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East African Communications Organisation

Communications for all in East Africa

EACO HARMONIZED LICENSING FRAMEWORK FOR SATELLITE SERVICES AND TERMINALS

Prepared by EACO

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Acronyms

FSS	Fixed Satellite Services
ESIMs	Earth Stations in Motion
WRC	World Radiocommunication Conference
GSO	Geo Stationary Orbit
GMPCS	Global Mobile Personal Communication by Satellite
NCMC	Network Control and Monitoring Centre
MSS	Mobile Satellite Services
NRA	National Regulatory Authority
VSAT	Very Small Aperture Terminal

1 Introduction

1.1 Background

Over the years, there have been increased efforts to find technological solutions to bridge the digital divide. In the last few years, there has been a concerted effort internationally to exploit the connectivity opportunities that provide low-cost and rapidly deployable technologies to address the digital divide. This has led to wide deployments of various types of satellite terminals such as Earth Stations, Very Small Aperture Terminal (VSAT), and Earth Stations in Motion (ESIM)

The characteristics that determine the potential of such technologies include:

i. Distance independence; this makes them suited towards locations that are not easily accessible for more traditional forms of connectivity such as fixed line technologies
ii. Simplicity; installation is relatively inexpensive and rapid.
iii. Easy maintenance; maintenance costs are low, and the technical expertise needed to maintain equipment is relatively low.
iv. Low service cost; allowing for the use of applications, such as Voice over Internet Protocol (VoIP), that can reduce the service cost to low-income people.
v. Ability to cover unserved or hard-to-reach areas with traditional networks (traditional networks refer to terrestrial, cable, and submarine networks)

While Earth Stations are predominantly used by corperate institutions, VSATs and ESIMs have two categories of users.
Corporate users such as;

i. Government agencies (Information sharing, voice, and data connectivity)
ii. Banks (Facilitating transactions between remote branches).
iii. Mineral exploration and mining companies (Information sharing with remote sites)
iv. Nationwide operation companies (Voice and data connectivity)
v. Transportation and logistics operators such as aviation, sea liners, trains, and trucks, among others.
vi. Individual Users such as households, Internet Cafes, small offices, or groups. Typical uses in this category include web surfing, emails, social activities on the web, voice calls (VoIP), and research, among others.

However, some of the advantages highlighted above have created regulatory challenges and raised security concerns in many countries worldwide, including among EACO member states. Key among these has been none compliance with type-approval requirements, unauthorized importation, deployment, and illegal operation of such stations and terminals. The portable nature of these stations and terminals also creates geo-location difficulties both locally and across borders, as the terminals could be dismounted and relocated with ease.

1.2 Rational

Article 18 and section 18.1 of the ITU Radio Regulations state that; “No transmitting station may be established or operated by a private person or by any enterprise without a license issued in an appropriate form and in conformity with the provisions of these Regulations by or on behalf of the government of the country to which the station in question is subject.”

Noting the associated legal and regulatory complexities which make satellite technologies prone to abuse by individuals or entities with ill intentions and cognizant of the advantages of these technologies for bridging the digital divide by providing access and connectivity to citizens in remote locations;
EACO member states resolved to adopt a harmonized approach/framework for satellite licensing and authorization within the region. This is intended to create an enabling environment and regulatory certainty for service providers and users of these technologies within the EACO region and address the regulatory and security problems arising from the illegal importation, deployment, and operation of such terminals.

1.3 Scope

The framework covers the following aspects of satellite licensing and authorization

i. Type Approval requirements for satellite systems
ii. Landing Rights requirements and procedures
iii. Earth Stations and VSAT licensing and authorization requirements.
iv. ESIMS licensing/authorization and mutual recognition requirements.
v. Cross border Operation and Coordination

2 Type approval

It is a general regulatory practice that all telecommunication/ICT equipment must be type-approved by the NRA before being imported or put into service in the territory. The framework encourages EACO Member States to adopt internationally recognised technical standards and procedures for type approvals subject to equipment test certificates issued by recognized international certification bodies.

It is encouraged to streamline traditional processes of type approvals and equipment-registration requirements for satellite terminals. On this, Member States could seek to harmonize their approaches to type approval and equipment registration, including acceptance of testing and certification by other Member States, to lower consumer costs and enable more cost-effective access to satellite services.
The following are some of the requirements for type approval;

i. All satellite ground station equipment and end-user terminals, including ESIMs, must be type-approved by the NRA before being imported or put into service in any EACO Member state.

ii. All earth stations with EIRP above *one kW (1000 watts),* aside from obtaining equipment type approval before importation, must obtain site approval from NRA after installation of equipment. These approvals must be obtained for each site irrespective of whether such equipment was given a general type approval earlier.

iii. If national regulation doesn't provide a requirement of type approval, self-declaration of conformity by manufacturers may be accepted as an alternative to the requirement of type approval for moderate and low power equipment as may be specified in the national regulations and guidelines taking into account the provisions of the ATU-R Spectrum Recommendations 005.

iv. Depending on the provisions of a national regulation, type approval may be waived where the applicant or licensee satisfies the NRA that ITU certification has been given under the GMPCS Memorandum of Understanding regarding the equipment in use.

v. Subject to national regulations, type approval may also be granted based on the mutual recognition of equipment approvals and certificates issued by other EACO member states or by recognized international certification bodies if a member state has such provisions.

vi. Key parameters for the type approval process shall include but not limited to equipment details (*manufacturer/model/type/size, frequency, power, transmission designation, modulation technique, test reports among others*) which enable the identification of the equipment and the classification of its functions.

vii. Such technical specifications shall be the basis for the essential requirements necessary for the type approval of terminals, and compliance with such

technical requirements shall be the basis for mutual recognition of type approval.

viii. In particular, ESIMs equipment shall be required to meet all specifications in Resolution 156 (WRC-15), Reports ITU-R S.2223, ITU-R S.2357 and, possibly, ETSI EN 303 978, ECC/DEC (13)01 or other mutually agreed specifications.

ix. Such technical specifications shall be the basis for the type approval of terminals, and compliance with such technical requirements shall be the basis for mutual recognition of type approval by other member states of an approval issued by 1 (one) EACO member state

3 Landing rights

Satellite landing rights or any other similar authorization is an authorization for the space segment of a Foreign Satellite Operator system to cover the national territory of a given country and operate on its recognized, recorded frequency assignment with the ITU. Usually, this licence does not permit the provision of services to end-users, which must be covered under a separate telecommunications license. The term “Foreign Satellite Operator” refers to operators providing satellite connectivity in a country outside the jurisdiction of the satellite operator’s host country of ITU satellite registration.

3.1 Considerations for Administrations

EACO administrations are encouraged to consider the following recommendations to minimize regulatory hurdles:

i. The satellite landing rights requirement should focus on establishing direct contact between the regulator and the satellite operator without creating an additional burden to enter the market. If not implemented correctly, a landing rights regime may result in reduced choices for local service providers, insufficient capacity, and higher end-user prices.
ii. Ensure that the process of applying for and obtaining the required landing rights is neither burdensome nor expensive.
iii. Landing rights duration should be equal to the lifespan of the satellite to provide operators with the regulatory certainty required for providing satellite services to the country.
iv. Authorization requirements for the space segment should be in accordance with ITU regulatory framework, which is presumed to have already been complied with by the satellite operator's filing administration in line with the ITU relevant procedures (articles 9 and 11 of Radio Regulations).
v. No legal presence or local entity requirements should apply to foreign satellite operators as such requirements may not apply to entities that do not provide end-user services and would be cumbersome, requiring satellite operators providing connectivity solutions globally to have a presence in each territory they serve. The foreign satellite operator shall however provide the certificate of registration from their country of origin.

3.2 Landing Rights Applicants

A landing rights applicant may comply with the following requirements:

i. Formally submit an application to an EACO administration expressing its intent to obtain landing rights of the territory of the given Administration.
ii. Obtain the Administration's recognition to the effect that necessary technical coordination of orbiting parameters and the associated frequency bands with the Administration has been carried out or is being carried out in accordance with ITU Radio Regulation procedures to ensure that existing or planned satellite systems of the administration are not impacted
iii. Submit simplified technical information on the satellite system, indicating its possible uses, orbiting parameters, frequency bands, and geographical areas to be covered, (footprints), and any other relevant data.
iv. Submit any other documents issued by a competent authority showing the terms authorized in the country of origin for the use of the space segment.
v. Comply with legal and regulatory conditions and standards governing satellite use, especially the provisions in the National Telecommunications Law or the Satellite Communications Guidelines.
vi. Comply with the financial obligations such as satellite landing rights fees or any other fees and for the use of the associated radio frequencies and any related fees as may be applicable and determined by the given administration.
vii. Commit to providing any necessary support, when requested by the Administration, to complete the process of frequency coordination with other networks of authorized satellite operators and related satellite networks;
viii. Submit a certificate as a signatory of the GMPCS MoU
ix. Submit formal undertaking to the effect that it shall submit periodically to the Administration the following information:
    a) All new activations and updates (in the event that there are changes) to the space segment.
    b) Submit the degree of compliance with the quality of service parameters applicable to the provision of space segment.

4 Satellite Earth Stations and VSATs

Satellite Earth Stations and VSATS shall be used according to the rules and regulations set by the NRAs in the EACO member states in a manner that does not contradict the radio regulations. This will include obtaining required type approvals and authorizations/licenses from the NRA for the importation of terminals into the country, installation and operation of Earth stations, /or VSATS in line with the relevant national laws and regulations. The following are the general regulatory, administrative, and technical requirements for deploying and operating Earth Stations and VSATS with the territories of EACO administrations.

4.1 Administrative Requirements for Authorization/License

Any entity intending to provide commercial satellite services in the territories of any EACO Administration using Earth Stations or VSATS should take into account the following requirements;

i. The applicant should demonstrate adequate knowledge and experience in the provision of satellite services using Earth Stations and VSATs.

ii. The applicant should have sufficient financial capacity and solvency to implement the terms, conditions, obligations, and duties stipulated in the license.

iii. The applicant should have entered into a contract with the operator of satellite telecom services that it is required to work with (if the applicant is not the operator of the satellite system) or obtain the operator's written approval to work with the applicant.

iv. The applicant should have undertaken a comprehensive study of the telecom market/ industry with the following analysis:

   a. Market potential and viability, gaps, opportunities, and challenges.

   b. The size of the market, its growth rate, the market pull factors and risks, the nature of the prospective customers, and various categories.

   c. The number of competitors and their acquisition shares, in addition to the competition expected with other licensees.

v. Submit a business and operational plan including quality of service to be provided, the technical relationship with other licensees, security and maintenance works, customer service, technological solutions for emergency response, and any other technical aspects, including revenue projections

vi. Technical parameters of the satellite station including but not limited to; Capacity, physical parameters, antenna characteristics of the indoor and

outdoor units and the modulation characteristics of all the satellites planned to be used.

vii. Other conditions as may be stipulated by the NRA, such as payment of license fees, frequency fees and other annual payments, per the terms and conditions specified in the national regulations.

4.2 Earth Stations Regulatory Requirements

The operator of an earth station should be a corporate body legally registered to conduct business related to providing satellite services within the territorial boundaries of a member state or a recognized government agency. An entity interested in deployment and operation of an earth station shall endeavor to fulfill the following regulatory and administrative requirements:

i. Obtain a license from the NRA of the given country to provide the required services in accordance with that country's relevant regulations and frequency plans.

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

iii. Comply with all conditions stated in the license granted as appropriate, including implementation of additional measures upon request by the NRA to reduce interference between systems operating within the national territory or across borders.

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

v. Ensure that systems and equipment are type approved and comply with international standards and specifications and that the installation and operation are being done in line with international and national health and safety requirements.

vi. Provide a point of contact that the NRA can reach out to in the event of an emergency that may occur, such as harmful interference to other systems or any matters such as natural disaster, or other national security concerns.

vii. Abide by the technical or organizational instructions issued by the NRA regarding the station’s operation as it deems necessary to enhance security and protect national sovereignty.

viii. The operator shall, as far as practicable, restrict the operation of licensed ground transmitting stations within the territorial borders of the country it is registered in and has to could immediately cease operation of the earth station upon request by the NRA on grounds such as harmful interference to other services.

4.3 Technical Requirements for the Deployment/Operation of Earth Stations

i. The locations and frequencies of terrestrial stations and earth stations operating in the frequency bands that are shared with equal rights between terrestrial and space radiocommunication services shall be chosen in accordance with the relevant ITU-R Recommendations relating to the geographical separation between terrestrial stations and earth stations.

ii. Article 21 (terrestrial services and space services that share frequency bands above 1 GHz) and Article 22 (space services) of the International Telecommunication Union Radio Regulations contain sections that stipulate the technical characteristics of the deployment of earth stations and any operator of earth stations must adhere to the technical values stipulated in those articles, including but not limited to the following:

   a. Earth stations shall comply with the minimum elevation angle specified in Article 21.14 of the Radio Regulations.

   b. Earth station antennas shall not be used to transmit at elevation angles less than 3-degrees measured from the horizontal plane in the direction of the maximum radiation, except with the agreement of the administrations concerned and those whose services may be affected.
   c. The equivalent radiated power (e.i.r.p.) transmitted in the direction towards the horizon from an earth station shall not exceed the limits in the provisions of Articles 21.8 to 21.14 of RR.

iii. The limits stipulated above may be exceeded in a case-by-case manner by an amount not exceeding 10 dB. But suppose the requirements of the coordination area resulting from this increase extend to the territory of another country, this exceeding must be approved by the administration of that country.

iv. The minimum performance of the antenna radiation pattern of an earth station communicating with a satellite in geostationary orbit shall comply with ITU-R Recommendations (ITU-R S.580).
v. The operator of earth stations inside a national territory must abide by any additional technical values established by the NRA that protect telecommunications services, whether space or terrestrial, from harmful interferences.

4.4 Regulatory Procedures to Resolve Interference from Earth Stations

i. In the event of reported interference, the NRA may take necessary actions practicable in collaboration with the station's operator to resolve the interference in the shortest time possible.

ii. If the interference persists, the NRA may immediately contact the satellite operator, if known, or the notifying administration and seek their intervention in resolving the interference caused by the station associated with the earth station affiliated with their satellite network.

iii. If interference is not resolved, the NRA shall request assistance from the Radiocommunication Bureau of the International Telecommunication Union by the rules stipulated in the Radio Regulations.

iv. The bureau may then study the matter and send its recommendations to the NRA and a copy to the notifying administration of the satellite network with recommended actions and measures to stop this interference.

v. As a remedial course of action in line with the National Telecommunication and ICT laws and the national regulations, the Regulatory Authority may take appropriate actions such as imposing fines on the interfering operator, directing payment of compensation by the interfering operator to affected entities among others.

4.5 VSATs

The licensee shall comply with the member states' standards and regulatory requirements for deployment and operation of VSAT stations. The VSAT Operator shall be required to:

i. Obtain prior written authorization/license from NRA before deploying the VSAT station at the desired locations.

ii. Commitment to using the licensee's 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 licensee is obligated to obtain a prior written approval from NRA before constructing and using it.

iii. Ensure that service is procured only from authorized/Licensed service providers in case the VSAT user is leasing capacity from a local central hub station that is providing VSAT services in a given country.

iv. The licensee shall provide the following services within the territorial boundaries of the country in which the license is issued using its infrastructure of the VSAT system and the specified frequency ranges:

a. Voice, video, and data services, except for radio and TV broadcasting.
b. Voice services from VSAT terminal stations of the customers within the authorizing/licensing country abroad and from abroad to the customers inside the authorizing/licensing country as per the rules and conditions outlined in the license.
c. Connectivity services with the Internet per the rules and conditions outlined in the license.

v. Commitment to provide the services mentioned above throughout or in the specified parts of the licensing/authorizing country as per the terms and conditions of the license.

vi. The licensee shall have a Network Management System (NMS) that enables monitoring of the service's efficiency and performance level under the license's scope, management of network customers' data, and notification of any network failure occurrence or seamlessness of the satellite service.

vii. The licensee shall provide the VSAT Services without discrimination for any reason, and not entitled to refrain from providing the service without giving reasons that should be subject to the NRA's decision in its sole discretion.

viii. The licensee shall keep a record of the operational characteristics of all terminals in the network and Provide accurate information related to network systems and operations and subscribers, such as location, transmission strength, and any other information that the NRA may require.

ix. Maintain the security and data privacy of subscribers by the service provider and not releasing their data except in accordance with the regulations and laws of the licensing country.

x. Maintain a database of all customers to whom VSAT services are provided and periodically provide the NRA with this data when needed.

xi. Comply with the relevant provisions as stipulated in Article 21 of the ITU Radio Regulations (terrestrial and space services sharing frequency bands above 1 GHz), in particular, the maximum levels of radiated power density (eirp) stipulated in the Radio Regulations by Articles 21.8 and 21.12.

xii. Compliance with relevant provisions stipulated in Article 22 (Space Services). In particular, the maximum levels of radiated power density (e.i.r.p) specified in the Radio Regulations from 22.26 to 22.39 for frequency bands assigned to the fixed-satellite service.

xiii. Compliance with the technical limits stipulated in footnotes 5.502 and 5.503 and Article No. 21.13A of the Radio Regulations regarding technical values for earth stations that provide fixed-satellite services in the frequency band 13.75 -14 GHz.

xiv. Comply with the technical limits stipulated in footnote 5.555C of the Radio Regulations regarding technical values for earth stations used to provide fixed-satellite services in the frequency band 51.4-52.4 GHz.

xv. Compliance with 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

xvi. Adhere to provisions in Recommendation ITU-R S.524-9, 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.

4.6 Regulatory Actions Against Unauthorized/Unlicensed Earth Stations and VSATs

i. In the event of unauthorized deployment and operation of earth stations and VSATs within the territorial boundaries of a given country, the NRA of that member state may take all appropriate measures available to it and within the limits of its ability to cease these unauthorized transmissions.

ii. If the matter is not resolved, the NRA may consult with other EACO member states for further guidance and/or assistance to inhibit the operation of the illegal earth station.

iii. If that the source of the interference and its location is determined, the responsible satellite operator and notifying administration known the NRA may contact the notifying administration of the satellite networks or systems that may be associated with these unauthorized earth stations if known and share with them the details of the station and related transmission parameters.

iv. The NRA may request the notifying administration and/or the satellite operator to take the necessary measures to stop transmission by the unauthorized station immediately.

v. If available, the notifying administrations of these satellite networks or systems shall cooperate with the NRA to the extent possible to resolve the matter satisfactorily and timely as stipulated in Resolution 22 (WRC-19).

vi. NRA may, within its mandate as stipulated in the relevant Telecommunication and ICT laws and line with national regulations, take appropriate legal actions such as arrest and/or imprisonment of the unauthorized operator, confiscation of equipment, fines, or any course of action that may be deemed appropriate as the law stipulates.

5 Domestic Licensing and Mutual Licence Recognition of Earth Stations in Motion (ESIMs)

ESIM technology has become widely deployed around the globe to serve the growing need for access to broadband connectivity to passengers and crew on board aeroplanes, maritime vessels, and land vehicles.

In terms of regulations, it has been widely agreed that there is more benefit from a harmonized approach to regional licensing and seamless movement of ESIMs among the Member States while complying with local rules and regulations. Currently, the technology allows the following applications:

i. ***Maritime:*** ESIM service provision can be tailored to the needs of the maritime industry, providing services to the crew and passengers (voice and internet browsing), the ship management (cargo monitoring and mechanical supervision), and the safety and security of the vessel (video monitoring, access to real-time weather and updated navigation charts).

ii. ***Aeronautical***: ESIMs can meet the industry's requirements by providing a truly global high-speed connectivity solution for the aeronautical sector. In addition to in-flight entertainment and broadband internet access, satellite connectivity also provides improved operational efficiencies for airlines, allowing them to communicate with cabin crew and non-safety-related systems on board the aircraft.

iii. ***Disaster relief:*** ESIMs are especially well suited to support emergency preparedness/disaster relief communications when terrestrial networks are unreliable or fail. In addition to providing high-bandwidth to affected users, it can provide backhaul to restore terrestrial communications.

iv. ***Government:*** ESIMs is ideal for expanding the potential for high-bandwidth applications such as live video, remote networks, and sensors. Offering outstanding quality, global coverage, and seamless mobility, ESIMs can support government users on land, at sea, and in the air.

v. ***Media:*** High-bandwidth, reliable, ubiquitous communications, which ESIMs can provide, are also essential to media users covering fast-breaking events, such as natural disasters, sporting events, civil unrest, and other media events.

5.1 Administrative Guidelines on the Licensing of ESIMs

i. An administration may authorize the use of the foreign satellite terminal within its territory on the understanding that the foreign satellite operator of the FSS/MSS has been issued with a license to provide satellite services within the territories of the given administration.

ii. Licenses duly issued by any EACO member state to be recognised within the territories of other member states to grant the possibility for ESIMs to circulate across borders provided the Satellite Operator giving service to the ESIMs has landing rights in the territories of the other EACO administrations

iii. Administrations should consider licensing ESIMs without requiring individual terminal-by-terminal authorization (e.g., on a class or blanket licensing basis).

iv. Both licensing/authorising administrations and administrations in whose territories the ESIMs operate should undertake regular inspections of the ESIMs to verify compliance with applicable regulations and confirm requirements such as license/authorisations validity and type approval certificates.

v. Duly licenced ESIM terminals by 1 (one) EACO member state should be exempted from customs and taxes in the visited member states when they are to operate temporarily.

vi. The duration for such temporary operation of an ESIM terminal in a given member state should be 3 months to curb abuse and illegal activities.

5.2 ESIMs Regulatory Requirements

Any entity interested in the deployment and operation of ESIMs shall endeavour to fulfill the following regulatory and administrative requirements:

ix. Obtain a license from the NRA of a given EACO member state to provide the required services in accordance with that country's relevant regulations and frequency plans.

x. Provide the required technical information regarding the ESIMs with an explanation of the purpose of use (Land, maritime, aeronautical) and the frequency bands to be used by the earth station, as well as the data related to the space station to which the earth station will communicate.

xi. Comply with all conditions stated in the license granted as appropriate, including implementation of additional measures upon request by the NRA to reduce interference between systems operating within the national territory or across borders.

xii. Ensure that systems and equipment are type approved and comply with international standards and specifications and that the installation and operation are in line with international and national health and safety requirements.

xiii. Provide a point of contact that the Licensing Authority can reach out to in the event of an emergency that may occur, such as harmful interference to other systems or any matters such as emergency, natural disaster, or other national security concerns.

xiv. Abide by the technical or organizational instructions issued by the NRA regarding the station's operation as it deems necessary to enhance security and protect national sovereignty.

5.3 ESIMs Regulatory Conditions

i. The operation of the ESIM (land, maritime and aeronautical) within the territory, territorial waters, and airspace under the jurisdiction of EACO member states shall be carried out only if authorized by at least 1 (one) EACO administration and mutually recognised by the other EACO administrations

ii. ESIM may operate in three environments: a) land (receive/transmit), b) vessel (receive/transmit), and c) aircraft (receive/transmit). In these three environments, ESIM can operate while stationary and in motion, under the terms and conditions specified in the Radio Regulations and as authorized by the regulatory authority, and shall be capable of operating in a closely spaced GSO/NGSO environment.

iii. Any airplane, ship, or vehicle equipped with an operating ESIM (aeronautical, maritime, or land) shall be authorized for radio communication using ESIM by the administration of the country in which the vehicle is registered.

iv. In the case of an in-country local service provider, an individual license shall be required to provision local satellite services FSS/MSS similar to that for VSAT Service providers.

v. Mutual recognition of ESIMs does not preclude the aircraft registration by the relevant national Administration and/or Civil Aviation Authority of the country where the aircraft intends to fly over or land of based on non-interference.

vi. A person in charge of a mobile platform shall operate and use the earth station only for the purpose for which the license was granted and shall be liable for any misuse.

vii. Any GSO/NGSO ESIM operator intending to deploy ESIM within the framework of these guidelines must submit to the NRA a declaration/commitment confirming that the ESIM operating complies with the technical and operational requirements set forth.

viii. ESIM operation is permitted only in the satellite networks in which frequency assignments of typical earth stations are (coordinated and notified)/recorded in the MIFR. In other cases, ESIM operation shall not be permitted;

ix. concerning to satellite networks of other administrations, ESIM shall remain within the framework of coordination agreements for frequency assignments of typical earth stations of a satellite network with which ESIM communicates.

5.4 Technical and Operational Obligations

i. ESIM operating to GSO and NGSO FSS satellite networks in the C, Ku, and Ka frequency bands shall comply with the technical, operational, and administrative requirements described in the following paragraphs.

ii. ESIM shall operate under permanent monitoring and control by a Network Control and Monitoring Centre (NCMC) or equivalent facility and be capable of receiving and acting upon at least “enable transmission” and “disable transmission” commands.

iii. The design, coordination, and operation of the ESIM shall take into account the following factors:

   a. antenna mis-pointing;

   b. variations in the antenna pattern;

   c. variations in the transmit e.i.r.p

iv. ESIM shall use techniques to track the associated GSO/NGSO FSS satellite; when using closed-loop tracking of the satellite signal, ESIM shall employ an algorithm resistant to capturing and tracking signals from other satellite systems. The earth stations must immediately cease transmissions when they detect that unintended satellite tracking has happened or is about to happen.

v. ESIM shall automatically cease transmissions immediately on receiving any “parameter change” command, which may cause harmful interference during the change until it receives an “enable transmission” command from its NCMC. In addition, it should be possible for the NCMC to monitor the operation of an ESIM to determine if it is malfunctioning.

vi. ESIM also needs to be self-monitoring, also need and should a fault which can cause harmful interference to FSS networks to be detected, the earth station must automatically mute its transmissions.

vii. The ESIM system shall include means of identification and mechanisms to immediately cease emissions whenever the station does not operate in compliance with the provisions of the national regulations. Cessation of emissions shall be implemented in such a way that the corresponding mechanisms cannot be bypassed on board the vessel or the aircraft, except in case distress or emergency or to assisting at a station in pain, to attract attention, make known the condition and location of the station in distress, and obtain or provide assistance (implementation of provisions of RR No. 4.9).

viii. ESIM shall conform to the applicable standards as approved by the authorizing administration.

ix. ESIM shall be equipped to:

a. enable the licensing administration under the provisions of RR Article 18 to verify earth station performance; and

b. enable the cessation of ESIM emissions immediately upon request by an administration whose services may be affected.

x. The operators of the satellite network with which the ESIM shall maintain a point of contact with the authority and ability to cease transmissions from any operating ESIM through a suitable network control centre and the notifying administration of the said satellite network. Permanent points of contact shall be designated and provided by the operator of satellite systems with which the ESIM communicates on a 24/7 basis to trace any suspected cases of unacceptable interference from ESIM and to immediately respond to requests from the focal point of the authorizing administration. A point of contact should be provided by the notifying administration also.

xi. When maritime ESIM operating beyond the territorial sea but within the minimum distance from the low-water mark of a coastal state, as established in the radio regulations, fails to comply with the terms required by the authorizing administration, the authorizing administration may request the ESIM to comply with such terms or cease operation immediately;

xii. Any aeronautical ESIM shall comply with the pfd limits produced at the Earth's surface on the territory of any EACO administration by emissions from single aeronautical ESIM as established in Resolution 169 (WRC-19) and other applicable ITU Resolutions approved at future conferences. Higher pfd levels produced by emissions from a single aeronautical ESIM at the Earth's surface shall be subject to the prior agreement of the NRA.

xiii. The authorization (permission to use the frequencies for aeronautical ESIM operation), in addition to the license for radio communication using ESIM to the aircraft on which the ESIM operates issued by the country that the aircraft is registered, shall be sought from the administration well before the aircraft equipped and operating ESIM flies over the airspace of administration.

xiv. Concerning to the compatibility of aeronautical ESIM with other radiocommunication services, the concepts of non-interference and non-protection concerning terrestrial services operating by the Radio Regulations will apply.

xv. Any aeronautical ESIM shall comply with the pfd limits produced at the Earth's surface on the territory of the EACO administration by emissions from single aeronautical ESIM as established in Resolution 169 (WRC-19) and other applicable ITU Resolutions approved at future conferences. Higher pfd levels produced by emissions from a single aeronautical ESIM at the Earth's surface shall be subject to the prior agreement of the administration.

xvi. The authorization (permission to use the frequencies for aeronautical ESIM operation), in addition to the license for radio communication using ESIM to the aircraft on which the ESIM operates issued by the country that the aircraft is registered, shall be sought from the regulatory authority well before the aircraft equipped and operating ESIM flies over the airspace of the said administration.

xvii. Concerning to the compatibility of aeronautical ESIM with other radiocommunication services, the concepts of non-interference and non-protection concerning terrestrial services operating by the Radio Regulations will apply.

xviii. Concerning to the compatibility of land ESIM with the terrestrial services of other administrations, the land ESIM in the frequency band 27.5 - 29.5 GHz shall not cause unacceptable interference to be fixed and mobile terrestrial services in this frequency band, operating by the Radio Regulations. The land ESIM in the frequency band 17.7 - 19.7 GHz shall not claim protection from the neighbouring countries' fixed and mobile terrestrial services in this frequency band, operating by the Radio Regulations.

xix. The maritime ESIM shall not operate within the minimum distance (70 km from the low-water mark) beyond which the maritime ESIM can operate without the prior agreement of administrations unless otherwise provided in these guidelines or exempted. Maritime ESIM should also comply with the e.i.r.p. spectral density limit, as established in Resolution 169 (WRC-19) and other applicable ITU Resolutions approved at future conferences.

xx. Any transmissions from maritime ESIM on board vessels within the minimum distance or with higher e.i.r.p. spectral density levels shall be subject to the prior agreement of the NRA. This obligation takes effect when the vessel operating the maritime ESIM is located in international waters within the minimum distance (70 km) under the sovereignty of the concerned EACO administration.

6 References

i. Article 21 (terrestrial services and space services that share frequency bands above 1 GHz) and

ii. Article 22 (space services)

iii. Resolution 163 (WRC-15): Deployment of earth stations in some Regions 1 and 2 countries in the frequency band 14.5-14.75 GHz in the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service.

iv. RESOLUTION 22 (WRC-19): Measures to limit unauthorized uplink transmissions from earth stations

v. Recommendation ITU-R S.524-9

vi. Recommendation ITU-R SF.765