Guide on how to capture and validate the diagram number and/or attachment number for the non-GSO satellite network using BR software SpaceCap and BR-SIS Validation

ITU BR

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1. Background

A satellite network filing normally contains two mdb files, one in the SNS format, and the other in the GIMS graphical format.

The one in the SNS format should be captured using the BR software SpaceCap, and the other one in the graphical format should be captured using the BR software GIMS (Graphical Interference Management System).

In accordance with Resolution **55** (**Rev.WRC-19**), all graphical data shall be submitted in graphics data format compatible with BR's data capture software GIMS.

The software for validating the completeness of information of the satellite filing is BRSIS Validation. To assist administrations when preparing notices, the cross-validation option of the validation software is available for validating the SNS format database against the GIMS format database for all notices for non-geostationary satellite systems, including advance publication information, request for coordination and notification notices.

The latest version **9.1** of these BR space software, is now available on the ITU website https://www.itu.int/ITU-R/go/space-software/en and distributed on BR IFIC (Space services) 2985/29.11.2022 and subsequent releases.

In this new version, the rules of capturing and validation of the GIMS diagrams and/or attachments for the non-GSO satellite networks have been updated. Please always ensure the latest version is installed for preparation of your submission.

This guide contains information on how to capture diagram numbers and/or attachment numbers using SpaceCap, and how to cross-validate this information with the GIMS database using the BR-SIS Validation, which applies to SpaceCap **V9.1.20** and BR SIS Validation **V9.1.10** and later versions.

2. Relevant Items of Appendix 4

The **Table 1** below shows the items of Appendix **4** of Radio Regulations that may be provided in SNS database, in GIMS or as attachments currently, as well as the conditions for their provisions for non-GSO satellite networks.

Table 1 Information that may be provided in SNS database, in GIMS or as attachments

Items in Appendix 4	Notice Type (A/C/N)	Description	Required format	Conditions
B.3.c.1	A, C, N	The co-polar antenna radiation pattern of space station.	In SpaceCap as pattern IDs, or in GIMS as diagrams (not both)	If the required antenna pattern is not available in the APL online and, therefore, cannot be captured as pattern ID in SpaceCap, it shall be provided as a diagram in GIMS database. See Section 4.2 for more details
C.10.d.5.a	A, C, N	Either the measured co-polar radiation pattern of the antenna or the co-polar reference radiation pattern of associated earth station.	In SpaceCap as pattern ID, or as diagram in GIMS (not both)	If the required antenna pattern is not available in the APL online and, therefore, cannot be captured as pattern ID in SpaceCap, it shall be provided as a diagram in GIMS database. See Section 4.3 for more details
B.4.a.3.a.1 B.4.a.3.a.2	A, C, N	The orientation angle alpha and beta, in degrees (see most recent version of Recommendation ITU-R SM.1413).	In SpaceCap as values, or as a description in an attachment (not both)	If the constant values for angles alpha and beta cannot be provided and captured in SpaceCap, it shall be provided as a description in an attachment, not both. Required for a space station submitted in accordance with Nos. 9.11A, 9.12 or 9.12A, or for active or passive sensors on board a non-GSO satellite network/system not subject to coordination under Section II of Article 9. See Section 5.1 for more details
B.4.b.2	C, N	The satellite antenna gain $G(\theta_e)$ as a function of elevation angle(θ_e) at a fixed point on the Earth.	As a diagram in GIMS or in an attachment (not both)	If this information is in the form of diagram or image, it shall be provided in GIMS database. If this information cannot be provided in the form of diagram or image, then the explanations shall be provided in an attachment. Required for a space station submitted in accordance with Nos. 9.11A, 9.12 or 9.12A. See Section 5.2 for more details

Items in Appendix 4	Notice Type (A/C/N)	Description	Required format	Conditions
C.9.a.1	C, N	The type of modulation.	In SpaceCap as selection or in an attachment (not both)	If different types of modulation may be used for the same emission of non-GSO satellite network/system, they may be indicated in an attachment. Required for each emission of non-GSO satellite network/system subject to Nos. 9.11A, 9.12 or 9.12A. Required for all space applications except active or passive sensors. See Section 6.1 for more details
C.9.c.1	C, N	The type of multiple access.	In an attachment	This information can only be provided in an attachment, not in GIMS database. Required for a non-GSO space station submitted in accordance with Nos. 9.11A, 9.12 or 9.12A. See Section 6.2 for more details
C.9.c.2	C, N	The spectrum mask.	As a diagram In GIMS or in an attachment (not both)	If this information is in the form of diagram or image, it shall be provided in GIMS database. If this information is in the form of equations or it cannot be provided in the form of diagram or image, then equations or explanations shall be provided in an attachment. Required for a non-GSO space station submitted in accordance with Nos. 9.11A, 9.12 or 9.12A. See Section 6.3 for more details
C.11.a	A, C, N	The service area or areas of the satellite beam on the Earth, when the associated transmitting or receiving stations are earth stations.	For A, either in SpaceCap as a group of country symbols or as a diagram in GIMS; For C and N, as a diagram in GIMS only.	For A, if the service area <u>cannot</u> be described by a group of territories of countries captured in SpaceCap, then it shall be captured using GIMS type of diagrams "NGSO Service Area" (not as an image) and provided in GIMS database. For C and N, the service area shall be captured using GIMS type of diagrams "NGSO Service Area" (not as an image) and provided in GIMS database only. Required for all space applications except active or passive sensors. See <u>Section 6.4</u> for more details

Items in Appendix 4	Notice Type (A/C/N)	Description	Required format	Conditions
C.11.b	C, N	The appropriate information required to calculate the affected region (as defined in Recommendation ITU-R M.1187-1).	In an attachment or as a diagram in GIMS (not both)	If this information is in the form of diagram or image, it shall be provided in GIMS database. If this information cannot be provided in the form of diagram or image, then the explanations shall be provided in an attachment. Required only for a non-GSO space station in the mobile-satellite service submitted in accordance with No. 9.11A in frequency bands between 1 and 3 GHz. See Section 6.5 for more details
A.3.a A.3.b	A, C, N	the symbol for the operating administration or agency	In SpaceCap as a symbol from the Preface; if the symbol does not exist, provide in an attachment	If the symbol does not exist in Table 12A / 12B of the Preface, it shall be provided in the cover letter or in a separate document. See Section 6.6 for more details

Notes:

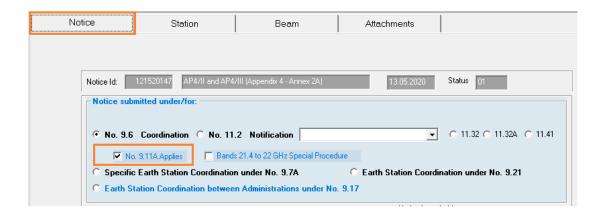
• A : Advance Publication Information

• C: Coordination Request

• N : Notification

3. Non-GSO Coordination and Notification Notices Subject to No. 9.11A

For non-GSO satellite networks containing frequency bands and services subject to coordination procedure under No. **9.11A**, in the notice tab, please make sure the box "No.**9.11A** Applies" is checked, then the relevant information specific to No.**9.11A** will be visible in the other tabs in SpaceCap.



Note that No.**9.11A** is a main provision, and the sub provisions include Nos. **9.12**, **9.12A**, **9.14**, for all cases subject to Nos.**9.12**, **9.12A**, **9.14**, please check the box "No.**9.11A** Applies" in SpaceCap.

4. Antenna Radiation Pattern for Space Station and Earth Station

Information concerning the antenna radiation pattern is mandatory for all non-GSO notices, for all beams, and for all associated earth stations.

Antenna pattern can be submitted as

- a pattern ID, available in the APL online, captured in SNS notice database via SpaceCap (available at https://www.itu.int/en/ITU-R/software/Pages/ant-pattern.aspx)
- a diagram "NGSO Space Station Pattern" and "NGSO Earth Station Pattern" in GIMS database (see our webpage: https://www.itu.int/en/ITU-R/space/support/nonGSO/Pages/non-GSO-graphical-submission.aspx)

If neither of the above is possible, then the antenna pattern can be provided in the form of equations as well as formulas/ tables which is also possible to be captured in GIMS database. If found compliant with the rules mentioned below, the Bureau may assign a pattern ID and capture it in the SNS notice database accordingly for publication.

Additional note:

The new types of diagrams "NGSO Space Station Pattern" and "NGSO Earth Station Pattern" in GIMS, that allow user to capture antenna radiation patterns for space and earth station antennas in digital format, are now available since the BR software GIMS version V14.0.10.

4.1. General Rules for Antenna Patterns

An antenna radiation pattern should comply with the following rules:

- if the antenna radiation pattern provided in the form of image, then the image must be sufficiently good quality that can be clearly viewed in GIMS by others;
- if the antenna radiation pattern provided in the form of equations, then the equations shall describe all parts of this antenna pattern;
- the co-polar antenna radiation pattern must be plotted as the antenna gain (dBi) as a function of the off-axis angle in degrees;
- the antenna gain must be defined for all off-axis angles in the range between 0 and +/- 180 degrees;
- the co-polar antenna gain must correspond to the respective maximum antenna gain for the same beam / associated earth station as you have captured in the notice database;
- for any off-axis angle, only one gain value shall be defined;
- the units of values should be clearly defined;
- the X and Y axes should be clearly and legibly labelled.

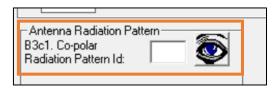
4.2. Item B.3.c.1: Space Station Antenna Radiation Pattern

Mandatory for all beams of non-GSO notices.

For the space station beam antenna pattern, it must be provided either as a pattern ID captured in SpaceCap or as a diagram in GIMS. If these are not possible, then it may also be provided as formulas in an attachment.

Kindly consult the APL online http://www.itu.int/en/ITU-R/software/Pages/ant-pattern.aspx, and search for an appropriate antenna pattern ID that fits the description of your antenna. If provided as a pattern ID, the ID should be selected in SpaceCap.

If no appropriate antenna pattern ID can be found that fits the description of your antenna, the antenna pattern may be submitted in graphical format in GIMS database. In this case, leave the field for antenna pattern ID empty as shown in the picture below via SpaceCap.



Please directly capture the antenna radiation pattern with the correct beam name and direction in the GIMS database, and make sure the cross validation with GIMS database must be run.

If no appropriate antenna pattern ID nor pattern diagrams can be provided, you may alternatively provide the pattern in the form of equations or formulas in an attachment. In this case, leave the pattern ID field empty in SpaceCap. There will be fatal errors in the validation report, please make sure to explain further that the formulas are provided in the attachment.

4.3. Item C.10.d.5.a: Associated Earth Station Antenna Radiation Pattern

Mandatory for all associated earth stations (whether specific or typical) of non-GSO notices.

For antenna pattern for an associated earth station, it must be provided either as a pattern ID captured in SpaceCap or as a diagram in GIMS. If these are not possible, then it may also be provided as formulas in an attachment.

Kindly consult the APL online http://www.itu.int/en/ITU-R/software/Pages/ant-pattern.aspx, and search for an appropriate antenna pattern ID that fits the description of your antenna. If provided as a pattern ID, the ID should be selected in SpaceCap.

If no appropriate antenna pattern ID can be found that fits the description of your antenna, the antenna pattern may be submitted in graphical format in GIMS database.

If provided in GIMS, please keep empty the field for antenna pattern ID and capture the specific diagram number in SpaceCap as you indicated in the GIMS database, as shown in the picture here.

The diagram number for associated earth station antenna is very important, as it is used together with beam name and direction to identify the compatibility,



the coherence, between the SNS notice database and the GIMS database.

Associated earth stations in the same or different groups within the same beam/direction having the same patterns may use the same diagram number and capture only one diagram in the GIMS database.

If no appropriate antenna pattern ID nor pattern diagrams can be provided, you may alternatively provide the pattern in the form of equations or formulas in an attachment. In this case, both fields for pattern ID and diagram number can be left empty. There will be fatal errors in the validation report, please make sure to explain further that the formulas are provided in the attachment.

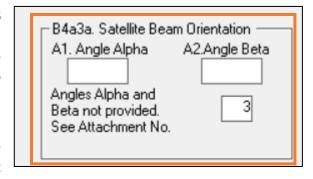
5. Beam Level Information

5.1. Items B.4.a.3.a.1/2: The Orientation Angles Alpha/Beta

Required for a space station submitted in accordance with Nos. **9.11A, 9.12** or **9.12A**, as well as for active or passive sensors on board a non-GSO satellite network/system not subject to coordination under Section II of Article **9**.

Angles alpha and beta can be provided as values in the fields in SpaceCap or in an attachment, not both. It is not possible to submit it in GIMS as shown in the "Beam" tab via SpaceCap in the picture here.

If provided as values, the values for both alpha and beta must be captured in the appropriate fields in SpaceCap and remain the attachment number empty.



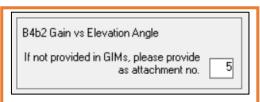
If the orientation angles alpha/beta (items **B.4.a.3.a.1/B.4.a.3.a.2** of Appendix **4**) cannot be captured in SpaceCap (for example, the beam is steerable), the attachment with explanations should be provided.

If provided as an attachment, just one attachment number is needed to be captured in SpaceCap. Make sure in the said attachment, both descriptions of alpha and beta are provided or explained.

5.2. Item B.4.b.2: Gain vs. Elevation Angle

Mandatory for all transmitting beams in non-GSO notices subject to No.9.11A, 9.12 or 9.12A.

Gain vs. elevation angle can be provided either as an attachment or in GIMS, as shown below:



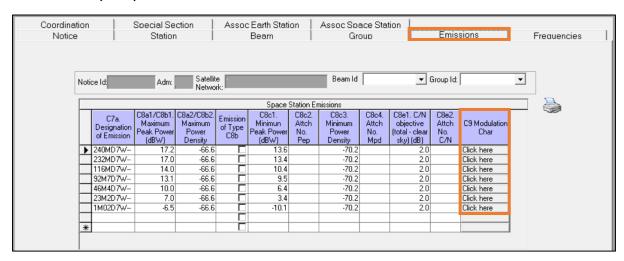
If provided as a diagram in GIMS, leave the field for attachment number empty in SpaceCap, and cross validation with GIMS database must be run.

If the satellite antenna gain as a function of elevation angle at a fixed point on the Earth (item **B.4.b.2** of Appendix **4**) cannot be provided in GIMS (for example, the beam is steerable), please provide as an attachment number in SpaceCap, and make sure the said attachment with explanation is included in the submission.

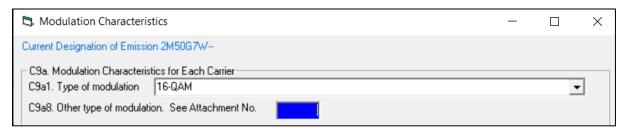
6. Group Level Information

6.1. Item C.9.a.1/8: Modulation

For all space applications except active or passive sensors, this information is mandatory for each designation of emissions of groups in non-GSO notices subject to coordination procedure under Nos. **9.11A**, **9.12**, or **9.12A**.



As shown in the picture below, it can be captured in SpaceCap by selecting from the drop-down list of the type of modulation (item **C.9.a.1** of Appendix **4**), and/or described in an attachment with the attachment number captured in item **C.9.a.8** of Appendix **4**.



If provided as an attachment number in SpaceCap, please make sure the said attachment with explanation for all emissions of your notice is included in the submission.

6.2. Item C.9.c.1: Type of Multiple Access

Mandatory for all groups in non-GSO notices subject to coordination procedure under Nos. **9.11A**, **9.12** or **9.12A**. It should be submitted in an attachment and it's not possible to be captured in GIMS.

The number of the attachment should be indicated in the appropriate field in SpaceCap per group, as shown in the picture below.

It can be one unique attachment for description of all types of multiple access.



6.3. Item C.9.c.2: Spectrum Mask

Mandatory for all groups in non-GSO notices subject to coordination procedure under Nos. **9.11A**, **9.12** or **9.12A**.

For spectrum mask, it can be submitted in an attachment or as a diagram in GIMS, but not both. If submitted in the graphical format as an image, it must be captured in a GIMS database.

Please indicate the same diagram number as you indicated in the GIMS database in the appropriate fields in SpaceCap as shown in the picture below and ensure that the cross validation must be run.



6.4. Item C.11.a: Service Area

Mandatory for all groups with earth stations in non-GSO notices, except those groups containing sensors or space-to-space links.

6.4.1. For A (API, Advance Publication Information)

Service area can be provided as a list of countries or geographic designation codes in SpaceCap or as a diagram "NGSO Service Area" in GIMS, but not both.

Via SpaceCap, you can select either include or exclude the countries or region codes by using the function





If you are providing diagrams in GIMS, please capture the same service area number in SpaceCap as you indicated in GIMS database.

6.4.2. For C (Coordination Request) and N (Notification)

Service area shall be provided as a diagram "NGSO Service Area" in GIMS only.

Please pay attention to the accuracy of the service area number, as it is used together with beam name and direction to identify the link between the specific group in the SNS notice database and the corresponding diagram in the GIMS database.

Please capture the same service area number in SpaceCap as you indicated in the GIMS database.

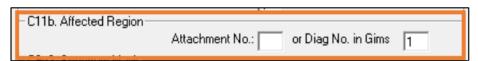


6.5. Item C.11.b: Affected Region

This information is mandatory for a non-GSO satellite network in the mobile-satellite service in the frequency range from 1 to 3 GHz under No. **9.11A**, as defined in Recommendation <u>ITU-R</u> M.1187-1.

It can be submitted in an attachment or as a diagram in GIMS, but not both.

If the affected region is provided in the graphical format, then the diagrams should be provided in GIMS database. Please indicate the same diagram number as you indicated in GIMS database in the appropriate fields in SpaceCap as shown in the picture below, and the cross validation must be run.



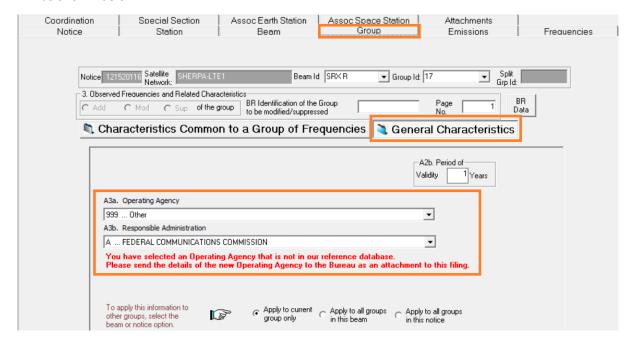
6.6. Item A.3: Responsible Administration or Operating Agency

This is mandatory for all notices.

Item **A.3.a** of Appendix **4**: the symbol for the operating administration or agency (see the Preface) that is in operational control of the space station, earth station or radio astronomy station.

Item **A.3.b** of Appendix **4**: the symbol for the address of the administration (see the Preface) to which communication should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the network or system or station (see Article **15**).

If your Administration intends to request for registration of new responsible Administration or operating agency, kindly capture the "XX...Other" and/or "999...Other" in the fields in SpaceCap as shown below:



Or,



Or,



Once you have selected the "999...Other" and/or "XX...Other" in the fields as shown in the above screenshots separately in SpaceCap, you will get the warning message respectively via SpaceCap to warn that: You have selected an Operating Agency and/or a Responsible Administration that is not in our reference database. Please send the details of the new Operating Agency and/or the Responsible Administration to the Bureau as an attachment to this filing.

Please make sure that you have provided the name of the new Responsible Administration or the new Operating Agency in your submission with the contact information, such as the address of the one concerned, and the Bureau will assign a new symbol and update it in the Table 12A / 12B of the Preface accordingly.

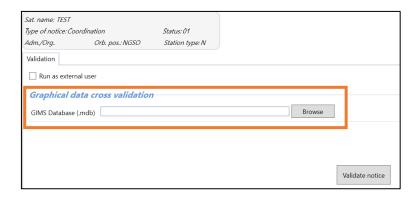
When submitting the notice through e-Submission system, a fatal error will be detected, and you should enter the message that the information of the operating agency is provided in either a cover letter or in an attached file.

7. BR-SIS Validation

If there is no diagram submitted within your notice, you can run validation directly without choosing the function of "Graphical data cross validation". There is no need to indicate GIMS database in the field of BR-SIS Validation. Click "Validate notice" and the validation report including information about all missing attachments will appear.

In accordance with Resolution **55** (Rev.WRC-19), any graphical data to be submitted within the notice, in the format like images or pictures, must be captured in the GIMS format database as mentioned at the beginning in this guide.

If diagrams are captured in GIMS, it is requested to run validation by providing the GIMS database path in the "Graphical data cross validation" field as shown in the picture below. This enables the cross-validation of the SNS format database against the GIMS format database. The cross-validation will provide information about missing diagrams in the validation report, and this could minimize delays in treatment and publication of the notice.



-----END-----