RESPONSE FROM SHG TO CONSULTATION ON LICENSING OF PERMANENT EARTH STATIONS AND RECEIVE ONLY EARTH STATIONS IN ST HELENA

FINAL Consultation response document

Publication Date: 19 March 2020

Contents

1. Summary

In November 2019 – January 2020, SHG issued a consultation on a proposed framework for licensing Permanent Earth Stations (PES) on the island. This consultation also looked into the possibility to recognise the use of spectrum by Receive only Earth stations (ROES). Usually, in other countries (e.g., the United Kingdom), ROES are not licenced because they do not emit any radio energy and thus cannot interfere other radio services and applications. However, in certain special situations (e.g., where the operator requires protection for its receive spectrum use), and on a case by case basis, ROES could be licensed to protect the receive spectrum from potential interference.

During the consultation one public meeting was held on 8 January 2020 to provide more information or answer questions from stakeholders. The Government of St Helena received seven responses to the consultation from the satellite and telecommunications industry, including one confidential. The seven responses have been reviewed and SHG is issuing this policy statement which sets our rules for the licensing of Permanent Earth Stations and Receive only Earth Stations.

The policy set in this document is based on the position the SHG has taken set by the consultation and the responses made by the stakeholder.

Section 2 analyses the responses from the stakeholders to the questions set in the consultation and provides our view on such responses.

The Responded to the consultation are:

- Atlas Space Operations (USA)
- Maxar Technology (USA)
- Space Exploration Holdings (USA)
- OneWeb LLC (USA)
- Swedish Space Corporation
- Sure Ltd (Channel Islamds)
- One responded requested to be kept confidential

2. Response to Stakeholder Comments and SHG's Views

The consultation asked 16 questions to stakeholders and the responses to such questions by 7 respondents are provided here. One responded asked to be kept confidential.

This section reviews these responses and provides the views and conclusions by the SHG.

1. Question 1: "Do you agree that the applicant of Permanent Earth Stations equipment should be licensed in the list of frequency bands provided in1? If not, please provide reason."

a. Summary of the Answers

Atlas Space Operations, Maxar Technology, and Space X agree. Atlas Space Operations and OneWeb suggest addressing the whole Frequency Table to facilitate any future update. OneWeb suggests that SHG retains the right to exempt some frequency ranges or to provide a blanket licensing.

SSC suggests that such a licensing will enable SHG to be aware of spectral usage and create the potential to minimize interference between earth stations.

Space X considers that the implementation of a licensing regime for PES equipment in the listed bands, notably in the Ku and Ka bands, will enable the ongoing development of innovative satellite services in St. Helena, and that care should be given to the management of interference and coordination process between the operators.

Sure Ltd suggests that SHG should ensure that current operations on St Helena are not affected, and asks how the spectrum expertise will be held in SHG. Sure Ltd notes the exceptions in paragraph 1.8 and especially 1.8.3 and 1.8.4, which may affect Sure Ltd's exclusive rights to provide public telecommunications services in St Helena.

b. Our View

For the sake of clarity, SHG considers that PES and ROES are fixed Earth stations operated at a given authorised location in St Helena, aimed at connecting certain satellites, or space objects, to a certain specific access point in St Helena. Such radio links are for private use and not aimed at connecting space systems to the public. SHG extends this licensing policy to telecommand and telemetry stations (TT&C; TLC for Telecommand or TLM for Telemetry), whose frequencies are also considered in Table 1 below.

In response to Sure Ltd, the licensing of PES through this policy is related to the private use of spectrum by fixed earth stations operated for the connection of space objects to the Earth access points. Hence the exceptions held under section 1.8 of the consultation are not affected by this policy.

This consultation considered only the licensing of PESs in existing frequency allocations of the International Telecommunications Union (ITU), including those which are already authorised by SHG, and not for satellite services to the public or retail business as some responders have proposed. As such, we will not be expanding this policy to other satellite services of public nature for the time being. Such policy may require a new consultation with all stakeholders, due to the different operating and technical conditions these will have. In the meantime, SHG has the powers to authorise other satellites services on an Ad-Hoc and Temporary basis until proper policy is determined and adopted by the SHG.

In response to proposals to extend the Table 1 of the consultation to other frequency bands, or to other satellite services of public or retail business nature, the view of SHG is not to extend this table due to the different operating and technical conditions these will have and any unintended consequences that may arise from these (e.g., technical and operational sharing with other services). However, SHG has the powers and agrees to apply this policy on an Ad-Hoc and Temporary basis to PESs which may authorise their use in some frequencies allocations not included in Table 1.

In response to some views that SHG should have a spectrum management capability, or have independent authority, SHG is of the view that:

- It will produce a list of licensees on their webpage to provide information on the current use of the band to potential license applicants of both satellite or terrestrial services. This will serve the applicant as a means to contact the existing users of the spectrum for which potential interference may be caused to and/or protection is sought from.

- For frequency coordination between satellite operators is an ITU matter and where the PES and TT&C are also coordinated. Proponents of satellite networks and systems will have to undertake their respective coordination through the ITU Article 9 frequency coordination process.
- For frequency coordination between PES and TT&C Earth stations vis-à-vis other services operating in the same frequency band in the St Helena, the competing parties must find a technical solution that will allow both to co-exist. SHG may from time to time be called upon by these parties, or by licensees, to resolve their interference disputes. At those times an independent expert may be called upon to resolve such disputes.

c. Conclusion

SHG adopts the following **Table 1** of allocation for PES and TT&C installations which can be licensed under the policy of this statement in the island of St Helena.

This table will be integrated in the National Frequency Table of St Helena, and the latter will be published on the SHG website.

For this Table, we define:

- **Permanent Earth Stations** or PES, those satellite stations that provider feeder-link connectivity (i.e., commercial / user data) between the ground access point (through a cable, or facility, connecting the communications to the satellite operators' network operations centre) and the satellites (geostationary orbit (GSO) or non-geostationary orbit (NGSO)) themselves. These Earth stations will have a transmit band (Earth-to-space; or up-link) and a receive band (space-to-Earth; or down-link), any related radio and electronic equipment situated in the island of St Helena. Usually these are modulated carriers and can have a very large spectral occupancy across the allocation range.

- **Telemetry, Tracking and Command** (TT&C) Earth Stations, those PES stations that have the sole purpose to:

    - Transmit telecommands (TLC) to the satellites for the only purpose to control the operations of the satellite; or,
    - Receive telemetry (TLM, or other signalling) for the sole purpose to monitor the space craft in outer space, or the monitoring of any of the spacecraft subsystems; or,
    - Receive tracking (TLT) information for the sole purpose to know the position of the satellite in outer space (via some navigation means).

Usually these TT&C stations have modulated or unmodulated carriers of very low spectral occupancy, and with occasional or small temporal usage.

Bands	Type of Use		Direction	Frequency range
Amateur Satellite	TLC[1] / TLMT[2] FL[3]		Both directions	<u>Primary Allocation</u> 28.0-29.7 MHz 144-146 MHz 24.0-24.05 GHz <u>Secondary Allocation</u> 435-438 MHz 1270-1280 MHz 2400-2450 MHz 3400-3410 MHz 10.45-10.5 GHz
	TLC / FL		Earth-to-space only	<u>Secondary Allocation</u> 1260-1270 MHz 5650-5670 MHz
VHF/UFH bands for: - Space Operations - Mobile Satellite	TLMT / FL		(space-to-Earth)	137 – 138 MHz
	TLC / FL		(Earth-to-space)	148 – 150.5 MHz
	TLC / FL		(Earth-to-space)	399.9 – 400.05 MHz
Space Research Space Operations Earth Exploration	TLC		(Earth-to-space)	2025 – 2110 MHz
	TLMT		(space-to-Earth)	2200 – 2300 MHz
	TLC		(Earth-to-space)	7145 – 7190 MHz
	TLC		(Earth-to-space)	7190 – 7250 MHz
	TLMT		(space-to-Earth)	8025 – 8400 MHz
	TLC		(Earth-to-space)	22.55 – 23.15 GHz
	TLMT		(space-to-Earth)	25.5 – 27.0 GHz
C-band: Fixed Satellite Service	GSO	FL /TLMT	(space-to-Earth)	3400 – 4200 MHz
		FL / TLC	(Earth-to-space)	5725 – 7075 MHz
	NGSO	FL / TLC	(Earth-to-space)	5091 – 5250 MHz
		FL /TLMT	(space-to-Earth)	6700 – 7075 MHz
X-band for: Fixed Satellite Service	FL / TLMT		(space-to-Earth)	7250 – 7750 MHz
	FL / TLC		(Earth-to-space)	7900 – 8400 MHz
Ku-band Fixed Satellite Service	FL / TLMT		(space-to-Earth)	10.7 – 12.75GHz
	FL / TLC		(Earth-to-space)	12.75 – 13.25GHz 13.75 – 14.5GHz
Ka-band Fixed Satellite Service	FL / TLMT		(space-to-Earth)	17.7 – 20.2GHz
	FL / TLC		(Earth-to-space)	27.5 – 31.0 GHz
	FL / TLC		(Earth-to-space)	24.65 – 25.25 GHz
	usually reserved[4]	FL/ TLMT	(space-to-Earth)	20.2 – 21.2 GHz
		FL / TLC	(Earth-to-space)	30.0 – 31.0 GHz

Table 1 - List of frequency bands considered for PES.

2. Question 2: "Do you agree that the applicant of Receive Only Earth Stations equipment should be licensed in the list of frequency bands provided in Table 2? If not, please provide reason."

[1] TLC = Telecommand transmit signals
[2] TLMT = Telemetry and Tracking receive signals
[3] FL = Feeder-Link
[4] Usually reserved for government use, utilising commercial and non-commercial space systems.

a. Summary of the Answers

Atlas Space Operations, SSC and Sure Ltd agree.

Maxar Technology disagrees, as their activities require a transmit and receive station.

Atlas Space Operations considers that a license grant should be for exclusive use or with associated protection from a local transmitter.

While OneWeb does not plan to operate ROES, suggestions are made to consider bands where there could be interference with terrestrial services, such as VHF and UHF bands which are already used by some Internet of Things (IoT) satellite operators on the island of St Helena. OneWeb questions the limitation to certain bands.

SSC does not anticipate installing any ROES but considers that licensing these stations will enable SHG to be aware of spectral usage and create the potential to minimize interference between earth stations.

For Space X, licensing radio devices should aim at reducing interference. While ROES devices do not directly contribute to interference, Space X considers that ROES should still be managed by SHG.

Sure Ltd agrees subject to a clear legal and regulatory framework addressing the potential for interference issues. Sure Ltd suggests that the coordination process should be overseen by an expert body/role within SHG.

b. Our View

Taking into account some of the responses received, SHG clarifies that ROES are satellite Earth stations operating at fixed locations in St Helena and in certain specific frequency allocations that have a receive only purpose, for example datalinks for meteorological and Earth exploration satellites (in their respective allocations), or monitoring Earth stations (e.g., in C-band 3600-4200 MHz), which normally would not be given protection.

Table 2 frequency ranges and the proposal to provide a spectrum grant[5] to certain types of ROES (i.e., stations receiving data from meteorological satellites, Earth exploration satellites, or monitoring stations) is introduced by the SHG to allow recognition of such uses and their protection from interference from other services (e.g., terrestrial services) using the same frequency. For this reason, the ROES in the frequencies of **Table 2** are different (except that of C-band) from those in **Table 1**.

In response to proposals to extend the **Table 2** of the consultation to other frequency bands, or to other satellite services of public or retail business nature, the view of SHG is not to extend this table due to the different operating and technical conditions these will have and any unintended consequences that may arise from these (e.g., technical and operational sharing with other services). However, SHG has the powers and agrees to apply this policy on an Ad-Hoc and Temporary basis to ROES, which may authorise their use in some frequencies allocations not included in **Table 2**.

[5] The Office of Communications (i.e., Ofcom) of the UK, allow the recognition of receive only Earth stations through a Recognised Spectrum Access (RSA) regime. A policy regime based on a statutory instrument is adopted, whereby the receivers of some space services is provided recognitions for the use of the spectrum and thus protection of the use of such spectrum.

In response to the views expressed by stakeholders, SHG accepts that ROES should be considered to receive a licence for their operations. The terminology spectrum grant will be dropped here on.

In response to some views that SHG should have a spectrum management capability, or an have independent authority, SHG is of the view that:

- It will produce a list of licensees on their webpage to provide information on the current use of the band to potential license applicants of both satellite or terrestrial services. This will serve the applicant as a means to contact the existing users of the spectrum for which potential interference may be caused to and/or protection is sought from.
- For frequency coordination between satellite operators is an ITU matter and where the ROESs are also coordinated. Proponents of satellite networks and systems will have to undertake their respective coordination through the ITU Article 9 frequency coordination process.
- For frequency coordination between ROES vis-à-vis other services (e.g., terrestrial) operating in the same frequency band in the St Helena, the competing parties must find a technical solution that will allow both to co-exist. SHG may from time to time be called upon by these parties, or by licensees, to resolve their interference disputes. At those times an independent expert may be called upon to resolve such disputes.

c. Conclusion

SHG adopts the following **Table 2** of allocation for ROES installations which can be licensed under a License in the island of St Helena.

This table will be integrated in the National Frequency Table of St Helena, and the latter will be published on the SHG web site.

SHG defines ROES as Earth Stations:

- Of fixed locations in the island of St Helena operating at a specific carrier frequency within the allocations given in Table 2 above, ROES are not stations intended to deliver services to the public;
- Of receive only purpose, for example datalinks for meteorological and Earth exploration satellites (in their respective allocations in X and Ka bands), or monitoring Earth stations (e.g., in C-band 3600-4200 MHz); and
- That usually do not require a license and thus not be given protection from interference, and that this policy has been introduced for those operators that seek protection through the License here introduced which will provide recognition for their spectrum use and protected these from harmful interference.

Band	Type of Use	Direction	Frequency range
L-band	Receive Earth stations of the Meteorological-Satellite Service	(space-to-Earth)	1690-1710 MHz
C-band	Receiver Earth stations of the Fixed-Satellite for Monitoring purposes	(space-to-Earth)	3600-4200 MHz

X-band	Receive Earth stations of the Meteorological-Satellite, Earth Exploration and Space missions	(space-to-Earth)	7750-7900 MHz
Ka-band	Receive Earth stations of the Meteorological-Satellite, Earth Exploration and Space missions	(space-to-Earth)	25.5-26.5 GHz

Table 2 - List of frequency bands considered for Receive Only Earth Stations.

3. Question 3: "Overall, do you agree with the overall objectives of this consultation? If not, please provide reason."

a. Summary of the Answers

All stakeholders agree unanimously with the objectives of the consultation.

OneWeb welcomes SHG's intention to introduce open and transparent licensing rules, and update legislation and regulatory documents (including the Telecommunications Ordinance) in order to make them fit for purpose for the licensing of Satellite Ground Stations.

SpaceX stresses the importance of transparency, regulatory certainty, and cost-effectiveness to enable potential licensees to make informed decisions regarding their network plans and investment decisions. Further, the incorporation of appropriate technical regulations into the overall regulatory framework allows operators such as SpaceX to ensure that any installed equipment is in compliance with all relevant standards and obligations, and that all licensees are held to the same standards.

Sure Ltd is concerned by the practical implementation of the regulations, which should rely on an independent technical and regulatory expertise.

b. Our View

SHG is keen to introduce this policy for the benefit of satellite operators, who will have open and transparent regulations and certainty for their investment in ground infrastructure placed in St Helena, and also for the citizens of St Helena, who will indirectly benefit from this policy.

As stated in 4.1.2 and 4.2.2 above, in case of technical and spectrum management issues SHG will call upon independent experts to resolve such matters.

4. Question 4: "Do you agree that installation, operations and use of PES and ROES equipment should be introduced in the island of St Helena, and that regulations be introduced to licence such installation and the national frequency allocation table is updated?"

a. Summary of the Answers

All stakeholders agree with the introduction and operation of PES and ROES equipment in the island of St. Helena.

Atlas Space Operations stresses the importance of a regulatory framework to manage potential interferences.

OneWeb also suggests a public listing of licenses (PES, ROES and terrestrial emitters) in order to facilitate coordination.

SSC stresses the importance of consistency with the ITU spectral allocations.

SpaceX considers that the presence of a clear regulatory regime and appropriately structured national frequency allocation table are key prerequisites for the installation of PES equipment in St. Helena.

b. Our View

SHG has reviewed the above comments and this document provides the policy for the licensing of PES, TT&C and ROES equipment installed in St Helena.

c. Conclusion

SHG will update and publish on its website a Table of frequency allocation, integrating the proposed Table 1 and Table 2 above.

SHG will also publish a Register of radio / wireless licensees in St Helena, inter-alia, incorporating PES and ROES licensees.

5. Question 5: Do you agree that the applicant of PES equipment should coordinate with other applications/services of other licensees operating in the same frequency band as the PES? If not, please provide reason.

a. Summary of the Answers

All stakeholders agree apart from Sure Ltd. Sure Ltd suggest these activities should fall under the mandate of a dedicated body funded by the license fees.

Atlas Space Operations considers it is essential for efficient communication.

OneWeb suggests that coordination is completed by prospective licensees only with operators in which interference is a possibility, as opposed to coordination with each and every operator in the same frequency band as the consultation suggests. OneWeb also believes that earth stations operating in C-band and above should be granted priority over terrestrial applications and services as satellite frequencies require international coordination, existing exclusive spectrum allocations for terrestrial applications are wide enough to fully avoid frequency bands that are potentially harmful to satellite communications, satellite earth stations will have a greater impact on St Helena‘s economy. OneWeb considers that a license should grant a certain level of protection.

SSC considers that the wording of 5.1.3 [of the Consultation Document] implies that spectrum can go to the highest bidder, with which they disagree.

For Space X, coordination is essential between PES users and other licensees in the same bands – as well as adjacent bands, if needed – in order to avoid or mitigate harmful interference. Space X supports the proposed mechanism by which an applicant can obtain a temporary license (on a non-interference, non-protection basis) in cases where coordination has not been completed. SpaceX encourages SHG to develop a mechanism addressing the potential lack of responsiveness to coordination by license applicants.

b. Our Views

The proposed policy for licensing PES is in line with use of spectrum allocations of the ITU and other countries, such as the United Kingdom. This should assure potential spectrum users that this policy takes into account existing sharing framework between satellite and terrestrial users.

While the satellite to satellite coordination will not cause interference between Earth stations in St Helena, the potential for interference between Earth stations and space stations is a matter of the ITU Article 9 coordination and as such St Helena will not get involved with such coordination, but it requests applicants to provide evidence of the coordination status in cases where two or more operators have Earth stations in the same frequency allocation.

The issue of concern from potential applicants is interference and protection between satellite installations vis-à-vis terrestrial users in the same frequency allocation. In such case SHG will:

- Update and issue its frequency allocation table on its website;
- Update and issue a Register of licensees in all frequency allocations.

This will serve as a means for applicants to contact the existing users of the spectrum, for which potential interference may be caused to and/or protection is sought from. The competing parties must find a technical solution that will allow both to co-exist.

SHG may from time to time be called upon by these parties, or by licensees, to resolve their interference disputes. At those times an independent expert may be called upon to resolve such disputes.

In response to a comment made by SpaceX for coordination with adjacent bands, SHG is of the view that interference to and from adjacent band services is a matter of band-pass filtering and/or a need for an isolation band gap between the two services, and SHG believes that this is outside the scope of frequency coordination. However, the parties using spectrum in adjacent frequency allocations have always the liberty to meet and discuss compatibility of their services, and thus could come to their own private arrangements, in addition to any filtering or band-gap necessary by national or international regulations. However, such arrangements shall be made known to the SHG, and not break any national or international regulations, nor impede access to other users of the frequency allocation.

SHG notes the comments made by SSC on section 5.1.3 (i.e., on Market Mechanism) of the Consultation Document, and clarifies the paragraph 5.1.3 of the consultation as follows:

> "**5.1.3 Market mechanism and incentive pricing**. The use of market mechanisms can enable spectrum rights to be assigned to the users who value the spectrum most, and hence to encourage more efficient spectrum use. Market mechanisms such as auctions and bidding are not appropriate for use in St Helena. However, market entry, how the market operates and responding to this are important when considering spectrum pricing and allocation - the size of the market in St Helena, the likely competition for spectrum in the specified bands and the

appealing geographical location. These factors all have an impact on the market and will be taken into account when valuing the spectrum and making spectrum allocations. The use of market mechanisms should be developed recognising the particular international nature of the satellite and space science sectors. Alongside market-based mechanisms to award spectrum, administrative incentive pricing will be used can also be used to ensure that spectrum continues to be used in the most efficient way, even after its initial allocation."

c. Conclusions on Spectrum Management Requirements

In view of the comments received and our views, SHG's policy on spectrum management requirements for the licensing of PES and ROES is as set in our Consultation Document. Below are our conclusions.

Radio Equipment Technical and Operational Requirements for Permanent Earth Stations:

1. Permanent Earth Station equipment is a fixed Earth station in the island of St Helena that must have both transmit and receive radio components in the frequency allocations identified in Table 1. Both components will require an authorization for the use of the intended spectrum.

2. As the Permanent Earth Station may cause harmful interference to other services/applications, they must comply with the following:

    a. The intended applications of these PES are:

        i. To provide a feeder link communication service to any satellite system; and/or
        ii. To provide a Telemetry, Tracking and Command (also known as TT&C) communication service.

    b. Operate within certain spectrum allocations as specified by SHG's Frequency Table of Allocation (in line with Article 5 of the ITU Radio Regulations and Table 1 in this document).

    c. Operate so that they use the minimum amount of spectrum and limit its in-band and out-of-band emissions, by employing proper filtering in transmit and receive channels (also to suppress harmonics).

    d. Operate in respect to certain technical limitations recommended and required by the ITU Radio Regulations and related ITU-R Recommendations, European Decisions and other international instrument, aimed at protecting other radio services and applications.

    e. Be part of a satellite system which complies with the ITU Radio Regulations, thus:

        i. Have its frequency assignments coordinated under the ITU Radio Regulations;
        ii. At a point in time have its assignments entered in the Master International Frequency Register of the ITU.

    f. When necessary, coordinate its frequency assignments with other services/applications in St Helena operating in the same frequency allocation.

    g. Operate in a manner that humans and animals are not caused any harm.

h. Operate in a manner that the emissions do not cause harm to aircraft in flight landing or taking off at nearby airports.

3. At the time of the license application submitted to the SHG, the applicant must submit the following information:

    a. For ITU Coordination:

        i. a written statement that their PES/TT&C equipment has been, or is being coordinated, with other Administrations under the relevant ITU-R provisions of Article 9.

        ii. status of the ITU coordination (of the satellite network or system) for all frequency assignments of the PES/TT&C equipment installed on the island of St Helena.

    b. For coordination with other services in the island of St Helena:

        i. At the time of the application SHG will inform the applicant if it requires to coordination with other licensed operators operating in the same frequency allocation.

            1. Applicants may initiate this coordination before the application is submitted. The applicant may request SHG a list of licensees in the same frequency allocation intended for the operations of their equipment. In the near future, SHG will issue a Register of Licensees on its webpage;

        ii. Before the full licence is issued, the applicant must perform any necessary frequency coordination with other licence holders in the island of St Helena and in the same allocation they intend to operate;

        iii. When such coordination is terminated, and an agreement is reached the applicant must provide a written statement to SHG which provides the results of such coordination;

        iv. The applicant has the right to file a complaint to the SHG against the other party after a period of 60 days when either (i) no response has been given to the request of coordination, or (ii) when the other party acted obstructively;

        v. A full licence will be issued when this process is terminated by an agreement by both parties;

        vi. During this process, the applicant may request a temporary license, authorising transmissions and receptions based on a non-interference and non-protection basis. During such time, if the equipment of the applicant is deemed to have caused harmful interference to another user of the allocation then the applicant must terminate its transmissions until the time it has resolved the cause of this interference.

4. The rights given by the licence granted by SHG are:

a. Rights of use are on a first come first serve basis. However, these rights stem from:
    i. SHG's law and regulations;
    ii. the ITU Radio Regulations, and Coordination agreements which takes precedent amongst satellite coordination, and,
    iii. other applicable general rules and regulations.

b. Protection of its receivers from harmful interference from other licensed operators, where applicable;

c. Right to transmit its signals within the license conditions granted.

However, if the licensee obstructs or delays the coordination of its installation vis-à-vis another applicant/licensee, SHG may initiate actions to revoke the licence (following a complaint filed by a new applicant) if the licensee has delayed or obstructed the coordination for a period of at least 60 days.

6. Question 6: Do you agree that radio installations of PES should comply with the above radiation limits, which are deemed to protect humans and animals from exposure to electro-magnetic emissions? If not, please give a reason.

a. Summary of the Answers

All stakeholders agree.

Sure Ltd stresses the importance of ensuring that changes to these requirements would be adhered to by licensees.

b. Our Views

The respondents are generally in agreement with the proposed requirement made in the consultation.

We also recognise that such requirements may also be complied by adopting other measures that result in the same technical results provided. These could be implemented by ring-fencing the installation and/or provide visible signage to keep away people from entering a non-safe area. However, SHG is of the view that such other means must be properly documented and shown that animals and humans are protected. Also, fences and visible signs around the facility must be installed to protect humans that may wonder around the facility.

c. Conclusions on Radiation Limits

In view of the above, SHG's policy on Radiation Limits for PES installations are as follows:

1. The electromagnetic field emitted from a radio installation may pose health and safety risks to humans and animals. There exist international guidelines on emissions limitations from (i) the ICNIRP[6] and (ii) the European Union. As a reference, the technical limitations of these guidelines are provided below.

[6] International Commission on Non-Ionizing Radiation Protection

2. These two guidelines are very similar and SHG requests the applicant, at the time of the submission of the application, to provide a written statement that states that the Permanent Earth Station and/or TT&C equipment (which includes all of its structure, cables, antennas, etc.) will comply with either of the below guidelines. The submission will need to include any technical evidence of such compliance.

3. Alternatively or additionally, the applicant may have other means to comply with such guidelines, such as exclusion zones, as long as such exclusion zones are properly isolated, fenced and with signage that warns people and to stop animals from entering the given installation area. The applicant must:

    a. properly document its solutions in showing that animals and humans are protected at all times from harmful emissions of the radio installations. In such case, these premises must be appropriately fenced to avoid humans and animals entering, and have visible signs to deter humans from entering while the equipment is in operation.

    b. provide written statement of such alternative structure, and that such structure is the same in the compliance to the ICNIRP or EU guidelines below. The submission will need to include any technical evidence of such compliance.

4. If SHG is made aware that the installation is in breach of the commitments undertaken by the licensee, SHG will inform immediately the licensee (SHG reserves the right to issue a penalty notice) and if after 60 days from the date of such communication the licensee has not remedied the breach SHG may initiate a process of termination of the licence.

<u>References to International Guidelines on Radiation Limits</u>

The ICNIRP[7] Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz)[8] state that the occupational exposure power density[9] limit from ICNIRP is 50W.m^{-2} (or 5 mW.cm^{-2}) over the range 10-300GHz. Table 4 of the Guidelines is presented in **Figures 1** and **2** below.

Table 4. Basic restrictions for time varying electric and magnetic fields for frequencies up to 10 GHz.*

Exposure characteristics	Frequency range	Current density for head and trunk (mA m^{-2}) (rms)	Whole-body average SAR (W kg^{-1})	Localized SAR (head and trunk) (W kg^{-1})	Localized SAR (limbs) (W kg^{-1})
Occupational exposure	up to 1 Hz	40	—	—	—
	1–4 Hz	40/*f*	—	—	—
	4 Hz–1 kHz	10	—	—	—
	1–100 kHz	*f*/100	—	—	—
	100 kHz–10 MHz	*f*/100	0.4	10	20
	10 MHz–10 GHz	—	0.4	10	20
General public exposure	up to 1 Hz	8	—	—	—
	1–4 Hz	8/*f*	—	—	—
	4 Hz–1 kHz	2	—	—	—
	1–100 kHz	*f*/500	—	—	—
	100 kHz–10 MHz	*f*/500	0.08	2	4
	10 MHz–10 GHz	—	0.08	2	4

* Note:

Figure 1 – Extract from ICNIRP guidelines.

[7] International Commission on Non-Ionizing Radiation Protection
[8] http://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf
[9] https://www.mdltechnologies.co.uk/products/hi-2200-rf-survey-meter/

Table 5. Basic restrictions for power density for frequencies between 10 and 300 GHz.[a]

Exposure characteristics	Power density ($W\ m^{-2}$)
Occupational exposure	50
General public	10

Figure 2 – Extract from ICNIRP guidelines.

Also, the Council of the European Union issued the "COUNCIL RECOMMENDATION (1999/519/EC) of 12 July 1999, on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)"[10]. Table 1 from this Recommendation is extracted below in **Figure 3** below.

Basic restrictions for electric, magnetic and electromagnetic fields (0 Hz to 300 GHz)

Frequency range	Magnetic flux density (mT)	Current density (mA/m^2) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density, S (W/m^2)
0 Hz	40	—	—	—	—	—
>0-1 Hz	—	8	—	—	—	—
1-4 Hz	—	8/f	—	—	—	—
4-1 000 Hz	—	2	—	—	—	—
1 000 Hz-100 kHz	—	f/500	—	—	—	—
100 kHz-10 MHz	—	f/500	0,08	2	4	—
10 MHz-10 GHz	—	—	0,08	2	4	—
10-300 GHz	—	—	—	—	—	10

Figure 3 – Extract from COUNCIL RECOMMENDATION (1999/519/EC-12 July 1999).

7. Questions 7: Do you agree that radio installations of PES should comply with the relevant ITU-R Recommendations on Our-of-Band and Spurious emissions, which protect services in adjacent frequencies or in other frequency bands/allocations?

a. Summary of the Answers

All stakeholders agree.

SpaceX suggests evaluating the ITU Recommendations and compare them with other antenna patterns and recommendations from other administrations to confirm that important elements of the communications infrastructure in St Helena will be protected from interference.

b. Our Views

[10] https://op.europa.eu/en/publication-detail/-/publication/9509b04f-1df0-4221-bfa2-c7af77975556/language-en

In view of the above responses, as SHG has not the technical expertise which would allow to perform any of the above suggested actions by SpaceX.

Furthermore, SHG believes that the ITU-R Recommendations and Radio Regulations form a basis for international cooperation and coordination on an equal playing field for all satellite operators and their Earth station operators that it adopts these as the regulations in St Helena.

c. Conclusions on Out-of-Band Emissions and Spurious Emissions

The applicant must submit a written statement that its facility and the equipment forming part of the facility comply with the limitations on the Out-Of-Band Emissions and Spurious Emissions referred below. The submission will need to include any technical evidence of such compliance.

If any complaints of potential interference caused to other equipment in the surroundings of the licensed installation are received by SHG, these will be investigated. If it is concluded that the interference is originated by the licensee's installation, SHG will request the licensee to turn off any transmissions from the facility until such interference is resolved.

d. ITU-R Recommendations on Out-Of-Band and Spurious limits

Out-of-Band emission limits for Permanent Earth Stations (such as those specified in ITU-R Recommendations - see below) should be complied with by the equipment manufacturer / operator of the Permanent Earth Stations to protect services in other frequency allocations. The ITU-R Recommendations in reference are:

- ITU-R Recommendation SM.329, "Unwanted emissions in the spurious domain";
- ITU-R Recommendation SM.1540, "Unwanted emissions in the out-of-band domain falling into adjacent allocated bands";
- ITU-R Recommendation SM.1541, "Unwanted emissions in the out-of-band domain", see Annex 5 of such ITU-R Recommendation.

For the potential interference caused to radio services in the island of St Helena by Out-Of-Band and/or Spurious Emissions of PES/TT&C installations in St Helena, other mitigations may exist, such as site shielding. The applicant will need to put a statement in its application if it intends to use such site shielding.

If other countries make a complaint that their satellites are being interfered with by installations in the island of St Helena, SHG will investigate the request and will calling upon the licensees of PES and TT&C installations.

In any of the above, if it is found that the licensed installation causes such interference it may request the licensee to shut down its transmissions until such interference is resolved. If the interference is not resolved within a period of at least 60 days, then it may start a process to terminate the license of the installation.

8. Questions 8: Do you agree that radio installations of PES should comply with the relevant limitations as provided in the ECC Report 272, which ensures that fixed Earth stations operating near airports need to comply with high

intensity radiated field (HIRF) levels established by the European Aviation Safety Agency (EASA), which protect aircraft safety systems? If not, please provide reason.

a. Summary of the Answers

All stakeholders agree.

OneWeb suggests SHG makes available to operators a visualisation of the "wedge shaped area originating at the departure and arrival end of the runway and extending for 3 nautical miles from the runway over which the aircraft would normally track"– as specified by EASA.

b. Our Views

It is of utmost importance that safety of aircraft landing or departing from St Helena is assured and the requirements expressed in this section are set to ensure that.

In response to OneWeb's request, SHG provides below a map with the "wedge shaped area originating at the departure and arrival end of the runway and extending for 3 nautical miles from the runway over which the aircraft would normally track".

c. Conclusions on Limitations Near Airports

The applicant must submit a written statement that its facility and the equipment forming part of the facility comply with limitations set in below. In such written statement the applicant must provide technical evidence on how it intends to comply with such limitations. The evidence must be complete of diagrams of the disposition of the installation vis-à-vis any airport facility in the island of St Helena, along with any necessary calculations that show compliance to the regulations below.

SHG will inform the airport authority of such written statement.

The applicant must also inform the local airport authority and coordinate with the airport authority any limitations that the airport authority sees fit. The applicant must provide SHG any agreement, consent, authorization that the airport authority will provide to the applicant.

Under our policy SHG adopts the following technical limitations for PES and TT&C stations. These are:

<u>Regulatory Compliance for Air Safety</u>

The European Conference of Postal and Telecommunications (CEPT) has determined that fixed Earth stations operating near airports need to comply with high intensity radiated field (HIRF) levels established by the European Aviation Safety Agency (EASA) to protect aircraft safety systems. These limits, for which PES and TT&C stations installed in St Helena must comply with, are provided in Table 1 of the ECC Report 272[11]; see also **Figure 4** below.

A map of the "wedge shaped area originating at the departure and arrival end of the runway and extending for 3 nautical miles from the runway over which the aircraft would normally track" is provided below in **Figure 5**.

[11] https://www.ecodocdb.dk/document/1028

Table 1: Maximum Earth station e.i.r.p. levels to ensure compliance with aircraft HIRF protection criteria

Earth station deployment type	Maximum e.i.r.p. levels (dBW)		
	4-6 GHz	12-18 GHz	18-40 GHz
Earth station on board aircraft located within airport premises	59.0	60.5	58.4
Earth stations in a fixed location within airport premises	67.0	68.4	66.4
Land mobile earth stations located within airport premises	53.0	54.5	52.4
Fixed earth stations or mobile earth stations on land within a wedge shaped area originating at the departure and arrival end of the runway and extending for 3 nautical miles from the runway over which aircraft would normally track**	73.0	74.5	72.4
Fixed earth stations or land mobile earth stations operating with NGSO satellites located outside the wedge shaped area extending for 3 nautical miles from the runway of an airfield over which aircraft would normally track**	79.0	80.5	78.4
Fixed earth stations or land mobile earth stations operating with GSO satellites located outside the wedge shaped area extending for 3 nautical miles from the runway of an airfield over which aircraft would normally track**	80.7-93.0*	82.2-94.5*	80.2-92.4*
Earth station on vessels	79.0	80.5	78.4
Earth stations on board aircraft in flight	73	74.5	72.4

NOTE 1: For satellite earth stations operating within TDMA networks, the above e.i.r.p values shall be respected after taking into consideration the duty cycle (see section 3.3 and 3.4).

* e.i.r.p values are dependent on earth station latitude (see section 3.4.6)

** the width of the wedge shaped area originating at the departure and arrival end of the runway and extending for 3 nm from the runway over which aircraft would normally track depends on the airfield and is determined by the airport authority

NOTE 2: In the context of this Report, the term "Mobile" refers to the definition in section 3.1.1 of the FAA Report and it relates to earth stations that are not operated in a fixed location

Figure 4 - Extract from ECC Report 272

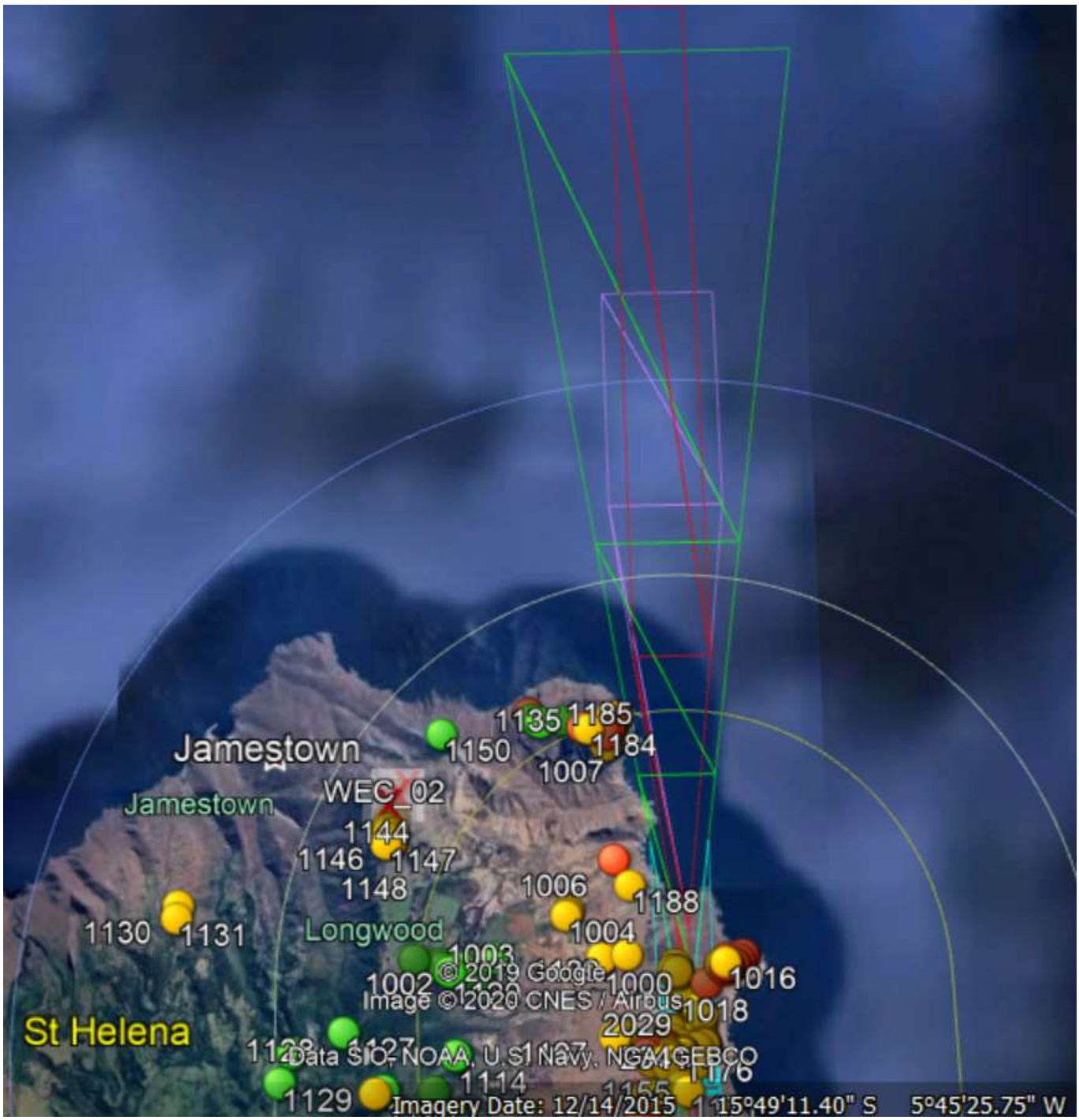
Jamestown
Jamestown
WEC_02
Longwood
St Helena
1135
1185
1150
1184
1007
1144
1146
1147
1148
1006
1188
1130
1131
1004
1003
1002
1000
1016
1018
2029
1114
1129
© 2019 Google
Image © 2020 CNES / Airbus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Imagery Date: 12/14/2015
15°49'11.40" S
5°45'25.75" W

Figure 5 – Wedge shaped area originating at the departure and arrival end of the runway and extending for 3 nautical miles from the runway over which the aircraft would normally track

9. Question 9: Do you agree that Receive Only Earth Stations should be recognised in their use of spectrum? And agree that Receive Only Earth Stations should be authorised through a spectrum grant rather than a licence? If not, please provide reason.

a. Summary of the Answers

All stakeholders agree.

Atlas Space Operations suggests the license provides either exclusivity or protection from interference.

Space X suggests that the recognition of ROES and the maintenance of appropriate records of their operations is appropriate, as long as their operation does not block or cause interference to other spectrum users, as indicated in Section 6.1.4 of the Consultation.

Sure Ltd considers that a licence should be issued too, combining the licensing and grant processes.

b. Our View

We have addressed some of these points in Question 2 above.

Taking into account the responses received, SHG clarifies that ROES:

i. Are satellite Earth stations at fixed locations in the island of St Helena operating at a specific carrier frequency within the allocations given in **Table 2** above; and,

ii. Have a receive only purpose, for example datalinks for meteorological and Earth exploration satellites (in their respective allocations in X and Ka bands), or monitoring Earth stations (e.g., in C-band 3600-4200 MHz); and

iii. Are Earth stations that do not require a licence and thus not be given protection from interference. For those that seek protection the Licence here introduced will provide recognition for the spectrum use and protection from harmful interference.

c. Conclusions

ROES are satellite Earth stations at fixed locations in the island of St Helena operating at a specific carrier frequency within the allocations given in Table 2 above.

ROES have a receive only purpose, for example datalinks for meteorological and Earth exploration satellites (in their respective allocations in X and Ka bands), or monitoring Earth stations (e.g., in C-band 3600-4200 MHz). ROES here considered are not stations aimed at delivering public services.

ROES operating in the allocations given in Table 2 do not require any license or spectrum recognition for operation in the island of St Helena.

If the respective ROES operators require protection of their installations, they can apply (through the respective application form) for a ROES License.

The ROES Licence is a license on its own right allowing the recognition of the ROES equipment to receive at a given frequency and at a given location in the island of St Helena.

SHG will make available a list of ROES licensees on its webpage, which provides information on the current use of the associated frequency bands. This will serve the other potential applicants as a means to contact the existing users of the spectrum for which potential interference may be caused to the ROES.

10. Question 10: Do you agree that the applicant of Receive Only Earth Station equipment should coordinate with applications/services of other licensees in St Helena, who operate in the same frequency band as the Receive Only Earth Station? If not, please provide reason.

a. Summary of the Answers:

All stakeholders agree apart from Sure Ltd.

Atlas Space Operations also considers that this would protect the band from unlicensed or licensed transmitters.

Space X considers that ROES equipment should not block or interfere with other spectrum users, in particular those holding spectrum licenses, and coordination should be considered to address this in the bands or adjacent bands.

Sure Ltd considers that an independent licensing body should be responsible for co-ordination, and not relying on parties.

b. Our View

In respect to the response from Atlas Space Operations, SHG is of the view that unlicensed transmitters in the island of St Helena are not recognised and cannot interfere other services or applications.

In respect to the response from SpaceX, we have clarified that ROES cannot transmit any signal. Additionally, this policy is to grant ROES a right to be recognised of the spectrum they use for the reason that they require protection from other sources of interference. This is the case only for the bands identified in **Table 2**, and for applications of national interest, such as meteorological and Earth exploration services.

In respect to the response from Sure Ltd, we have already provided our responses to Question 1 and Question 2.

c. Conclusion

SHG has taken into account the responses of the stakeholders and concludes that:

<u>ROES Spectrum Licence Policy</u>

a. It is the view of SHG that frequency coordination:

   i. For international coordination between satellite operators is an ITU matter. Here the ROESs are also coordinated between the satellite operators through the ITU Article 9 frequency coordination process.

   ii. For national frequency coordination in St Helena, between ROES vis-à-vis other services (e.g., terrestrial) operating in the same frequency band in the St Helena, the competing parties must find a technical solution that will allows both to co-exist. SHG may from time to time be called upon by these parties, or by licensees, to resolve their interference disputes. At those times an independent expert may be called upon to resolve such disputes.

b. SHG adopts the following policy for the licensing of ROES equipment:

   i. All operators of ROES equipment operating in the frequency bands of Table 2, must inform in writing the SHG of such operations.

1. If the operator does not seek to obtain a Licence for its ROES, then the ROES can continue to operate on a non-protected basis. This means that the ROES cannot be protected from any other licensed transmitter.

2. If the operator seeks to obtain a Licence for its ROES, then it must follow the procedure below:

   a) The ROES operator must submit a ROES license application (see **Annex 2**).

   b) The applicant may start its operations on a non-protected basis upon submission of the application.

   c) Within 60 days from submitting the ROES application, the applicant may want to seek coordination with the other licensed users overlapping the ROES pass-band frequencies[12]. Applicants may seek information on other users from the SHG, or alternatively review the Licensee Register on the SHG website.
      - Upon determination by the ROES applicant that their radio receiver equipment overlaps that of transmitters of other operators operating in the same band, the ROES operator may, at its own will, contact the identified operators to seek coordination. Otherwise, the applicant may wish not to pursue this coordination and operate on a non-protected basis from prior licensed transmitters.
      - The applicant must provide a written statement, within 60 days of submitting the application to SHG, which should state that the applicant has either obtained coordination agreements, or that it will not request any protection from other existing co-frequency or overlapping transmitters.
      - Whereas, the applicant requires more than 60 days to finalise its coordination, it may seek extension of this deadline by writing to the SHG.

   d) SHG will issue a license to the applicant within a 60 day period from when the application was submitted. Other requirements are applicable as per this policy.
      - Within this period the ROES equipment will be registered and operate on a non-protected basis;
      - After the 60 day period, unless a written request was made to extend this period, if the applicant does not comply with all the necessary requirements of this policy, including coordination, then SHG may inform the applicant that it will not issue a License and the equipment may be registered as, and continue to operate on a, non-protected basis. Any application fees will be retained by SHG.

   e) Technical requirements of any ROES that are authorised through a Spectrum licence under this policy:
      - must operate in the frequency bands identified in Table 2 of this policy;
      - will be registered onto the SHG's licence register and be protected from future licensed transmitters in the overlapping frequencies (unless this is waived by the ROES operator at its application stage).

[12] The pass-band frequencies of the ROES are usually the allocated bandwidth equal 1.2 times the occupied bandwidth, i.e., to ABW = 1.2 OBW. The occupied bandwidth may be taken as the 3dB bandwidth of the ROES signal it is receiving.

- must follow, (where these exist and are applicable), the ITU-R Recommendations[13] [14]and ITU Radio Regulations, as well as existing and/or current receiver standards, as these form a basis for international cooperation and coordination on an equal playing field for all satellite operators and their Earth station operators.

f) The rights given by the ROES Licence by SHG are:
- Rights of use and protection of its receivers are on a first come first serve basis. However, these rights stem from:

  i. SHG's law and regulations;

  ii. the ITU Radio Regulations, and Coordination agreements which takes precedent amongst satellite operators, and,

- Protection of its receivers from harmful interference from other licensed operators, where applicable;

However, if the licensee obstructs or delays the coordination of its installation vis-à-vis another applicant/licensee, SHG may initiate actions to revoke the licence (following a complaint filed by a new applicant) if the licensee has delayed or obstructed the coordination for a period of at least 60 days.

11. Question 11: Do you agree that the applicant of ROES should provide a written statement that states the status a front-end / pass-band filter? If not, please provide reason.

a. Summary of the Answers

Atlas Space Operations, OneWeb, SSC, SpaceX and Sure Ltd agree that ROES should declare the status of such receiver filtering. In particular, Atlas Space Operations states that the capabilities of the receiver should be declared during importation of the equipment, and SpaceX supports the use of the latest in RF filter technology.

Maxar Technologies disagrees (no reasoning was provided).

b. Our View

SHG is of the view that ROES shall have appropriate filtering. This is necessary so that spectrum can be used efficiently.

SHG adopts the policy that all applicants of ROES Licence must declare, at the application submission point, the filtering capabilities of the ROES equipment.

SHG also requires that such ROES equipment has filtering capabilities that are consistent with industry's norms; such that the allocated bandwidth (ABW), which may refer to the protected

[13] See, https://www.itu.int/rec/R-REC-S/en.
[14] For example, ITU-R Recommendation S.465, S.580, S.731.

bandwidth, is equal to 1.2 times the signal occupied bandwidth (OBW), usually taken as the 3dB signal bandwidth. If this is not the case, the applicant must provide justification to the SHG in its application.

c. Conclusion

The ROES technical requirement below is added to the other ROES technical requirements in section 4.10.3.

a. ROES applicant must declare the technical characteristics of their ROES pass band filtering.

b. The ROES equipment must have a pass-band filter which ensure the minimal use of spectrum and which protect the ROES from harmful interference in adjacent frequency bands and allocations. Such pass-band filter is also necessary to ensure that the ROES is efficient in the use of the spectrum.

   i. It is typical that the amount of spectrum that is utilised by a ROES is equal to the allocated bandwidth (ABW), usually equal to 1.2 times the occupied bandwidth (OBW), i.e., to ABW = 1.2 OBW.

   ii. The occupied bandwidth may be taken as the 3dB bandwidth of the ROES signal it is receiving.

   iii. If this is not the case, the applicant must provide justification to the SHG in its application.

12. Question 12: Do you agree with the above operational requirements, and/or are there any other missing? If not, please provide reason.

a. Summary of the Answers

SSC and Sure Ltd agree. Atlas Space Operations and Maxar do not agree. OneWeb did not reply.

Maxar Technologies stresses that ROES do not provide the value needed for a station on the island.

Atlas Space Operations considers that transmitters should be licensed in all bands managed by the ITU.

SpaceX supports the use of blanket licensing, or license exemption for ubiquitous user terminals. If the terminals are shown to be in compliance with ECC Decisions 271, 272 and relevant ETSI standards, such as 303-980 and draft standard 303-981, they should be exempt from licensing or, at very least, licensed as a group.

b. Our Views

We have already provided our views in other questions above (such as Question 2), especially clarifying the intend and scope of ROES. Also, under this question, we have promoted the need for ROES to use the spectrum efficiently without causing a blockage to other potential users. Hence the

need to accept ROES application no more than two years before such system is launched, and then need for ROES to use the spectrum efficiently (as already address in Question 11 above).

In regard to the view expressed by Maxar, we have clarified in earlier questions (such as question 2) that ROES operate on a receive only mode, and these Earth stations are necessary for certain types of applications, such as meteorological or Earth exploration space missions. Such Earth stations operate in certain frequency allocations as recognised by the ITU.

In regard to the view expressed by Atlas Space Operations, we note that ROES operate under the receive bands (i.e., space-to-Earth) of the ITU. Thus, our policy is consistent with the ITU Radio Regulations.

In regard to the expressed by SpaceX, we believe that their response does not apply for the specific ROES and bands we have consulted on. The policy in this document is based on equipment which is not sold to the public or installed in public premises, nor ubiquitous equipment for bidirectional use. For this, the mentioned ECC Decision 271 and related ETSI standard are not applicable.

However, ECC Decision 272 is applicable to any Earth stations being that ubiquitous and mobile terminals or fixed Earth stations for specific purposes such as PES, TT&C.

Furthermore, as we have mentioned in other questions above ROES equipment can operate on an unlicensed basis if the operator wants, but then it has no recognition when it comes to protection from interference from other terrestrial sources, if these exist. Licence offered under this policy provides that recognitions and protection required by some ROES operators in the bands provided in Table 2.

c. Conclusions

Considering the comments from respondents and our views, SHG adds the following requirements for the ROES.

Operational Requirements of ROES

An application for a Licence for ROES can be accepted if the relevant satellite is either fully operational or will be fully operational in the bands applied for (see Table 2) within 2 years of the date of application at an orbital location provided in the application form.

ROES equipment must comply with ITU-R Recommendations, such as the antenna radiation pattern envelope must meet the minimum performance specified by ITU Recommendation ITU-R S.465, or ITU-R.S.580, or equivalent. Same for the relevant ITU-R recommendations cross-polarization patterns.

13. Question 13: Do you agree with the fees set in the above Table 5? If not, please provide reason.

a. Summary of the Answers

Atlas Space Operations, OneWeb, Space X and Sure Ltd disagree.

Atlas Space Operations considers the fees in relation to the local economy.

OneWeb considers that the “per antenna” fee structure set out in Table 5 would make likely NGSO deployment in St Helena infeasible due to excessive costs and suggests the US model per license basis.

SSC asks if the fee is per antenna or a fee per spacecraft.

Space X considers the fees quite high, not aligned with national norms in Europe and North America. The initial application fee of GBP 1,000 is high but manageable if paid just once. The fee of GBP 4,000 per Ku antenna is considered prohibitive and considers that this cost also applies for user terminals.

Sure Ltd asks for clarity in comparison to other public fees by SHG. Sure Ltd considers that fees should be set so they are reasonable and proportional against the services that are delivered. Sure Ltd asks about an annual review of fees; and should not be subject to Retail Price Index (RPI). Sure Ltd considers that fees should be relating to the cost of managing the frequencies and should be addressed in a separate exercise.

b. Our View

SHG has clarified in our consultation that these fees are applicable only to fixed Earth stations providing feeder-link services (which we have called Permanent Earth Stations) or receive only Earth stations (ROES) in some specific bands. As such we clarify here that the fees proposed in Table 5 of the consultation are not applicable to ubiquitous small terminals for the provision of services to end-users and businesses.

SHG has also analysed the fees of PES and ROES of certain countries, and it has concluded that the fees can vary from about a thousand pounds per antenna to several hundred thousands of pounds on a per year basis. The fees can also vary by (and proportional to) bandwidth size and by frequency allocation (i.e., lower frequency allocations spectrum is scarce, and the fees are higher). We also are aware that some countries charge on a percentage basis of the value of business traffic passing through the PES, but we have not considered this and reverted to a fixed price per antenna basis. As such, SHG concludes that Table 5 of the consultation provides a good benchmark for charging fees for PES and ROES by the SHG.

In view of the comments received above, SHG has listened to the stakeholders and has reduced the fees proposed on Table 5 of the consultation document. The modified fees adopted by the SHG are provided in Table 3 below.

SHG also recognises that the Amateur Satellite service, as is also defined by the ITU Radio Regulations, is a service “solely with a personal aim and without pecuniary interest” (see Consultation document). It is also known that the Amateur community uses such services to relay emergency service communications at long distance. As such, such services will be charged a nominal fee for their Earth stations in St Helena territory.

We note that SHG will reserve the right to recommend a waiver or reduction in fees, where there is a strong economic or social case to do so, with permission from SHG’s Financial Secretary.

We note that from time to time SHG will aim to review the PES and ROES fees proposed in this policy.

Furthermore, we have also considered that as TT&C Earth stations, defined as those Earth stations which provide bi-directional communication services for the navigation, ranging and monitoring of the

spacecraft, require a much smaller amount of spectrum that normal PES Earth stations, the spectrum fees are lower than those of the PES fees. These fees are reported into Table 3 below.

In response to the comments made by the stakeholders SHG provide the following views:

In respect to Atlas Space Operations, SHG is of the views that charging fees for PES and ROES should be based on various aspects. This includes the small geographical size of St Helena, the scarce availability of land and resources in St Helena, and the potential high demand by satellite operators to place their PES and ROES on the island of St Helena, and a fee benchmark with other countries.

In respect to OneWeb, in its analysis SHG understand that other countries are charging on a per antenna basis (e.g., Australia, France), as well as on the scarcity of spectrum (e.g., Australia, South Africa) and fees may vary extensively. SHG is of the view that the fees charges for PES and ROES equipment by the US/FCC do not reflect the reality of a small country like St Helena, the scarcity of resources and land available versus the expected demand for the placement of non-GSO PESs in the island of St Helena.

In response to SCC, the fees we will charge will be based on an antenna basis deployed in the island of St Helena, as each antenna may be the cause of potential interference and has a physical presence that may require specific management.

In response to SpaceX, as we have also responded in previous questions, we have clarified that PESs are fixed Earth stations providing feeder-link services and not ubiquitous terminals that provide services to the public, end-users or businesses.

In response to Sure Ltd, SHG has explained above in (b) that in addition to the cost recovery principle, fees will be set against several benchmarks and scarcity of resources. SHG has listened to all stakeholders and has revised the fees proposed in Table 5 of the consultation to those set in Table 3 below.

c. Conclusion

In determining the fees for PES and ROES, SHG took a heuristic approach adopted the policy following this paragraph by considering the following points, i.e.:

- the views from stakeholders in response to the PES and ROES licensing consultation;
- the charging by other countries;
- the small size of the island of St Helena;
- the likely demand by several satellite operators in placing their infrastructure in St Helena;
- the geographical advantage of the island of St Helena for non-GSO systems;
- the need to have a simplified licensing regime for charging fees
- the need to have small fees for non-commercial based systems, such as Amateur and institutional services (such as Meteorological, Earth Exploration);
- the need for non-GSO satellite constellations to have more than one antenna to provide connections to the visible satellites from St Helena;
- that scarcity of spectrum at lower frequency allocations;
- that lower frequency allocations (C-band) will require the deployment of larger antenna sizes than higher frequency allocations (Ka-band).

Fee Schedule for License Application and Spectrum Fees for PES, TT&C Earth Stations and ROES

1. Under the Telecommunication Ordinance, St Helena Government has the power to charge fees to applicants and licence of radio apparatus. As such SHG is introducing, both for:

    a. Yearly administrative fees, which are fees to recover any spectrum management activities and the processing of the licence application form.

    b. Yearly spectrum use fee, which is a fee related to the operations of the apparatus in the use of the spectrum resource.

SHG will reserve the right to recommend a waiver or reduction in fees, where there is a strong economic or social case to do so, with permission from SHG's Financial Secretary. From time to time SHG will aim to review and communicate changes the PES and ROES fees proposed in this policy.

2. The fee schedule for Permanent Earth Stations, TT&C Earth Stations and Receive Only Earth Stations installed in the territory of St Helena, is provided in Table 3 below.

3. The applicable fees for each license application will be based on:

    - The applicable frequency band, or bands applied for, i.e., Table 1 for PES and TT&C, and Table 2 for ROES.

    - The number of antennas deployed;

    - One fee applicable for both the receive and transmit frequency bands of the PES, or TT&C.

Cumulative fees are applicable if the applicant applies for more than one frequency allocation.

4. Procedure for payment of fees:

    a. For the payment of the relevant fees the applicant will pay these after it submits an application to SHG.

    b. Within 60 days from submitting the application, the applicant must provide to SHG evidence (for example, copies of the bank transactions) of such payment.

    c. Spectrum fees must be paid before each anniversary date and a written evidence must be submitted to SHG before the anniversary date. If this fee is not paid by the anniversary date SHG will initiate termination of the licence.

	Band and Satellite type (see Table 1)		Application fee per application per Band (GBP)	Yearly Spectrum use fee per Antenna per Band (GBP)
Permanent Earth Stations	C-band	GSO	1000	8,500
		NGSO		2,500
	Ku-band	GSO		5,000
		NGSO		1,500
	Ka-band	GSO		3,500
		NGSO		1,000
	Amateur Satellite Service (AMSS)		10	25
	< 1 GHz (UHF/VHF) Mobile Satellite Service (MSS) Earth Exploration Satellite Service (EESS) Space Operation Service (SOS) Space Research Service (SRS)		250	500
	Earth Exploration (EESS) Space Operation (SOS) Space Research (SRS)	1 to < 3 GHz	500	750
		3 to < 10 GHz	500	750
		10 to 31 GHz	500	750
TT&C Earth Stations	< 3 GHz		250	750
	≥ 3 GHz		250	750
Receive Only Earth Stations	Meteorological and EESS	1690-1710 MHz	250	750
	Monitoring Stations	3600-4200 MHz	250	750
	Meteorological and EESS	7750-7900 MHz	250	750
	Meteorological and EESS	25.5-26.6 GHz	250	750

Table 3 - Fee Schedule for PES, TT&C Earth Stations and ROES.

14. Question 14: Do you agree that the length of a PES or a ROES licence is five (5) years? If not, please provide reason.

a. Summary of the Answers

Atlas Space Operations, Maxar Technologies, OneWeb, SSC, Space X disagree.

Atlas Space Operations and Space X suggests 10 years to warrant the investment, while Maxar Technologies questions the duration and OneWeb suggests 15 years for the investment and predictability.

SSC suggests that the licenses should be annually renewable as long as the PES /ROES performance remains the same and as long as the licensed spacecraft remains operational and supported by the PES/ROES.

Sure Ltd suggests that the spectrum license should align with the service license and notes an inconsistency in the timeframes quoted within 8.2.1 with respect to the period within which a request for renewal should be made.

b. Our View

In view of the responses by stakeholders, and recognising that a commercial entity requires certainty for the operation of its business and thus may require that the length of the Permanent Earth Stations licence, TT&C stations, or Receive Only Earth Stations licence be with a good length of validity, we have listened to the stakeholders and agree to a license length of 10 years validity. However, SHG reserves the right to consider the termination of any license, before the expiry period, based on national policy requirements.

In response to the other comments made by the stakeholders:

- In response to SSC, the licence under this policy is automatically renewed, as long as licence conditions remain unchanged and the yearly fees are paid as per Fee Schedule (see Question 13). We agree with SSC's comment that the licence is valid as long as the satellite system/network associated with the licence remains operational and supported by the related Earth station.
- In response to Sure Ltd, who suggests that the spectrum license should align with the service license, SHG states that this is not required because the corresponding system may not offer, for whatever reason, operational services in the island of St Helena. If these are offered in the island of St Helena, then the corresponding services will follow a different authorisation regime. We thank Sure Ltd, regarding the point made on 8.2.1.

SHG is of the view that a license can be terminated, within 60 days from when the licensee has been informed in writing, if the license conditions have changed, such as:

- Satellite system, or satellite network, under which the licence is granted is no longer operational;
- The license conditions under which the license has been granted are no longer met;
- The relevant yearly spectrum fees have not been paid;
- Or other breaches determined by the licensing policy.

At the end of the licensing period our consultation proposed (see section 8.2.1) that the licence be renewed by a submission of a formal letter requesting the renewal of the licence, only if the conditions of the license have not changed, including that of the licensee.

- Such letter must be submitted within 60 days from the end of the period of validity. Note: we have changed our views on when the date such letter must be submitted.
- Within 30 days of receiving the letter, SHG will issue a letter to the licensee informing that the licence has been either granted or cancelled (for reasons to be provided by SHG). The licensee can appeal the decision and SHG will organise a meeting with the licensee to discuss this.
- If the license has been cancelled, the licensee can submit a new license application.

The licensee can also submit a new application if the license conditions have changed.

c. Conclusion

Policy on Renewal of Licence

i. Period of validity of Licence for PES, TT&C Earth Station and ROES

The length of a Permanent Earth Stations, TT&C Earth Station or Receive Only Earth Station Licence is for ten (10) years from the date of when the license is granted (such date is the licence "anniversary date", or also "expiry date").

ii. Renewal of Licence

Each year the license is automatically renewed upon payment of the spectrum fees (as per fee schedule – see Table 3) and the written submission of the payment made as per fee schedule.

Within 60 days before the period of validity of the licence ends, the licensee may request to renew the license for the Permanent Earth Station, TT&C Earth station, or Receive Only Earth Stations by submitting a formal letter to SHG requesting its renewal and stating also that nothing has changed from its current licence. In such case, no new application form is required.

Within 30 days of receiving the letter, SHG will issue a response letter to the licensee informing that the licence has been either granted or cancelled (for reasons to be provided by SHG).

If the license has been cancelled, the licensee can appeal the decision to SHG and SHG will organise a meeting with the licensee to discuss this. If the licence is deemed to be cancelled, the licensee can re-submit a new license application.

If SHG does not received a letter from the licensee to renew its license, SHG will cancel the licence at the 10th year of the anniversary date. SHG will inform the licensee, where possible, that the licence has been cancelled.

SHG reserves the right, under certain justifications, to reinstate the licence after its expiry date or after its cancellation.

iii. Cancellation of licence before the period of validity of the licence ends:

SHG has the right to cancel or not renew a licence due to legal and/or policy constraints. Such reasons shall be communicated to the licensee. Other reasons may be applicable.

A licence can be terminated, within 60 days from when the licensee has been informed by SHG in writing, if inter-alia:

- The satellite system, or satellite network, under which the licence is granted is no longer operational;
- The license conditions under which the license has been granted are no longer valid;
- The relevant yearly spectrum fee has not been paid; or,
- Other breaches as determined by SHG.

When a licence is cancelled SHG will issue a letter to the licensee.

The licensee can appeal the decision of SHG to cancel the licence and SHG will organise a meeting with the licensee to discuss this.

If the licence is deemed to be cancelled, the licensee can re-submit a new license application.

15. Question 15: In reviewing the form in Annex 2, do you agree with the information that is required from the applicant? If not, please provide reason.

a. Summary of the Answers

All stakeholders apart from Sure ltd agree.

Sure Ltd considers that there should be an independent body with the necessary expertise and legal framework, and not relying on co-ordination mechanisms between parties.

b. Our View

Satellite operators or Earth station operators can apply to the SHG to obtain a licence for a Permanent Earth Stations, TT&C Earth station, or for Receive Only Earth Stations Licence, by submitting the form in **Annex 2.**

In view of the response made by Sure Ltd, we have already responded to this in other questions above, we are of the view that spectrum is a shared resource and for:

- international space systems and networks the related Earth stations shall be coordinated within the ITU Article 9 frequency coordination;
- national coordination with terrestrial services we have laid out the process in response to Questions 1, 2 5 and 10 above.

Furthermore, SHG is of the view that in the current policy and legal framework, SHG is the licensing authority for all the Earth stations under this policy.

c. Conclusion

In view of the form provided in **Annex 2**, this is adopted, and the applicant will need to provide all relevant information of compliance to the coordination and other technical requirements as laid out in our response to questions 1, 2, 5 and 10.

3. St Helena Government's Decision

Having consulted with stakeholders on the authorisation of Permanent Earth Stations and Receive Only Earth Stations installed in St Helena, under the Telecommunications Ordinance (1989) and its subsequent revisions, we have, as given by Section 54 of the Ordinance, consulted with Stakeholders to revise our licensing regulations and create new authorisation policy for such wireless telegraphy stations.

Having considered the responses to our consultation, and expressed our views and conclusions in this document, we have decided to recommend that we proceed with the authorisation of Permanent Earth Stations and Receive Only Earth Stations installed at fixed locations in the island of St Helena, through licence provision. These installations will be authorised under the licence regime of our Policy, published in parallel to this statement.

The Telecommunications Ordinance will be modified accordingly to incorporate this new policy.

To clarify that:

- the new authorisation framework applies to PES and ROES that operate to satellites in geostationary and non-geostationary orbits;
- the frequency ranges for operation within and out of St Helena are those provided in Table 1 and Table 2 of the new Policy;
- A licence application form for such installation will be made available for applicant on our webpage;
- A Table of Allocation and Licence Registry will be made available on our webpage;
- A fees schedule will be issued for the Administrative fees and the Spectrum Use fees;
- Other provisions and procedures will be published on our new policy.

We recommend that the policy comes into force after endorsement by Economic Development Committee in 2020. We recommend the regulations covering the licensing of PES and ROES at fixed locations in St Helena to be in force after endorsement by Executive Council in 2020.