

Response to ICASA document:
“Consultation on the proposed new
Licensing Framework for Satellite
Services”

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TABLE OF CONTENTS

1. INTRODUCTION	4
2. REFERENCES	4
3. DEFINITIONS OFFERED.....	4
4. BACKGROUND TO PROPOSED LICENSING APPROACH	5
4.1 Facility Licenses	6
4.1.1 Gateway License	6
4.1.2 TT&C Earth Station License	6
4.1.3 User Terminal Network license.....	6
4.2 Spectrum Licenses	6
4.2.1 Gateway Spectrum License.....	6
4.2.2 TT&C Spectrum License	7
4.2.3 User Terminal Spectrum License	7
4.3 Illustration of various operational scenarios and associated licenses.....	7
5. RESPONSES TO ICASA CONSULTATION QUESTIONS	11
5.1 Question 2 Response: Exclusions.....	11
5.2 Question 3 Response: Separate category licensing	11
5.3 Question 4 Response: Gateway Licenses	11
5.4 Question 5 Response: Spectrum Fee calculations	12
5.5 Question 6 Response: Satellite User Terminals	14
5.6 Question 8 Response: AGA Protection	15
5.7 Question 9 Response: Satellite role in addressing underserved areas.....	16
5.7.1 Satellite backhaul	16
5.7.2 Supplemental Coverage from Space as a means to address underserved areas	16

List of Figures

Figure 1: Network and Commercial Relationships for Scenario 1: HTS/NGSO operator with Gateway outside South Africa 8

Figure 2: Network and Commercial Relationships for Scenario 2: HTS/NGSO operator with Gateway inside South Africa 8

Figure 3: Network and Commercial Relationships for Scenario 3: Conventional GSO operator with Gateway inside South Africa 9

Figure 4: Network and Commercial Relationships for Scenario 4: Conventional GSO operator with Gateway outside South Africa 9

Figure 5: Network and Commercial Relationships for Scenario 5: Supplementary Coverage from Space (SCS) with Gateway inside South Africa 10

List of Tables

Table 1: Satellite deployment combinations and applicable Spectrum licences 10

LIST OF ACRONYMS

ECNS	Electronic Communications Network Service
ECS	Electronic Communications Service
GSO	Geo-Stationary Orbit
HTS	High Throughput Satellite
IoT	Internet of Things
MNO	Mobile Network Operator
MSS	Mobile Satellite Services
NGSO	Non Geo-Stationary Orbit
SCS	Supplemental Coverage from Space
TT&C	Telemetry, Tracking and Control
UT	User Terminal

1. INTRODUCTION

This document provides a response to the “Consultation on the proposed new Licensing Framework for Satellite Services”, Government Gazette 51044 of 14 August 2024.

The author, Roy Blatch, has worked in the satellite industry since 1998 and provides advisory services to the telecommunications industry across many technologies. Systems House Technologies has no affiliation to, or commercial engagement with, any satellite-based organisation or entity. These inputs are provided in the spirit of furthering telecommunications deployments within South Africa.

The Systems House Technologies’ response addresses selected questions only.

2. REFERENCES

[Ref1] “Consultation on the proposed new Licensing Framework for Satellite Services”, Government Gazette 51044 of 14 August 2024

[Ref2] The National Radio Frequency Plan 2021, Government Gazette 46088

3. DEFINITIONS OFFERED

The definitions provided in the ICASA document are not considered to be comprehensive and are ambiguous in places. The proposed definitions below are offered and are the ones used within this response.

“**Conventional GSO**” refers to the historical GSO satellite whose payload frequency converts, amplifies and re-transmits the signal received from an Earth Station. Individual satellite beams are typically large covering countries, regions and continents. The satellite operator effectively sells raw capacity in MHz and has no participation in the services offered over the satellite, this being the responsibility of the GSO Satellite Service Provider.

“**Earth station**” is a satellite antenna with associated radio equipment fitted or placed on land, marine vessel or aircraft used to communicate with one or more satellites. This may take the form of conventional parabolic type antennas or flat-panel active antennas and antennas may be in a fixed position or motorised to enable tracking of the satellite used.

“**Gateway**” comprises one or more non-transportable fixed earth stations that serve as the central hub for traffic to and from User Terminals on a satellite network, connecting those User Terminals to the internet or operator’s closed terrestrial network. A Gateway can also be a broadcast head-end operating unidirectionally to receive-only earth stations in a satellite broadcast network. In the case of GSO satellites, a single earth station can be used and in the case of NGSO constellations, multiple earth stations are typically used at one location. Where multiple antennae service the same GSO satellite or the same NGSO constellation, they shall be classified as a single gateway.

“**Gateway/TT&C Earth station**” is an earth station that fulfils the dual roles of Gateway and TT&C Earth station.

“**GSO Satellite Service Provider**” is an entity that activates and operates a satellite service on a conventional GSO satellite. They procure satellite transponder capacity from the satellite owner/operator in MHz, not Mbps. They typically make use of their own or a third-party earth station and satellite hub, located either within South Africa or abroad, to activate the satellite network used to provide services to user terminals located within the footprint of the satellite beam being used. A GSO Satellite Service Provider

“**High Throughput Satellites (HTS)**” are a new generation of GSO communication satellites that use advanced technologies to provide higher data transmission capacity than conventional satellites. They use focused spot beams instead of wide beams, which can result in 10 to 100 times higher throughput.

“**Satellite Bus**” is the satellite platform comprising the modular structure or framework that forms the core of the satellite.

“**SCS device**” is a hand-held consumer-grade device (phone, tablet etc) or IoT device typically used on terrestrial cellular networks that is capable of operating with satellites providing Supplemental

Coverage from Space (SCS) on the mobile network operator's licensed spectrum used for terrestrial services. Blanket licensing of these devices is already in place and no additional licensing is therefore envisaged. For the avoidance of doubt, SCS Devices are excluded from the User Terminal definition and licensing.

“Teleport Facility” is a facility that comprises of one or more Gateways or TT&C Earth Stations which are located at a single, physically demarcated geographic location. A teleport facility can have one or more earth stations serving either:

- a. a single satellite network such as NGSO constellation – this would entail multiple earth stations;
- b. multiple satellite networks such as NGSO constellations - this would entail multiple earth stations;
- c. a single GSO satellite network – could be a single earth station or multiple stations if redundancy is provided for;
- d. multiple GSO networks - this would entail multiple earth stations or Torus/multi-beam earth station; or
- e. any combination of the above.

“TT&C Earth Station” is a non-transportable fixed earth station used for transmission of telemetry and command data used for management of the Satellite Bus and for accurate tracking of satellites. A TT&C Earth Station may be used on a multitude of satellites belonging to one or more satellite operators and is thus not necessarily dedicated to a specific satellite. It can typically operate the narrow bandwidth TT&C carriers within a very large segment of bandwidth (several GHz for high bands).

“User Terminal” is a device at the end-user's location that communicates bidirectionally with the Gateway via the satellite using designated satellite radio frequency spectrum. The user terminal may be mobile, nomadic or fixed, hand-held or portable. Note that in the case of some NGSO constellations, a single user terminal may comprise of multiple (typically two) earth stations to enable uninterrupted communication services. Any user device transmitting on “Mobile-Satellite” (MSS) or “Fixed-Satellite” (FSS or BSS) spectrum as listed in the “The National Radio Frequency Plan 2021 (Gov Gaz-46088)” is considered a User Terminal.

4. BACKGROUND TO PROPOSED LICENSING APPROACH

Whilst responses are provided in section 5 to the questions posed by ICASA in their consultation paper ([Ref1]), it is necessary to provide an overview of the authors proposed licensing approach as context to the answers provided.

We believe the optimal approach is to have the following satellite licence categories:

1. Facility licenses
 - a. Gateway;
 - b. TT&C Earth Station;
 - c. User Terminal Network
2. Spectrum Licenses
 - a. Gateway spectrum licence;
 - b. TT&C Spectrum licence;
 - c. User Terminal spectrum licence

These categories are discussed in the sections that follow.

And as proposed by ICASA, the Space Segment Registration process is essential. Many satellites transmit over South Africa whether there are any local User Terminals or not. There is thus no point in trying to oblige foreign entities without plans to deploy User Terminals in South Africa to register their space stations with ICASA. Regulation and coordination is undertaken by the ITU and the applicable footprint and frequency information per satellite can be sought from them, if required.

4.1 Facility Licenses

Our proposal is that the Facility licence exclude the associated spectrum licence. However, as part of the license application the applicant shall provide all radio frequency details of the facility capabilities eg. total operating frequency band, specific operating frequencies and bandwidths, power, modulations and sensitivities, etc.

4.1.1 Gateway License

It would seem logical to license a Gateway either by each GSO satellite or by each NGSO constellation (multiple Earth Stations) utilised by that Gateway. Thus, a Teleport Facility (other than one with exclusively TT&C Earth stations) will require at least one and possibly many Gateway licences.

Multi-feed antennas transmitting to multiple GSO satellites will require multiple Gateway Licenses.

Local Gateway licensees should not be financially penalised for their operations compared to those with gateway operations outside of South Africa. There is of course some administration effort from ICASA in the licensing of a Gateway and the coordination aspects associated with this and the cost of this administrative effort should be the basis for a minimum Gateway fee calculation which, in our view, should not be linked to spectrum used at the Gateway.

The author believes that broadcast satellite uplink facilities should also require a Gateway License.

4.1.2 TT&C Earth Station License

A TT&C Earth Station licence should attract a minimal licensing fee to encourage the use of South Africa as TT&C station location (based on its favourable geographic position).

4.1.3 User Terminal Network license

The User Terminal Network license is as proposed by ICASA in their consultation paper.

 Reference [Ref1] Para 10.2: *“Once included in the Authorised list of Space Stations, a foreign entity will need additional radio frequency spectrum either by itself or through an already licensed Individual Electronic Communications Network Licence holder (I-ECNS) provider.”*

Comment on above : An individual ECNS/ECS should not be mandatory for satellite User Terminal deployment if the User Terminals are geographically limited based on the geographic coverage area of a class ECNS /ECS licence. Rules applicable to class ECNS/ECS licensees should not be different for different technologies.

4.2 Spectrum Licenses

In the same way as electronic communications network service or broadcasting service licences are separate from radio frequency spectrum licences, so the satellite spectrum licences should be separate from facility licenses. This is also in line with the requirements of the ECA in relation to the grant of individual licences (Chapter 3) and radio frequency spectrum licences (Chapter 5).

ICASA needs to know the locations and specifications of transmitters to satellites in order to be able to coordinate usage between terrestrial and satellite systems, resolve any interference issues and, of course, to obtain fees for spectrum usage. The proposed spectrum licenses will address this requirement.

4.2.1 Gateway Spectrum License

The Gateway Spectrum License should be calculated based on the total bandwidth uplinked from the gateway.

The author believes that broadcast satellite uplink facilities should also require a Gateway Spectrum License.

4.2.2 TT&C Spectrum License

Non-satellite specific TT&C Earth Stations, such as those used by South African National Space Agency (SANSA), operate at discrete frequencies and narrow channel widths across a wide spectrum band, depending on which satellite or launch vehicle TT&C services are being provided to.

The TT&C Spectrum License should be based on the maximum carrier bandwidth envisaged for TT&C operations as opposed to the total bandwidth capability of the TT&C Earth Station.

4.2.3 User Terminal Spectrum License

The User Terminal spectrum licence fee should be based on the retail product sold to a client eg. (10Mbps downlink and 5Mbps uplink) and the license fee calculated on the maximum of downlink or uplink speed.

In the specific scenario where an operator sells a pool of bandwidth (eg. 2Mbps) to a single client to be shared amongst multiple terminals (eg. 100 terminals at ATMs) as opposed to individual packages per terminal, the average (20kbps in this example) should be used for determining the spectrum fee.

HTS satellites and NGSO constellation Gateways are operated by the owner of the satellite/space segment who provide an end-to-end managed service, wholesaling to local distributors and licensees who then retail these to end users/customers (only a South African ECS/ECNS licensee should be allowed to retail any service to South African customers). However, the User Terminal should be available to be purchased from any operator or approved distributor, not necessarily an ECS/ECNS licensee, in the same way that distributors can sell devices for mobile services provided they hold a radio dealer licence.

An HTS/NGSO satellite operator, given it provides an end-to-end managed service, has full visibility of:

- all customer locations
- the product they have purchased (eg. 20Mbps downlink, 10Mbps uplink)
- the local ECS/ECNS partner who retailed that solution (as this is the satellite operator's wholesale client).

The satellite operator is thus in a position to provide detailed reporting both to the ECS/ECNS licensee and ICASA, if so requested, for the purposes of annual User Terminal spectrum fee calculations. Confirmation of this reporting capability and agreement to provide said reports should be included in the Space Segment Registration process.

For conventional (non-HTS) GSO solutions, the satellite operator leases capacity (in MHz) to a GSO Satellite Service Provider which is then responsible for building and operating the Gateway in terms of its licence. In such instances, only the GSO Satellite Service Provider has knowledge of the user information required for spectrum fee calculation. In such cases, the GSO Satellite Service Provider (an ECS/ECNS licensee), is required to provide the detailed user-information reporting to ICASA and certify its accuracy.

4.3 Illustration of various operational scenarios and associated licenses

This section presents graphical representations of different network scenarios and gateway locations and for each indicates the network and commercial arrangements in place together with the associated license requirements on the various parties.

Scenario 1: HTS/NGSO operator with Gateway outside of South Africa

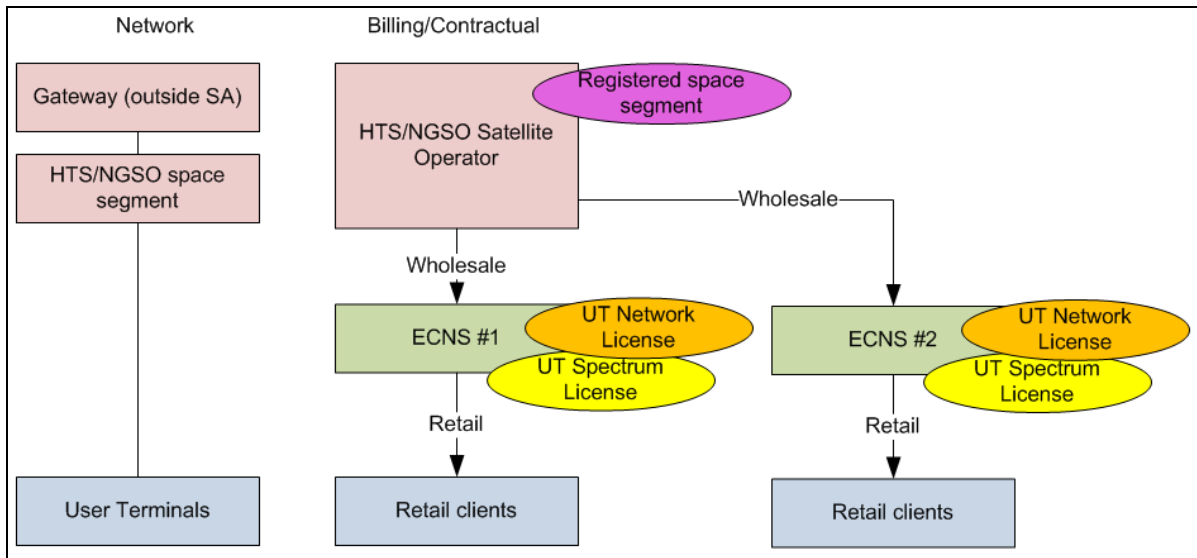


Figure 1: Network and Commercial Relationships for Scenario 1: HTS/NGSO operator with Gateway outside South Africa

Scenario 2: HTS/NGSO operator with Gateway inside South Africa

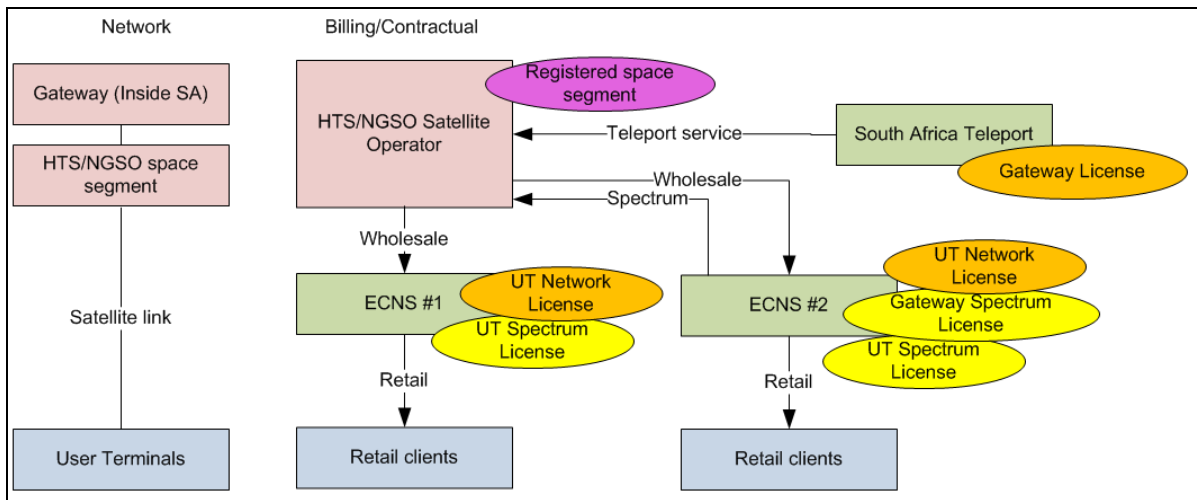


Figure 2: Network and Commercial Relationships for Scenario 2: HTS/NGSO operator with Gateway inside South Africa

The Satellite Operator will contract with a local ECNS licensee for the Gateway Spectrum License. This ECNS licensee may be, but does not need to be, the Teleport owner. Multiple ECNS licensees can retail the service, either directly or via distributors.

Scenario 3: Conventional GSO operator with Gateway inside South Africa

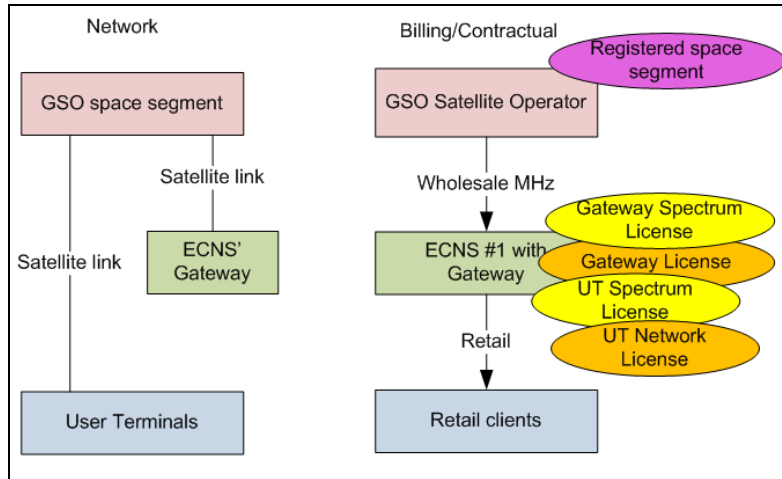


Figure 3: Network and Commercial Relationships for Scenario 3: Conventional GSO operator with Gateway inside South Africa

In the case of a broadcast head-end, the same would apply with the exception of the UT Network and Spectrum Licenses which would not be required.

Scenario 4: Conventional GSO operator with Gateway outside of South Africa

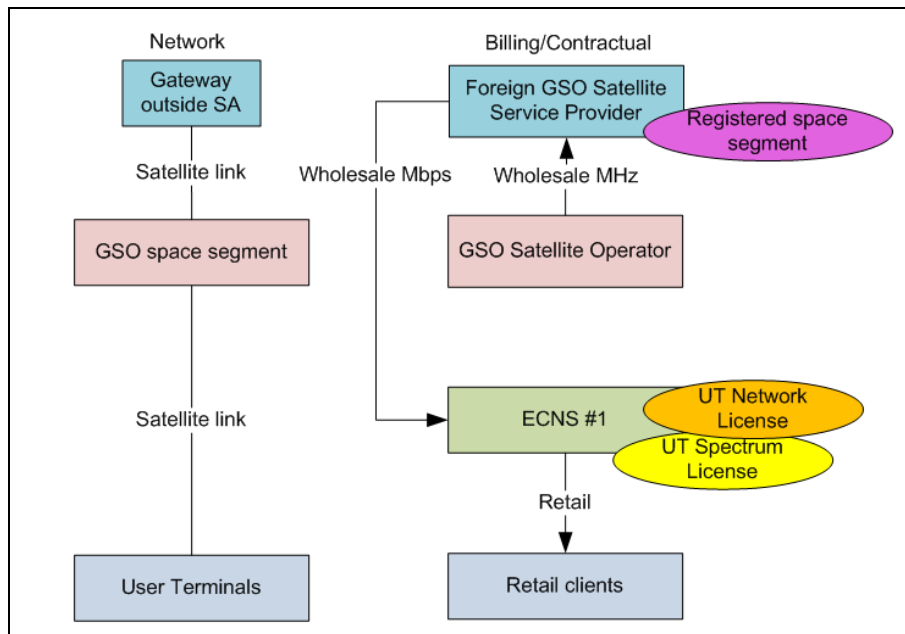


Figure 4: Network and Commercial Relationships for Scenario 4: Conventional GSO operator with Gateway outside South Africa

In Scenario 4 above, it is suggested that the foreign GSO Satellite Service Provider is required to complete the Space Segment Registration as opposed to the satellite operator. This is because there is no direct commercial relationship between the ECNS and Satellite Operator and hence the latter may not be supportive in such registration.

Scenario 5: Supplementary Coverage from Space (SCS) with Gateway inside South Africa

For more information on Supplementary Coverage from Space, please refer to section 5.7.2.

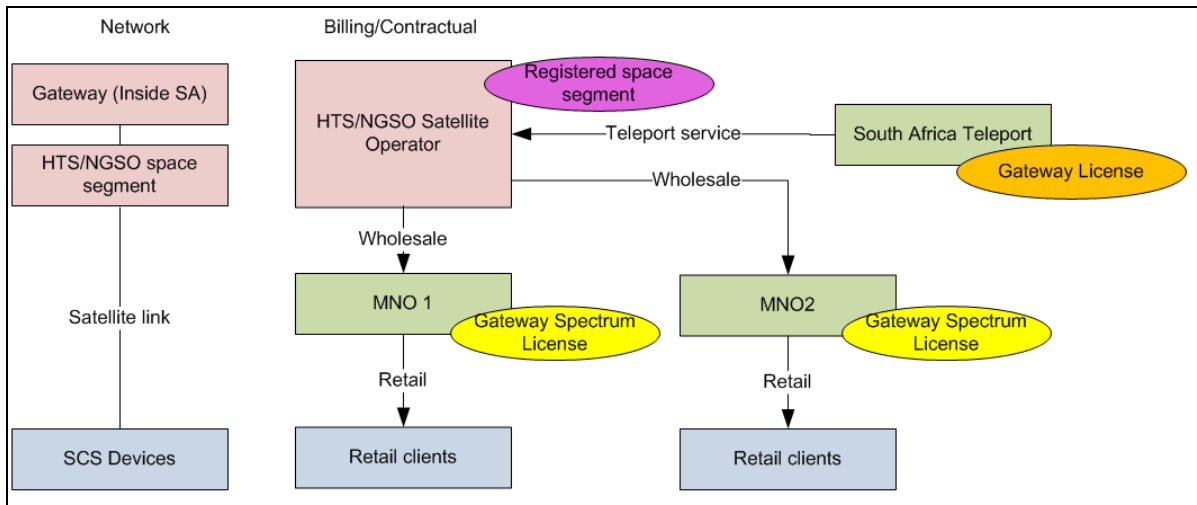


Figure 5: Network and Commercial Relationships for Scenario 5: Supplementary Coverage from Space (SCS) with Gateway inside South Africa

Whilst SCS from an HTS is unlikely to be technically infeasible, it is included in the above figure for completeness. A South African Gateway is considered essential for SCS given the need to minimise latency for this service. Whilst a single Gateway may be used, it is foreseen that each MNO will apply for their own Gateway Spectrum License given that the specific channels used at the Gateway will be unique to each.

Summary

The proposed approach addresses the various combinations of deployments and implements licence fees proportional to actual usage within South Africa and does not disadvantage operators of local Gateways over ones located outside of South Africa. The licensing scheme should always encourage deployment of Gateways within South Africa.

Table 1: Satellite deployment combinations and applicable Spectrum licences

Scenario	Gateway in South Africa	Gateway outside South Africa	User Terminals in South Africa	User Terminals outside South Africa	Spectrum Licences Required
1 & 3		X	X		User Terminal Spectrum licences
2 & 4	X		X		Gateway Spectrum Licence & User Terminal Spectrum licences
2 & 4	X			X	Gateway Spectrum Licence
2 & 4	X		X	X	Gateway Spectrum Licence & User Terminal Spectrum licences
5	X				Gateway Spectrum Licence
-		X		X	None

5. RESPONSES TO ICASA CONSULTATION QUESTIONS

5.1 Question 2 Response: Exclusions

QUESTION 2

Do you agree with the exclusions of radio navigation satellite services, amateur satellite services, earth exploration, space research satellite services and radio astronomy services indicated above and others if applicable? If not, please explain your reasoning and propose an alternative to this proposal.

Q2 Answer: Yes to the exclusions indicated. However, two items should be highlighted:

1. It is unclear why C band satellite services are excluded. 3600 – 4200MHz are currently allocated to FSS C band Downlink and 5725 – 6429MHz and 6700 – 7075MHz are currently allocated to FSS C band Uplink. There are numerous conventional and high throughput satellites operating over the country/region and planned satellites that could operate in the C band, and hence it should be included in the licensing and authorisation process.
2. TT&C operations to any space vehicles for any application should not be excluded as it is critical for ICASA to maintain information on all transmitters and transmitter locations.

5.2 Question 3 Response: Separate category licensing

QUESTION 3

Do you agree with the proposed approach of having a separate licence/authorisation (where applicable) for each segment of the Satellite Communication value chain? Please elaborate.

Q3 answer: In principle, yes, we agree with the proposed categories. The understanding is that these licences are to enable regulation of local transmissions, interference identification and mitigation etc. These are entirely separate from spectrum licences.

However, in addition to these categories, a TT&C Earth Station Licence should also be added in line with the proposed definitions as described in section 4.1.2. The Authority can decide whether an Earth Station that is used for both TT&C and Gateway services requires one or two licences. The former is recommended.

5.3 Question 4 Response: Gateway Licenses

QUESTION 4

Please provide your comments on the proposals in the preceding paragraph and the duration of the Gateway Earth Station licences.

Q4 Answer: Given the magnitude of the investment in Gateway or TT&C Earth Stations, a 10-year initial licence period would seem to be more appropriate.

Suggested edit: "The creation of a satellite Gateway ~~earth station~~ licence would allow the licensee to install and operate a satellite Earth Station" [add] **in accordance with any Gateway Spectrum License granted.**

 Reference [Ref1] Para 7: *“The Gateway Earth Station licensee may establish a Gateway in respect of one or more satellite systems in the Approved list of authorised Space Stations (ALOSS) and it shall not be permitted to provide any telecommunication service or broadcasting service directly to the end-users, for the provision of which, a separate licence (radio spectrum licence, I-ECNS or ECS licence) is required from the Authority”*

Comment on above: We agree with the approach that a Gateway license should be capable of being issued to a non-ECNS licensee but that spectrum licenses are only issued to ECNS licensees. A Gateway License must be a pre-requisite for a Gateway Spectrum License to be granted.

 Suggested Edit in [Ref1] Para 7: *“The creation of a Satellite Gateway ~~earth station~~ licence would allow the licensee to install ~~and operate~~ one or more a-Satellite Earth Stations using a specified radio frequency band”[add] **and operate the earth station/s once a Gateway Spectrum License is provided to an ECNS license holder.***

 Reference [Ref1] Para 7: *“It is for this reason that the Authority will continue to issue separate licences for Gateway Earth Stations and service link licences”.*

Comment on above: The definition of “Service Link Licenses” has not been provided nor is it understood. We believe this should refer to Gateway Spectrum License and User Terminal Spectrum License.

5.4 Question 5 Response: Spectrum Fee calculations

QUESTION 5

Please comment on the above-mentioned alternative proposals to levy the spectrum fees for Gateway Earth Stations and indicate your preferred option. The Authority understands that there are other spectrum fee calculation methodologies used elsewhere in the world. Please give details of the methodologies which you believe would be most suitable for South Africa.

There is no agreed international definition of what an “HTS” is, hence it should be clearly and unambiguously defined by ICASA if this is going to be used in a discount structure on spectrum fees. The definition provided by ICASA is inadequate for this purpose. In any case, we believe there is no need for the exact definition given the arguments below.

1. We do not believe that “HTS” GSO systems should be treated any differently from conventional GSO satellite networks. The HTS operator is already reaping the benefit of reusing the spectrum over a multitude of smaller beams and thus increasing the overall capacity and revenue potential on the satellite/constellation hence it is not clear why HTS would need any specific discount structure over, say a LEO constellation, or conventional GEO. Of course, initially when HTS is deployed it may be that the full capacity of the GSO satellite is deployed but not utilised, resulting in high spectrum license fees without commensurate income, a problem that is common in most communications deployments. No special treatment is necessary, however.
2. In conventional GSO systems, the GSO service provider has typically managed their spectrum usage (and therefore both the spectrum fee and capacity cost) by increasing the carrier bandwidth of networks as they grow and thus being able to more closely match the active to utilised capacity. The same approach could be followed by HTS operators.
3. Spectrum fees should therefore rather apply a “Satellite Factor” as opposed to an HTS factor, so that all satellite operators and Satellite Service Providers are treated equally.

4. This is the same rationale used for mobile network spectrum licensing: MNOs do not pay lower licensing fees for using more efficient or modern technology or densification of their network (more base stations), they simply benefit on the revenue side by increasing the capacity on the network.
5. Furthermore, the spectrum fee should be calculated per Gateway (and not Earth Station). Since NGSO gateways reuse the same spectrum on all Earth Stations at the Gateway, using this approach they would then not be penalised for the number of Earth Stations needed at the Gateway and can be treated identically to other Gateway licensees from a spectrum licensing perspective.
6. Where a licensee has geographically redundant Gateways (ie. different Teleports), spectrum fees should only be charged for one Gateway or the spectrum fee should be split across both.
7. Where a network uses different frequency bands for Gateway to Satellite and Satellite to User Terminal links, the fee for the lowest frequency band should be used for the Gateway Spectrum license calculation. This is proposed as in the offered User Terminal Spectrum license fee calculation there is no frequency band factor.

The proposed method of reducing spectrum fees per MHz for increased frequency usage is consistent with current ICASA fee structures. A satellite factor can be applied to these, as proposed, to ensure these bands remain affordable.

The proposed fees (eg. R100/MHz paired for > 17.3GHz annual fee) implies an HTS or NGSO system using, say 1GHz of Ka band bandwidth, will be required to pay a Gateway License fee of R100 000 per annum. This appears to be very reasonable and no further "Satellite Factor" need be applied.

As proposed previously, a User Terminal Spectrum licence fee should also be charged, calculated based on the cumulative capacity (in Mbps) sold by the ECS/ECNS to end users within South Africa. This should be a nominal amount (of the order of R50/Mbps/annum thus adding R500/annum to a 10Mbps service) so as to not make it a significant percentage increase (guideline < 5%) in the typical broadband service cost.

This approach minimises the barrier to entry for new satellite operators, recovers spectrum fees in proportion to usage and does not penalise those with Gateways operating from within South Africa.

It is recognised that Gateways could be established in South Africa without any intention to offer competitive services within South Africa. Whilst such Gateway investments should be encouraged, a Satellite Factor = 2 should be applied to Gateway Spectrum Licence fees where the network associated with that Gateway has less than say 500 terminals in operation in South Africa. This will further incentivise the Gateway licensee to accelerate local deployments by offering advantageous service pricing to encourage uptake which will positively impact on the affordability of broadband access within the country.

To encourage deployment of local Gateways, an "Offshore Gateway" factor could be applied to User Terminal Spectrum License fees for all User Terminals operating from Gateways outside of South Africa. An "Offshore Gateway" factor of 2 is proposed i.e. R100/Mbps/annum for User Terminals.

 Reference [Ref1] Para 9: *"This approach is very similar to the mobile/cellular environment, where devices are exempt from individual licensing i.e., blanket licence."*

Comment on above: Yes, it is similar, but this approach is only workable if the network is being operated in-country, as is the case with MNOs, but this is not always the case for satellite networks. We do not therefore believe this is the correct approach given the prevalence of Foreign Satellite Operators as ICASA has no jurisdiction over them and no means of validating the User Terminal information or enforcing reporting from them or payment of fees due. The blanket license approach should, however, apply for Supplementary Coverage from Space as discussed in section 5.7.2.

5.5 Question 6 Response: Satellite User Terminals

QUESTION 6

Kindly comment on the section above and on the proposal for blanket licensing with a fee for a set number of terminals under a new proposed licence regime to be referred to as "Satellite User Station Network Licence". If possible, please provide a breakdown of the number of terminals with the corresponding spectrum fee values in South African Rands.

Licences should not be required for the sale of end user terminals other than the current radio dealer licence under the National Radio Frequency Spectrum Regulations, 2015, only for the provision of services to such terminals in which case a class or individual ECS/ECNS licence is required and all conditions associated with such licences apply as per any other technology.

All satellite equipment used in South Africa should be type approved (per equipment model and not per distributor, ECS, network etc) as is the case for all technologies.

Regarding the annual reporting listed in [Ref1] Section 9:

- a) There should be no need to provide the band and frequency utilised as that information should be captured in the User Terminal Network Licence and is not specific to a User Terminal.
- b) The information required for User Terminal Spectrum Fee calculation per frequency band is,
 - a. For each User Terminal within South Africa, active at any time in the year:
 - i. Product sold in Mbps (maximum used in the year), downlink
 - ii. Product sold in Mbps (maximum used in the year), uplink
 - iii. Name and address of customer (if essential). It is not clear why ICASA needs this information and there may well be privacy concerns in this regard.
 - iv. Terminal type: Mobile/Nomadic/Fixed
 - v. Current GPS location of User Terminal, if fixed
 - vi. Unique identifier eg. modem serial number
 - b. The total bandwidth in Mbps for all South African User Terminals operational in this frequency band in the preceding year.

No User Terminal fees should be charged on transitory terminals e.g. ESIMs on international aircraft, ships, vessels, and roaming terminals on foreign vehicles crossing national borders as these are almost impossible to audit and manage. The administrative effort will far outweigh the possible returns.

The administrative process for the proposed User Terminal Spectrum Licence Fee is relatively simple in relation to both ECS/ECNS licensees and ICASA and could be automated by all parties. It should not in any meaningful way increase regulatory administrative costs.

It would not be administrative effort but rather spectrum fees that could stifle development and uptake of satellite services.

Whilst some insights can be provided by the author on the number of User Terminals in operation in South Africa, the quantum is not relevant if the User Terminal Spectrum licence is based on the total capacity in Mbps, as proposed.

5.6 Question 8 Response: AGA Protection

QUESTION 8

Please provide your comments and details of the best practices in other jurisdictions to fulfill the intentions of the Authority as indicated in the above section. Furthermore, considering the provision set out in the Astronomy Geographic Advantage (AGA) Act of 2007, and the requirements of the Radio Quiet Zone, what measures and techniques do you propose to be employed in mitigating the possible interference that may be caused by the satellites within the Astronomy radio frequency bands in South Africa?

The author has limited knowledge of the approach used in other jurisdictions hence cannot comment on that matter.

The proposed approach for Registration of Space Segment is deemed appropriate and should include, as previously mentioned,

1. Agreement by HTS/NGSO Satellite owners to provide annual reports to ICASA per local reseller (assumed to be ECNS/ECS licensees) with the user information described in the preceding section.
2. Agreement that they will implement South African court orders to suspend services to any local reseller's clients within 30 days of receipt of such court order.

Reference [Ref1] Para 10.1: *"The Authority is proposing that a satellite system filled with the ITU by a foreign Administration may provide satellite capacity over the territories of South Africa after registration with the Authority and entered into authorised list of Space Stations through the process outlined in section 10.2 and Appendix A of this inquiry."*

Comment on above: The Authority has no control over whether a satellite system can provide capacity over South Africa other than through participation in the relevant ITU filing processes. A satellite on orbit with a footprint covering South Africa is already providing "capacity" over South Africa. What can be controlled is whether local operations (either Gateway or User Terminals, or both) can utilise that satellite system, or not. We recommend replacing "capacity over South Africa" with "services in South Africa". A User Terminal Licence or Gateway licence should only be granted once the applicable Registration of Space Segment has been completed.

Reference [Ref1] Para 10.1: *"Once included in the Authorised list of Space Stations, a foreign entity will need additional radio frequency spectrum either by itself or through an already licensed Individual Electronic Communications Network Licence holder (I-ECNS) provider"*

Comment on above: We disagree that foreign entities can obtain radio frequency spectrum "by itself". Only local ECS/ECNS licensees should be able to do so. These can be in the form of User Terminal Spectrum licences or Gateway Spectrum licences if the foreign entity wishes to operate a local Gateway, as indicated in the Table above.

Reference [Ref1] Para 10.2: *"This is only applicable where the Space segment operator intends to provide retail service directly to the end user (i.e., not through the already licensed I-ECNS holders)."*

Comment on above: Whilst technically the space segment operator is providing the full end-to-end managed service, it should only be retailed through an ECS/ECNS (class or individual) licensee from a billing perspective.

If one allows foreign entities to directly provide retail services it may disintermediate the local satellite communications sector. Foreign entities who are non ECS/ECNS licensees should be required to wholesale to local ECS/ECNS licensees.

 Regarding the AGA:

- For HTS GSO satellites, beam footprints are defined at design stage and are normally not able to be altered once on orbit. It would not be possible to adjust such beams to avoid the AGA given they are typically 100s of km in diameter.
- For NGSO satellites, it may be possible for the operator to switch off transmissions over the AGA but this would likely affect potential customers within several 100km of the AGA given the typical footprint size of such satellites. Whilst it may be possible, an operator could simply indicate it is not in order to avoid reduction of their coverage area. This would require a detailed technical audit to verify the assertion, which the operator is unlikely to agree to.
- For all systems, the HTS/NGSO satellite operator and local GSO Satellite Service Provider should be prohibited from offering services to any User Terminal located within the AGA. This should be included in the Registration of Space Segment conditions.

5.7 Question 9 Response: Satellite role in addressing underserved areas

QUESTION 9

Please provide proposals on the role the Satellite operators can play in ensuring that broadband connectivity reaches the areas of the country in terms of community networks with Satellite connectivity as a backhaul.

Kindly provide a regulatory solution that can be applied by Satellite operators to address the shortcomings of terrestrial networks in providing to unserved and underserved areas of the country. This may include collaboration with government programs to reach out to those unserved and underserved areas of the country.

5.7.1 Satellite backhaul

Satellite networks have historically been used for backhaul of cellular and other fixed wireless networks and will continue to play this role. We do not believe that any specific regulatory solution is required on the satellite side to address the provision of service to underserved areas, other than ensuring that the spectrum fees for User Terminals and Gateways, and Gateway licences are affordable. Throughputs offered by the latest User Terminals on HTS/NGSO systems are more than sufficient to address many community network coverage backhaul requirements, be these connecting mobile or fixed wireless base stations.

In order to minimise latency, maximise availability and possibly also for data sovereignty reasons, Gateways serving cellular base stations need to be located within South Africa. Licensing fees for Gateways should therefore be affordable so as to increase the viability of such solutions contributing to the national policy goals of digital connectivity for all and increasing the availability and affordability of communications.

5.7.2 Supplemental Coverage from Space as a means to address underserved areas

Mobile Satellite Services (MSS) have been in operation for many years utilising both GSO and NGSO satellites and requiring bespoke devices unique to each MSS service.

3GPP Release 17 has included standardised cooperation between 5G and non-terrestrial networks, including satellites, to provide a seamless transition between them. Smartphones will progressively have integrated satellite connectivity enabling operation on both MNO terrestrial networks (using traditional terrestrial spectrum) and satellite networks (using additional satellite spectrum).

Supplemental Coverage from Space (SCS) systems are currently under development that will provide direct connectivity to mobile devices utilising the same spectrum as the terrestrial mobile

network, thus not requiring terrestrial base stations at all and providing wide-scale coverage of under-served areas utilising consumer devices.

Whilst both dedicated satellite spectrum and reuse of terrestrial spectrum possibilities technically exist, wide-scale use of SCS is expected as this is anticipated to make use of the existing device ecosystem, of which in excess of 100 million devices are already in operation in South Africa. And given the inability of many people in underserved areas (where SCS will be used) to invest in a new handset, this is a key factor in terms of adoption and viability for the mobile operator.

The United States Federal Communication Commission has undertaken extensive work in this regard and in March 2014 published the “Single Network Future: Supplemental Coverage from Space” (FCC 23-22¹) adopted in April 2024 which provides a great deal of insight into the foreseen challenges, regulatory considerations, technical considerations of SCS which the reader should refer to.

Implementation of SCS will require an update to The National Radio Frequency Plan 2021 [Ref2] providing for a co-primary or secondary allocation of these bands to satellite. The future adoption of SCS would align with the licensing scheme offered in this response, as is captured in Figure 5 on page 10. No User Terminal licensing would apply by definition.

¹ <https://docs.fcc.gov/public/attachments/FCC-23-22A1.pdf>