demand (DAMA) – REDDIG application

3.5 Design model

a. Parameters and equations
b. Link Budget
c. Technical performance
d. Service Quality (QoS)

INTEGRAL TRAINING PLAN PROGRAMME

COURSE IV July 2010

Data transmission

4.1 Communications systems generalities

a. Data transmission
b. Networks and their criteria
c. Protocols and standards

4.2 Basic concepts

a. Link configuration
b. Topology
c. Transmission mode
d. Network classes

4.3 OSI Mode

a. Architecture and model levels
b. Functions and levels interconnection

4.4 Signals, Coding and Modulation

a. Digital signals
b. Digital to digital conversion
c. Analogical to digital conversion
d. Digital to analogical conversion
e. Analogical to analogical conversion

4.5 Data transmission interfaces

4.6 Data transmission media

a. Guided media (Plaited pair cable, coax cable, wave guide and optical fibre)
b. Non-guided media (radio frequency and propagation, microwaves, via satellite)
c. Transmission deterioration
d. Media comparison

4.7 Multiplexation

a. Frequency division (FDM)
b. Time division (TDM)
c. Applications and ranks

4.8 Error correction and link control

a. Type of errors
b. Detection and error correction
c. Flux control
d. Error control

4.9 Data link protocols

a. Asynchronical and synchronic protocols
b. Character-oriented protocols
c. Bit-oriented protocols (HDLC)

INTEGRAL TRAINING PLAN PROGRAMME

COURSE V October 2010

Communication networks and applications

5.1 LAN networks

a. Architecture types
b. Access methods
c. 802 Project and standards
d. Network comparison

5.2 Commuting

a. Circuits commuting
b. Packages commuting
c. Messages commuting

5.3 Telephone network applications

a. PPP protocol
b. ISDN service

5.4 Frame Relay (Plot retransmission)

a. Operation
b. Levels and congestion control
c. Traffic control
d. REDDIG applications and use

5.5 Network devices and networks interconnection

a. Repeaters
b. Bridges
c. Routers and algorithm
d. Protocol converters (Gateways)

5.6 TCP/IP Protocols set

a. TCP/IP – Internet – OSI
b. Network level – IP Protocol
c. Addressing and sub-networks
d. Other protocols at network level
e. Transportation level
f. Client – server model
g. Client – server applications: TELNET, FTP, SMTP, SNMP
h. Routers programming
i. REDDIG applications and uses

5.7 IP aeronautical applications

a. AMHS
b. Radar data exchange
c. GNSS
d. CNS/ATM applications integration

8/13/2007 6:55:45 AM

ViaSat Price Quotation

*** Price Quote Subject to ViaSat Standard Terms and Conditions, and Valid Through Oct 28, 2007 ***

Quotation Number: 200800489 Rev 1
Customer Name : **ICAO**
Project Name : **Linkway Upgrade**
Account Manager : **Robert Feierbach**

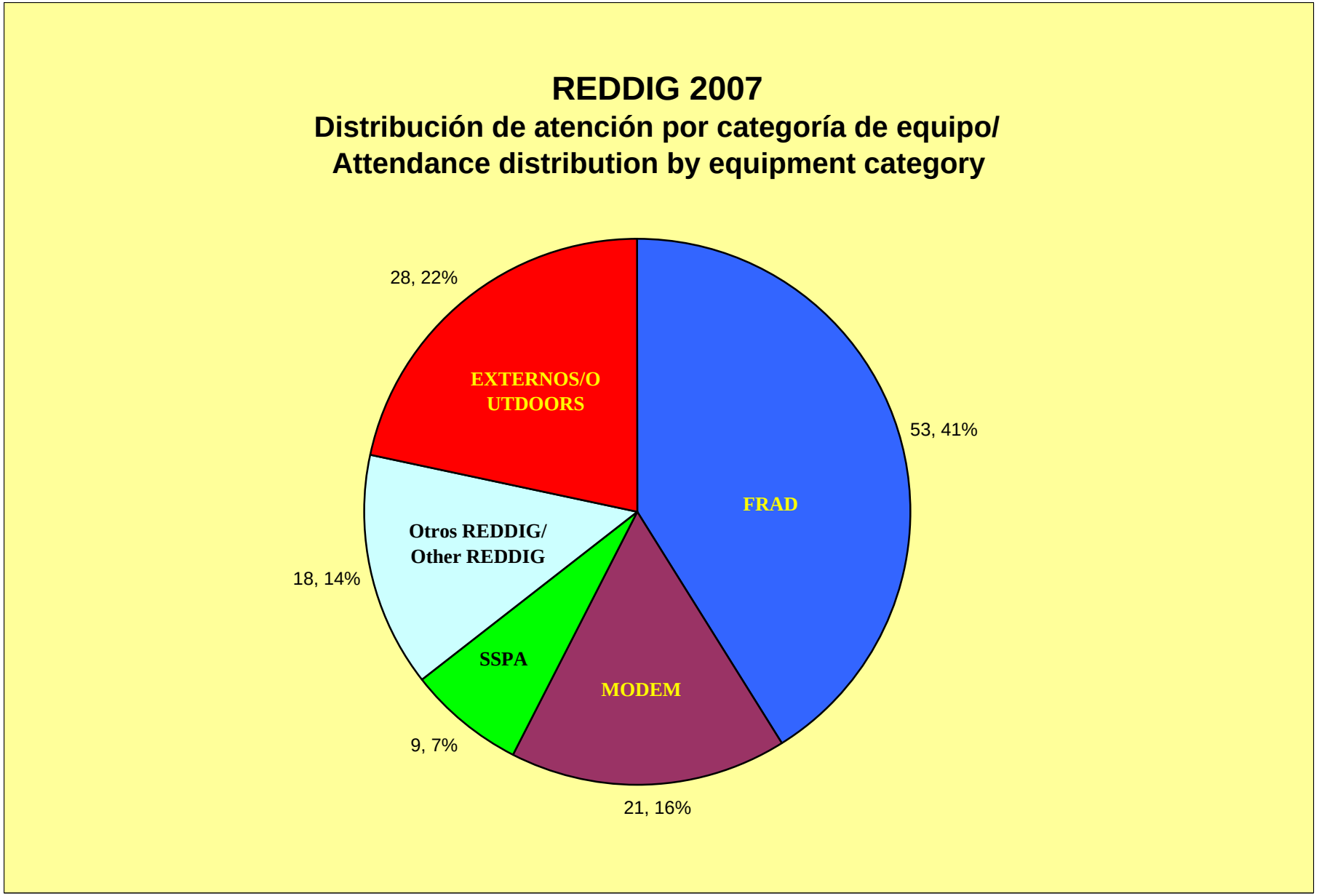
Item Number	Model	Description	Qty/Site	Unit Price	EXW US$ Extended Price
LINKWAY NCC Equipment and Software					
01	LW-NCC-SUN-1U	SUNFire V210, 1U, Video Card, Keyboard & Mouse, 110/220VAC	6		
02	LW-SW-SYS	Linkway NCC/NMS System Software with IP	1		
				Item Price :	**$110,000**
Program Management and Engineering Services					
01	PMSE	System Engineering	1		
02	PMIPIT	In-Plant Integration and Test	1		
03	PMSDM	Standard Documentation & Manuals	1		
04	PMSCEA	Shipping Coordination & Export Administration	1		
05	PMPM	Program Management	1		
06	PMPPL	Program Planning & Logistics	1		
				Item Price :	**$9,400**
				Total System Price :	$119,400

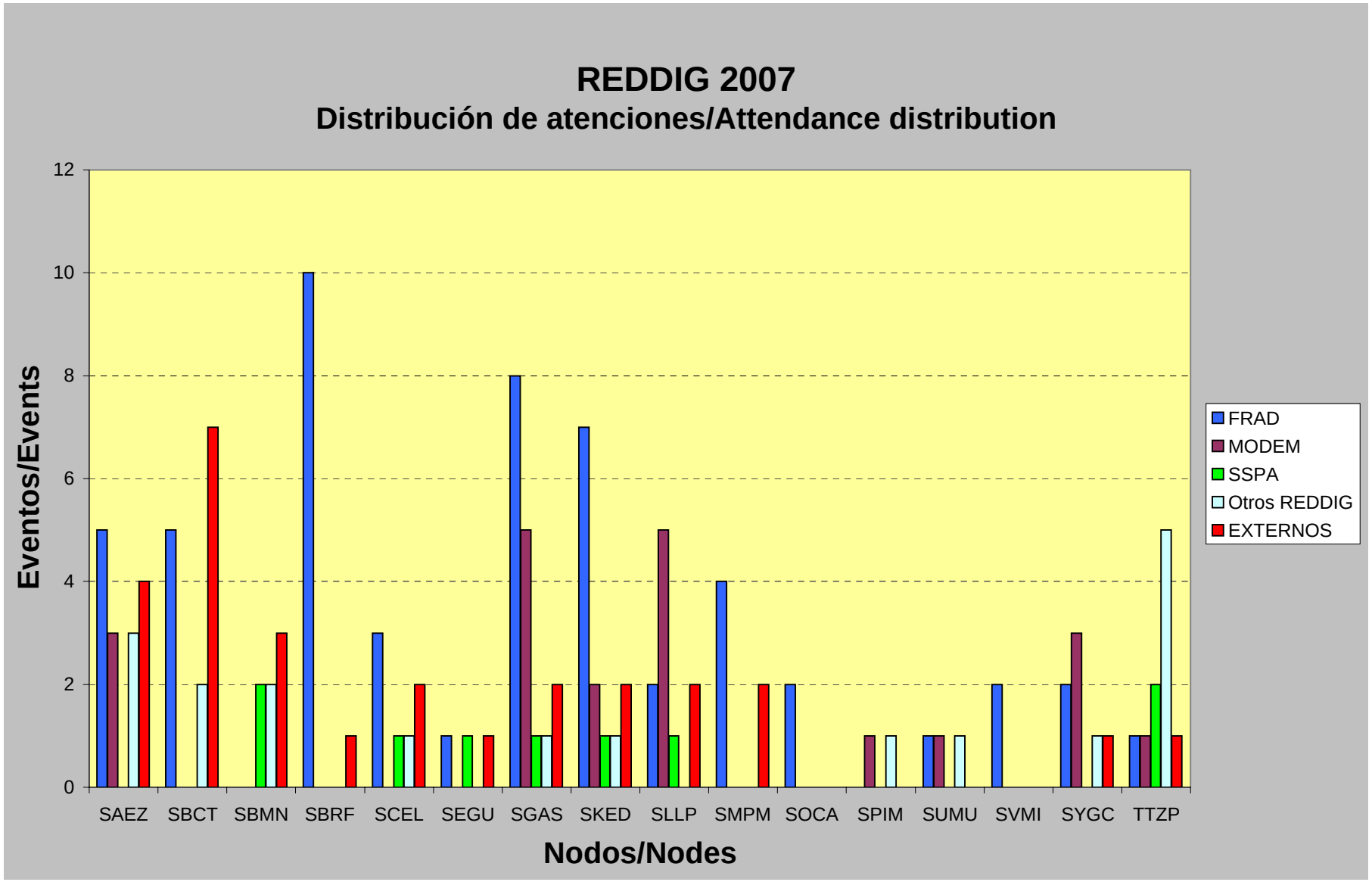
ViaSat Price Quotation

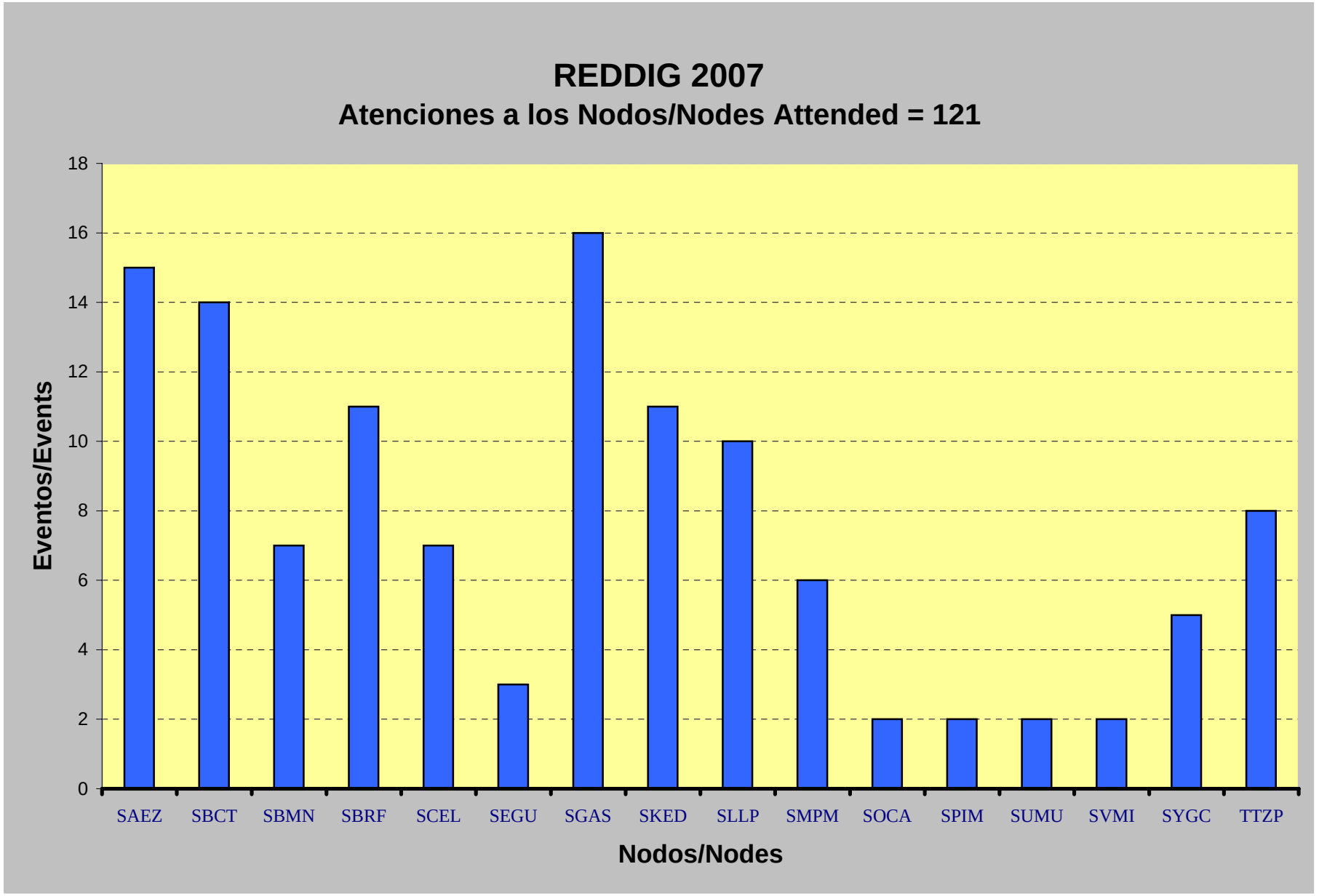
*** Price Quote Subject to ViaSat Standard Terms and Conditions, and Valid Through Oct 28, 2007 ***

Quotation Number: 200800489 Rev 1
Customer Name : **ICAO**
Project Name : **Linkway Upgrade**
Account Manager : **Robert Feierbach**

Item Number	Model	Description	Qty/Site	Unit Price	EXW US$ Extended Price
		Options			
		LINKWAY Installation Support Man-Day Rate			
01	RECOSSE	On-Site System Engineering Man-Day Rate (minimum 3 days, travel and living expense to be billed at actual cost plus 15%)	0	$1,500	


REDDIG 2007
Distribución de atención por categoría de equipo/
Attendance distribution by equipment category
28, 22%
EXTERNOS/O
UTDOORS
53, 41%
FRAD
Otros REDDIG/
Other REDDIG
18, 14%
SSPA
MODEM
9, 7%
21, 16%


REDDIG 2007
Distribución de atenciones/Attendance distribution
Eventos/Events
0
2
4
6
8
10
12
SAEZ
SBCT
SBMN
SBRF
SCEL
SEGU
SGAS
SKED
SLLP
SMPM
SOCA
SPIM
SUMU
SVMI
SYGC
TTZP
Nodos/Nodes
FRAD
MODEM
SSPA
Otros REDDIG
EXTERNOS


REDDIG 2007
Atenciones a los Nodos/Nodes Attended = 121
Eventos/Events
0
2
4
6
8
10
12
14
16
18
SAEZ
SBCT
SBMN
SBRF
SCEL
SEGU
SGAS
SKED
SLLP
SMPM
SOCA
SPIM
SUMU
SVMI
SYGC
TTZP
Nodos/Nodes