



INTERNATIONAL CIVIL AVIATION ORGANIZATION  
ELEVENTH MEETING OF THE NAFISAT SUPERVISORY COMMITTEE (NAFISAT-SVC/11)  
(NAIROBI, KENYA, 10-11 OCTOBER 2016)

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**Agenda Item 10(b): NAFISAT VSAT Upgrade Progress Report**

*(Presented by ATNS)*

**SUMMARY**

This working paper discusses the progress made to date with respect to the upgrade of the NAFISAT VSAT Network and certain implications and risks that have been identified. The working paper provides recommendations in respect of the transition of services to the upgraded network.

**References:**

Report of the 10<sup>th</sup> NAFISAT Supervisory Committee meeting

**1. Background**

1.1. At the 10<sup>th</sup> NAFISAT Supervisory Committee meeting it was agreed that the state-of-art ND Satcom MF-TDMA technology will be used for the NAFISAT network upgrade. The equipment will be capable of providing connectivity for existing legacy as well as planned ICAO IP based services such as AMHS.

1.2. Challenges were experienced in the upgrade project, which have resulted in delays of the initially committed commissioning timeframe. However, the current network infrastructure continues to provide safe and reliable service to the users. This level of performance will be assured until the transition date of the network.

1.3. ATNS has put contingencies in place to ensure sustained availability and reliability of the NAFISAT network including the following:

- Spares holding of critical components have been replenished in respect of the Memotec multiplexor equipment and RF transmitter equipment from the sites that have already been upgraded and additional spares acquired from ND Satcom;
- Regular preventative and routine maintenance will continue to be conducted by the ATNS maintenance team as normal during the upgrade.

With these measures in place ATNS will ensure continued reliable operation of both networks, prior to and during the upgrade.

**1.4. The NAFISAT upgrade project is split in two parts:**

**Phase 1:** Includes the equipment acquisition of the SkyWAN IDU7000 MF-TDMA technology platform from ND Satcom and other auxiliary equipment. This phase was completed on 18 March 2016, and

**Phase 2:** The installation and commissioning of the new network equipment: This includes the delivery of equipment to the various sites, site surveys, development of site specifications, installation of new equipment and refurbishment of retained equipment, setting up and commissioning of equipment and final transfer of operations to the upgraded network.

1.5. The training of technical staff from each Member State on the new technology will also be addressed as part of the network upgrade.

## 2. Discussion

2.1. The Contract for Phase 1 of the upgrade was signed on 19 May 2015 with ND Satcom. The following milestones have been achieved to date:

- A Requirements Workshop was completed with ND Satcom on the **11th June 2015**.
- The Preliminary Design Review was completed on the **23rd July 2015** after which ND Satcom commenced with material sourcing.
- The Critical Design Review was successfully completed on the **25<sup>th</sup> September 2015** after which manufacturing commenced.
- The hardware integration was completed by ND Satcom on **20 November 2015**.
- The upgrade of the training equipment at the ATNS Training Academy was completed on **30 October 2015**.
- Local training for the ATNS Technicians by ND Satcom was conducted from **2 to 6 November 2015** on the ATA platform.
- Further specialised OEM training for ATNS VSAT Technicians and Training personnel was conducted in two parts from **23 November to 4 December 2015 and from 8 to 19 February 2016**.
- From **22 to 26 February 2016** the Factory Acceptance Testing (FAT) was completed successfully at ND Satcom.
- Packing of the equipment commenced immediately after the FAT and the equipment was ready for shipment on **18 March 2016**.

2.2. Phase 2 of the upgrade involves the installation and commissioning of the network. After going through a sourcing process and based on a recommendation by ND Satcom a contract was signed between ATNS and GDS Technologies on 14 January 2016.

2.3. In collaboration with ATNS, GDS Technologies is responsible for the following tasks in terms of the contract:

- Site surveys and drafting of the site installation specifications
- Arrange shipping from the ND Satcom factory in Germany and delivery of all equipment to the sites
- The physical installation of all hardware and refurbishment of all the retained equipment e.g. the VSAT antenna structure and earthing system.

ATNS is responsible for the overall contract management, site design documentation, final setting-up and configuration of equipment, commissioning, training and completion of as-built documentation. Refer to Attachment A and B for diagrams depicting the project work breakdown structure and upgrade schedules respectively.

## 3. Implications

3.1. Despite the challenges experienced in the initial stages (contractor sourcing) the NAFISAT and SADC II upgrade project is making good progress. ATNS would also want to assure

the meeting that the delays and challenges experienced will in no way compromise the network service levels, the quality of the communications or impact on its availability. This is supported by the most recent availability statistics presented in the working paper on the network operation and performance.

### **3.2. NAFISAT Site Surveys and Specifications**

Site surveys have been completed at all the NAFISAT sites except Jeddah and Sana'a. Dates for Jeddah and Sana'a must still be finalised. Similarly, the site specifications for the upgrade of each site have been completed except for Jeddah and Sana'a. Please refer to the table in Attachment C: Documentation.

Site surveys were problematic at a number of sites where a Letter of Invitation is required before application for a visa can be made. The delays with the site surveys results in delays the completion the site upgrade specification, shipping of materials required for the upgrades and consequently also the upgrading of the VSAT terminals.

### **3.3. NAFISAT equipment delivery and installation**

After packing and crating shipment of the VSAT upgrade equipment, shipping to each site and custom clearance, commenced in March 2016. Attachment C: Shipment shows a summary of the shipping status. Extensive delays were experienced with certain sites which involved custom clearance and inspection by SGS. Presently two sites, namely Kinshasa and Jeddah, is shown as "PENDING COLLECTION" which means the equipment is still at ND Satcom in Germany. The sites indicated as "COLLECTED" are with the shipper, and have not been delivered to the sites.

Site installation activities have started and the status is shown under "Installation" in Attachment C. Sites completed are shown in Green. Outstanding sites are shown in Grey. Taking the problems experienced into account it is expected to have installation of all terminals, except Sana'a and Jeddah, completed by calendar week 49.

It should be noted that during the upgrade of the terminals and refurbishment of the antennas it is inevitable that service interruptions will be experienced. These interruptions are coordinated closely with on-site operational and technical personnel to limit service interruption to a minimum.

### **3.4. Transition of Services to the upgraded networks**

#### **3.4.1. Option 1**

Taking into account the delays experienced the target date for the transition from the existing to the upgraded network is planned for January 2017. This is shown graphically in Attachment C as the "Orange" transition during in Calendar Weeks 1 and 2 (2017). For this Option to be viable the following requirements will apply:

- Upgrading of the VSAT terminals in Saudi Arabia and Yemen must be completed by 16 December 2016.
- Transition will only be possible after both the NAFISAT and SADC VSAT2 networks have been upgraded. This is required to ensure interconnectivity between the two networks i.e. between Johannesburg, Dar es Salaam, Plaisance, Antananarivo, Kinshasa, Kigali (in SADC), and Khartoum, Nairobi, Entebbe, Victoria (in NAFISAT). A delay in the upgrade of either network will cause a delay in the transition.
- A period during calendar weeks 51 and 52 will be utilised to ensure proper operation of the new network.

### 3.4.2 Option 2

In view of the uncertainty in regard to the terminal upgrades in Saudi Arabia and Sana'a an alternative "realistic" Option is proposed. In this Option more time is allowed for the completion of Jeddah and Sana'a. It is considered that by Calendar Week 6 (16 February 2017) the upgrades of these two sites will be completed. This Option is shown graphically in Attachment C as the "Green" transition during in Calendar Weeks 7 and 8 (2017).

There will however still be a possibility that in this Option one or both of these terminals may not be completed, in which case the following will apply:

- The transition will take place without Jeddah and/or Sana'a.
- ATS/DS and AFTN interconnection from Sana'a and Saudi Arabia, as shown in the table below, will still be provided but operations will remain on the existing network.

LOCATION	INTERCONNECTED TO:					
<b>Sana'a</b>	Addis Ababa	Asmara	Mogadishu	Djibouti	Cairo	Jeddah
<b>Jeddah</b>	Addis Ababa	Asmara	Khartoum	Sana'a	Cairo	Asmara

- The existing equipment at all sites that connect to Sana'a and Jeddah will also be retained.
- Other than that, transition of all other site will occur as per Option 1 during calendar weeks 7/8 (2017).

3.4.3 It should be noted that although transition without completion of Jeddah and Sana'a in Option 2 will still allow for the continued provision of services. However the following disadvantages will apply:

- The transition process will be more complex and more risky to ensure continued operation.
- It will also be more expensive as more trips will have to be conducted by technical personnel before and after the transfer of these terminals.
- It will not be possible to optimize the satellite spectrum usage as spectrum for operation of the existing network will have to be retained.

3.4.4 It is proposed that ATNS endeavours to achieve transition of all terminals, including Sana'a and Jeddah, as per Option 1. The Meeting must however accept that Option 2 is a more realistic date for the transition of the networks.

3.4.5 In the unfortunate case that the upgrade of either Sana'a and/or Jeddah remains problematic for an unpredictable after period after 17 February 2017, ATNS will make a decision to transfer to the new networks excluding these two terminals.

### 3.5. Training of Technical Personnel

- The training facility at the ATNS Training Academy has been upgraded and new training material developed based on the new ND Satcom SkyWAN IDU7000 modem and NetPerformer Frame Relay Access Device (FAD).
- Training of technicians from all the NAFISAT and SADC VSAT2 states commenced on 20<sup>th</sup> June 2016 and courses will continue until all States have been trained.

- In addition, all technicians will receive basic on-site training during the installation phase of the project. This training will also ensure that the transition from the existing to the new upgraded network will be accomplished without any significant interruptions in the services provided.
- The on-site training will cover this aspect as the transition will require technical assistance from each country on a predetermined date and time.
- This will be coordinated with each State as described in paragraph 3.4 above.

**3.6. Retention of interconnectivity with AFISNET**

The following NAFISAT sites interconnect with AFISNET:

NAFISAT	AFISNET			
	ATS/DS		AFTN	
Nairobi	Brazzaville		Brazzaville	
Khartoum	Brazzaville	N'Djamena	Brazzaville	N'Djamena
Ethiopia	Niamey			
Tripoli	N'Djamena	Niamey	N'Djamena	Niamey
Addis Ababa			N'Djamena	

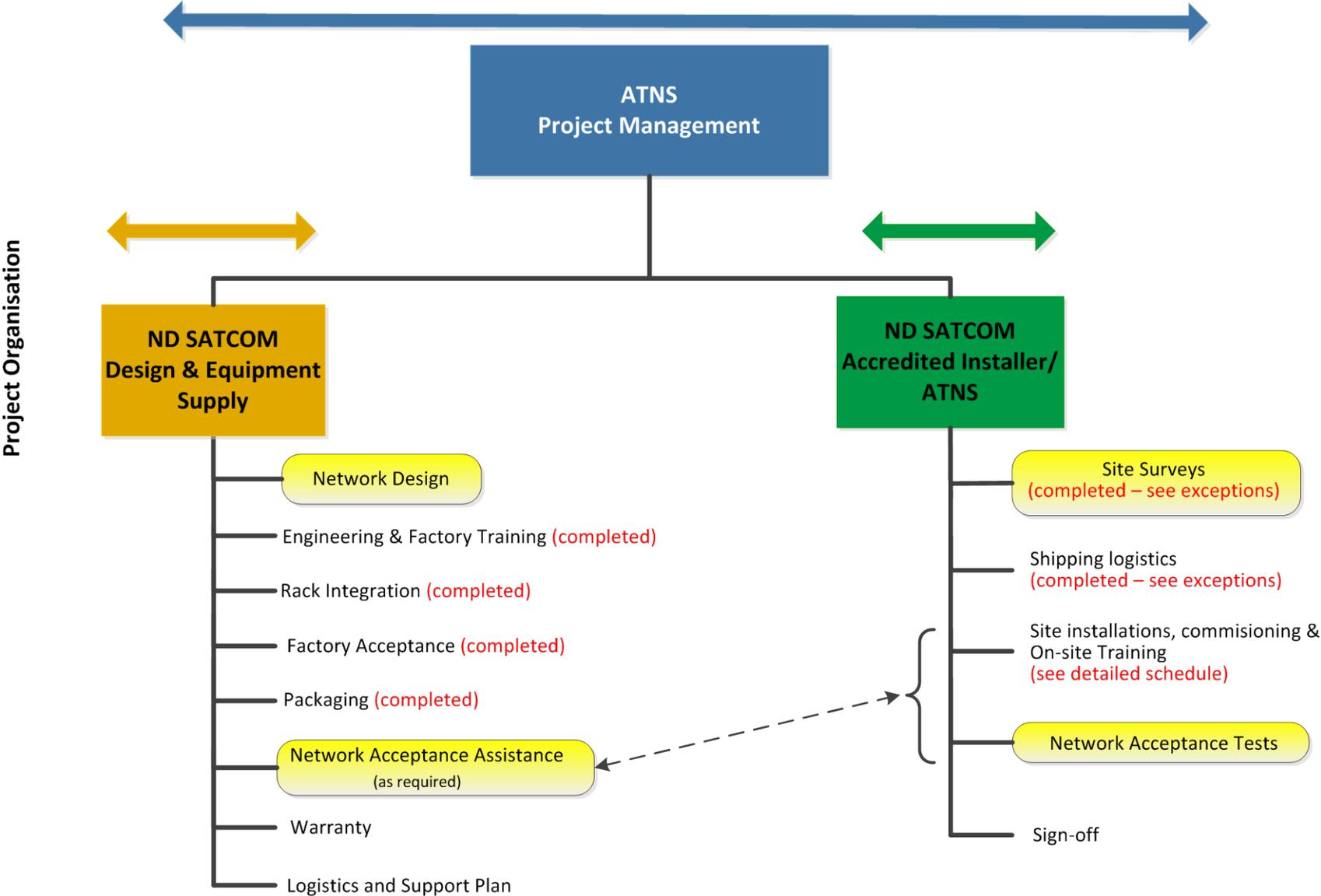
The above circuits will be retained during the upgrade. AFISNET has not upgraded their network and consequently the Datum MCPC (SCPC) modems and obsolete Memotec modems will have to be retained at these NAFISAT sites. The risk of maintaining the obsolete Memotec equipment used in the NAFISAT network will be mitigated through the number of additional Memotec units that will be available after the upgrade.

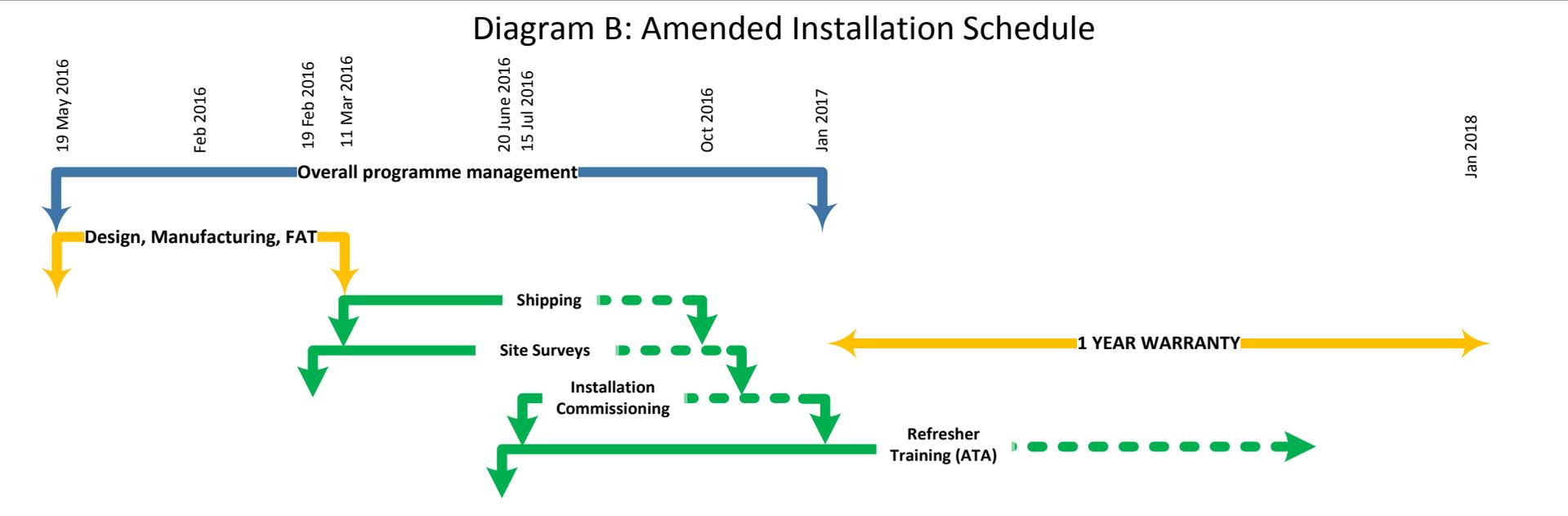
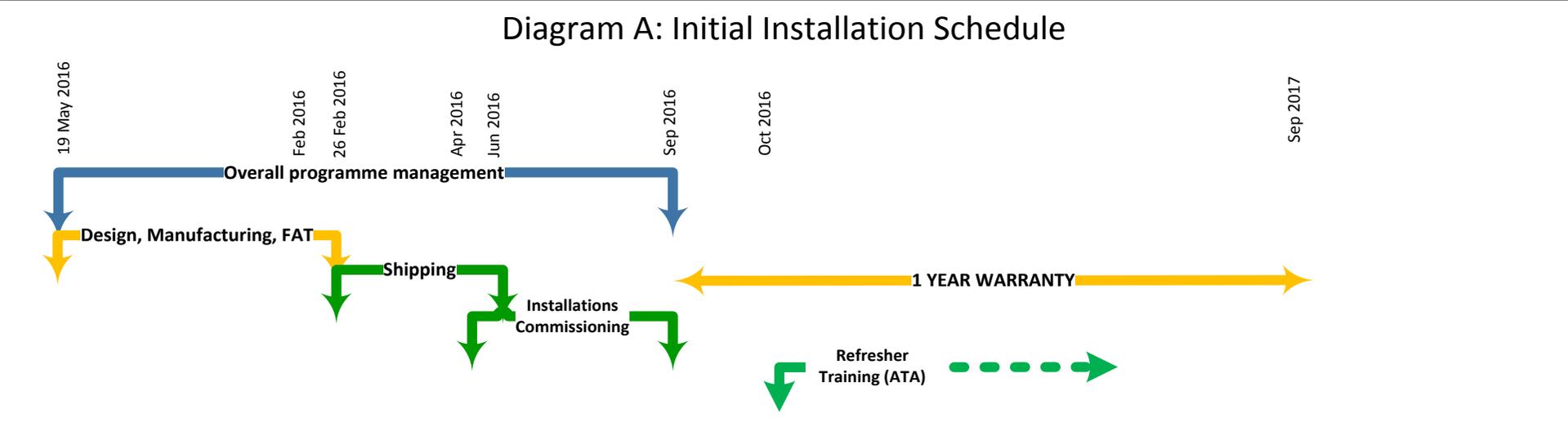
ASECNA has indicated in their upgrade plans that all AFISNET Memotec equipment will be replaced by NetPerformer devices. The upgrade of the AFISNET modems (TDMA satellite access technique) in line with the ICAO Best Practices for VSAT networks is still subject to a decision by the AFISNET Satellite Network Management Committee (SNMC).

**4. Recommendations**

- 4.1 It is requested that the meeting:
- Takes note of the progress made in respect of the upgrade of the NAFISAT network.
  - Adopt the proposal in paragraphs 3.4.4 in regard to the transition of services to the upgraded network, taking into account the provision for a more realistic transition date.
  - Take note of the situation as indicated in paragraph 3.4.5 with regard to the exclusion of Jeddah and Sana'a as part of the planned transition of services to the upgraded network.

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NAFISAT & SADC VSAT2 Upgrade (Transfer of Operation)

SITE NAME	SHIPPING		DOCUMENTATION		2016																	2017									
	SHIPPING STATUS	TOTAL DELIVERED	SURVEY REPORT	SPECIFICATION	CW 28	CW 31	CW 32	CW 34	CW 36	CW 37	CW 39	CW 40	CW 41	CW 43	CW 44	CW 45	CW 46	CW 47	CW 48	CW 49	CW 50	CW 51	CW 52	CW 1	CW 2	CW 3	CW 4	CW 5	CW 6	CW 7	CW 8
					11-15 JUL	1-5 AUG	8-12 AUG	22-26 AUG	5-9 SEPT	12-16 SEPT	26-30 SEPT	03-07 OCT	10-14 OCT	24-28 OCT	31-04 NOV	07-11 NOV	14-18 NOV	21-25 NOV	28-02 DEC	05-09 DEC	12-16 DEC	19-23 DEC	26-30 DEC	02-06 JAN	09-13 JAN	16-20 JAN	30-03 FEB	06-10 FEB	13-17 FEB	20-24 FEB	27-03 MAR
<b>NAFISAT</b>		10																													
DJIBOUTI	DELIVERED	1	YES	YES																											
CAIRO	DELIVERED	1	YES	YES																											
ASMARA	DELIVERED	1	YES	YES																											
ADDIS ABABA	DELIVERED	1	YES	YES																											
NAIROBI	DELIVERED	1	YES	YES																											
TRIPOLI	DELIVERED	1	YES	NO																											
JEDDAH	PENDING COLLECTION	0	NO	NO																											
KHARTOUM	DELIVERED	1	YES	YES																											
MOGADISHU	COLLECTED	0	YES	YES																											
VICTORIA	DELIVERED	1	YES	YES																											
ENTEBBE	DELIVERED	1	YES	YES																											
MMC	DELIVERED	1	YES	YES																											
SANA'A	COLLECTED	0	NO	NO																											
<b>SADC VSAT2</b>		16																													
DAR ES SALAAM	DELIVERED	1	YES	YES																											
RWANDA	DELIVERED	1	YES	YES																											
KINSHASA	PENDING COLLECTION	0	YES	YES																											
ANTANANARIVO	DELIVERED	1	YES	YES																											
BEIRA	DELIVERED	1	YES	YES																											
BUJUMBURA	DELIVERED	1	YES	YES																											
LUSAKA	DELIVERED	1	YES	YES																											
LUANDA	DELIVERED	1	YES	YES																											
LILIONGWE	DELIVERED	1	YES	YES																											
GABORONE	DELIVERED	1	YES	YES																											
HARARE	DELIVERED	1	YES	YES																											
JOHANNESBURG	DELIVERED	1	YES	YES																											
MANZINI	DELIVERED	1	YES	YES																											
MAPUTO	DELIVERED	1	YES	YES																											
MASERU	DELIVERED	1	YES	YES																											
MAURITIUS	DELIVERED	1	YES	YES																											
WINDHOEK	DELIVERED	1	YES	YES																											

Today

Target Network Transfer

Realistic Network Transfer

- E N D -