Radio Spectrum Guidelines

Satellite Earth Stations

September 2021

Issue No. 1.0

National Telecommunications Regulatory Authority (NTRA)
P O Box 12577, CAIRO, Arab Republic of Egypt (EGY)
www.tra.gov.eg

Document History

Version	Issue date
1.0 (Active)	May 2022

1 Introduction

Satellite earth stations are the ground component of the satellite network and they are responsible for communicating with the satellite to transmit data from the user to the satellite or vice versa, it works to provide means of communication where needed. It communicates with the satellite by sending and receiving radio waves in the frequency bands on which the satellite operates. The location of the earth stations may be fixed or mobile depending on the service provided.

Broadcasting satellite reception is widely available in Egypt, as broadcasting satellite TV channels are typically found in every home equipped to receive the broadcasting content that is being sent from the satellite, and the signal it receives is translated into visual or audible content.

In addition to broadcasting satellite reception, other types of satellite communications are also utilized in Egypt, such as the stations that provide fixed-satellite services, mobile-satellite services and Earth Exploration satellite service.

2 Definitions

The terms, words and expressions used in this regulatory document shall have the defined meaning clarified in the Telecommunications Regulatory Law No. (10) of 2003. In addition, this document provides terms and phrases that are defined as follows:

2.1 **The State**: The Arab Republic of Egypt, including its geographical borders, territorial waters and airspace.

2.2 **NTRA**: National Telecommunication Regulatory Authority regulating the telecommunication sector in Egypt pursuant to the provisions of the Egyptian telecommunications law No. (10) of 2003.

2.3 **Applicant:** any person who can apply for a frequency license in accordance with the Egyptian telecommunications law No. (10) of 2003.

2.4 **Operator:** the entity which provide the telecommunication service through Earth station.

2.5 **Radio**: A general term applied to the use of radio waves.

2.6 **Station:** one or more radiocommunication transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment.

2.7 **ITU (International Telecommunication Union):** A leading United Nations agency regulating information and communications technologies on the international level.

2.8 **Earth Station:** a station located either on the Earth's surface or within the major portion of the Earth's atmosphere and is intended for communication with one or more Space Stations, or with one or more stations of the same kind by means of one or more reflecting Satellites or other objects in space.

2.9 **Harmful interference**: The effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radiocommunication system, manifested by any performance degradation, misinterpretation, or loss of information by another radio device which could be extracted in the absence of such unwanted energy.

2.10 **Minimum Distance:** the distances from Low-water Mark as specified in Resolution 902 (WRC-03) in the Radio Regulations.

2.11 **FSS (Fixed Satellite Service):** Radiocommunication service between earth stations at given positions, when one or more satellites are used; the given position may be a specified fixed point or any fixed point within specified areas; in some cases, this service includes satellite-to-satellite links, which may also be operated in the inter-satellite service; the fixed-satellite service may also include feeder links for other space Radiocommunication services.

2.12 **MSS (Mobile Satellite Service):** A Radiocommunication service between mobile earth stations and one or more space stations, or between space stations used by this service or between mobile earth stations by means of one or more space stations. This service may also include feeder links necessary for its operation.

2.13 **BSS (Broadcasting Satellite Services):** A Radiocommunication service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public.

2.14 **EESS (Earth exploration satellite service):** A Radiocommunication service between earth stations and one or more space stations, which may include links between space stations, in which information relating to the characteristics of the Earth and its natural phenomena, including data relating to the state of the environment.

3 Legal Considerations

3.1 The guidelines contained in this document are issued by NTRA according to articles of the Telecommunications Regulatory law No. (10) of 2003 and subsequent ministerial decisions.

3.2 NTRA has the right to modify any of the guidelines contained in this document.

4 Scope of Implementation

This document comprises spectrum usage requirements and the technical conditions for earth stations operations in Egypt. It shall be read in conjunction with the following documents:

4.1 National Frequency Allocations Table.

4.2 Aeronautical Radio Systems guidelines.

4.3 Maritime Radio Systems guidelines.

4.4 Satellite Networks International Coordination guidelines.

5 Spectrum Authorization for Earth Stations

5.1 The applicant shall provide NTRA with the operational information for the earth station including the location and the technical characteristics of the station in addition to the technical information of the space station associated with this earth station.

5.2 Earth Station spectrum use will be authorized to the following types:

5.2.1 **Generic earth station:** Earth station located at fixed locations with antenna diameter of typically 2.4 meters and above for communications via satellites. This earth station can be used for:

5.2.1.1 Fixed satellite service transmissions.

5.2.1.2 Broadcasting satellite service transmissions.

5.2.1.3 Earth exploration satellite service transmissions.

5.2.2 **VSAT earth station:** Earth station with antenna diameter of typically less than 2.4 meters installed at fixed location for communications via satellites. This earth station is used to provide data relay services from one fixed location to another.

5.2.3 **ESIM earth station:** Earth station used while in motion for communications via satellites. This earth station is used on the moving platform to provide broadband Internet services using Ka band, it is currently classified into three types: Earth stations on land (Land ESIM), at sea (Maritime ESIM) and in the air (Aeronautical ESIM).

5.2.4 **ESV earth station:** Earth station installed on a ship for communications via satellites. This earth station is used to provide internet services to the ship using C & Ku bands.

5.2.5 **AES earth station:** Earth station installed on an Aircraft for communications via satellites. This earth station is used to provide Internet services to the aircraft using C & Ku bands.

5.2.6 **GMPCS terminal:** Small terminal used to provide mobile communications to its bearer via satellites.

5.2.7 **SNG earth station:** Earth station installed at fixed location with antenna diameter of typically less than 2.4 meters and used for TV content transfer via satellites and can be transported to different locations while note operating. This earth station is used by the broadcasting providers to transfer live events to a studio or directly to a broadcasting satellite

6 Spectrum Coordination and Notification for Earth Stations

6.1 Coordinating frequency bands for Earth Stations at the national, regional and international levels shall be made through NTRA.

6.2 Notifying and registering Radio Frequencies in the ITU shall be made through NTRA according to the procedures outlined in the Radio Regulations and the guidelines issued by NTRA for the Satellite Networks International Coordination.

6.3 The applicant or the operator of the earth station shall support the coordination procedures conducted by NTRA.

6.4 Earth Station shall comply with the coordination agreements of the Satellite Networks with which this Earth Station is associated.

7 Regulatory Requirements and Spectrum Usage

7.1 Earth stations shall be designed, constructed, maintained and operated in such a way that its use does not cause any harmful interference.

7.2 Earth stations are required to conform to all conditions mandated within the license issued by NTRA for the earth station. Where needed, the earth station may be required to implement additional measures to reduce the potential for causing interference to other operational systems.

7.3 The applicant shall provide an explanation of the purpose of use and the frequency bands requested to be used by earth station.

7.4 Users authorized to install and operate earth stations must ensure that their equipment meet planning requirements and obtain the necessary approvals from NTRA or from other relevant government entities.

7.5 All earth stations shall comply with the coordination agreements of the Satellite Networks for which the corresponding earth station is associated with.

7.6 Users authorized to install and operate earth stations shall abide by the instructions issued by NTRA regarding the operation of the station, whether technical or organizational it deems necessary to protect Egyptian sovereignty.

7.7 The emissions of earth stations shall, as far as practicable, be restricted to cover the territories of the Arab Republic of Egypt on the geographical borders of the Egyptian territory.

7.8 The table below lists the exiting designated frequency bands for the different types of earth stations in Egypt:

Earth station type	Frequency range	Regulatory requirements
GMPCS terminal	1518 – 1559 MHz 1618 – 1660 MHz	RR Resolution 25 (WRC-03) ITU-R Recommendation ITU-R M.1343 ITU-R Recommendation ITU-R M.1480
VSAT	3800 – 4200 MHz (Space-to-Earth)	ITU-R Recommendation ITU-R S.524
	5500 – 6750 MHz (Earth-to-Space)	
	10.95 – 11.20 GHz (Space-to-Earth) 11.450 – 11.700 GHz 12.20 – 12.750 GHz (Space-to-Earth)	
	13.75 – 14.47 GHz (Earth-to-Space)	
	17.70 – 21.20 GHz	
	27.50 – 31.00 GHz	
	51.4 – 52.4 GHz	
ESIM	17.7 – 19.7 GHz (Space-to-Earth) 27.5 – 29.5 GHz (Earth-to-Space)	RR Resolution 169 (WRC-19)
	19.7 – 20.2 GHz (Space-to-Earth) 29.5 – 30.0 GHz (Earth-to-Space)	RR Resolution 156 (WRC-19)
AES	5925 – 6425 MHz (Earth-to-Space) 14 – 14.5 GHz (Space-to-Earth)	Recommendation ITU-R M.1643 (14 GHz)
ESV	5925 – 6425 MHz (Earth-to-Space) 14 – 14.5 GHz (Space-to-Earth)	RR Resolution 902 (WRC-03) Recommendation ITU-R S.1587
SNG	10.95 – 11.2 GHz 11.45 – 11.7 GHz 12.2 – 12.75 GHz 13.75 – 14.75 GHz	ITU-R Recommendation ITU-R SNG.770

Earth exploration earth station	435 – 438 MHz	
	8025 – 8400 MHz (Earth-to-Space) 2200 – 2290 MHz (Space-to-Earth)	RR Resolution 750 (WRC-19)
Broadcasting satellite earth station	11.7 – 12.5 GHz (BSS) 21.4 – 22 GHz (BSS)	
	17.3 – 18.1 GHz (BSS feeder link)	

7.9 Generic Regulatory Rules:

7.9.1 The operator should be a registered corporate body to conduct business related to providing a satellite service within the Arab Republic of Egypt.

7.9.2 Obtaining a license from the National Telecommunications Regulatory Authority to provide the required service in accordance with the frequency spectrum assigned by the NTRA.

7.9.3 Provide the required technical information regarding the earth station with an explanation of the purpose of use and the frequency bands will be used by earth station, as well as the data related to the space station to which the earth station will communicate.

7.9.4 Obligation to operate any earth station licensed in accordance with the provisions of the Radio Regulations issued by the International Telecommunication Union (ITU)

7.9.5 The operators of earth stations shall comply with all conditions stated in the license granted as appropriate.

7.9.6 Not to operate and use the earth station in services not covered by the license granted to the service provider and/or operator.

7.9.7 The earth station operator must commit that the earth station shall not cause any harmful interference with other systems inside the Egyptian territory.

7.9.8 The earth station operator shall obtain prior written approval from the National Telecommunication Regulatory Authority in the event of modifying any characteristics or specifications of the earth stations used.

7.9.9 It is not permissible to operate earth stations inside the Egyptian territories without prior license from the National Telecommunication Regulatory Authority. In the event that otherwise occurs, the following shall be taken:

I. In the event that there are unlicensed transmissions on its territory, the Egyptian administration represented by the National Telecommunication Regulatory Authority shall take all appropriate measures available to it and within the limits of its ability to cease these transmissions.

II. If the matter is not resolved, the NTRA may contact the notifying administrations of the satellite networks or systems that may be associated with these transmissions of the details of those transmissions, if available; The notifying administrations of these satellite networks or systems shall cooperate with the Egyptian administration, to the extent possible, in order to resolve the matter in a satisfactory and timely manner.

7.10 Generic Technical Requirements:

7.10.1 Large number of frequency bands that are allocated in NFAT to satellite radiocommunication services are also allocated to terrestrial radiocommunication services. Therefore, the specific utilization of these co-allocated frequency bands is subject to the relevant intra/inter-service sharing considerations stipulated in the relevant provisions of ITU Radio Regulations and ITU-R recommendations. ITU Radio Regulations provisions in Articles 21 and 22 shall be applied, in particular the following:

7.10.1.1 Earth station antennas shall not be used to transmit at elevation angles less than the value specified in ITU RR 21.14 measured from the horizontal plane in the direction of the maximum radiation.

7.10.1.2 Maximum isotopically radiated power (e.i.r.p) limits for Earth station as given in ITU Radio Regulations 21.8 to 21.13 shall not be exceeded.

7.10.1.3 The level of off-axis equivalent isotopically radiated power (e.i.r.p.) emitted by any earth station operating with a space station in GSO fixed-satellite service shall not exceed those limits specified in ITU Radio Regulations 22.26 to 22.39 in the frequency bands where these limits are applied.

7.10.1.4 The equivalent power flux-density limits (ePFD) in ITU Radio Regulations Article 22 shall not be exceeded by earth station operating with a NGSO space station.

7.10.2 The equivalent isotopically radiated power (e.i.r.p.) density of emissions limits as given in ITU Radio Regulations 5.503 shall not be exceeded by earth station in the fixed-satellite service operating with a space station in GSO in the frequency band 13.77 - 13.78 GHz.

7.10.3 The minimum antenna diameter, power flux density and (e.i.r.p.) limits given in ITU Radio Regulations 5.502 shall be met by earth station operating with a space station in GSO fixed-satellite service in the frequency band 13.75 – 14 GHz.

7.10.4 A minimum diameter of 4.5 meters as given in ITU RR 5.502 shall be met by earth station operating with a space station in NGSO fixed-satellite service in the frequency band 13.75 – 14 GHz.

7.10.5 The minimum performance for an antenna radiation pattern according to the relevant ITU-R Recommendations (e.g., ITU-R S.580) shall be met by earth station. The antenna pattern shall be provided by the applicant.

7.10.6 earth station operator licensed to install and operate earth stations must provide a point of contact in the event of an emergency that may occur, such as the occurrence of harmful interference to other systems or any matters that may threaten Egyptian national security.

7.10.7 the earth station operator licensed to install and operate earth stations is obligated to immediately cease the operation of the earth station if NTRA requests that, as a result of the station causing interference to other systems or for any purposes that NTRA deems appropriate to protect national sovereignty.

7.10.8 The earth station operator shall obtain NTRA prior written approval in case it uses satellites or additional capacities other than those stipulated and determined by the NTRA.

7.11 Specific Conditions:

7.11.1 Earth station operating for Broadcasting satellite transmissions:

7.11.1.1 The operator is committed to establish earth stations operating in broadcasting services (BSS) within the borders of the Arab Republic of Egypt to control and monitor the Licensed Satellite service.

7.11.1.2 The regulatory and technical requirements stipulated in ITU Radio Regulations in Appendices (AP30-AP30A) shall be applied by the earth station operating as Broadcasting satellite.

7.11.2 Earth stations operating in the fixed-satellite service (VSAT):

7.11.2.1 VSAT operator shall own its central sub-station in the satellite station to provide VSAT services, and in the event of changing the location of the central sub-station or establishing another central sub-station, the earth station operator is obligated to obtain written approval from NTRA before constructing and using it.

7.11.2.2 VSAT operator shall construct a Network Management System (NMS) that allows it to monitor the efficiency and performance level of the service, under scope of the license, and enables it know the data of the network customers, and be notified of the occurrence of any failure or drop during the internet connectivity or be informed of the seamlessness of the satellite service.

7.11.2.3 VSAT operator shall comply with the following limits upon approval of his licensing request:

7.11.2.3.1 To comply with the technical limits stipulated in footnote 5.555C of the Radio Regulations regarding technical values for earth stations used in the provision of fixed-satellite services in the frequency band 51.4-52.4 GHz.

7.11.2.3.2 The provisions of Resolution 163 (WRC-15) regarding the deployment of earth stations in some countries of Regions 1 and 2 in the frequency band 14.5 - 14.75 GHz in the fixed-satellite service (Earth-to-space) other than the feeder links of the broadcasting satellite service

7.11.2.3.3 Adhere to provisions in Recommendation ITU-R S.524 which include maximum levels of radiated power density (e.i.r.p) earth station has off-axis the main beam in geostationary-satellite orbit networks operating in the fixed-satellite service in the frequency bands of 6 GHz, 13 GHz, 14 GHz and 30 GHz.The operator shall have the facility to disable individual terminal transmission.

7.11.3 ESIM operating in the fixed-satellite service:

7.11.3.1 The use of ESIM shall be in accordance with ITU RR Resolution 156 (WRC-15) in frequency ranges 19.7 – 20.2 GHz (space-to-Earth) and 29.5 - 30 GHz (Earth-to-space).

7.11.3.2 The use of ESIM shall be in accordance with ITU RR Resolution 169 (WRC-19) in frequency ranges 17.7 – 19.7 GHz (space-to-Earth) and 27.5 – 29.5 GHz (Earth-to-space).

7.11.3.3 The ESIM operator shall obtain prior written approval for communicating with any space station.

7.11.3.4 The earth stations in motion shall be subject to the coordination agreements of the typical earth stations of the satellite network to which they are communicate with.

7.11.3.5 The ESIM operator need to take into account ITU-R S.2223 Report when operating earth stations in motion, which includes the technical and operational requirements for earth stations in the fixed-satellite service connected with geostationary satellites (GSO) on mobile platforms in the frequency bands of 17.3 - 30 GHz.

7.11.3.6 The ESIM operator need to take into account ITU-R S.2261 Report when operating mobile stations, which includes the technical and operational requirements for earth stations in the fixed-satellite service and connected with non-geostationary satellites (NGSO) on mobile platforms in the frequency ranges of 17.3 - 19.3 GHz 19.7-20.2GHz, 27-29.1GHz, 29.5-30GHz.

7.11.3.7 The ESIM operator need to provide a commitment to comply with the following:

7.11.3.7.1 That ESIM characteristics shall remain within the envelope of characteristics of the typical earth stations associated with the satellite network with which earth stations in motion communicate with respect to the satellite networks and systems of other administrations.

7.11.3.7.2 That ESIM shall have the necessary means to track the geostationary satellite during the ESIM movement and to avoid transmitting to any satellites not authorized by the National Telecommunication Regulatory Authority.

7.11.3.7.3 That ESIM operator shall take the necessary measures so that ESIMs are subject to permanent monitoring and control by a network control and monitoring Centre (NCMC) or equivalent facility, and are capable of receiving and acting upon at least “enable transmission” and “disable transmission” commands from the NCMC or equivalent facility; Taking into account the changes in the equivalent radiated power transmitted from these earth stations

7.11.3.7.4 That measures shall be taken when needed to limit the operation of ESIM stations to the territories under the jurisdiction of the Egyptian administration if it permits the operation of these stations, including the territorial waters and national airspace.

7.11.4 ESV operating in the fixed-satellite service:

7.11.4.1 ESV operator shall obtain prior written approval for communicating with any space station.

7.11.4.2 ESV operator shall provide a commitment not to operate the earth station in the regional waters, without permission from NTRA.

7.11.4.3 ESVs shall be operated only within the minimum distances as specified in Resolution 902 (WRC-03) in the Radio Regulations.

7.11.4.4 ESVs may be required to implement additional regulatory or technical requirements as set by NTRA while in operation within the minimum distances referred to in 7.10.4.3 above.

7.11.4.5 When an ESV is operated outside the regional waters, but within the minimum distances and does not comply with the conditions specified by NTRA, that ESV shall be required to cease its transmission immediately.

7.11.4.6 ESV operator needs to take into account Recommendation ITU-R S.1587 regarding technical characteristics of ESVs communicating with FSS satellites in the frequency bands 5925-6425 MHz and 14-14.5 GHz .

7.11.4.7 ESV operator needs to follow methodologies indicated in Recommendation ITU-R S.1857 to estimate the off-axis E.I.R.P. density levels and to assess the interference towards adjacent satellites resulting from pointing errors of vehicle mounted earth stations in the 14 GHz frequency band.

7.11.4.8 ESV operator needs to follow ITU-R Recommendation SF.1649 to assess the interference potential between ESVs and Fixed Service stations within the minimum distance.

7.11.4.9 ESV operator should utilize the necessary means to track the geostationary satellite during the movement of the station and avoid communications with any satellite not authorized from NTRA to provide communication service.

7.11.5 AES in the fixed-satellite service:

7.11.5.1 AES operator shall obtain prior written approval for communicating with this space station.

7.11.5.2 The AES operator shall provide a commitment not to operate earth stations on aircraft within the regional airspace, without permission from NTRA.

7.11.5.3 The AES operator needs to consider Recommendation ITU-R M.1643 regarding the technical and operational requirements for aircraft earth stations of aeronautical mobile-satellite service including those using fixed-satellite service network transponders in the band 14-14.5 GHz (Earth-to-space)

7.11.5.4 These stations shall not claim any protection from the operating systems or impose restrictions on the development of the terrestrial systems. And in the event of any harmful interference, the earth station shall be switched off immediately

7.11.5.5 AES operator should utilize the necessary means to track the geostationary satellite during the movement of the station and avoid communications with any satellite not authorized from NTRA to provide communication service.

7.11.6 GMPCS terminal operating in the mobile-satellite service:

7.11.6.1 The GMPCS operator shall abide by the technical and regulatory provisions of the International Telecommunication Union (ITU) as well as the technical and regulatory rules established by the NTRA with regard to providing mobile satellite services in the Arab Republic of Egypt to prevent any interference between other Egyptian systems operating in the same frequency band.

7.11.6.2 In addition, The GMPCS operator shall comply with the provisions stipulated in Resolution 25 (WRC-03) of the ITU Radio Regulations regarding to the operation of global satellite systems for personal communications.

7.11.6.3 Recommendation ITU-R M.1343 provide Essential technical requirements of mobile earth stations for global non-geostationary mobile-satellite service systems in the band 1-3 GHz.

7.11.6.4 Recommendation ITU-R M.1480 provide essential technical requirements of mobile Earth stations of geostationary mobile-satellite systems that are implementing the Global mobile personal communications by satellite (GMPCS) in the band 1-3 GHz.

7.11.7 SNG earth stations:

7.11.7.1 The applicant shall obtain prior agreement from the satellite operator with which it intends to associate the earth station with and submit this agreement to NTRA.

7.11.7.2 The applicant shall be responsible to obtain all the necessary media production, filming and shooting permissions from the relevant authorities.

7.11.7.3 The applicant should provide a point of contact available 24 hours all days to ease the coordination procedure with the NTRA and set the necessary procedure towards the station in case of emergencies.

7.11.7.4 SNG earth station operating with a space station in GSO fixed-satellite service in the frequency band 13.78-14 GHz must have a minimum antenna diameter of 1.2m. Earth stations with an antenna diameter of less than 4.5m will be operated on a non-interference basis with respect to maritime radiolocation stations in accordance with ITU-R radio regulation RR 5.502.

7.11.7.5 SNG earth station shall comply with the harmonized operational procedures, related with the digital accumulation for the news via satellite available in ITU Recommendation SNG.770

7.11.7.6 The operator of SNG earth station should provide the following information:

7.11.7.6.1 The type of the service.

7.11.7.6.2 The positions of the broadcast and location of the station.

7.11.7.6.3 The satellite which communicate with the station.

7.11.7.6.4 The time and duration of transmission for the station.

7.11.7.6.5 The technical information of the station while transmitting.

7.11.8 Generic earth station operating in the earth exploration satellite service:

7.11.8.1 The station in the earth exploration satellite service in the frequency band 401-403 MHz shall comply with the technical limits stipulated in footnote 5.264A of Radio Regulation.

7.11.8.2 The EESS operator should comply with the resolution 750 (WRC-19) regarding the technical values for computability between the earth exploration satellite service (active) and the other active services.

7.11.8.3 The use of sensors used in the EESS (active) of the frequency band 432-438 MHz shall be in accordance with Recommendation ITU R RS.1260.

7.11.8.4 Earth exploration earth stations operating in the frequency band 8025-8400 MHz shall be in accordance should not exceed the following power flux density for angles of arrival above the horizontal plane (θ) as stipulated in footnote 5.462A.

I. -135dB(W/m2) for BW=1MHz

II. -135+0.5(θ-5)Db(W/m2) for BW=1MHz

III. -125 Db(W/m2) for BW=1MHz.

Appendix 1: list of acronyms

- NTRA: National Telecommunication Regulatory Authority.
- ITU: International Telecommunication Union.
- GSO: the Geo-Stationary Orbit of a Satellite.
- NGSO: the Non-Geostationary Orbit of a Satellite.
- FSS: Fixed Satellite Service.
- MSS (Mobile Satellite Service): Mobile Satellite Service.
- BSS: Broadcasting Satellite Services).
- EESS: Earth exploration satellite service
- VSAT: Very Small Aperture Terminal.
- ESIM: Earth Station in Motion.
- ESV: Earth Station onboard Vessels.
- AES: Aircraft Earth Station.
- GMPCS: Global Mobile Personal Communication by Satellite.
- SNG: Satellite News Gathering.