AfricaStar AccessTM by EgyptSat

AfricaStar Access Installation and commissioning process on Atlantic Bird 3 C-Band

Tutorial

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- *IV Physical installation and antenna pointing*
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I. Verify Equipment

Verify equipment

- Antenna complete (1.8m diameter)
- EgyptSat Access terminal (RCST)
- BUC 5 watt
- D LNB
- Reflector
- DC external power supply for C-band (BUC)
- 2 Cables 0-30m RG6 (included with the connectors already connected) or 0-100m RG11 75 Ohm (not included)
- 2 Adapters F male to N female if RG11 cable to be used
- Earth wire (not included)



Correct dish diameter for installation

C-Band -> 1.8 m minimum for African countries

Maximum Cable length and type between RCST and antenna

RG 6 :
RG 11 75 Ohm loss :

0 - 30m 0 -100m

- Due to the amount of power needed to run the ODU (Out Door Unit) it is <u>MANDATORY</u> that RG 6 cable type be used <u>only up to 30m</u>.
- In any case, the shorter the IFL cables between the EgyptSat Access terminal and the antenna, the better in order to minimize the heating of the EgyptSat Access terminal

II. Required tool kit

Required Tool Kit (1/3)

- PC (see specifications next page)
- Spectrum Analyser (see specifications after next page)
- 5m max RG6 cable with F-male connectors at each end
- GPS (Accuracy: 1 km)
- Compass for antenna pointing (azimuth)
- Inclinometer for antenna pointing (elevation)
- Vulcanic waterproof tape (self-fusing 6")
- Electricians Multi-meter
- Kit of Coaxial cable connectors (if RG11 cables used)
- 10, 11 & 13mm socket or spanners
- Set of Allen keys
- Screwdrivers

Required Tool Kit (2/3)

PC with LAN/Ethernet port, and Ethernet crossover cable to run basic Telnet session (see later: *V. commissioning*)
 Any OS is accepted, provided it can support a Telnet session (see *V. commissioning*)

Required Tool Kit (3/3)

- Spectrum analyser specifications: (i) 100Hz to 10Mhz steps accuracy (span), (ii) BER measurement (C/N measurement), (iii) capable of:
 - 1. showing L-Band frequency range,
 - 2. powering the LNB with a 13/18 volt & 22Hz injection,
 - 3. viewing both analogue & digital carriers,
 - 4. interrogating DVB carriers (optional).
- The spectrum analyser must come with a BNC-F female adaptor
- 2. The RG6 cable to be connected between the spectrum analyser (via the above adaptor) and the LNB (see *IV*. *Pkysical installation and antenna pointing*) must not exceed 5m, and must have F-male connectors at each end



DVB Receiver part of the spectrum analyser



III. Overview of the system



Overview of the System (2/2

EgyptSat Access frequency ranges

Satellite Atlantic Bird 3 Outroute (downlink) Frequency for the EgyptSat Access service : 3.727 GHz

(Local Oscillator of LNB: 5,150 GHz)

(L-Band Frequency : 1.423 GHz : this L-Band frequency range is the one between the RCST and the LNB: you will need it when fine pointing the antenna by using the spectrum analyser – see *IV*. *Physical installation and pointing the antenna*) *IV. Physical installation and antenna pointing*

Before anything: Polar azimuth and elevation (1/2)

• With the Lat/Long co-ordinates given by the GPS (with a 2*decimal* accuracy) go to the web site:

www.intersputnik.com/LookAngleCalculator.shtml

- Select the satellite "Atlantic Bird 3 (5W)" in the pop-up menu
- Enter Latitude and Longitude (please respect the convention for positive or negative signs)
- Cick on "Calculate" → the **polar azimuth** and the **elevation** of the antenna to point the satellite will then be given to you for your Lat/Long position

Before anything: Magnetic azimuth calculation (2/2)

- Polar azimuth is different from magnetic azimuth given by a magnetic compass
- Go to the web site: http://www.ngdc.noaa.gov/cgibin/seg/gmag/fldsnth1.pl
 - Enter your Lat/Long and click on "Compute"
 - You obtain the Declination, marked "D" (either positive or negative number in degrees and minutes)
- Apply the formula (*please respect the number signs**): Magnetic azimuth = Polar azimuth – Declination to obtain the <u>magnetic azimuth</u> that you will use with your magnetic compass

* If Declination is a negative number, the magnetic azimuth will be greater than the polar azimuth

You are (nearly) ready to start

- You have now all your equipment verified (*I. Verify equipment*)
- You have now all your tool kit (*II. Required tool kit*)
- For the location of the EgyptSat Access terminal and antenna, you know:
 - The elevation of the antenna to the satellite,
 - The magnetic azimuth ("bearing") of the antenna to the satellite
 - → YOU ARE READY FOR INSTALLATION

BUT BEFORE, SEND US THE COMMISSIONING FORM

Where to install the antenna

Using the compass and the inclinometer, verify that there is an **unobstructed line-of-sight** toward the satellite. There should bo no obstruction by buildings or by trees. Take into account future tree growth. Also, avoid installing the antenna next to electrical equipment (air

conditioning units, etc.) because they can cause signal interference.



The first Warning

• WARNING 1: The antenna MUST be installed in a location with a permanently unobstructed line-of-sight to the satellite

• There will be further warnings along this guide.

Antenna physical installation

- No mast is delivered \rightarrow distributor's responsibility
- Install antenna with BUC and LNB (refer to documentation coming with antenna)
- Install N female connectors on both Rx and Tx cables in case of use of RG11 final cables between the RCST and the antenna (already done for the supplied RG6 cables see *I. Verify equipment*)
- <u>do not connect these cables yet between the RCST and</u> <u>the antenna (BUC and LNB)</u>

C-band antenna and antenna feed assembly



The antenna offset as mentioned in the above drawing is 22.6°.

Use of the spectrum analyser

- Spectrum analyser must be powered off
- Install the BNC-F female adaptor to the Rx (usually labelled "RF in") of the spectrum analyser (see *II. Required Tool kit (3/3)*)
- Connect the RG6 cable (max. 5m long as mentioned in *II*. *Required Tool kit (3/3)*) between the F-female of the above adaptor and the F-female connector of the LNB
- See WARNING 5 later (spectrum analyser must be off)
- See the specifications of your spectrum analyser to check the right order of the 2 following steps
- Power-on the spectrum analyser
- Ensure that the spectrum analyser powers the LNB between 15V and 18V (and not more)

Antenna pointing: elevation (1/3)

- Adjust the antenna (dish) in elevation with the <u>elevation</u> that you have previously determined: it is very important that the antenna mast be exactly vertical: check it with your inclinometer
- Check the elevation with the elevation indicator and with the inclinometer (see important remarks below)



The elevation indicator on the antenna takes into account the antenna offset: real elevation

The value indicated on the Inclinometer of course does not take into account the antenna offset \rightarrow value read on the inclinometer = value read on the antenna – 22.6° = real elevation – 22.6°

Antenna pointing: azimuth (2/3)

Adjust the antenna (dish) in azimuth with the **magnetic azimuth** that you have previously determined.

Check the magnetic azimuth with the compass (see important remark below).

WARNING 2: Keep the compass far away from any metallic structure

Antenna pointing: polarization (3/3)

The EgyptSat ACCESS BUC is RIGHT hand circular polarisation on Atlantic Bird 3 (C-Band) Check that the polarisator between the Reflector and the BUC indicate an RIGHT arrow

The LNB is in LEFT hand Circular polarisation on AB3

inclination of the BUC/LNB is irrelevant



Confirmation that you are on Atlantic Bird 3

• TV channels available on AB3:

-CRTV, 3711 Mhz, LHCP, MPEG-2
-RTG 1, 4152 Mhz, LHCP, MPEG-2
-RTG 2, 4152 Mhz, LHCP, MPEG-2
-No channels available in analogic.

Fine pointing of the antenna

- You have now positioned your antenna in elevation and azimuth. However, before fixing it solidly in this position, you must fine tune the pointing of your antenna.
- To do so, adjust your Spectrum Analyser settings in order to see the L-Band Atlantic Bird 3 spectrum on your Spectrum Analyser (see your user manual)
 Then fine point the antenna to see the following patterns on your spectrum analyser (next 2 pages)



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AND TOTA WEN TO TA LU



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@ 001/002

WARNING 3:

Do not stop the pointing process until you can see these spectrums !!!

If you can't see them, try the following:

- Check you spectrum analyser documentation in order to be sure that you use it properly.

- Adjust the antenna fine pointing in order to find and maximise the signal.

Now that you have seen these spectrums properly (with the maximum dBm values) by fine tuning the pointing of the antenna, you should now solidly fix the antenna in this position

Finalize physical installation

- Power-off your spectrum analyser and disconnect it from the LNB
- Connect the IFL cables between the EgyptSat Access terminal (the RCST) and the ODU (OutDoor Unit):
 - Rx to LNB,
 - Tx to BUC.
- Connect the ground wire between the antenna (back of the BUC) and the ground
- WARNING 4: before connecting power-supply and powering, check the Rx goes to LNB and Tx to BUC
- Connect the DC power-supply for C-band 5-W ODU to the EgyptSat Access terminal (AUX ODU PWR)
- Power-on the EgyptSat Access terminal -> PWR led green

WARNING 5

 IFL cable connection and disconnection have to be preformed with the RCST unit powered off

 The same applies when connecting the spectrum analyser to the LNB: spectrum analyser powered-off (see "Use of spectrum analyser")



The EgyptSat Access terminal MUST be located in an airconditioned room.

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* Sealed with vulcanic waterproof tape (self-fusing 6")

Disclaimer

If any of the 7 warnings is not properly attended to, EgyptSat refuses any responsibility or liability, as regard the proper operation of the EgyptSat Access service (No warranty applied in that case)

V. Commissioning

Before commissioning the EgyptSat Access terminal

• <u>4 working days</u> before commissioning the EgyptSat Access terminal, please send to EgyptSat by fax or by e-mail the Commissioning Form (see Appendix 1):

- <u>– Email : commissioning</u> : activations@egyptsat.com

 - : technical support : support@egyptsat.com
- Tel :+ 33 1 45 61 54 10
- Fax : + 33 1 45 63 49 72 / 73
- EgyptSat will either send back to you an IP address (to be used for further applications – see later), or you will obtain it from the hub operator during the commissioning process

4 working days later: translate the EgyptSat Access terminal address

- Every EgyptSat Access terminal has a default Ethernet MAC address (written on a sticker at the back of the terminal)
- To access and program a EgyptSat Access terminal, this default MAC address must be translated into an IP address
- The MAC address of the EgyptSat Access terminal is always in hexadecimal format; the IP-translated address is the same, but in decimal format for the last 4 hexadecimal digits, preceded by 10.0 in decimal format
- Example: MAC address: 00.A0.94.73.27 translates to the following IP address:10.0.115.39
- (all EgyptSat Access terminals default IP address starts with

Then change the IP address of the PC to the default IP address

- Access your TCP/IP protocol for the Ethernet device on your PC
- Then change the PC IP address to the default IP address of the EgyptSat Access terminal **plus 1**
- Example:
 - Default IP address of the EgyptSat Access terminal: 10.0.115.39
 - Then change the PC IP address to 10.0.115.40
 - Subnet mask 255.255.255.0
- Connect the PC Ethernet port to the EgyptSat Access terminal Ethernet port via the crossover cable (PC and EgyptSat Access terminal powered-on)

Then start the Telnet session

Telnet to the EgyptSat Access terminal via a 'C:\' prompt (Windows) Telnet 10.0.115.39 (as per example before)
Upon request of login and password, type [Enter] (Carriage Return) each time

These are the default login and password. After the first installation, EgyptSat will change these 'root login and password' in order to ensure the security of the system.

Telnet session (continued)

Type following command, followed by [Enter] : **lmep**

(and record response, i.e. software version, for email to EgyptSat in the post-commissioning questionnaire)

• Type the following command string (followed by [Enter]):

save -f 1423250 -s 5964000 -pcr 0x365 -c
0x1029 -t -30 -pop 0x11e0001 -o 2

If the parameters are correct these parameters will be saved to NVRAM of the EgyptSat Access terminal

Exact lat and long need not be entered: they are specified in the Commissioning Form together with the MAC address of the EgyptSat Access terminal

Outcome of the Telnet session

- ODU Led green solid
 AB3 reached with the right parameters for the EgyptSat Access service
- SAT Led green blinking: not registered on the network yet, but hub already contacted
- Do not quit the Telnet session yet, since you may need to optimize your parameters with the hub:
 - Power parameter (-t 30 in the previous command line)
 - Antenna pointing fine tuning
- Wait ca. 5 minutes, during which the EgyptSat Access terminal may reboot (normal)

Finalize the commissioning (1/2)

After these 5 minutes, call the hub operator:

- Tel: + 39 0863 550304
- The hub has noticed that the EgyptSat Access terminal tries to connect to it:
 - The terminal is identified by the hub by its MAC address
 - The hub operator enters the lat/long parameters of the Commissioning Form corresponding to this MAC address
 - The hub starts to operate a "line-up feed" with the terminal
- The hub operator tells you by phone whether to modify the antenna pointing for fine tuning (increase in signal strength)

Finalize the commissioning (2/2)

- When the hub operator is satisfied with the previous operations, he will:
 - Register the EgyptSat Access terminal on the network,
 - Automatically assign a new IP address to the EgyptSat Access terminal,
 - Give you this new IP address (always by phone), unless already given by EgyptSat in response to the Commissioning Form: please note it.
- Commissioning is finished → the SAT Led must now be green solid after ca. 10 minutes (the Telnet session will automatically terminate due to the EgyptSat Access terminal IP address change) → you may hang the phone up with the hub operator
- If the SAT Led is not green solid after 10 minutes, restart the commissioning procedure from the beginning

How to proceed next

- New IP address in the EgyptSat Access terminal (see previous page)
 new IP address of the PC Ethernet port in order to communicate with the EgyptSat Access terminal
- PC IP address = IP address of the EgyptSat Access terminal (given by the hub operator) plus 1
- Example:
 - IP address of the EgyptSat Access terminal: 10.254.50.1
 - Then change the PC IP address to 10.54.50.2
 - Subnet mask 255.255.255.0
- Connect the PC Ethernet port to the EgyptSat access terminal Ethernet port via the crossover cable (PC and EgyptSat Access terminal powered-on), if not already done

Check the transmission quality (1/2)

- Telnet the RCST IP address with your connected PC (as per example of previous page: 10.254.50.1)
- Upon request of login and password, type [Enter] (Carriage Return) each time
- Type following command, followed by [Enter]:
 tcmp
- An information line is then displayed: write down the value of the following parameter: "QPSK BER"

Check the transmission quality (2/2)

- If the value of "QPSK BER" is 0 (zero) → perfect transmission quality → antenna perfectly pointed → go to *VI. Testing*
- If the value of "QPSK BER" is > 0.00001, try fine tuning the pointing of the antenna in order to reach a 0 (zero) value for the "QPSK BER" (by entering the command mentioned in the previous slide)
- If the value of "QPSK BER" is comprised between 0 and 0.00001, the quality of service and the grade of service may be below expectations: EgyptSat then denies any responsibility or liability

NB: during this all procedure, the RCST remains commissioned at the hub

VI. Testing

Performing tests

Tests have now to be carried out;

- Ping the hub IP address → check that the EgyptSat
 Access terminal is properly registered on the network
- Ping EgyptSat's server IP address
 proper Internet routing
- Ping EgyptSat's server's name → proper DNS access to the Internet backbone
- ftp test on the hub ftp server → check the EgyptSat Access service bandwidth

Ping the hub IP address

Type the following command line: ping 151.99.125.2 [Enter]
Test result:

answer from 151.99.125.2 : bytes=32 time=650ms TTL=254
Time should be around 650 ms

Ping EgyptSat's server IP address

- Type the following command line: ping 213.41.63.2 [Enter]
- Test result:
- answer from 213.41.63.2 :
 bytes=32 time=800ms TTL=254
 Time should be around 800 ms

Ping EgyptSat's server name

- Type the following command line: ping www.EgyptSat-access.com [Enter]
- Test result:

answer from 213.41.63.2 : bytes=32 time=800ms TTL=254

• Time should be around 800 ms

ftp to the hub ftp server

- Type the following command line: ftp 151.99.125.2 [Enter]
- Type at *prompt*: *login:* test *password:* test
- Type at *prompt*: *ftp>* hash
 - ftp> get 1mb.pak

• Test result:

ftp 1000000 bits transferred in X seconds :
 rate Y kbytes/s

• Rate should correspond to the grade of service

[Enter] [Enter]

[Enter] [Enter]

Post installation Process

You now have to fill out the as-installed questionnaire (Appendix 2) and send it electronically to EgyptSat at the following email address:

activations@EgyptSat.com

VII. Miscellaneous

Useful Commands during a Telnet session

- tclgets
- temp
- prt termexec
- save -0 1
- save -t -1 to -25
- **hw**
- Imep

?

terminal status **QPSK ber, forward carrier status** hub, receive, transmit, etc status turns ODU on range of transmit attenuation hardware reset software & firmware versions gives full command list

Glossary

BUC		Block Up Converter = the RF emission unit
DVB		digital video broadcast
DC		Direct current
GPS		Global Positioning System
Hub		10 meters antenna in Italia
IDU		Indoor Unit = RCST
IFL		InterFacility Link (the final cables between the RCST and the antenna)
LNB		Low Noise Block = the RF reception unit
MAC add	ress :	Medium Access Control adress
ODU		Outdoor Unit = antenna + BUC + LNB + reflector + mechanical parts
OS		Operating System
PC		Personal Computer
QPSKBEI	R :	Bit Error Rate measurement on the satellite link
RCST		Remote Channel Satellite Terminal : the EgyptSat Access terminal
Rx		Reception
Tx		Transmission

EgyptSat contact points

EgyptSat Access:

EgyptSat phone: commissioning : technical assistance : +33 1 45 61 54 10 activations@EgyptSat.com support@EgyptSat.com

Thank you for your attention

And

Enjoy your new broadband Internet access !!

VIII. Appendixes

Appendix 1: Commissioning Form (in Word format: double-click on the form below)

Appendix 2: as-installed questionnaire (in Word format: double-click on the form below)