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23   </cmn:AttachmentDescription>
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26     Apparatus Licenses_Ku.pdf</cmn:FileName>
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**From:** Ray Contreras <Ray.Contreras@acma.gov.au>  
**Sent:** Tuesday, 1 December 2020 2:50 PM  
**To:** [REDACTED]  
**Cc:** [REDACTED]; Satellite Coordination  
**Subject:** RE: Request for Assessment of Proposed Space/Space Receive Apparatus Licenses [SEC=OFFICIAL]  
**Attachments:** Fwd: Earth Station agreement confirmation [SEC=OFFICIAL] (64.2 KB); FW: Earth station license application - Ku (67.8 KB); ACMA\_LoA\_STEAM1\_20201123.docx

Our reference: SSTOUT 13867

H [REDACTED]

The ACMA has completed the assessment of the SpaceX Starlink Ku-band Space/Space receive licence request for high, medium, low and remote density area licences across Australia as detailed in the table below and conditions outlined in this email.

#### Technical Regulator Assessment Endorsement

Technical regulatory assessment has been successfully completed and these licences can proceed but as coordination of the STEAM 1 satellite network is ongoing and is yet to be recorded in the MIFR, then they need to incorporate the conditions of Appendix B of the [Space Station BOP](#).

#### Licence Parameters

Category	License 1	License 2
Licence type	Space receive	Space
Licence renewability (ongoing/non-ongoing) and licence period	Ongoing (5 years)	Ongoing (5 years)
Direction	Uplink	Downlink
Frequency lower bound (MHz)	14,000.0000	10,700.0000
Frequency upper bound (MHz)	14,500.0000	12,750.0000
Service purpose (communications, TT&C, broadcasting reception)	Communications	Communications

The related ITU satellite network name <sup>[1]</sup>	STEAM-1	STEAM-1
The orbital longitude of the satellite network	NGSO	NGSO
The service area where associated earth stations operate <sup>[2]</sup>	High, medium, low & remote density areas	High, medium, low & remote density areas
The owner/controller/operator of the related satellite network	SpaceX	SpaceX

#### **Australian satellite operator views**

We thank SpaceX for the information provided and for seeking the views of Defence and Optus in regards to these licence applications.

#### **Recorded in MIFR**

Thank you for providing the letter of assurance and we note that the ITU-R Bureau has issued a favourable finding for the STEAM 1 network but that coordination is yet to be completed and as such, this satellite network has not been recorded in the MIFR.

#### **NGSO to GSO interference and PFD limits**

From the information provided and having checked the Radiocommunication Bureau comments of CR/C 3739 MOD 5 relating to the findings with respect to No. 11.31 there is a favourable finding in regards to the limits specified under Nos. 22.5C, 22.5D and 22.5F and this indicates SpaceX will comply with article 22.2. There is also a favourable finding for all other frequency assignments which covers compliance with the terrestrial PFD limits (Article 21.16).

#### **Acceptance of no protections from fixed links**

The ACMA accepts the statement made by SpaceX that “SpaceX understands the User Terminals will operate on an unprotected basis due to interference caused by a point to point station in the frequency bands 10.7-11.7 GHz”.

<sup>[1]</sup> Failure to provide accurate ITU satellite network information will delay the process. The ITU SNL database (Part B) is a useful tool for checking the accuracy of the satellite network name. See <http://www.itu.int/net/ITU-R/space/snl/bsearchb/spublication.asp>.

<sup>[2]</sup> A map illustration for the service area will be possibly needed.



### **NGSO to NGSO Interference**

The ACMA would like to draw to SpaceX's attention that other NGSO operators have Space/ Space Rx licences in Australia with some of the licences in overlapping parts of the Ku-band (eg. Kepler [11022172/1](#)). In these instances interference is unavoidable and becomes a statistical issue depending on constellation size and deployment of satellites at what point it becomes harmful interference. In regard to coordination of frequency usage and interference management between satellite networks, the ACMA's view is that this is undertaken through the ITU satellite filing and coordination process. This is a principle inherent in the ACMA's long-standing approach to management and licensing of space-based communication systems. While in some cases such as ESIM, very large earth stations, NGSO to GSO and space/space receive licences, the ACMA applies additional due diligence requirements during licence application assessment, the onus is on the satellite operator to manage interference. Hence in the case of NGSO to NGSO operation with overlapping bands, the ACMA expectation is that the NGSO operators will resolve interference management provisions with other NGSO networks through Operator-to-Operator agreements as part of the ITU satellite filing and coordination process.

The ACMA would also like to advise that the Space/ Space Receive licences work in conjunction with the [Radiocommunications \(Communication with Space Object\) Class Licence 2015](#) and under these arrangements SpaceX's earth station terminals are:

- authorised to operate only when operation does not interfere with the operation of a radiocommunications receiver
- will not be afforded protection from interference caused by a radiocommunications transmitter of other radiocommunications service
- are not to cause interference to the *Mid-West Radio Quiet Zone*

We are pleased to complete this assessment and wish SpaceX all the best in launching their Starlink service in Australia.

If you have any questions or require further information, then please do not hesitate to contact me.

Kind regards,

**Ray Contreras**

Senior Engineer  
Space Systems Section

---

**Australian Communications and Media Authority**

T +61 2 6256 2830

E [ray.contreras@acma.gov.au](mailto:ray.contreras@acma.gov.au)

[acma.gov.au](http://acma.gov.au)



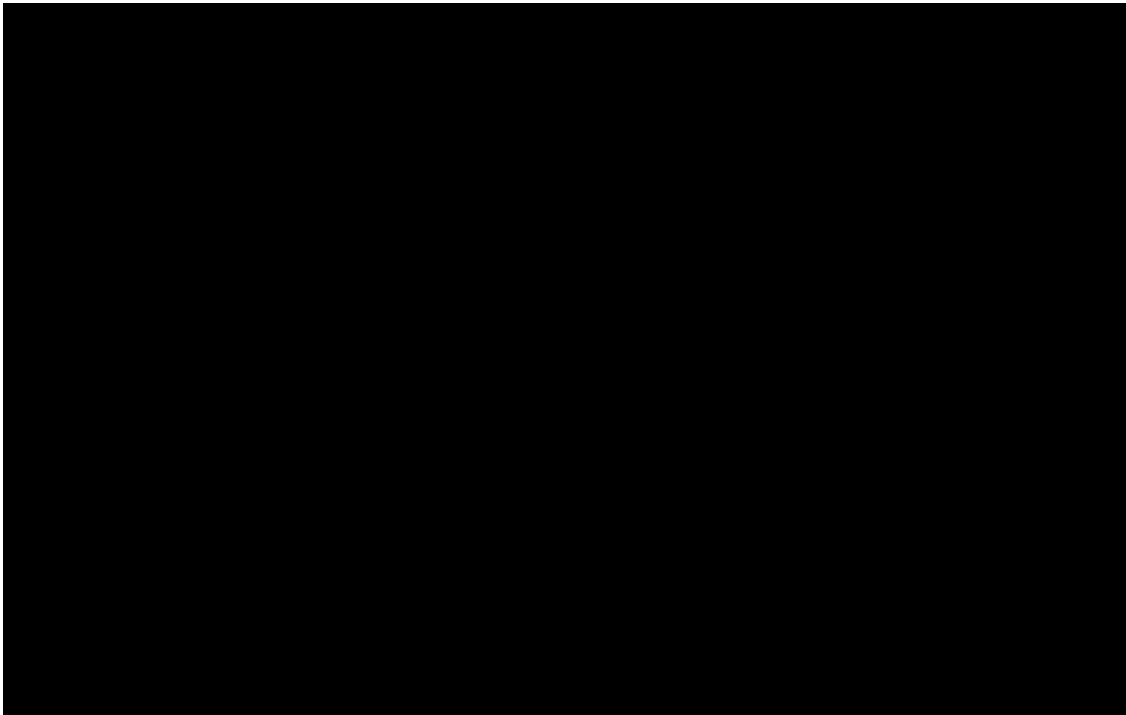
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**From:** [REDACTED]  
**Sent:** Tuesday, 1 December 2020 7:56 AM  
**To:** Ray Contreras <[Ray.Contreras@acma.gov.au](mailto:Ray.Contreras@acma.gov.au)>  
**Cc:** [REDACTED] Satellite Coordination <[Satellite.Coordination@acma.gov.au](mailto:Satellite.Coordination@acma.gov.au)>  
**Subject:** RE: Request for Assessment of Proposed Space/Space Receive Apparatus Licenses [SEC=OFFICIAL]

Hi Ray,

I have received confirmation from SpaceX as to their complete understanding and agreement with the conditions defined in your draft response included in your email of 24<sup>th</sup> November 2020. SpaceX has also provided an amended Letter of Assurance reflecting the minor changes requested (see attached). As such, I believe ACMA are now in a position to complete the assessment of proposed licenses and issue the formal response, allowing for the application for Space and Space Receive licenses to proceed.  
Please advise at your earliest convenience.



---

**From:** Ray Contreras [<mailto:Ray.Contreras@acma.gov.au>]  
**Sent:** Tuesday, 24 November 2020 11:43 AM  
**To:** [REDACTED]  
**Cc:** [REDACTED] Satellite Coordination

**Subject:** FW: Request for Assessment of Proposed Space/Space Receive Apparatus Licenses  
[SEC=OFFICIAL]

Hi [REDACTED]

Please see draft approval email below, as it stands we can grant standard Space/Space Rx licences for SpaceX. [REDACTED]

Our review process identified some minor changes to the Letter of Assurance as the modifications made around favourable findings are in relations to the Coordination Requests and not the Notification. To assist we have included some suggested edits for SpaceX to consider.

I also draw your attention to the section NGSO to NGSO Interference in the draft email below as this has not been previously raised with SpaceX. This section highlights how other NGSO operators are already licenced to operate in Australia and interference management needs to be conducted through operator-to-operator agreements. The ACMA has assumed that by SpaceX issuing the letter of assurance then coordination with these other operators is well advanced and if not completed then preliminary arrangements are in place. As these satellite networks are filled through foreign administrations, any interference issues would be expected to be managed through those administrations which is why Australia does not require SpaceX to seek the views of licenced NGSO systems such as Kepler. Likewise, similar process will be followed for any new entrants from foreign satellite operators wanting to provide services in Australia. We also highlight in the draft approval email the conditions under which the satellite earth station terminals operate under as required by the Space Objects Class Licence.

Once SpaceX confirms their understanding and agreement of the conditions in the email below we will finalise this assessment.

Kind regards,

Ray

\*\*\*\*\* draft response \*\*\*\*\*

The ACMA has completed the assessment of the SpaceX Starlink Ku-band Space/Space receive licence request for high, medium, low and remote density area licences across Australia as detailed in the table below and conditions outlined in this email.

#### **Technical Regulator Assessment Endorsment**

Technical regulatory assessment has been successfully completed but as coordination of the STEAM 1 satellite network is ongoing and is yet to be recorded in the MIFR, then these licences can proceed and need to incorporate the conditions of Appendix B of the [Space Station BOP](#).

### Licence Parameters

Category	License 1	License 2
Licence type	Space receive	Space
Licence renewability (ongoing/ non-ongoing) and licence period	Ongoing (5 years)	Ongoing (5 years)
Direction	Uplink	Downlink
Frequency lower bound (MHz)	14,000.0000	10,700.0000
Frequency upper bound (MHz)	14,500.0000	12,750.0000
Service purpose (communications, TT&C, broadcasting reception)	Communications	Communications
The related ITU satellite network name <sup>[1]</sup>	STEAM-1	STEAM-1
The orbital longitude of the satellite network	NGSO	NGSO
The service area where associated earth stations operate <sup>[2]</sup>	High, medium, low & remote density areas	High, medium, low & remote density areas
The owner/controller/operator of the related satellite network	SpaceX	SpaceX

### Australian satellite operator views

We thank SpaceX for the information provided and for seeking the views of Defence and Optus in regards to these licence applications.

### Recorded in MIFR

Thank you for providing the letter of assurance and we note that the ITU-R Bureau has issued a favourable finding for the STEAM 1 network but that coordination is yet to be completed and as such, this satellite network has not been recorded in the MIFR.

---

<sup>[1]</sup> Failure to provide accurate ITU satellite network information will delay the process. The ITU SNL database (Part B) is a useful tool for checking the accuracy of the satellite network name. See <http://www.itu.int/net/ITU-R/space/snl/bsearchb/spublication.asp>.

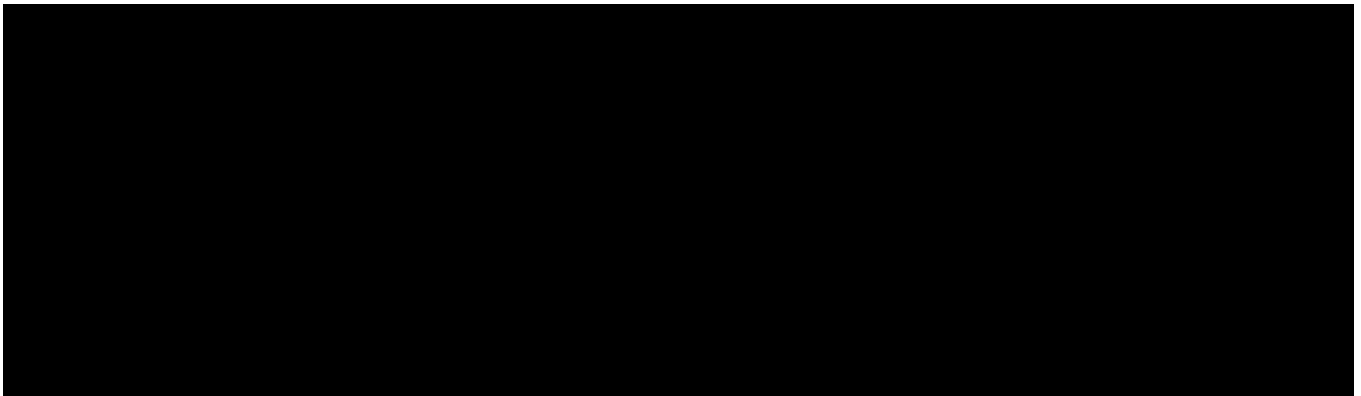
<sup>[2]</sup> A map illustration for the service area will be possibly needed.

### **NGSO to GSO interference and PFD limits**

From the information provided and having checked the Radiocommunication Bureau comments of CR/C 3739 MOD 5 relating to the findings with respect to No. 11.31 there is a favourable finding in regards to the limits specified under Nos. 22.5C, 22.5D and 22.5F and this indicates SpaceX will comply with article 22.2. There is also a favourable finding for all other frequency assignments which covers compliance with the terrestrial PFD limits (Article 21.16).

### **Acceptance of no protections from fixed links**

The ACMA accepts the statement made by SpaceX that “SpaceX understands the User Terminals will operate on an unprotected basis due to interference caused by a point to point station in the frequency bands 10.7-11.7 GHz”.



### **NGSO to NGSO Interference**

The ACMA would like to draw to SpaceX's attention that other NGSO operators have Space/ Space Rx licences in Australia with some of the licences in overlapping parts of the Ku-band (eg. Kepler [11022172/1](#)). In these instances interference is unavoidable and becomes a statistical issue depending on constellation size and deployment of satellites at what point it becomes harmful interference. In regard to coordination of frequency usage and interference management between satellite networks, the ACMA's view is that this is undertaken through the ITU satellite filing and coordination process. This is a principle inherent in the ACMA's long-standing approach to management and licensing of space-based communication systems. While in some cases such as ESIM, very large earth stations, NGSO to GSO and space/space receive licences, the ACMA applies additional due diligence requirements during licence application assessment, the onus is on the satellite operator to manage interference. Hence in the case of NGSO to NGSO operation with overlapping bands, the ACMA expectation is that the NGSO operators will resolve interference management provisions with other NGSO networks through Operator-to-Operator agreements as part of the ITU satellite filing and coordination process.

The ACMA would also like to advise that the Space/ Space Receive licences work in conjunction with the [Radiocommunications \(Communication with Space Object\) Class Licence 2015](#) and under these arrangements SpaceX's earth station terminals are:

- authorised to operate only when operation does not interfere with the operation of a radiocommunications receiver
- will not be afforded protection from interference caused by a radiocommunications transmitter of other radiocommunications service
- are not to cause interference to the *Mid-West Radio Quiet Zone*

We are pleased to complete this assessment and wish SpaceX all the best in launching their Starlink service in Australia.

If you have any questions or require further information, then please do not hesitate to contact me.

Kind regards,

**Ray Contreras**

Senior Engineer  
Space Systems Section

---

**Australian Communications and Media Authority**

T +61 2 6256 2830

E [ray.contreras@acma.gov.au](mailto:ray.contreras@acma.gov.au)  
[acma.gov.au](http://acma.gov.au)



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---

**From** [REDACTED]

**Sent:** Friday, 20 November 2020 4:15 PM

**To:** Ray Contreras <[Ray.Contreras@acma.gov.au](mailto:Ray.Contreras@acma.gov.au)>; Satellite Coordination  
<[Satellite.Coordination@acma.gov.au](mailto:Satellite.Coordination@acma.gov.au)>

**Cc:** [REDACTED]

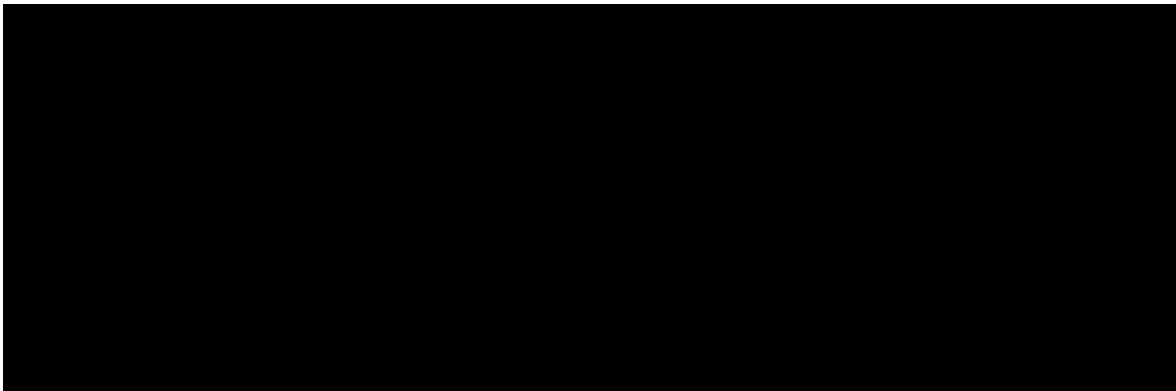
**Subject:** FW: Request for Assessment of Proposed Space/Space Receive Apparatus Licenses

Ray,

As referred to in my email of earlier this afternoon, please find a consolidated list of attachments that have been provided by way of supporting evidence of our submission for the assessment of Space/Space Receive Ku-band licenses, made on behalf of SpaceX.

Please review and advise if there is absolutely anything else you require to enable completion of your assessment.

Many thanks,



[REDACTED]

---

**From:** [REDACTED]  
**Sent:** Wednesday, 14 October 2020 8:05 AM  
**To:** 'Ray Contreras'; 'Satellite Coordination'  
**Cc:** [REDACTED]  
**Subject:** RE: Request for Assessment of Proposed Space/Space Receive Apparatus Licenses

Ray,

Following our discussion of last Friday, in order to facilitate ACMA assessment of the proposed satellite-based radiocommunications service against the defined requirements for the ITU regulatory status and ITU registration details of the related satellite network, please find revised details for Space and Space Receive licenses associated with ITU satellite network STEAM-1 sought by our client. This information below includes information required for regulatory assessment as defined by the BOP 'Submission and processing of applications for space and space receive apparatus licences', and supplemented by the information requested in your email of 17<sup>th</sup> August 2020

1. *Address all the sections under 3.5 regarding **Interference management requirements***
  - a. *from this information we will determine who SpaceX needs to seek their views*
  - b. *any information you can provide regarding with compliance of FCC or ECC requirements especially around NGSO/GSO coexistence*
- **Filings, Interference, and Coordination (BOP 3.5.1, 3.5.3, 3.5.4, 3.5.5)**
  - Relevant Filings (Ku)
    - ITU: STEAM-1 ([link](#)) - IFIC 2920
  - SpaceX protects terrestrial communications in Ku by complying with the PFD limits (see favorable findings). The ITU accepts filings only if the PFD limit check is favorable.
  - SpaceX protects GSO and BSS by complying with the EPFD limits. We have a [favorable findings from the ITU](#) for our approved mod, inclusive of 9.7a and 9.7b. We can make available the EPFD files that were submitted to FCC, upon request.
  - SpaceX is coordinating with all NGSO operators.
  - SpaceX is protecting Radio Astronomy in Ku. Please see [ECC report 271](#).
- [REDACTED]
  - [REDACTED]
    - [REDACTED]
    - [REDACTED]
- **Quiet Zone (3.5.6)**

- SpaceX is capable of complying with the quiet zone requirement and is happy to discuss the requirements for implementation into our network.
- **Non-Protection Agreement (3.5.7)**
  - SpaceX understands the User Terminals will operate on an unprotected basis due to interference caused by a point to point station in the frequency bands 10.7-11.7 GHz, 18.2-18.8 GHz and 19.3-19.7 GHz.

2. *Table as outlined in Appendix C*

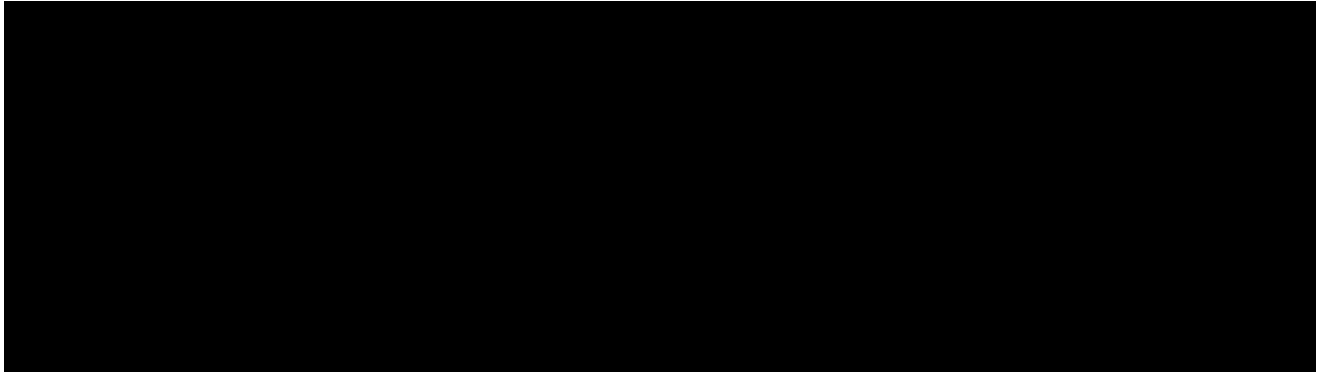
Category	License 1	License 2
Licence type	Space receive	Space
Licence renewability (ongoing/non-ongoing) and licence period	Ongoing (5 years)	Ongoing (5 years)
Direction	Uplink	Downlink
Frequency lower bound (MHz)	14,000.0000	10,700.0000
Frequency upper bound (MHz)	14,500.0000	12,750.0000
Service purpose (communications, TT&C, broadcasting reception)	Communications	Communications
The related ITU satellite network name <sup>[1]</sup>	STEAM-1	STEAM-1
The orbital longitude of the satellite network	NGSO	NGSO
The service area where associated earth stations operate <sup>[2]</sup>	High, medium, low & remote density areas	High, medium, low & remote density areas
The owner/controller/operator of the related satellite network	SpaceX	SpaceX

3. *Letter of Assurance if filing(s) have not concluded coordination (Part IIs)*

<sup>[1]</sup> Failure to provide accurate ITU satellite network information will delay the process. The ITU SNL database (Part B) is a useful tool for checking the accuracy of the satellite network name. See <http://www.itu.int/net/ITU-R/space/snl/bsearchb/spublication.asp>.

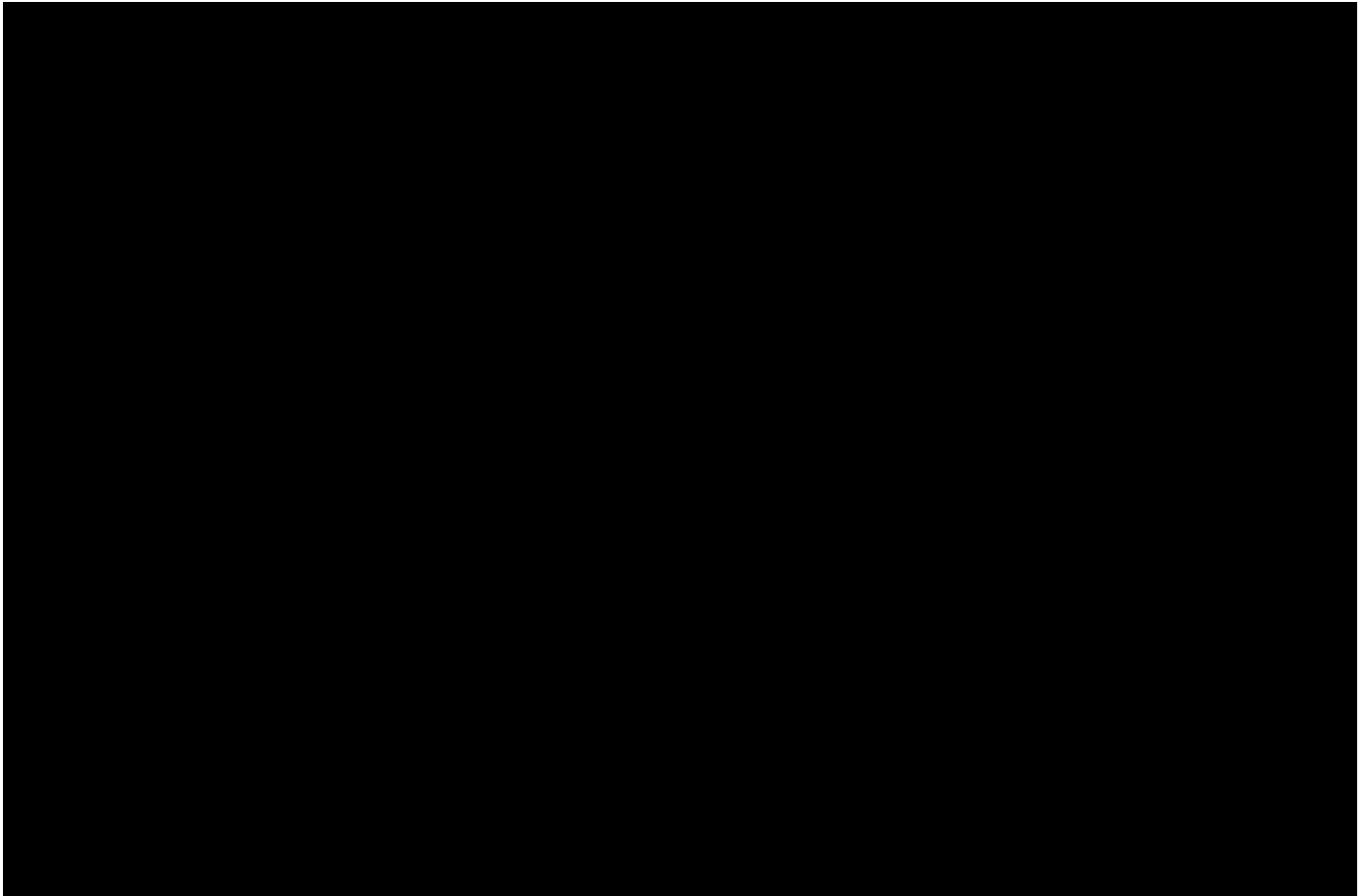
<sup>[2]</sup> A map illustration for the service area will be possibly needed.

A Letter of Assurance relating to the STEAM-1 filing currently with the ITU is attached. Please note that the ITU has already published “favourable findings” for the filing.



Please let me know if there are any omissions from the information provided above, or points of clarification that you need me to elaborate on, as keen to ensure you have all the information on hand to enable completion of your assessment.

Regards,



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# Appendix A: Not recorded in the MIFR

Where the satellite network is still under coordination and has not as yet been recorded (notified) in the MIFR:

## User-defined

1. This space station and associated earth stations are authorised to communicate with the *Starlink* satellite network as published by the International Telecommunication Union (ITU) in Special Section *such as CR/C/3739* of International Frequency Information Circular [*IFIC 2920*].