

## APPENDIX A

### Amendments to the draft version of the REDDIG Technical specifications document

#### CHAPTER 1 – INTRODUCTION

#### 1.4 Considerations in the design and technical characteristics of the network

1.4.1.1 In this regard, the aeronautical administrations, taking into consideration:

- a) the region's communications development;
- b) the characteristics of the AFS networks in the current and future ICAO regional plans;
- c) the high degree of availability required by the aeronautical communications services;
- d) the "last mile" segment problems;
- e) the need to reduce current communications exploitation costs of rented PTT analog circuits; and;
- f) the need to have operational a network of easy expansion and growth capacity.

agreed to implement the REDDIG in the ICAO SAM Region, which will be composed of intelligent nodes to multiplex and switch voice and data communications with a dynamic bandwidth management. The REDDIG is a digital communications network, which, as a primary means, uses VSAT technology and takes advantage of satellite transmission broadcasting and multicasting. The REDDIG network presents the following characteristics:

- a) a mesh topology, flexible, multiprotocol, multiservice and of wide area network (FWAN);
- b) will be "future proof", and should permit migration to other network technologies;
- c) will be scaleable, of easy expansion and hubless;
- d) will have redundancy and automatic alternate routing in case of failure of the main means;
- e) will be of open architecture based on a Frame Relay or ATM platform permitting the integration of voice and data communications;
- f) will provide support in a cost-efficient manner, and with a high reliability, availability and minimum delay to the aeronautical fixed service (AFS) communications required by the ATM, AIS, COM, MET and SAR units, as well as to for the new GNSS augmentation services, radar data interchange, and administrative and maintenance related communications;
- g) will be designed as a sub-network compatible with the aeronautical telecommunications network (ATN) to permit internetworking services in dissimilar network environments of the future ICAO CNS/ATM systems;
- h) will integrate the domestic network systems developed by SAM States and will facilitate the interconnection with other regional digital networks within the technical agreements that could be adopted in the other network environments in order to execute the appropriate interface.

**1.5 Scope of the project**

1.5.2 The Project takes into consideration the contractor's provision of the following services:

- a) site survey, prior to installation;
- b) engineering and documentation of the system;
- c) civil works;
- d) installation of the equipments at each node site;
- e) interconnection and integration of the equipment' node with the corresponding domestic networks and systems including the backup network;
- f) equipments node testing protocols;
- g) commissioning;
- h) personnel training;
- i) technical warranty and updating of the systems; and
- j) all services that may be necessary to guarantee the correct installation, operation and maintenance of the network.

**CHAPTER 2 - DOCUMENT STRUCTURE AND PROJECT TIMING****2.1 Document structure**

2.1.1 This document is composed by one (1) index, ten (10) chapters and two (3) Appendixes. The chapter are also divided in sections and paragraphs. The Appendixes A & B contain all the necessary data that the tenders will need to carry out the requested design that should be included in the offers to be presented to this bid, and Appendix C includes the acronyms glossary.

**2.1.3 f) Chapter 6 – Provision tests & Cut-over**

The requirements that the contractor must take into account with the equipment test service providers testing and node's cutover; are explained in this chapter. The end of this process will imply the final acceptance certification and the end of the contractor's participation in the project.



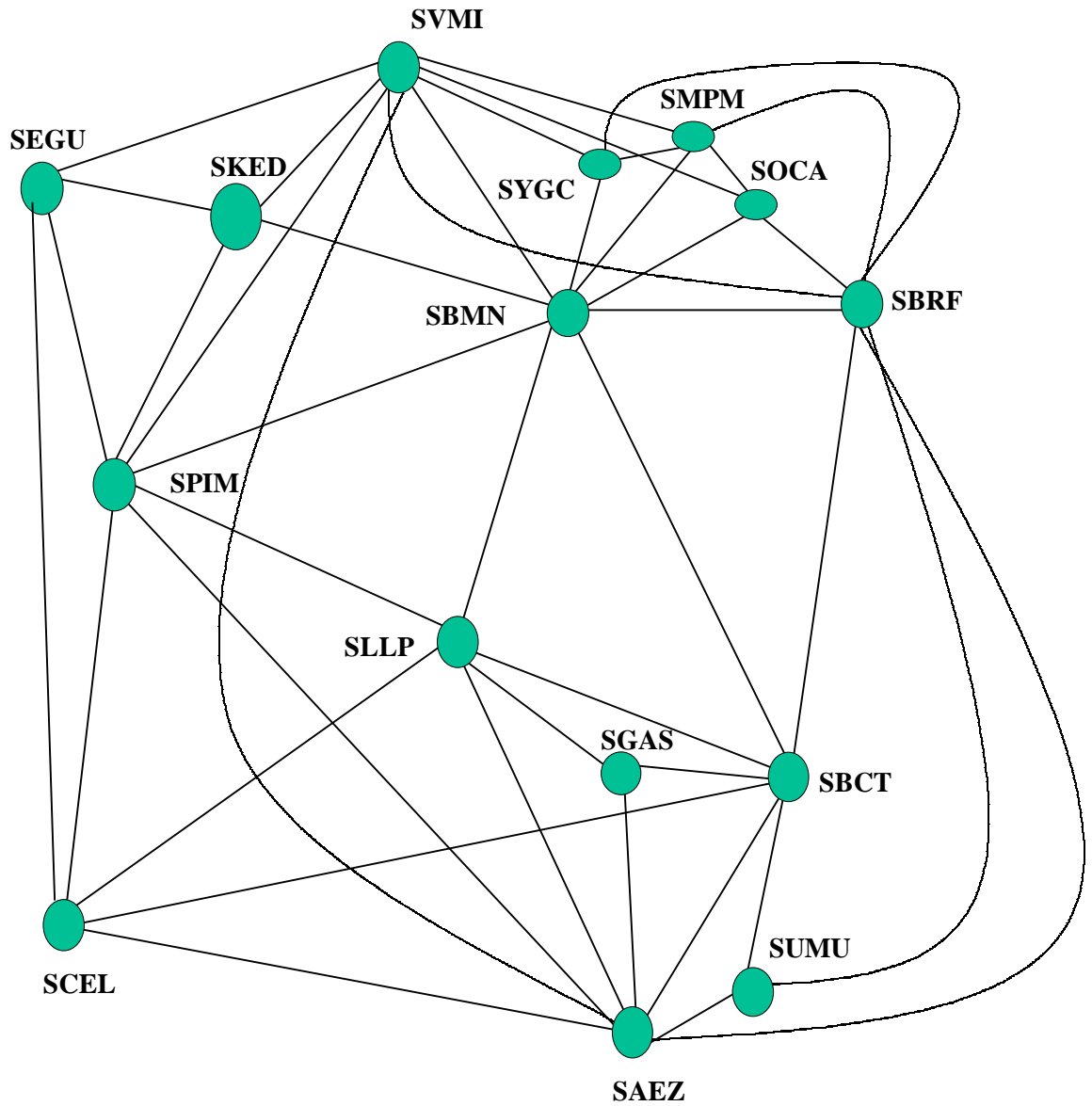
**CHAPTER 3 – REDDIG NETWORK DESIGN****3.1 Earth segment****3.1.1 REDDIG nodes**

3.1.1.2 The States and nodes, with their basic geographical magnitudes, which are included in this tendering process are as follow:

<b>COUNTRY</b>	<b>Node</b>		<b>Latitude</b>	<b>Longitude</b>
<b>Argentina</b>	Ezeiza	SAEZ	34° 49' 25" S	58° 31' 43" W
<b>Bolivia</b>	La Paz	SLLP	16° 30' 22" S	68° 11' 09" W
<b>Brazil</b>	Manaus	SBMN	03° 01' 52" S	60° 02' 29.9" W
	Recife	SBRF	08° 08' 15" S	34° 55' 29" W
	Curitiba	SBCT	25° 24' 06" S	49° 14' 07" W
<b>Chile</b>	Santiago	SCEL	33° 23' 27" S	70° 44' 18" W
<b>Colombia</b>	Bogotá	SKED	04° 42' 05" N	74° 08' 48" W
<b>Ecuador</b>	Guayaquil	SEGU	02° 09' 29" S	79° 53' 02" W
<b>Guyana</b>	Georgetown	SYGC	06° 25' 55" N	58° 15' 14" W
<b>French Guyana</b>	Cayenne	SOCA	04° 49' 11" N	52° 21' 38" W
<b>Paraguay</b>	Asunción	SGAS	25° 14' 24" S	57° 31' 09" W
<b>Peru</b>	Lima	SPIM	12° 01' 27" S	77° 06' 20" W
<b>Surinam</b>	Paramaribo	SMPM	05° 27' 10" N	55° 11' 16" W
<b>Uruguay</b>	Montevideo	SUMU	34° 50' 15" S	56° 01' 49" W
<b>Venezuela</b>	Maiquetía	SVMI	10° 36' 12" N	66° 59' 26" W

3.1.2 **Network topology**

3.1.2.1 The REDDIG digital network is a totally meshed network, which topology is determined by the need of links between its nodes. All REDDIG communication requirements, are described in Appendix A & B of this document. In figure 1.1 the REDDIG topology diagram, which corresponds to the permanent-established requirements is shown below.



**Figure 1.1**  
**REDDIG TOPOLOGY**  
 (permanent-established requirements)

REDDIG Node  
 REDDIG link

3.1.2.3 Later, In chapters 3 and 4 of this document, the necessary interconnection and integrations with the subsystems in each air traffic dependencies that the tendered systems should carry on in each earth station, will be analysed.

### 3.1.3 **Network basic characteristics**

3.1.3.5 At the beginning of the operation, the REDDIG must use as its primary mean to establish the inter-nodal communications a satellite repeater, through a VSAT stations network, (VSAT system), that is part of the provision, and, as way of backup of the earth digital dedicated circuits and ISDN switched connections, which can be established over optic fiber or digital microwaves earth networks. Finally when the earth digital networks will be developed (optic fiber SDH digital microwaves radio) in the region and their operation costs decrease, the REDDIG have plan to use this way as its primary mean, and the VSAT system as backup and for the handling of overload. The amount of earth links for the REDDIG operational final case have to be determined in order that the oral communications requirements of the FASID of the SAM Region Air Navigation Plan, can be established with no more than one transit point in the REDDIG network (No double hops are allowed). Only in exceptional cases just in exceptional cases such as contingency plans or interregional circuits (with other continents), double hops could be permitted.

### 3.1.4 **Types of circuits**

#### 3.1.4.2 **General aspects related with speech communications**

3.1.4.2.4 e) controlled Echo through echo canceller devices (UIT-T G.165 standard) supplied for each VSTN circuit. Each echo canceller device must have available programmable parameters to allow the control of the operation (enable/disable), and the echo round trip time (0 to 50 ms or more);

3.1.4.2.5 l) trunk circuits E1/CAS and T1/CAS emulating in their channels any combination of TS (TS/E1, TS/T1), LU (LU/E1, LU/T1), LS (LS/E1, LS/T1), GS (GS/E1, GS/T1), E&M (E&M/E1, E&M T/1), Phantom (Phantom/E1, Phantom/T1), 64 Kbps trunk with sub multiplexing types 3B+D (ECMA-253) and 6B+D (ECMA-289) with QSIG signalling (QSIG/D64U/LL) and 64 Kbps clear digital dedicated lines (D64U/E1, D64U/T1).

#### 3.1.4.3 **Aeronautical fixed services (AFS) voice communications**

##### 3.1.4.3.1 General aspects

3.4.3.1.1.3 In the Appendix B of this document, the harmonized requirements for each REDDIG node are shown, not only the AFS voice communications but also the traffic details, port numbers, interfaces types, circuit protocols and other complementary data.

## 3.1.4.3.3.5 Dialling plan

3.1.4.3.3.5.3 Each one of the REDDIG nodes must be identified by a three (3) or two (2) digits code, according with the used dialling plan. These codes should not be transmitted unless the communication device provides transit routing. The associated codes of the REDDIG nodes are:

<b>REDDIG Nodes</b>	<b>IDENTIFIER</b>	<b>CODE</b>
Argentina -Ezeiza	(SAEZ)	(7)20
Bolivia -La Paz	(SLLP)	(7)25
Brazil -Curitiba	(SBCT)	(7)30
Brazil- Manaus	(SBMN)	(7)36
Brazil- Recife	(SBRF)	(7)38
Chile- Santiago	(SCEL)	(7)40
Colombia - Bogotá	(SKED)	(7)45
Ecuador - Guayaquil	(SEGU)	(7)50
Guyana - Georgetown	(SYGC)	(7)90
French Guyana - Cayenne	(SOCA)	(7)92
Paraguay - Asunción	(SGAS)	(7)55
Perú - Lima	(SPIM)	(7)60
Suriname - Paramaribo	(SMPM)	(7)94
Uruguay - Montevideo	(SUMU)	(7)65
Venezuela - Maiquetia	(SVMI)	(7)80

3.1.4.4.9.3 Each REDDIG node must be identified by a three (3) and two (2) digit code, according with the numbering plan used. These codes should not be transferred unless the destine communications devices provide the traffic routing. The REDDIG nodes associated codes are as follows:

<b>REDDIG Nodes</b>	<b>IDENTIFIER</b>	<b>CODE</b>
Argentina -Ezeiza	(SAEZ)	(7)20
Bolivia -La Paz	(SLLP)	(7)25
Brazil -Curitiba	(SBCT)	(7)30
Brazil- Manaus	(SBMN)	(7)36
Brazil- Recife	(SBRF)	(7)38
Chile- Santiago	(SCEL)	(7)40
Colombia - Bogotá	(SKED)	(7)45
Ecuador - Guayaquil	(SEGU)	(7)50
Guyana - Georgetown	(SYGC)	(7)90
Fre. Guyana - Cayenne	(SOCA)	(7)92
Paraguay - Asunción	(SGAS)	(7)55
Peru - Lima	(SPIM)	(7)60
Surinam - Paramaribo	(SMPM)	(7)94
Uruguay - Montevideo	(SUMU)	(7)65
Venezuela - Maiquetia	(SVMI)	(7)80

### 3.1.4.6 **Data communications of the aeronautical fixed service (AFS).**

#### 3.1.4.6.1 **General aspects**

3.1.4.6.1.5 e) The interface document control X.25 (ICD X.25) of CAR/SAM regions.

#### 3.1.4.6.2.4 **Switch-to-switch connection**

3.1.4.6.2.4.4 When taking into consideration the implementation of the connection through asynchronous circuits without port to port and without protocol (freewheeling), the FWAN must provide and emulate the physical connection between the two ports to which the AFTN commuters are connected. Each AFTN commuter must be physically connected with a FWAN port that provides FRAD service for asynchronous port.

### 3.1.5 **Fault tolerance and recovery**

#### 3.1.5.1 **General aspects**

3.1.5.1.3 All systems and equipments provided must include a mechanism that automatically allow to find malfunctions; auto reconfigure and restart, in order to keep on giving the services as planned, without operator's intervention. The equipments must be restarted automatically when the following events happen:

- a) hardware and/or software fault;
- b) commissioning (power connection);
- c) return of the electrical power after a back-out;
- d) chart change in hot (hot swap);
- e) operators direct action (reset);

3.1.5.1.4 Under no circumstances the total or partial interruption produced by:

- a) the automatic recover after a fault;
- b) the automatic restart when power is reconnected;
- c) the power return after a fault; and
- d) the restarting by the operator (*reset*).

must engage the air operations security by missing communications for more than **120 seconds**.

#### 3.1.5.4.4 **Duplicated VSAT terminals**

3.1.5.4.4.2 This type of configuration must be implemented as a domestic solution inside a State, or as a solution distributed that involves two REDDIG nodes of different States.

3.1.5.4.4.3 In case of taking this solution, the switching systems of the REDDIG nodes, must be joint by a digital terrestrial dedicated line (optic fiber, digital microwaves) with enough bandwidth to hold the stations traffic.

3.1.5.4.4.4 The tender can develop a solution based in duplicated VSAT terminals as an alternative for the redundant VSAT terminal, in case it is asked for. In this case the proposal must consider the installation costs and the rented lines costs for a five (5) years period. The tenders must take into consideration that the evaluation will consider the REDDIG operation costs during a period of five (5) years.

### 3.1.6 Backup network

3.1.6.4 The following table shows the initial alternate routings of the REDDIG network that has to be programmed. The first column (NODE) indicate the failed REDDIG node, the second column (ALT 1) indicate the preferred routing in case of failure, the 3<sup>rd</sup> (ALT 2) and 4<sup>th</sup> (ALT 3) columns indicates the 2<sup>nd</sup> and 3<sup>rd</sup> routing alternatives.

NODO	ALT 1	ALT 2	ALT 3
SAEZ	SUMU	SLLP	SGAS
SLLP	SCEL	SPIM	SAEZ
SBCT	SBRF	SGAS	SUMU
SBMU	SBRF	SBCT	
SBRF	SBCT	SVMI	
SCEL	SLLP	SPIM	SAEZ
SKED	SEGU	SVMI	SPIM
SEGU	SPIM	SKED	
SYGC	SOCA	SMPM	
SOCA	SBRF	SYGC	SMPM
SGAS	SBCT	SAEZ	
SPIM	SCEL	SLLP	SEGU
SMPM	SOCA	SYGC	
SUMN	SAEZ	SBCT	
SVMI	SKED	SBRF	SEGU

3.1.6.10 It has been foreseen the use of some permanent digital backup circuits between two REDDIG nodes. These dedicated terrestrial lines must be established through features such as digital microwaves and optical fiber. Within this category shall also be considered the circuits used for the duplicated VSAT terminals. (See paragraph 3.1.5.4.3). The REDDIG have to provide redundant ports to make the interconnection. The interface used in the interconnection is node dependent, and must be supported by the standards: V.35, RS 422, and D64U/LL.

3.1.6.11 The communications of the network management system must be supported by a switched telephone line (PSTN) in each node. The REDDIG must include the correspondent modems.

### 3.2 **Space segment**

#### 3.2.1 Basic characteristics

3.2.1.1 It has been foreseen the use of the IS-903 satellite, that will be operational in June 2001, at the 335,5 East orbital position. The satellite beam to use is the west zone beam, with PREMIUM capacity (non interruptible). Eventually, this capacity could be not available whenever the reservation will be made at INTELSAT. This is the reason, why the tender must realise all the link budgets computations for this beam, as well as other, , hemispheric beams of INTELSAT1, that the tenders may consider a good alternative. The theoretical EIRP of the different choices to take into account are shown below:

<b>Satellite</b>	<b>Orbital Pos.</b>	<b>Beam Type</b>	<b>Theoretical e.i.R.p.</b>
INTELSAT IS-903	335,5°E	Zone	37,0 – 45,0 dBW
INTELSAT VIII/IX		Hemi	37,0 – 40,0 dBW

## **CHAPTER 4 – NODES EQUIPMENT DESCRIPTION**

### 4.1 **General aspects**

#### 4.1.2.1 b) VSAT system (VSATS)

- b.1) Antenna subsystem;
- b.2) Radio frequency transceivers (RFU), and;
- b.3) Modulator and demodulator subsystem (MODEM).

### 4.3 **VSAT System (VSATS)**

4.3.1 The VSAT system is aimed at the establishment of a digital international WAN with full voice and data connectivity, using the INTELSAT IS-903 satellite, which will be available in June of 2001, at 335.5 East geostationary orbit position. The tender must make reference to established in paragraph 3.2.1.

### 4.5 **Network and management system (NMS)**

#### 4.5.1 **General considerations**

#### 4.5.3 **NMS Equipment**

- 4.5.3.1 b) Printer:
  - b.1) laser type;
  - b.2) resolution 600 dpi or better;
  - b.3) paper formats: A4, letter, and others; and
  - b.4) 6 PPM minimum printing speed.

#### 4.5.6 **Reports**

4.5.6.3 The reports could be initiated automatically (alarms, routine reports), and by demand. Any action by the NMS administrator that produces any change in any node database will automatically produce the correspondent report.

#### 4.5.10 **Validation**

4.5.10.1 Even though, initially the NMS administrator will act directly over the node systems, without operating in the domestic node, the NMS system may come to a decision on require the validation by the domestic NMS.

### **CHAPTER 5 - INSTALLATION AND STANDARDS**

#### 5.1 **Installation general aspects**

5.1.3 The Tender, since it is a turn-key system, shall include in its proposal all the services (design, installation and testing), equipment and materials (cable trays, antenna & equipments down cabling, clamps, anchors, the seals for the building cable entries, path panels, the connection and cross-connect panels, and the other accessories and necessary materials for the lines and cables installation for the signal, power and protection circuits) necessary to meet the requirements of this chapter. The tender in the elaboration of its proposal shall take into consideration the CAA responsibilities, which are indicated in paragraph 5.11. The Contractor can use the existing services at the installation place only based on the evaluation results during the site survey and with the approval by the Project Office. The Contractor must coordinate the installation tasks with the person in charged in each site by the Project Office.

5.1.14 The installation, testing and supply operation must not degrade the existing services in any way, and in the event of requiring an interruption of the service, this interruption must be reported duly in advance to the Project office, so that it may coordinate with the States in due time.

#### 5.5 **Protection system against lighting discharge**

5.5.4 The resistance of the protection grounding system shall be less than 2.5 ohms. If required in the design and construction of the grounding pit the following should be taken into account:

- a) the natural electrical resistance and the altitude of the terrain;
- b) the advantage of the low resistance stratum and the use of electrodes having the same longitude of the available stratum;
- c) the replacement of the pit terrain by farming land and the use of electrolytic chemical treatment to lower terrain acidity in order to protect the electrodes;
- d) the pits interconnection or the use of copper bands of 50 mmx05 mm grounded 60 cm. deep to obtain the required resistance;
- e) the use of electrodes in the form of electrolytic copper rods of 3/4 x 2.40 m. and copper spiral conductors of 2 AWG;
- f) the pit radius should be not less that 0.50 m. with a adequate deep to install the electrodes;
- g) in case of use of several interconnected pits they should be separated at least by 6.00 m. The interconnection should be made by copper cable of 6 AWG grounded 60 cm. deep; and
- h) the connections to the electrodes should be soldered by CADWELD process.

## 5.11            **CAAs responsibilities**

5.11.1            The CAA must provide an area in a closed place, which will be used as REDDIG equipment room. The high between the floor and de ceiling of this area should be at least 2.6 mts.

5.11.2            Are part of the CAA responsibilities to provide:

- h)        ISDN dedicated lines for the support network as corresponds, for the backup network;

## **CHAPTER 6 - PROVISION TESTS AND CUTOVER**

### 6.1            **General aspects**

6.1.1            The provision test (PS) purposes are to prove that the equipments purchased complies with the specifications detailed in this technical specifications document.

6.1.2            The provision tests (PS) are as follows:

- a)    provisional acceptance tests on site (PAPS) for each node;
- b)    network operation acceptance tests (PAR); and
- c)    final acceptance tests (PAF).

6.1.3            The provision tests (PS) include the following aspects:

- a)    physical inspection of the provision;
- b)    physical verification of the installation;
- c)    technical, and operation tests and network performance; and
- d)    updating and fixing of problems found out during operation.

6.1.4            PAPS Test Verifications must be at the level of equipment, sub-system, system and network, covering the following aspects:

- a)    hardware and software;
- b)    station verification and approval by INTELSAT provider;
- c)    connectivity with the public carrier networks (backup network);
- d)    connectivity with all CAA networks (AFTN, voice channels, data link circuits, administrative networks, etc.);
- e)    NMS; and
- f)    documentation.

6.1.5 The PAPER tests will be performed once PAPS tests are completed satisfactorily in all nodes. The purpose of PAR tests is to verify:

- a) that the complete provision, as a whole, allows for the establishment of the communications and services requested and the handling of the real traffic foreseen, within the performance parameters requested;
- b) the correct operation of the backup network and the NMS;
- c) the operational stability of the network (R&M). This test will start only if the results of the tests under a) and b) have been satisfactory.
- d) The tests indicated in a) and b) will have a duration of four (04) weeks, and the test under c) will last six (6) weeks.

6.1.6 Based on that specified in the previous paragraph, the contractor will develop its network operation acceptance test protocol as well a cutover programme for the transfer of services from the CAAs to the REDDIG, as indicated in Section 2.4.6 of the TSD. The cutover will begin immediately after a satisfactory completion of the network operational stability test. Once the cutover has been satisfactorily completed, the start-up certificate shall be issued.

6.1.7 PAF tests are performed in order to prove that the Contractor has solved all pending problems, including those that might be identified after the issuance of the start-up certificate. In order to issue the final acceptance certificate, a chronogram will be executed within the six (6) months following the start-up certificate issuance.

6.1.8 The Provision Tests (PS) must be executed by the Contractor together with the Experts assigned in each node and with the Project Office. These tests will be performed once the Project Office had approved the documents known as Provision Test Protocols (PPS).

6.1.9 The Provision Test Protocols (PPS) and their conclusions can be used by the Project Office as a reference for the next tests, as well as in the provision operation and maintenance.

6.1.10 It is well established that the Provision Test Protocols (PPS) must be as deep as necessary, so the tests to be performed guarantee and demonstrate that the provision follows satisfactorily with all the requirements found on this technical specifications.

6.1.11 In all coordinations and provision test protocols (PPS), the languages to be used are Spanish and English, as the case may be.

6.1.12 It is the Contractor's duty, to provide all the instruments, cables, test connectors, simulators, computers, technical documentation, auxiliary and test equipment, etc. required for the correct execution of the tests indicated in paragraph 6.1.2.

6.1.13 It is established that:

- a) the PAPS tests are considered satisfactorily completed when their results are those expected in the testing protocol programs. In case of differences between the results and the protocols, the Project Office will determine if those differences must be corrected before or at the end of the PAPS tests or if those can be resolved before the final acceptance tests (PAF);
- b) the “start-up certificate” does not imply the definitive acceptance of the provision;
- c) once the “start-up certificate” has been issued, the warranty period will begin automatically, as indicated in Section 10.3 of the TSD;
- d) the Contractor is responsible for the provision until the issuance of start-up certificate certificate by the Project Office.

6.1.14 The Contractor, 15 days before the beginning of each “provision test” (PAPS, PAR y PAF), must contact the Project Office indicating the staff who will be involved in those tests and who will be responsible, and therefore, will sign the corresponding protocols of each “provision test”. Also the Project Office will design their representatives, for the same events.

## 6.2 **“Provision test” programmes and protocols**

6.2.1 The “provision test programmes” (PROG-PS) are documents that establish in detail the schedules, test sites, etc. for the provision tests.

6.2.2 The “Provision test programs” documentation must include at least the following:

- a) Detailed daily test schedules;
- b) Sites and timetable of the tests;
- c) Contractor’s staff list.

6.2.3 The “provision test protocols” documentation (PROT-PS) indicates in detail the technical proceedings for the execution of the “provision tests”. Also in these documents the outcome of the “provision tests” must be registered.

6.2.4 The documentation for each test established in the “provision test protocols”, at least should include:

- a) test objective;
- b) general description of the hardware and software of the provision to be tested;
- c) proceedings and steps to be followed during the tests;
- d) tables with the expected outcomes;
- e) explanatory and interconnection diagrams;
- f) detailed lists of the provision to be tested, indicating marks, models and series numbers;
- g) complete technical manuals of the equipment to be tested;
- h) instrument operation and special equipment manuals to be used in the test;
- i) complementary documentation and references.

6.2.5 The Contractor must issue and deliver to the Project Office the “provision test proposals” for the programs and “provision test protocols” for the PAPS, PAR y PAF tests.

6.2.6 The Contractor must deliver to the Project Office the proposals for the “provision test” programmes and protocols sixty (60) calendar days prior to the PAPS, PAR y PAF tests. The Contractor must take into account the following:

- a) the Project Office has up to thirty (30) calendar days following reception of the proposals for “provision test” programmes and protocols to evaluate and issue its approval or disapproval certificate;
- b) if the Project Office considers that the mentioned proposals do not comply with the technical specifications document, the proposals will not be approved. In this case, the Contractor must perform the necessary amendments with the requested additions and modifications and will send these documents, in the required date, for the approval of the Project Office;
- c) all the delays involved during the contract execution due to the non approval of the mentioned documents, will be attributed to the Contractor and no extensions will be granted in the execution terms already established in these specifications and contract;
- d) “provision tests” cannot start as long as the Project Office does not approve the corresponding test programme and protocol.

6.2.7 Once the program proposals and provision test protocols are approved, they will become official documents.

6.2.8 During the test execution, additional tests can be requested if the Project Office finds it necessary, in order to precise the correct operation of the provision. These tests will be automatically included as supplements into the official test program.

### 6.3 CUTOVER

6.3.1 The cutover of the present CAA systems to the new system will be of the Contractor’s responsibility and will be performed without interruption of the services, according to a programme established together with the Project Office.

6.3.2 The technical procedures for the cutover must be performed by the Contractor and must be submitted to the Project Office for its consideration, including the corresponding schematic diagrams, and all the resources that could be needed.

## CHAPTER 7 - SPARE PARTS TOOLS AND MEASUREMENTS EQUIPMENTS

### 7.2 Spare parts

7.2.2 The Project Office reserves itself the right to select and purchase, based on the total batch assigned to the spare parts set, the items considered more suitable according to the observed performance of the system, and the list recommended by the manufacturer, taking into account that the maintenance required is at the level of card replacements. The set of spare parts elaborated by the Project Office will be given to the contractor well in advance, and before the start of the final acceptance test. The set of spare parts must be handed to the Project Office before the end of the final acceptance tests.

7.2.4 c) components: fuses, coaxial cables, data cables; and

7.2.7 the Contractor must guarantee the provision of spare parts during the network useful time life established in ten (10) years.

#### 7.4 **Measurement equipments**

7.4.2 The tender must quoted at least, the following testing equipment:

- a) one (01) portable 26.5 Ghz spectrum analyzer, equipped with a wave analyzer, of analog and digital modulation, synthesized vectorial generator with tracking, calibration cables, measurement, set of attenuators, appropriate for C band and the type of connectors provided with the REDDIG equipment, transportation case;
- b) two (02) portable LAN/WAN networks protocol analysers; ATM, IP, frame relay, X.25, ISDN, E1, T1; incorporated traffic generator, BERT rate measuring device, cables and adapters compatible with the interfaces provided in the REDDIG.

### **CHAPTER 8 - DOCUMENTATION AND SOFTWARE**

#### 8.1 **Supplied documentation**

8.1.1 In this chapter the characteristics on the documentation concerning the provision, are specified. The tenders must include those documents in their final budged.

#### 8.2 **Documentation to be provided**

8.2.1 The type of documentation to present correspond to:

- a) training manuals;
- b) operation and maintenance technical manuals;
- c) bulletin and charts of service;
- d) civil works;
- e) installation manual (as build) and interconnection charts of the provision;
- f) technical update and upgrade;
- g) license approval procedures

#### 8.4 **Technical manuals**

8.4.2 The Contractor must provide in each node a complete set of technical manuals for the software, systems and equipment that are part of the provision. The Contractor must also supply and extra set of technical manuals that must be sent to the Project Office. Likewise a supplementary manual or quick guidance manual must also be delivered, which include functions of basic maintenance, mentioned in paragraph 9.1.5.1.

## **CHAPTER 9 - TRAINING**

### **9.1 General aspects**

9.1.2 The training program must include:

- a) Two (2) theoretical-practical training subprograms (ten academic days minimum), to be held in Spanish for 15 persons each, and in a site to be determined;
- b) a theoretical-practical training subprogram (ten academic days minimum, in English for 15 persons and in a site to be determined);
- c) a training subprogram during the work in each REDDIG node (on the job training) dictated in Spanish or English languages depending on each node language.

### **9.3 On-the-job training (OJT)**

9.3.2 The OJT must be developed in each REDDIG node previous the PAPS test process, and must include at least, the theory and practice of the following:

- a) installation details and the explanation of the correspondent schematic diagrams;
- b) Usage of the command panels and visualization of the node supplied systems;
- c) performance, starting, restart and node equipment and systems interacting;
- d) use, test, measurements, analysis, failure search and documentation handling of the supplied equipment and systems (SCM, SVSAT, SDEI, and NMS) as well as the VSAT antenna appointing;
- e) examination and test of the users circuits;
- f) backup network operation;
- g) failure practice;
- h) suggestions to the systems operation.

9.3.3 The OJT will be a domestic course for the staff designated by the CAAs in number no more than (5), that will comply with paragraph 9.3.2 and that will have a duration of at least two (2) academic days. This course must be carried out after the PADS test in each node.

9.3.4 The desirable personnel to provide the OJT, must own the suitable capacity required for the training achievement.

## **CHAPTER 10 - EXPERIENCE, TECHNICAL SUPPORT AND WARRANTIES**

### **10.1 Experience of the tender**

10.1.1 The tenders must have broad demonstrable experience in the engineering, provision, installation and launching of networks and systems similar to those requested in this document. The tenders must include a list of clients to whom they have provided and installed, during the past five (5) years, networks involving technologies similar to those offered in their technical proposal, and which are still in operation. The list must contain names, addresses and references of clients that can be contacted.

## 10.2 **Technical support**

10.2.1 The tenders should have a South American technical office based in Lima. They should also indicate in their proposal the location of their engineering and technical service offices, as well as the measuring equipments that will be available to provide warranty and post-sale services, plus a list of their technical personnel, indicating the qualifications and curriculum vitae of the contractor staff that will participate during the development of the contract and the warranty period.

10.2.2 The contractor must, if so requested, provide technical support for both hardware and software after the end of the equipment's warranty. To this effect, the tenders must include in their proposal a 1-, 2- and 5-year maintenance contract project, with the same scope and coverage established in the warranty shown in paragraph 10.3. The Project Office reserves the right to adopt this option, to which end the tender should keep the offer valid at least until the end of the technical warranty of the provision.

## 10.3 **Warranties**

### 10.3.1 **Technical warranty of the provision**

10.3.1.1 The contractor must guarantee the goods provided, both in hardware and software, against all defects that could appear in the design, manufacturing, workmanship, installation, malfunctioning, etc. The warranty period starts with the issuance of the start of operation certificate and will have a duration of at least one (1) year.

10.3.1.2 The responsibility of the contractor, relative to any part of the equipment (hardware and software) covered by the hereby described warranty, will be to deliver to the site the replacement units (equipment) for their installation by the technical personnel of the CAAs. This delivery will be done without any charge whatsoever to the Project Office, and within five (05) working days of the request for the spare parts.

10.3.1.3 During the warranty period, the contractor must keep in South America staff specialized in the goods provided, both in hardware and in software, to coordinate and solve any problems as soon as possible so as to guarantee the continuous operation of the provision within the availability rates requested in this document, and at no additional cost.

10.3.1.4 To facilitate the compliance of what is indicated in the above paragraphs, the contractor can use the spare parts indicated in paragraph 7.2.3 of this document. The contractor must replace the used spare parts with new ones.

10.3.1.5 If the accumulated time corresponding to the repair(s) and replacement(s) of a piece of equipment were greater than thirty (30) calendar days, the warranty of this particular equipment must be extended for a period of time equal to the one accumulated during the repair(s) and replacement(s) period.

10.3.1.6 Within the warranty period, the following actions should be made, without additional costs:

- a) The Project Office, with the support of the skilled technical personnel of the CAAs, will carry out preventive maintenance to the provision, in accordance with the schedule recommended by the contractor.
- b) The contractor will carry out periodical inspections to the site to verify and/or make hardware and software adjustments and/or corrections in order to guarantee the provisions correct work out, and will submit a technical report at the end of the inspection. The tenders must include a draft inspection schedule in its proposal.
- c) In the event of occurring a problem with the hardware and/or software that cannot be readily solved, the contractor will be so informed in order to let him take the corrective actions. The response period should not be higher than 48 hours, except in the unavailability of air tickets.
- d) The contractor must provide all the goods and services necessary to implement a diagnosis and maintenance system with the equipment manufacturer through public telephone network and/or Internet. All transactions made through this interface must be registered in the NMS system.
- e) The contractor must have an updated version of the operational system and of all software provided, as well as an original and a copy of the updated versions and technical documentation in each node.
- f) The contractor, before making any modification or updating to the hardware and/or software, must inform of this event to the ICAO Project Office and will maintain at the site the replaced versions. The changes made in hardware and software must not degrade, under any circumstances, the availability, the MTBF and MTTR rates indicated and established in this document.
- g) The contractor must guarantee that the network, the systems and the equipment will provide the service in accordance with the availability values, MTBF and MTTR required and indicated in this document. Non compliance with these values can be considered as fault in design, and the contractor is responsible for solving this deficiency at no extra cost.

### 10.3.2 **Warranty for the provision of spare parts, technical service and upgrading**

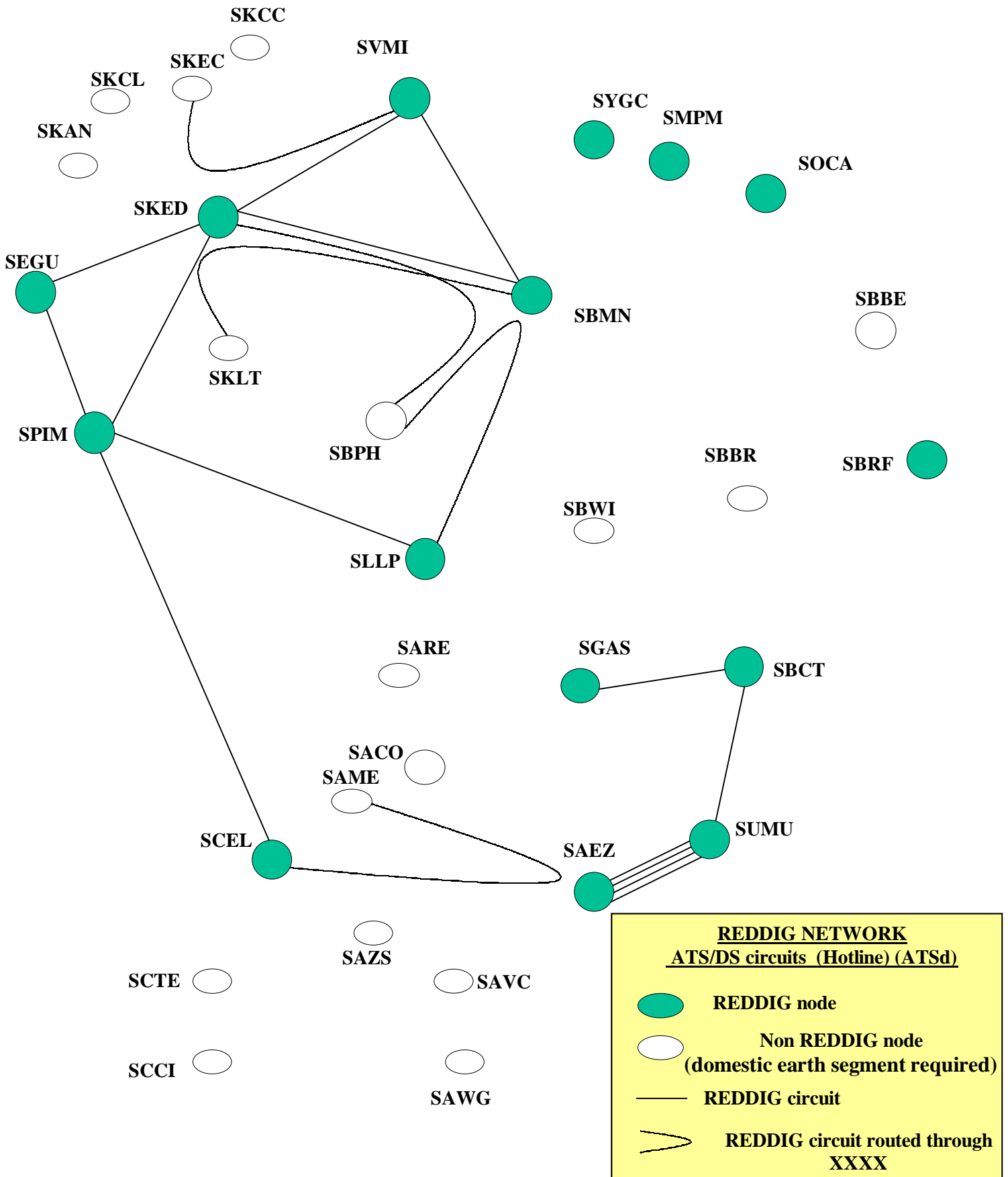
10.3.2.1 The tenders must guarantee, through a document signed by their legal representative, the provision of all spare parts necessary, as well as technical support services for all the equipment, for a period not less than the provision's expected useful life.

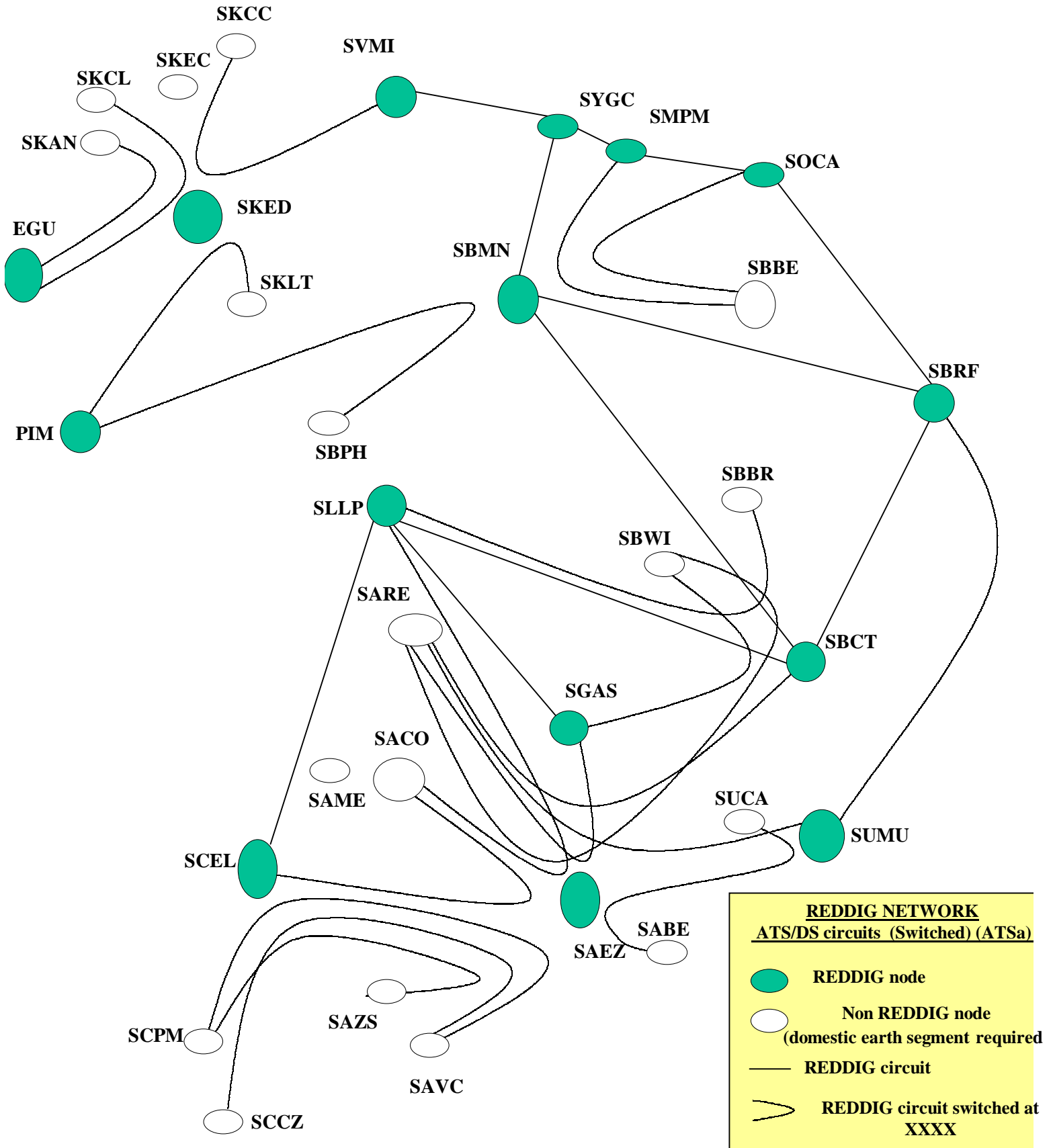
10.3.2.2 If, due to progress in the standards and/or improvement in the technology to overcome a problem in design, an improvement or upgrading of the systems and/or equipment is generated during the warranty period, the tenders must upgrade the equipment at no cost whatsoever to the Project Office. Once the warranty period is over, any improvement and/or upgrading must be quoted to the purchaser.

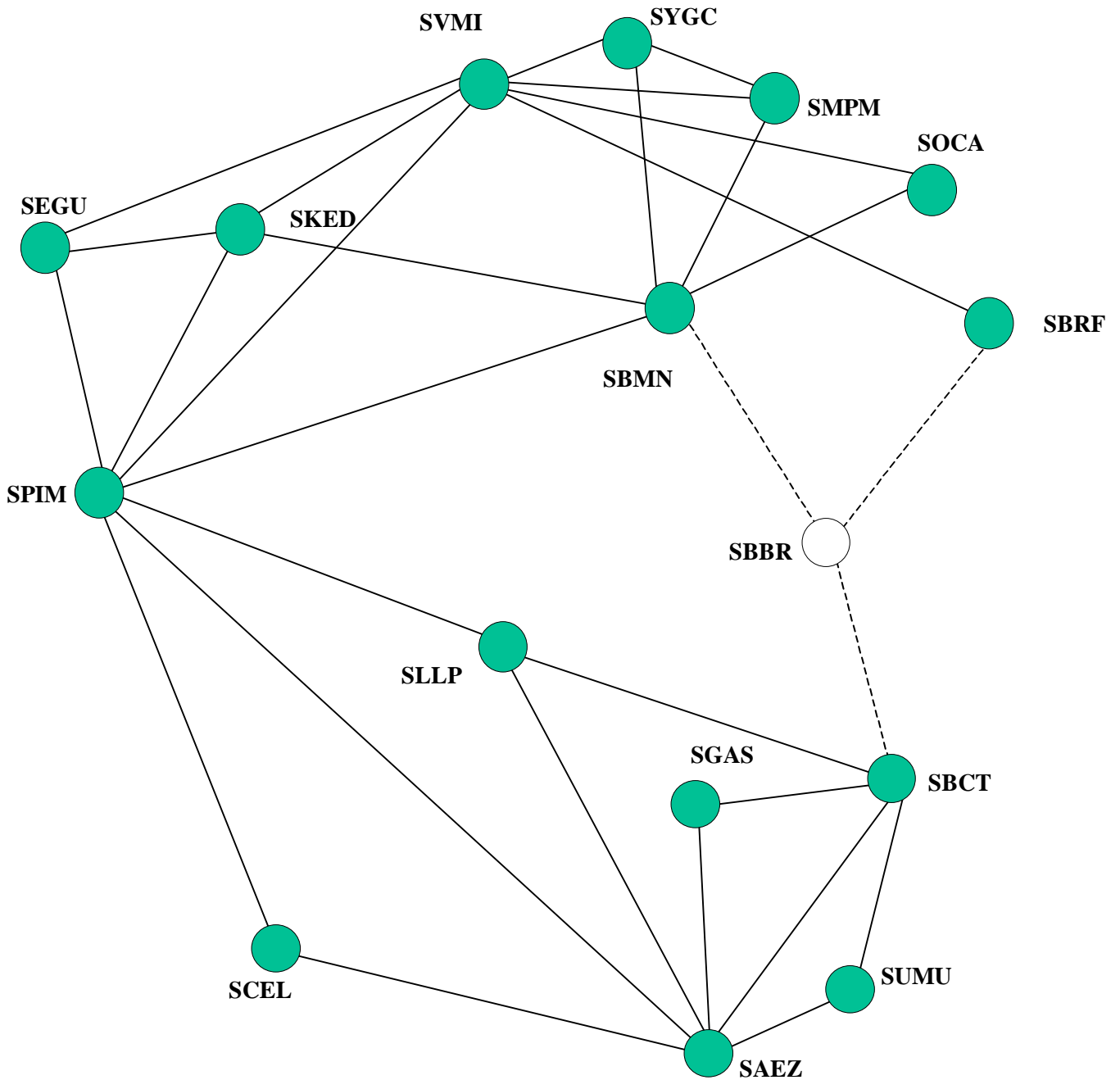
**10.3.3 Equipment guaranteed to the entire satisfaction of the purchaser**

10.3.3.1 The contractor binds itself in the sense that the provision of all additional goods and services not directly indicated in this document neither so offered, and that could be necessary to guarantee the correct installation and operation of the REDDIG, will be at the entire satisfaction of the Project Office.





10.3.3.2 In the event of existing in this document any omission or error, the contractor commits himself not to use it to its own benefit, nor impair the Project Office.

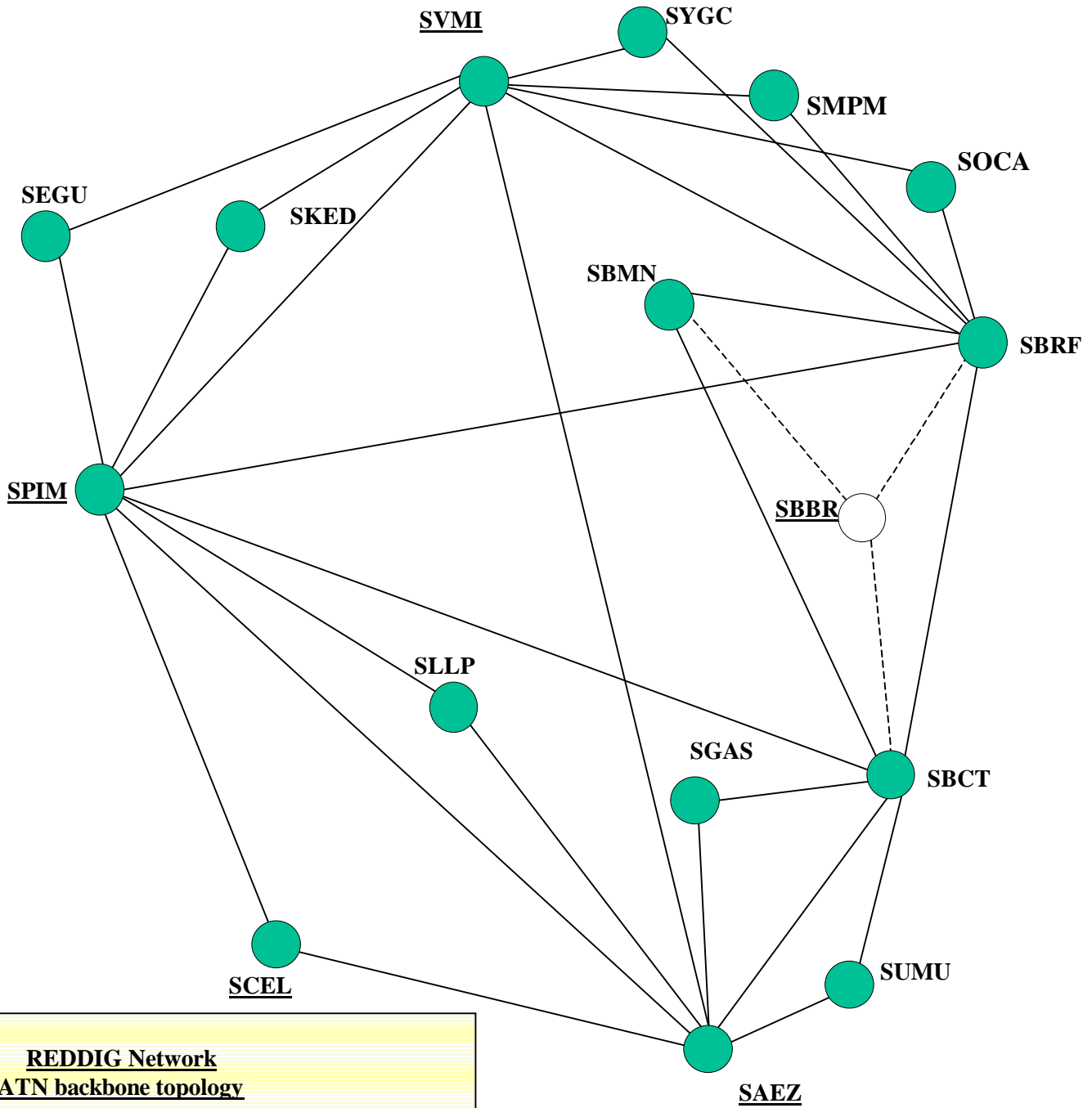












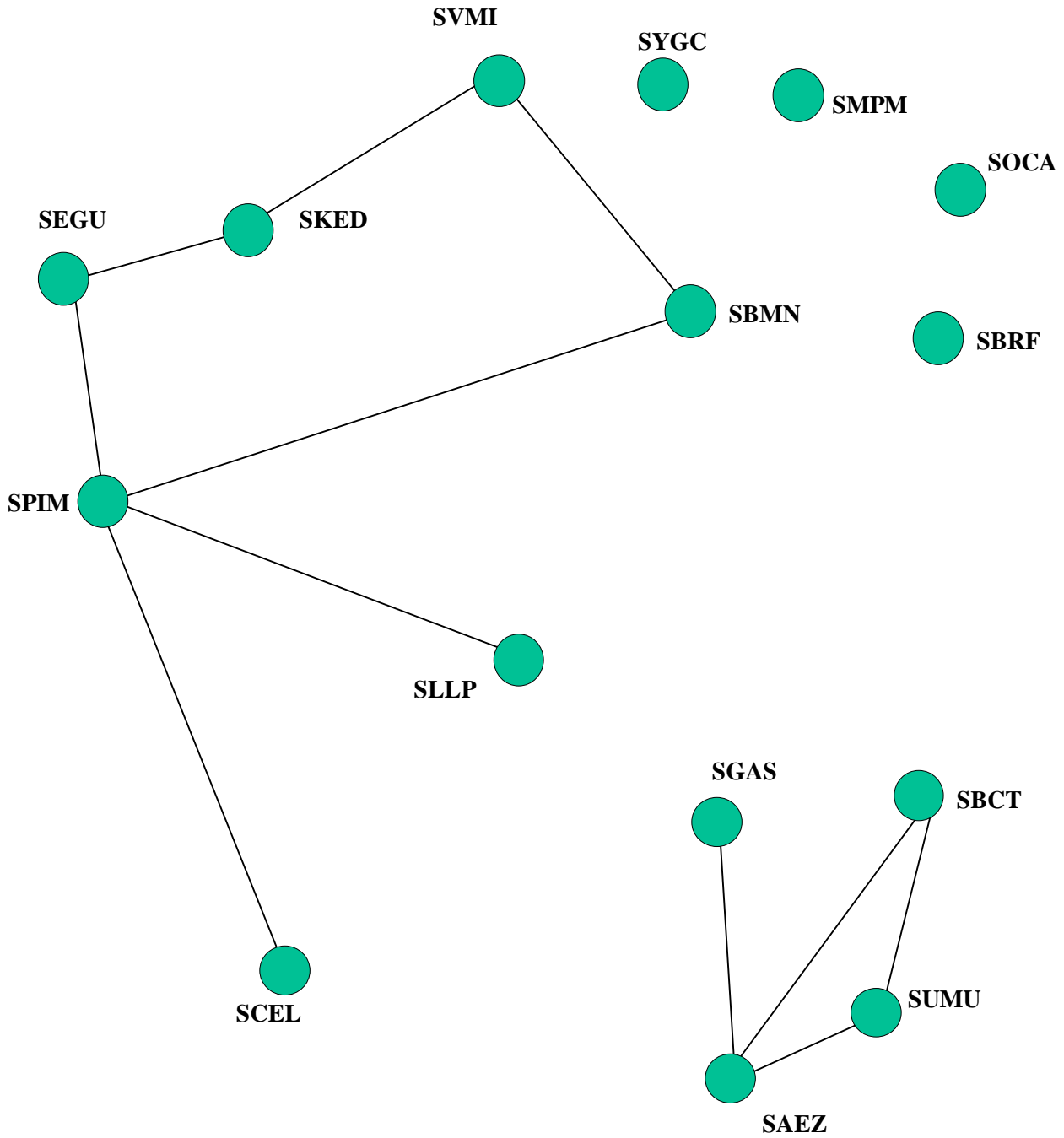
**REDDIG Network**  
**AFTN Circuits Topology**

-  REDDIG node
-  AFTN Switch Center (Brasilia)
-  REDDIG circuits
-  Domestic dedicated circuits





**REDDIG Network**  
**ATN backbone topology**

-  REDDIG node
-  Non REDDIG node
-  REDDIG circuits
-  Domestic dedicated circuits
-  BIS node - *Boundary Intermediate System*
-  IS node - *Intermediate System*



**REDDIG Network**  
**RADAR Interchange service**

 **REDDIG node**

 **REDDIG circuits**