29TH WORLD RADIOCOMMUNICATION SEMINAR
30 November – 11 December 2020
ITUWRS ONLINE2020

Submission of API for satellite networks not subject to coordination

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www.itu.int/go/wrs-20
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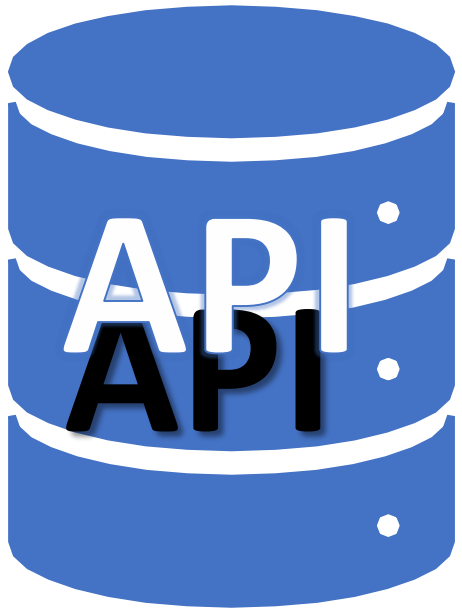

- Submission
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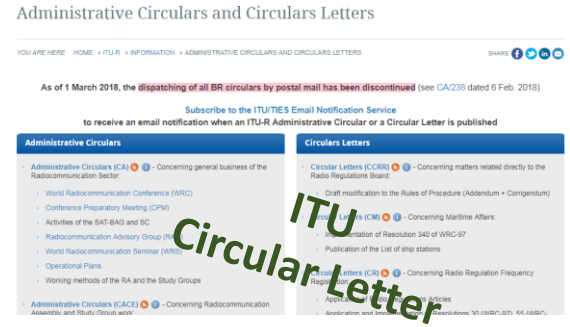
Where to go for submission?

E-Submission of satellite network filings

available at https://www.itu.int/ITU-R/go/space-submission
telefax or mail is **not** required
recorded on the **actual date of receipt**

E-Communication system

available at https://www.itu.int/ITU-R/go/space-communications
generally used for response of BR communications
for comments which don't require SpaceCom mdb files
for correspondences between administrations

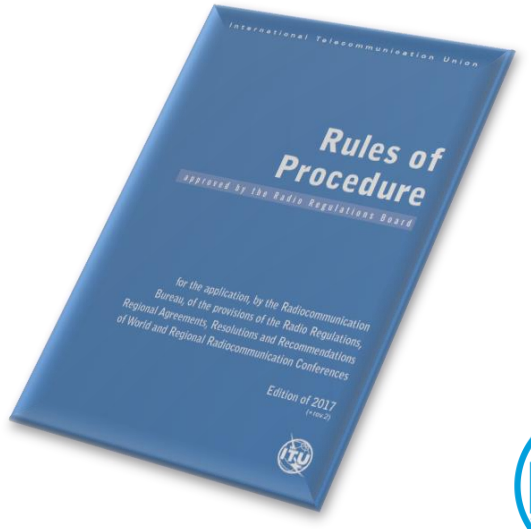


Telefax and E-mail BRmail@itu.int

recorded as received on the **actual date of receipt**
generally used for response of BR communication
telefax is not recommended

Postal Mail

recorded on the **first working day**
following the period of closure
(not recommended)



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RES 55, RES 907/908 (Rev.WRC-15); **RoP** (Edition of 2017 Rev.2); **CR/464** (2020)

What should you do
to make your **API** notice for satellite networks
receivable

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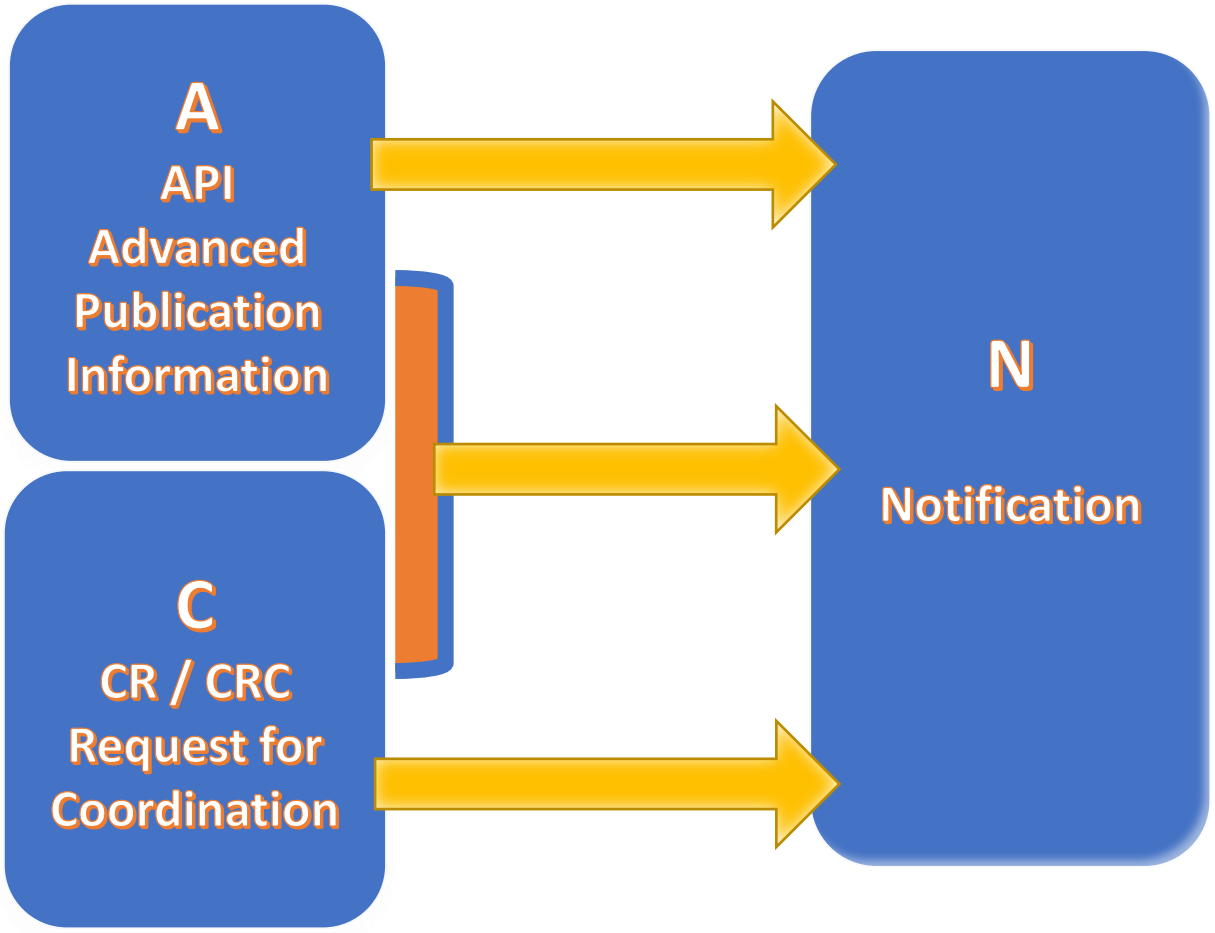
What is receivable ?

Submit in correct formats !



ADM obligations

API or CRC ?

- **API** is a mandatory procedure for all satellite network **not** subject to coordination procedure under section I of Article 9

- **CRC** is a mandatory procedure for all satellite network subject to coordination procedure under section II of Article 9

- To know whether a frequency band is subject to coordination: read the footnotes in the Table of Frequency Allocations

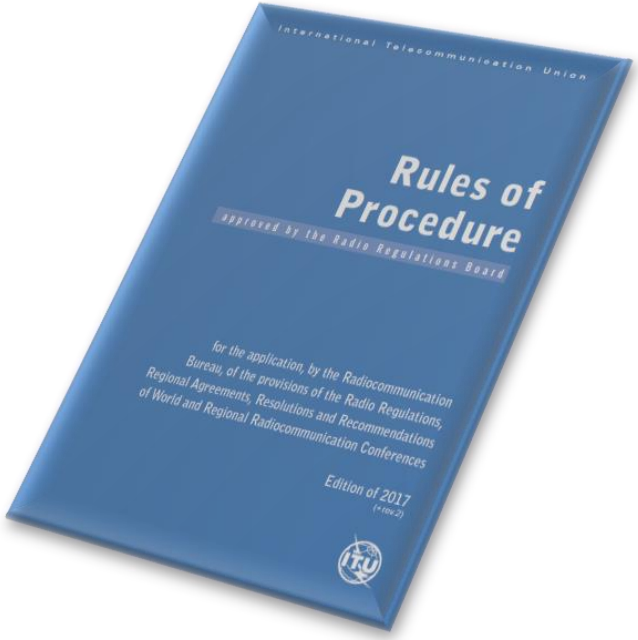
Examples of footnote indicating coordination is required:

- **No. 5.364** *The use of the band 1 610-1 626.5 MHz by the mobile-satellite service (Earth-to-space) and by the radiodetermination-satellite service (Earth-to-space) is subject to coordination under No. **9.11A**.*

  (For coordination under No. **9.11A**, see also **Rule of Procedure**)

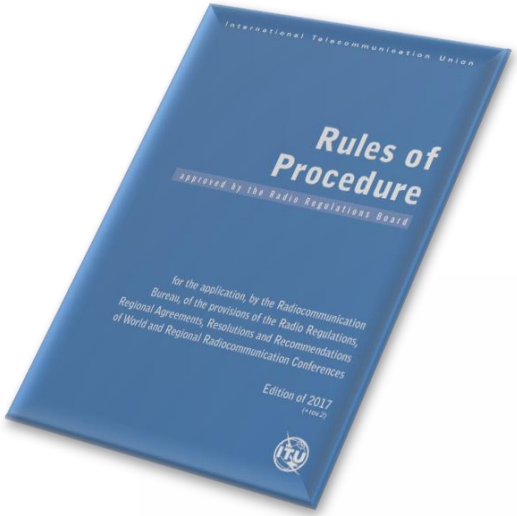
- **No. 5.286** *The band 449.75-450.25 MHz may be used for the space operation service (Earth-to-space) and the space research service (Earth-to-space), subject to agreement obtained under No. **9.21**.*

Establishment of a formal date of receipt



- In order to establish a formal date of receipt for the purpose of treatment of the submissions, the Bureau shall examine inter alia the completeness and correctness of the information submitted by administrations.
- Where a notice received by the Bureau does not contain all of the mandatory information as defined in Annex 2 of Appendix **4** or appropriate reason for any omissions, the Bureau shall regard the notice as incomplete. The Bureau shall immediately inform the administration and seek the information not provided.
- Further processing of the notice by the Bureau will remain in abeyance and a formal date of receipt will not be established until the missing information is received. The formal date of receipt will be the date of receipt of the missing information.

Rules concerning Receivability



30 days to respond
with complete info
within the scope of Bureau's enquiry

Part A1	Receivability	page 1	rev. 2

Rules concerning the Receivability of forms of notice generally applicable to all notified assignments submitted to the Radiocommunication Bureau in application of the Radio Regulatory Procedures*

RR (Edition of 2020), **Rop** (Edition of 2017 with updates in 2018)

Rules concerning Receivability

Response

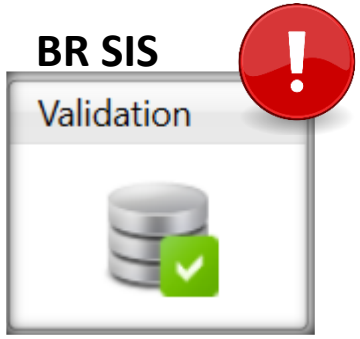
- **within the scope with complete info by due date** of Bureau's enquiry
  → retain **original** date of receipt
- **Not within** the scope of Bureau's enquiry, **out of due date**
  → establish **new** date of receipt

- Missing any mandatory information required under **AP4**
  - ➢ will be returned to the Administration
- Frequency bands subject to **AP30/30A/30B** procedures
  - ➢ will be returned to the Administration
- Wrong format
  - ➢ will be returned to the Administration

Withdrawal within **15 days** possible without cost recovery fee

Rules concerning Receivability

Appendix 4

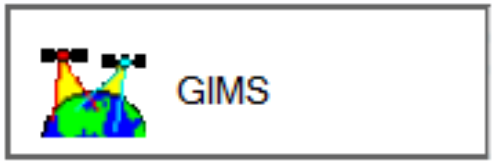


Use the latest BR software V9.0

Notice Database

Cross validation

Diagram Database



Check completeness and **correctness**
to **establish a formal date of receipt**

CR/464 only GIMS mdb format
shall be receivable under **RES 55** (WRC-19).

Graphical Data in GIMS MDB

Diagram Database

CR/464 (2020) **only GIMS mdb format**
shall be receivable under **RES 55 (WRC-19)**.

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Graphical Data for **API**

To capture diagrams as images in Gims

GIMS

- mandatory information concerning
  -- the **co-polar** antenna radiation pattern (item **B.3.c.1** of Appendix **4**) for the space station antenna and
  -- the measured **co-polar** antenna radiation pattern or the **co-polar** reference radiation pattern for the associated Earth stations (item **C.10.d.5.a** of Appendix **4**)

  have to be provided either

  with **pattern ids** in the notice database or
  with **diagrams** in the Gims database

  → Gain values must be provided for all **off-axis angles (0 to ±180°)**

  → Diagrams must be marked with the **correct header elements**

- Please follow the guide on how to capture the diagrams for API as shown in the website below
  - https://www.itu.int/ITU-R/go/space-AdditionalDataUnderAP4/en

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For co-polar Antenna Radiation Patterns

Kindly submit the appropriate diagrams, or indicate the antenna pattern IDs
by selecting from the Antenna Pattern Library (APL) available at the webpage:

https://www.itu.int/en/ITU-R/software/Pages/ant-pattern.aspx

Eg. Earth Station co-polar Antenna Radiation Patterns

AP7	APERR_012V01	Appendix 7 Earth station antenna pattern for the determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz.	Receiving	32
			Transmitting	75
Non-directional	APEND_099V01	Non-directional earth station antenna pattern.	Receiving	607
			Transmitting	608

Eg. Space Station co-polar Antenna Radiation Patterns

Non-directional	APSND_499V01	Non-directional space station antenna pattern.	Receiving	610
			Transmitting	609

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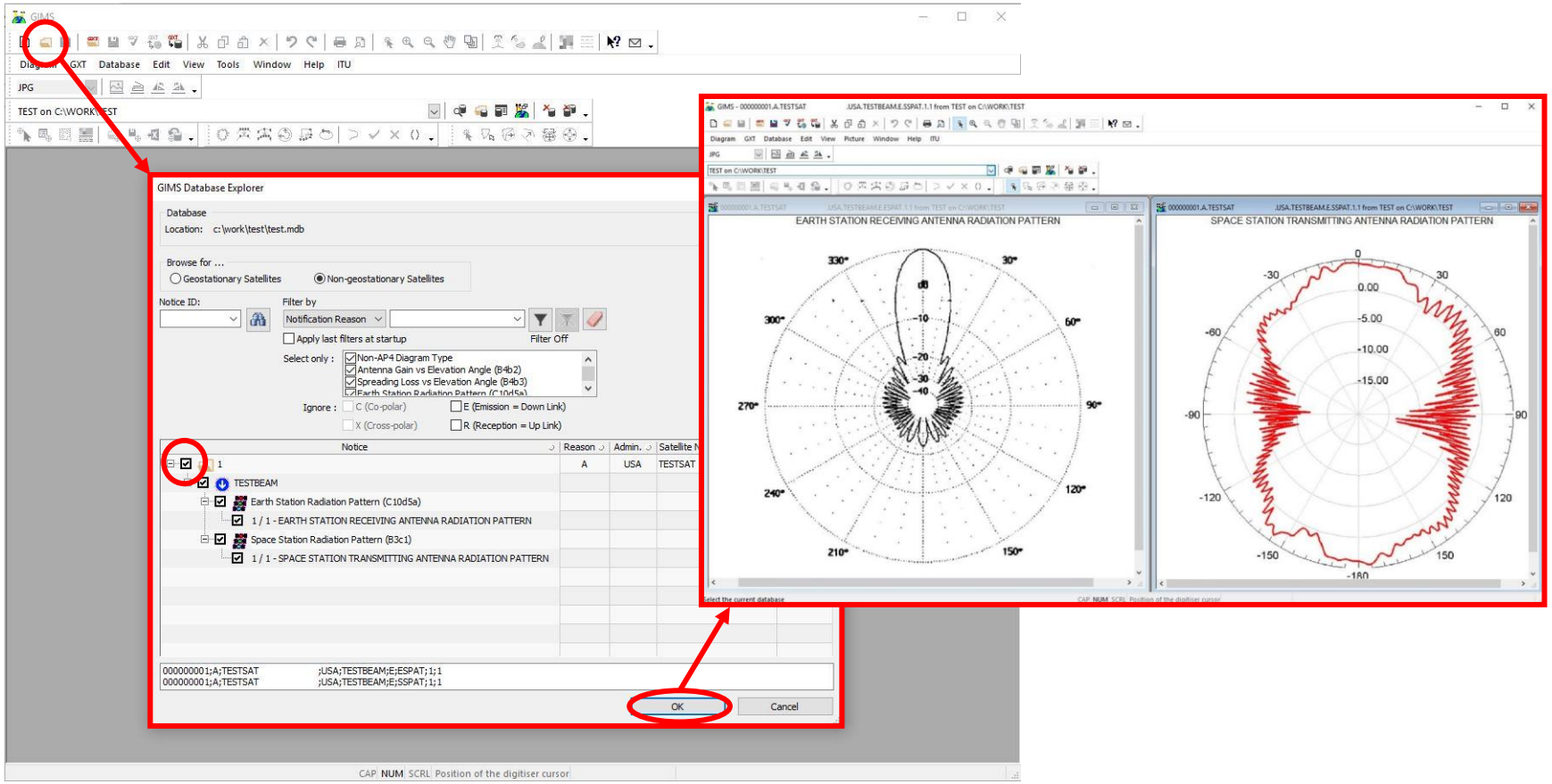
See more details from the webpage

To capture images in GIMs for API

- To be captured for all transmitting / receiving beams and Earth stations that do not contain an antenna pattern ID in the SNS mdb
- To check that all diagrams are there, and with all the correct keys and labels with cross-validation tool



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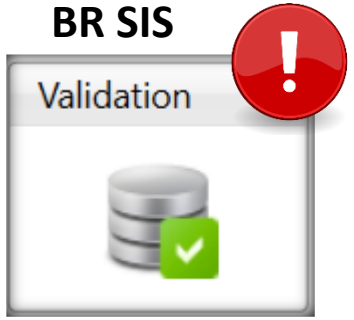
Notice Database

BRsoft V9.0

BR SIS



No fatal error

Cross validation

Appendix 4

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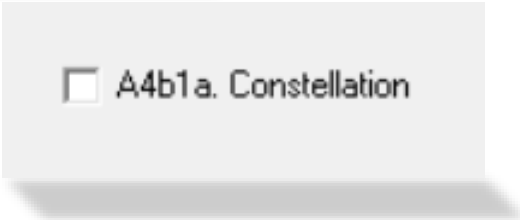
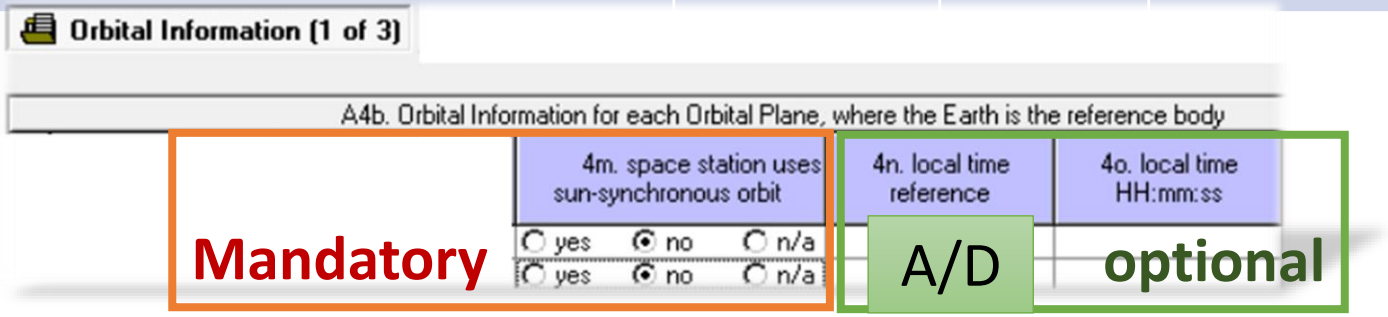
Specific tips for API



- New mandatory info for all NGSO API not subject to coordination:

AP4 item	Description	Key word	Type of response	Where can be provided?
A.1.g	indicator showing that the non-GSO satellite system is planned to be operated in accordance with Resolution **32 (WRC-19)**	SDM	Y/N	SpaceCap v. 9.0 (Notice TAB)
A.4.b.1.a	indicator of whether the non-geostationary-satellite system represents a "constellation", where the term "**constellation**" describes a satellite system, for which the relative distribution of the orbital planes and satellites is defined	Constellation	Y/N	SpaceCap v. 9.0 (Notice TAB)
A.4.b.4.m	indicator of whether the space station uses sun-synchronous orbit or not	Sun-synchrounous	Y/N	SpaceCap v. 9.0 (Orbital info 1/3 TAB)

Mandatory !!



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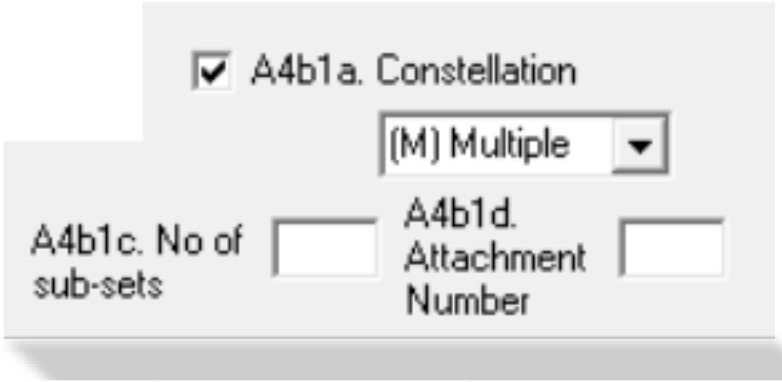
Specific tips for API

- If **Constellation** indicator = **Y**:

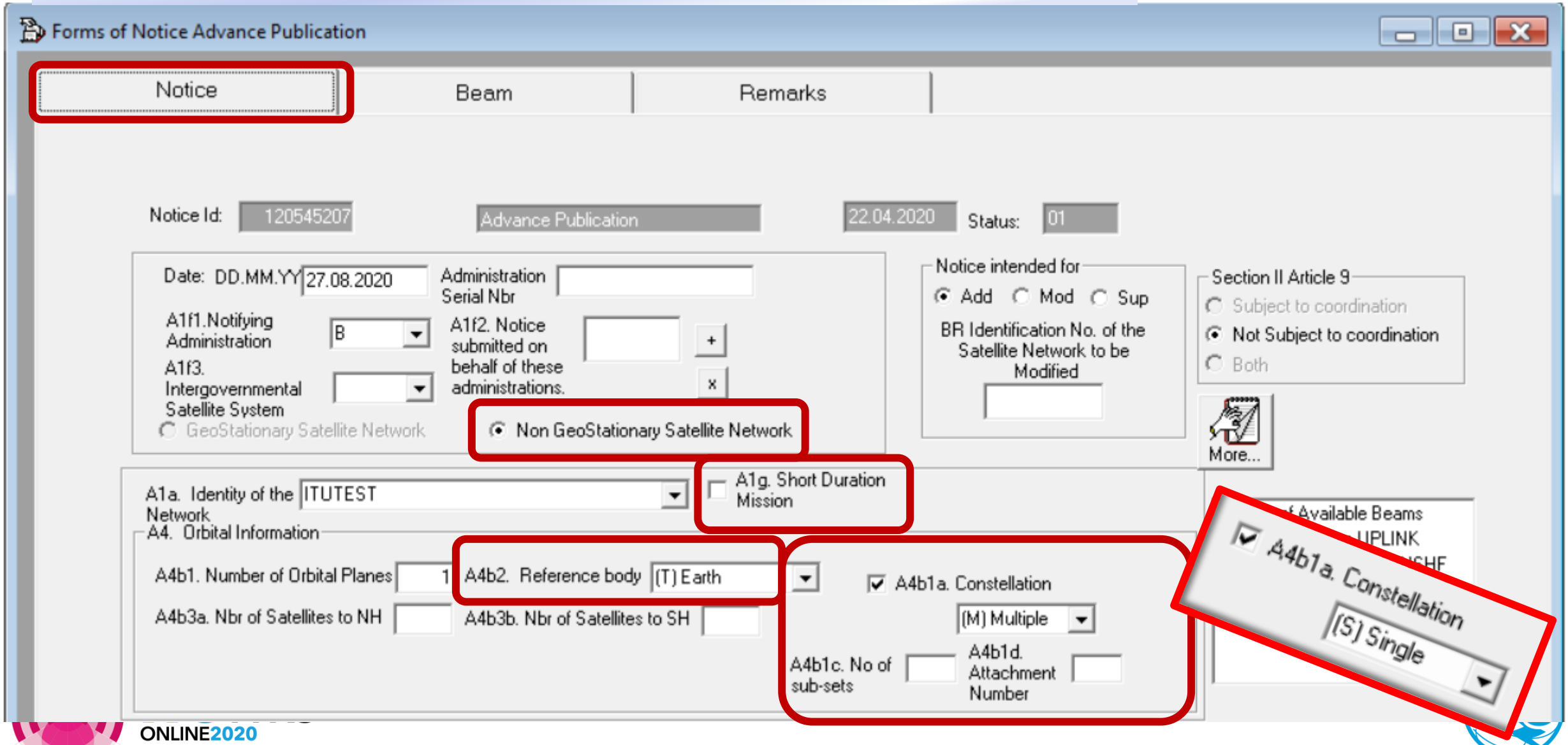
Item A.4.b.1.a :



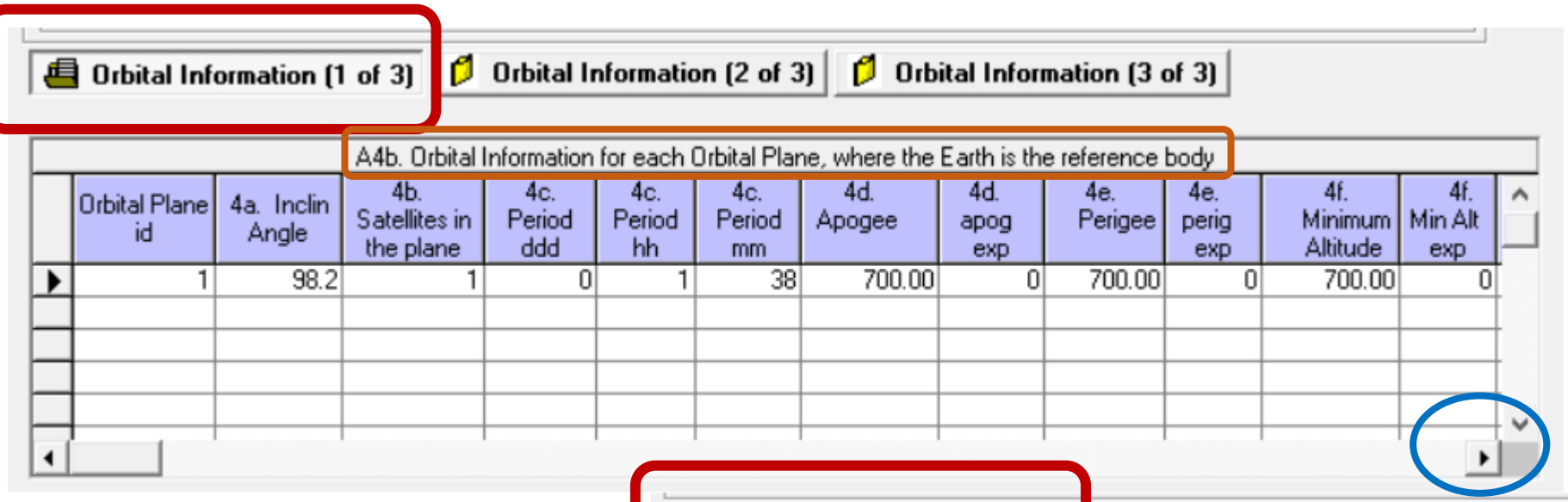
AP4 item	Description	Key word	Where can be provided?
A.4.b.4.h	the initial phase angle (ωi) of the i-th satellite in its orbital plane at reference time t = 0, measured from the point of the ascending node ($0° \leq \omega i < 360°$)	**Initial Phase angle**	SpaceCap v. 9.0 (Orbital info 2/3 TAB)
A.4.b.4.i	the argument of perigee (ωp), measured in the orbital plane, in the direction of motion, from the ascending node to the perigee ($0° \leq \omega p < 360°$)	**Argument of Perigee**	SpaceCap v. 9.0 (Orbital info 2/3 TAB)
A.4.b.4.j	the longitude of the ascending node (θj) for the j-th orbital plane, measured counter-clockwise in the equatorial plane from the Greenwich meridian to the point where the satellite orbit makes its South-to-North crossing of the equatorial plane ($0° \leq \theta j < 360°$)	**LAN**	SpaceCap v. 9.0 (Orbital info 3/3 TAB)

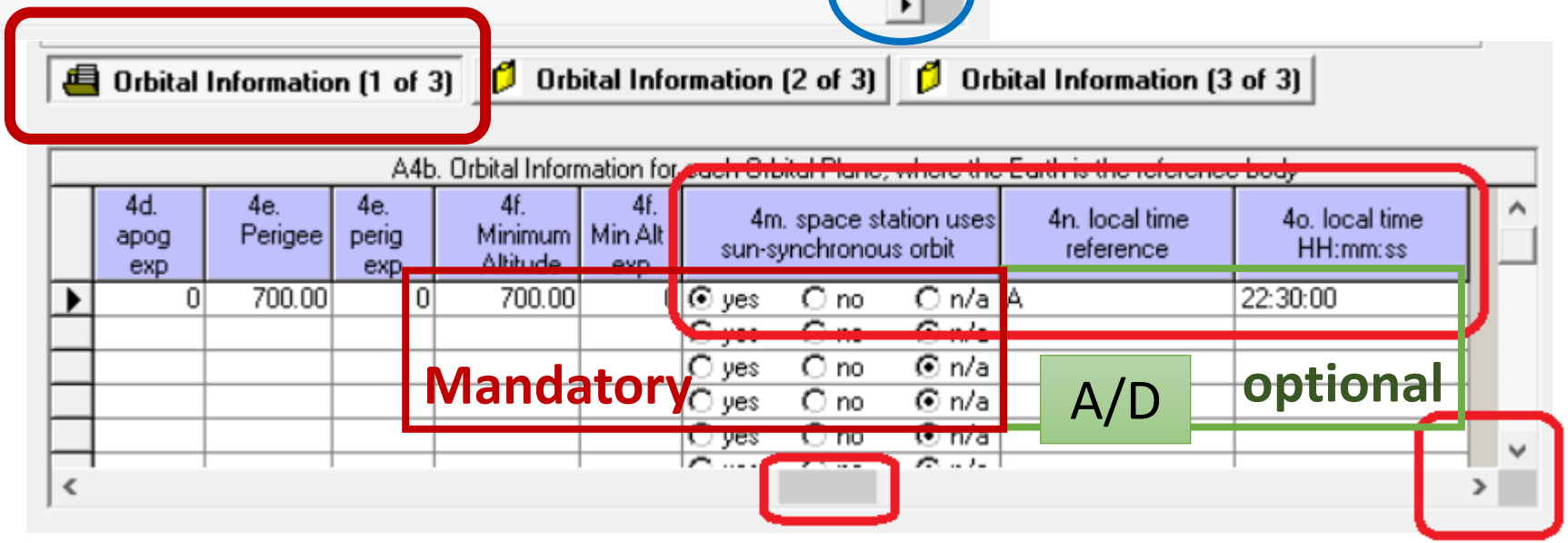
Mandatory !!

Notice Information_SpaceCap



Orbital Information 1_SpaceCap





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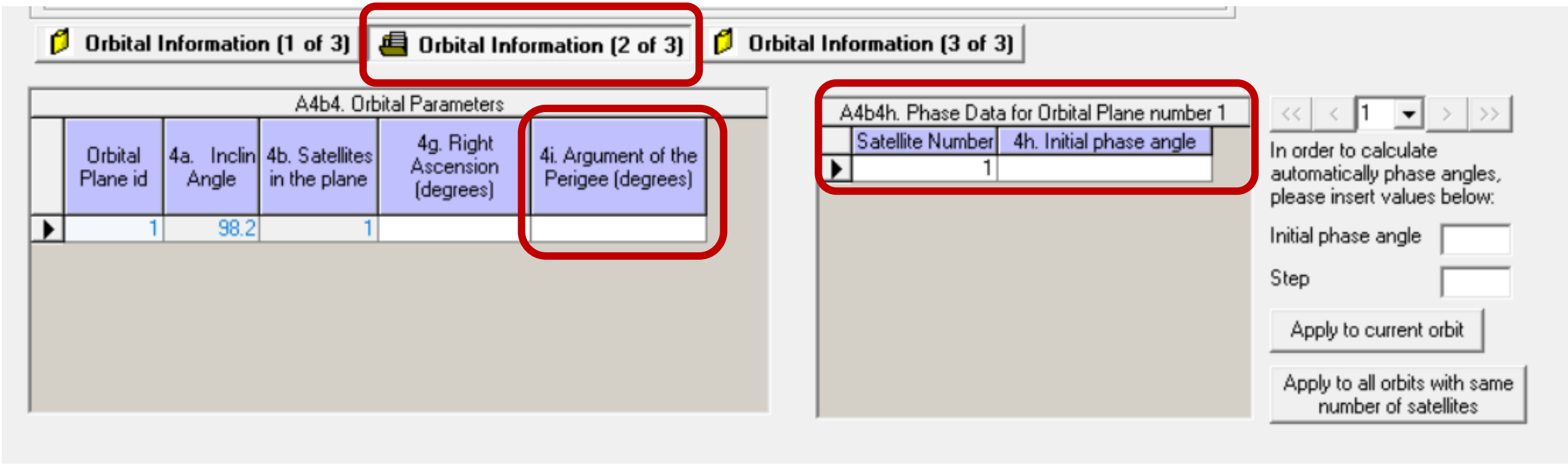
Orbital Information 2_SpaceCap



- Items **A4b4h, A4b4i, A4b4j**: required when **Constellation indicator = Y**
- **Item A4b4i Argument of the Perigee: required only when Apogee ≠ Perigee**

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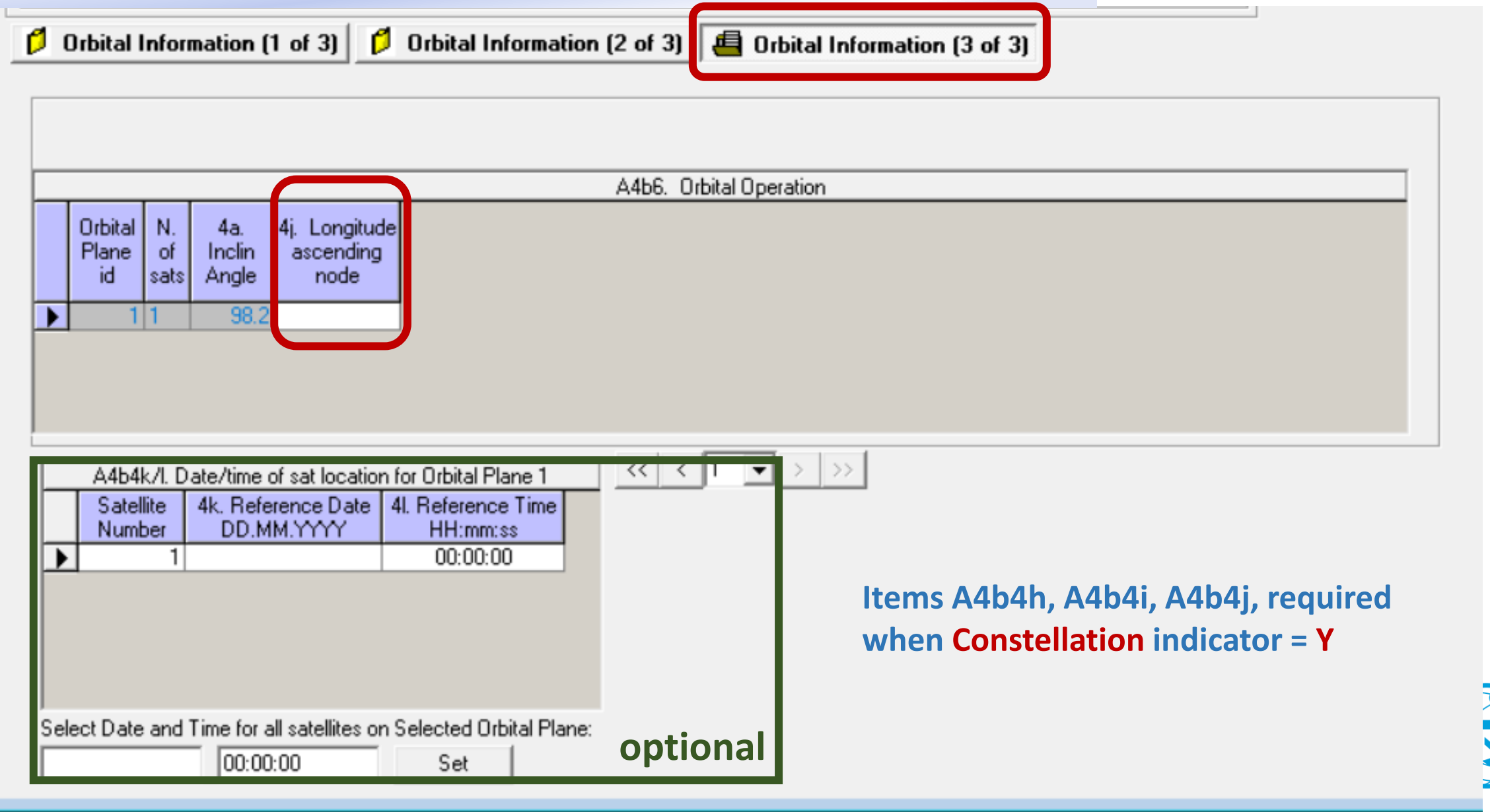
Orbital Information 3_SpaceCap



Items A4b4h, A4b4i, A4b4j, required when Constellation indicator = Y

Space Operation Service

Space operation: ET ≠ EK, ER, ED

RoP No. 1.23

2 In the No. **11.31** examinations, notices concerned with space operation **functions** will be considered in conformity with the Table of Frequency Allocations (favourable Finding) in the case where the assigned frequency (and the assigned frequency band) lies in a frequency band allocated to the:

- space operation **service**, or
- the main service in which the space station is operating (e.g. FSS, BSS, MSS).

3 In the case where the assigned frequency concerning space operation **functions**, lies in a frequency band allocated to a service in which the space station has no operating function, the No. **11.31** finding will be **unfavourable**.

For notice where there is only space operation functions, should include ET as main service

Space Operation Service

Space operation: ET ≠ EK, ER, ED

For the frequency band which is **allocated** to the space operation service,
should capture ET as service.

For the frequency band which is **not allocated** to the space operation service,
should capture ED, EK or ER as space operation functions,
plus other main satellite service.

For notice where there is **only** space operation functions,
should include ET as the main service.

Non-allocated bands not recommended

- It is not encouraged to use bands that are not allocated to the service
- If administration wish to do so, please request for **No. 4.4**
  – checkbox at the group tab via SpaceCap should be checked
- Administration should ensure that
  - It has determined that it will not cause harmful interference into the stations of other administrations operating in conformity with the Radio Regulations;
  - It has identified measures to avoid harmful interference and to immediately eliminate such in case of a complaint.
- When notifying the use of frequency assignments to be operated under **No. 4.4**, the notifying Administration shall provide a confirmation as mentioned above.

Modification of characteristics

- According to **Nos. 9.2**, amendments to the information that requires **new API** are:
  - **Additional frequency band**
  - **Modification of the direction of transmission**
  - **Modification of reference body**
  - However, it is a good practice to submit a modification to the API for any change in characteristics including orbital characteristics, service area (adding earth stations) etc.
  - This will provide other administrations/operators the chance to submit comments before the modifications are notified for recording in the Master Register.
- If during the notification, there are other changes in characteristics from the information published, other administrations can submit comments following the Part I-S (No.**11.28.1**).

Modification of characteristics

- For **mod API** notice, if:
  - **No change in orbital position**
    - Only **new frequency bands** will be given a new regulatory start date same as the date of receipt of the MOD API
  - **Change in orbital information**
    - **All frequency bands** will be given a new regulatory start date same as the date of receipt of the MOD API

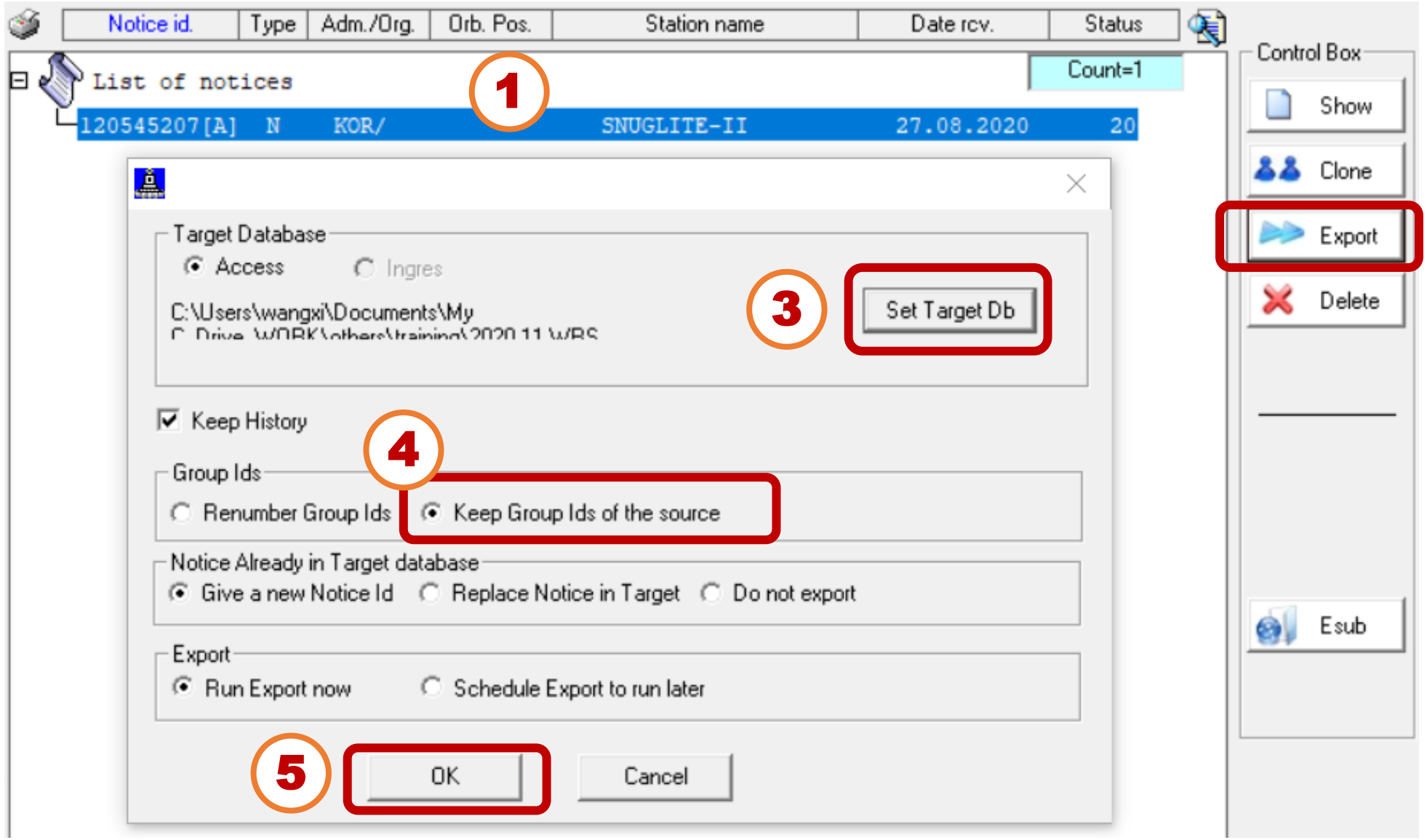
Avoid submitting a frequency range that span across frequency bands with different regulatory date limits previously submitted or published, if possible!

Modification of characteristics

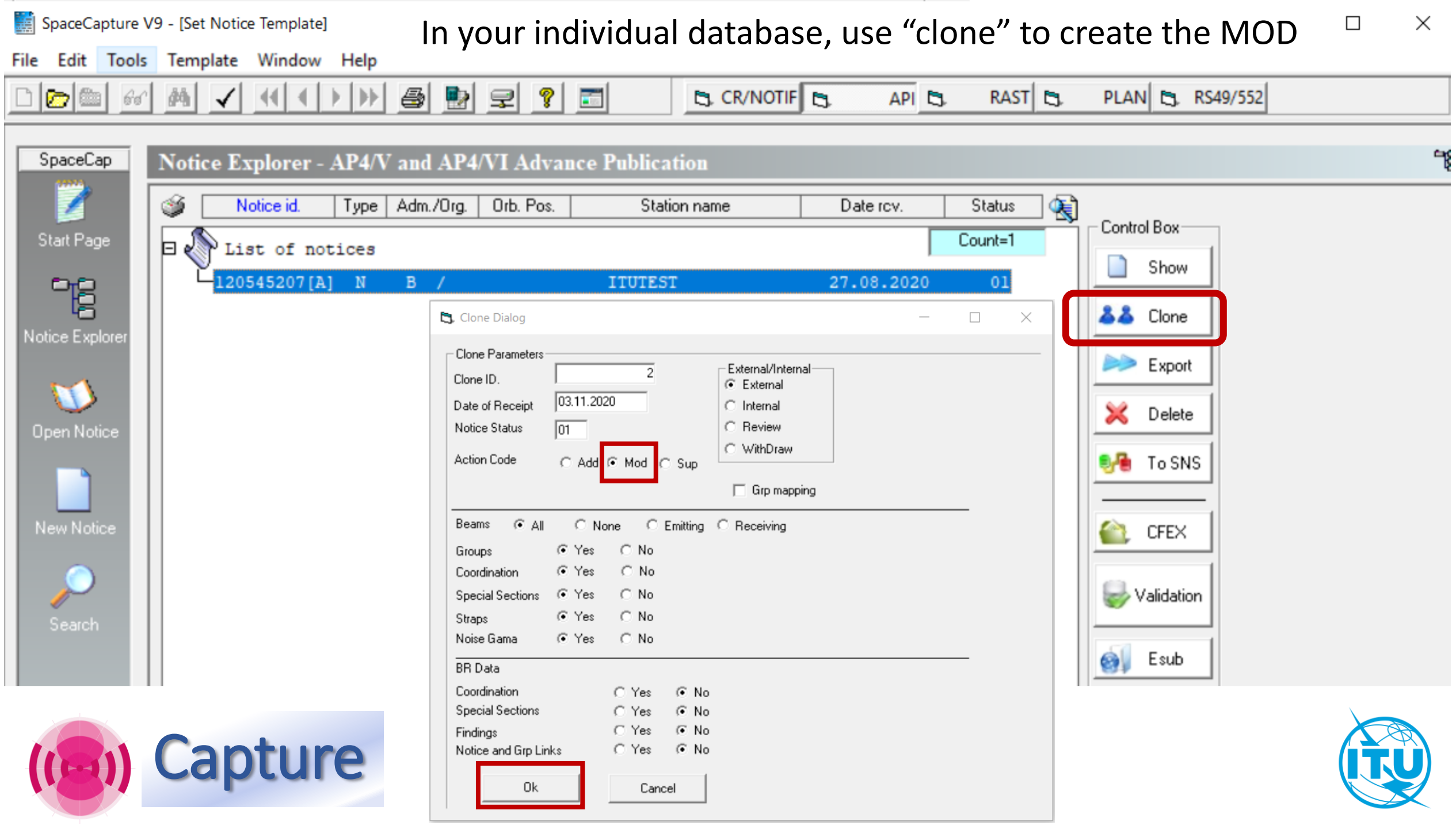
- For MOD, it's recommended to **clone** from the target from SRS mdb,
  it will automatically capture the action codes for beams/groups and target group id's,
  remove those beams/groups not concerned by the modification
- Pay more attention of all **action codes** for Notice, Beams, Groups, Earth stations etc.
- For **MOD beam**: indicate if any of diagrams has been modified vs. the original notice
- For **MOD group**: indicate the **target group IDs** previously published and the action codes for all groups and for all associated Earth stations via SpaceCap
- Pay more attention for the **associated Earth stations** ,
  remove those Earth stations not concerned by the modification,
  capture manually the action codes (**add, mod, sup**) for all Earth stations.

Capture

For MOD, export your target database from SRS mdb first



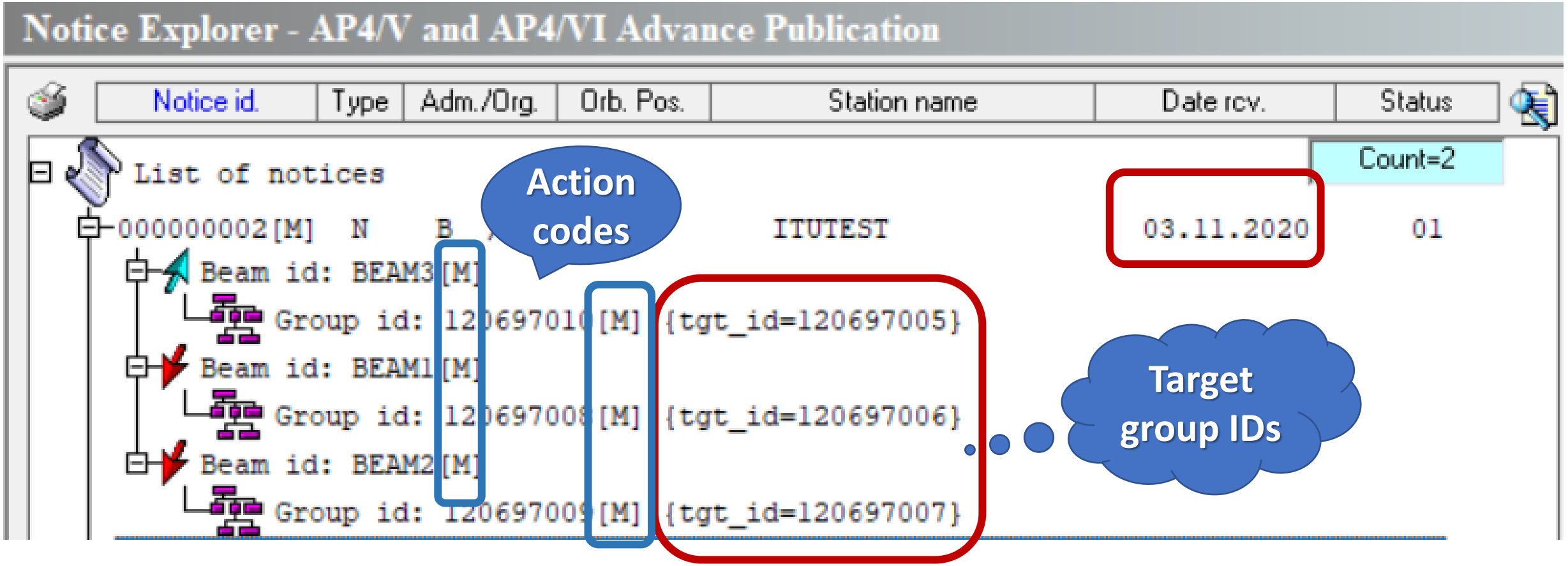
In your individual database, use “clone” to create the MOD



Capture

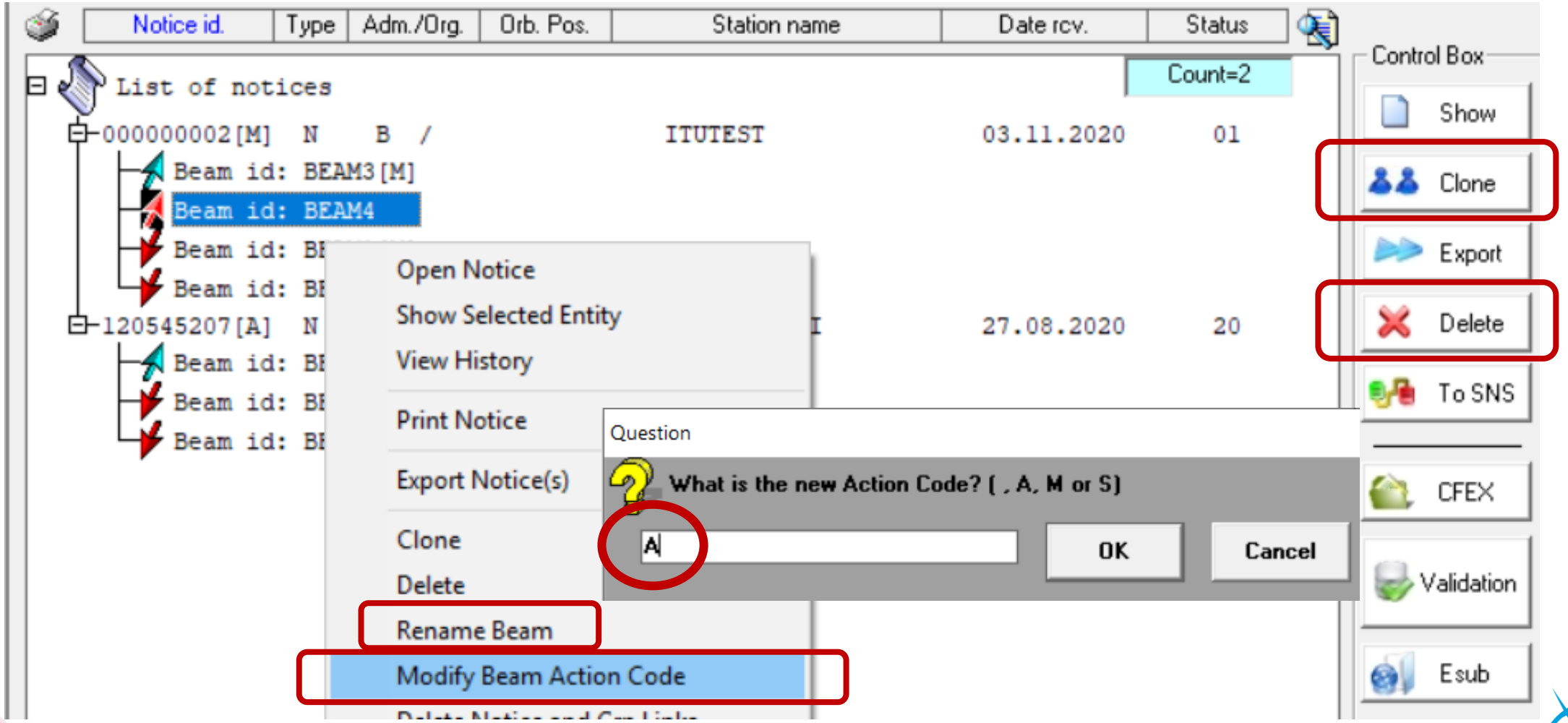
Capture

Using the “Clone” function via SpaceCap,
action codes and target group ids are captured automatically



Capture

After the “Clone”, you can remove beams/group, modify action codes, or rename beam to have a new one, then modify the detail characteristics



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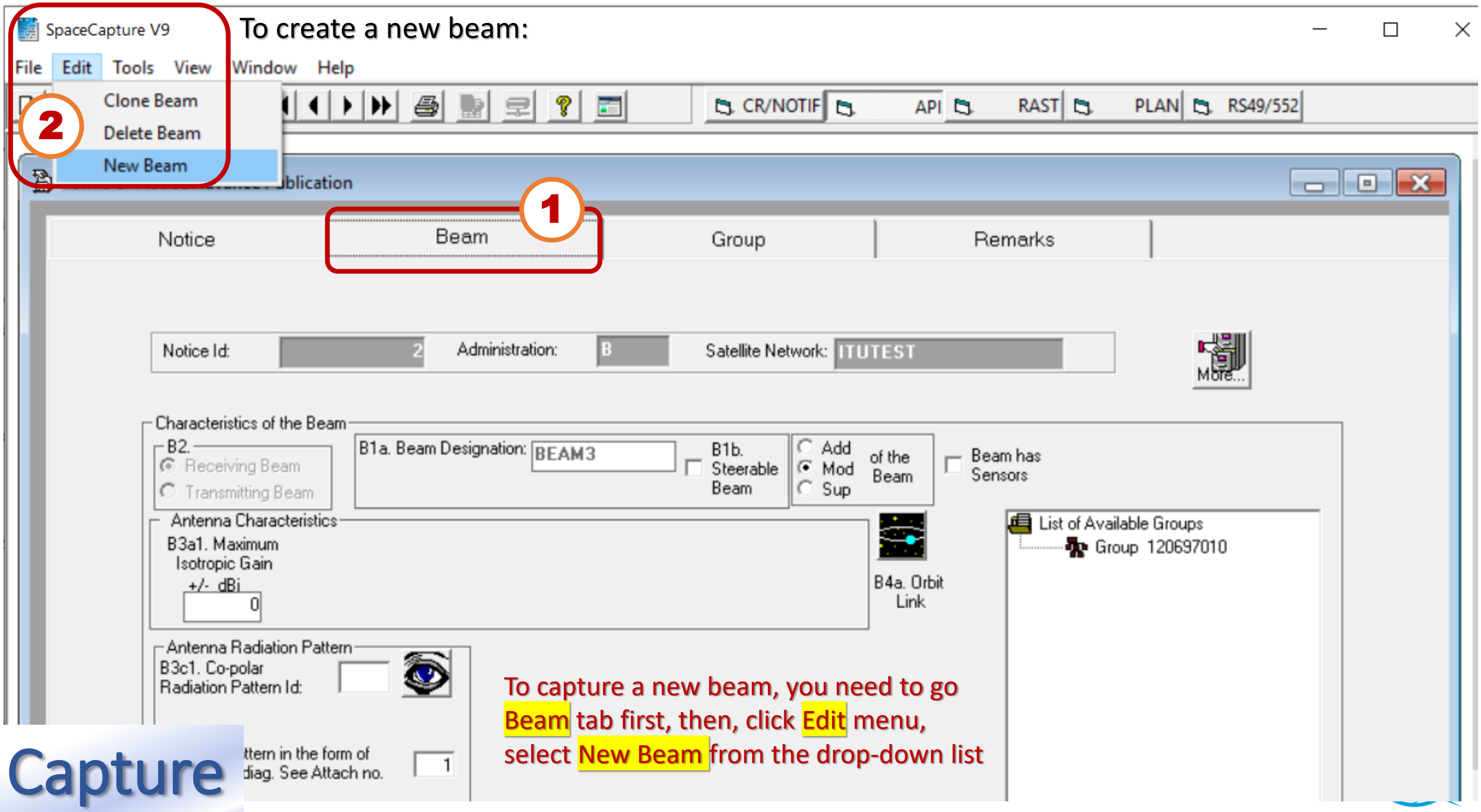
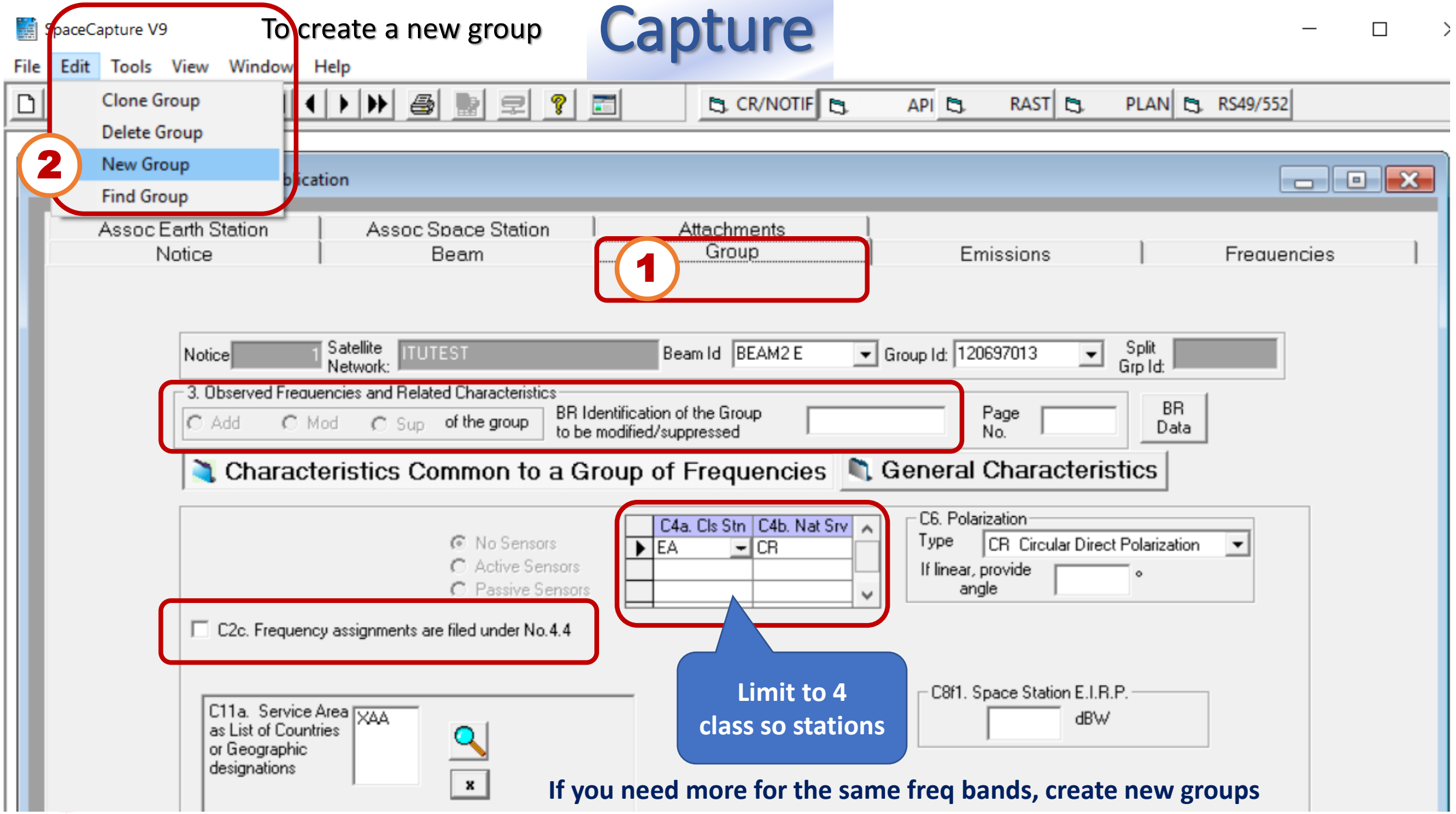
To create a new beam:



Capture

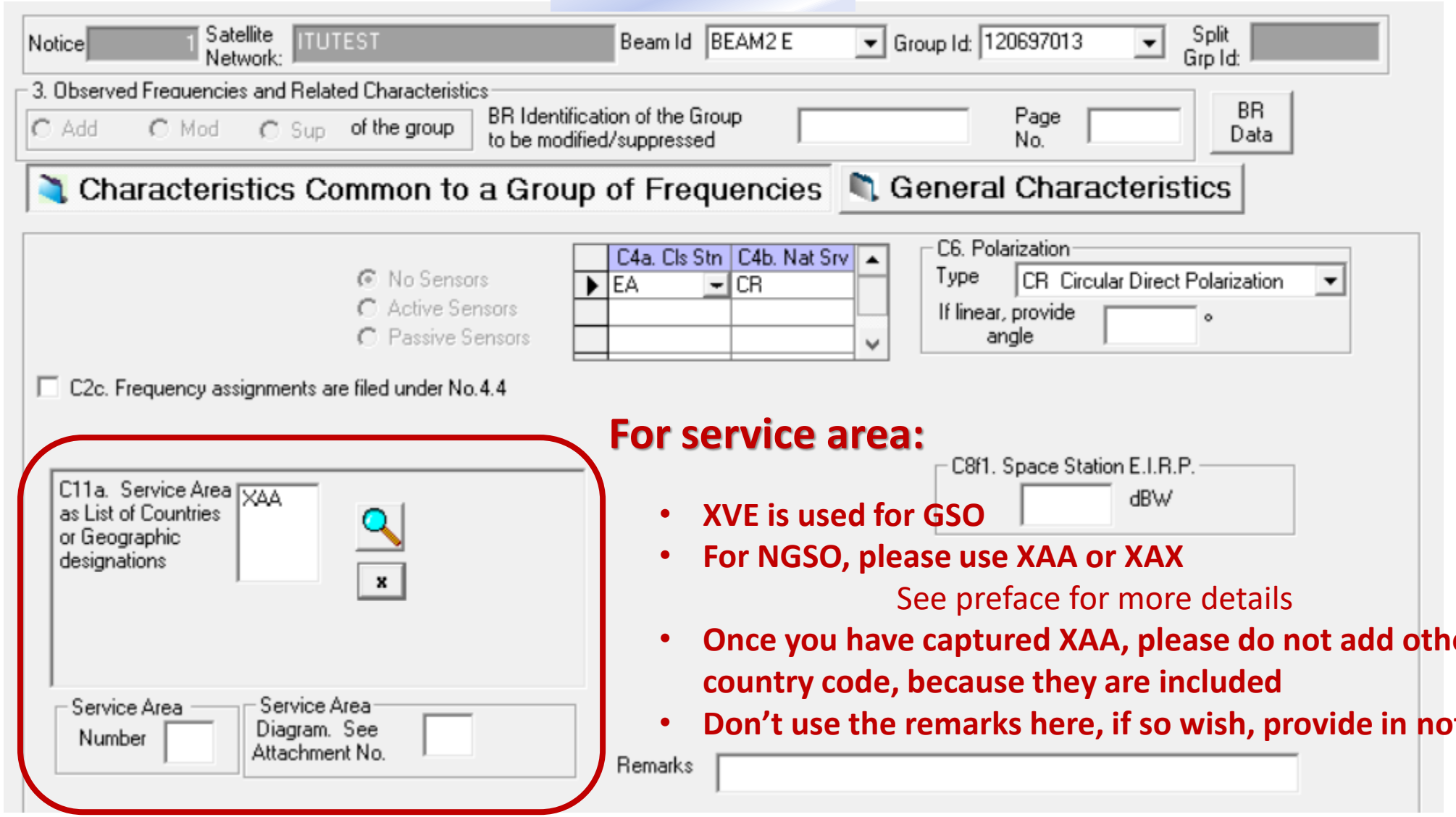
Capture

To create a new group



In group tab

Capture



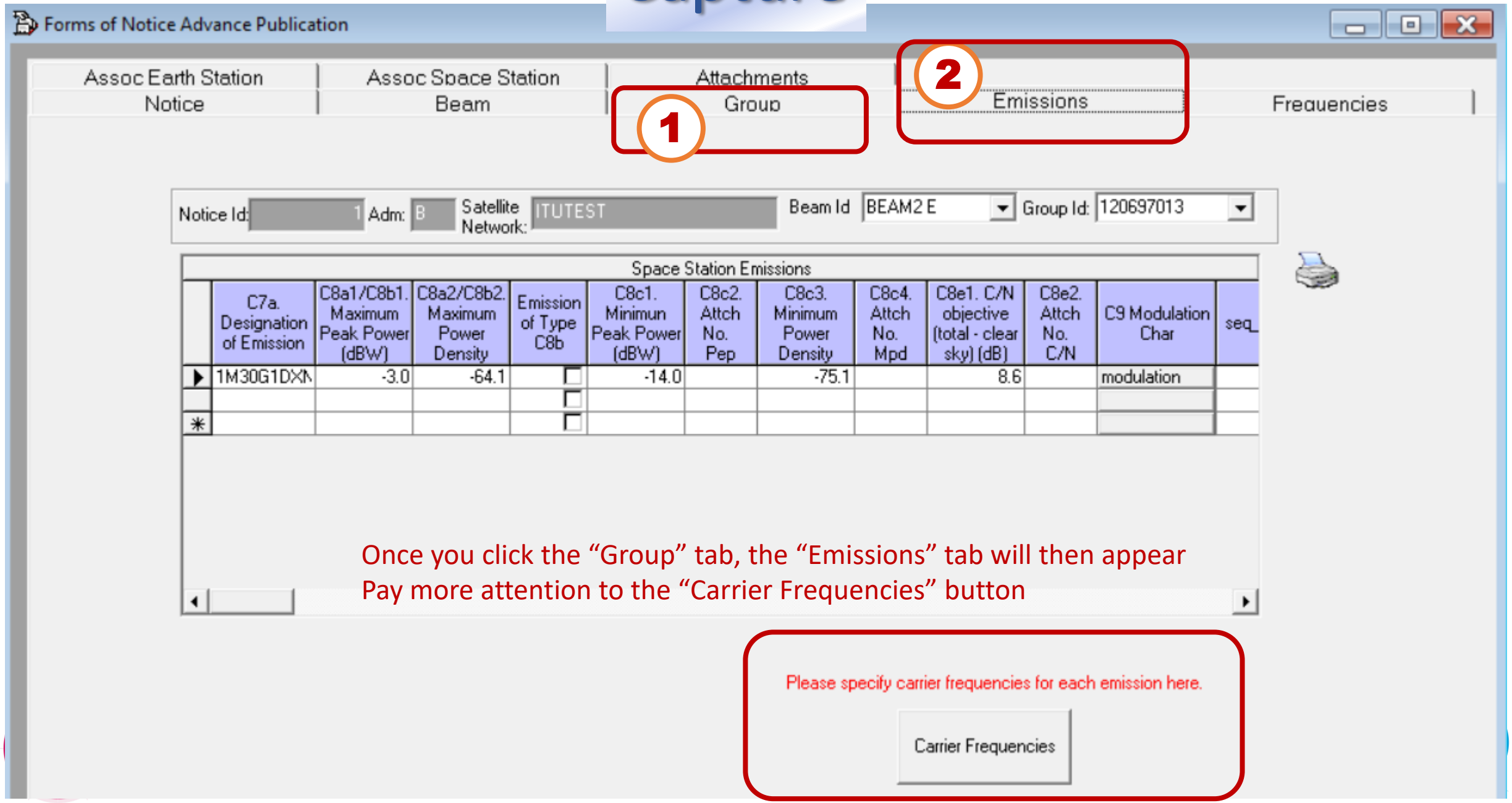
For service area:

- **XVE is used for GSO**
- **For NGSO, please use XAA or XAX**

  See preface for more details
- **Once you have captured XAA, please do not add other country code, because they are included**
- **Don't use the remarks here, if so wish, provide in notes**

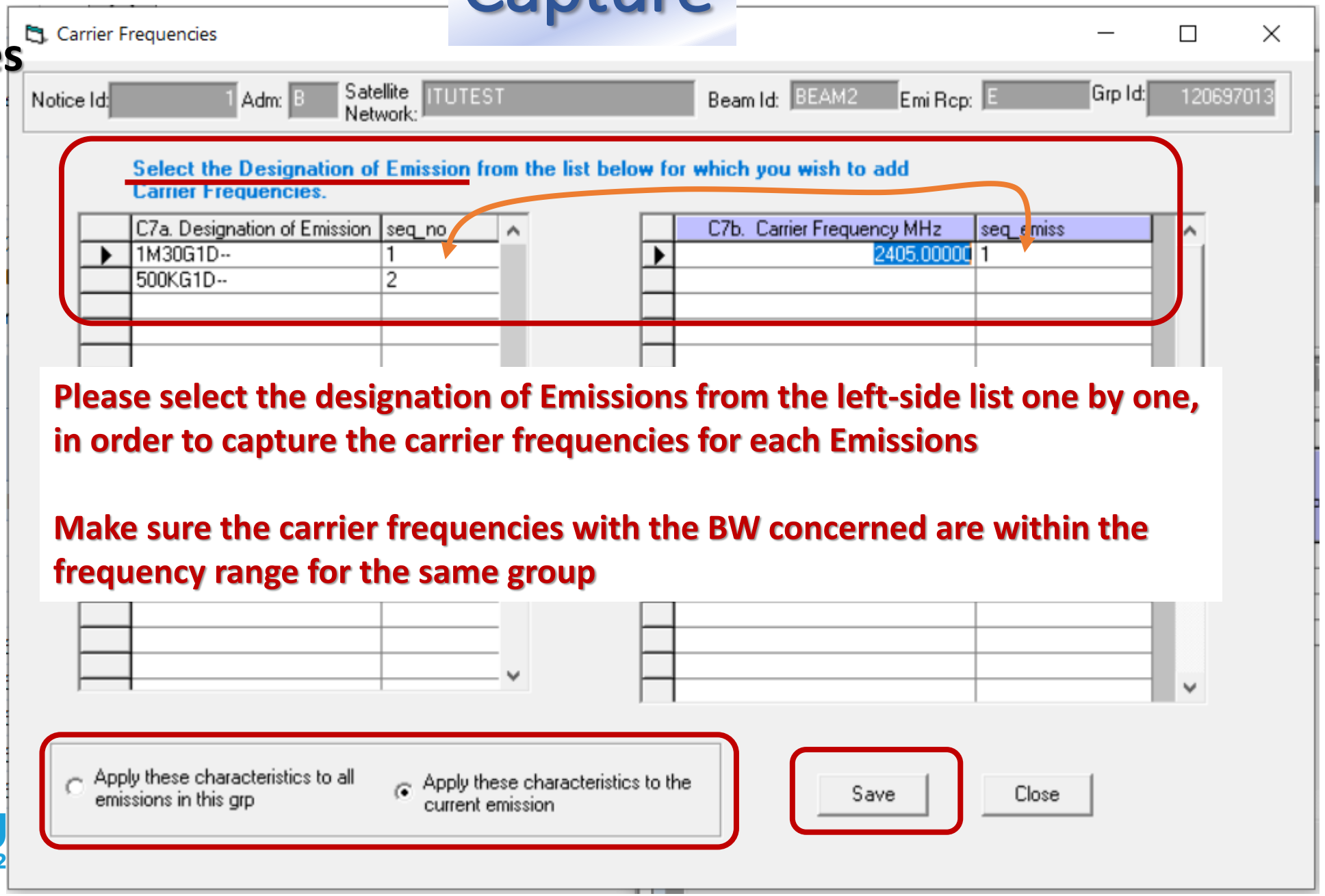
In Emissions tab

Capture



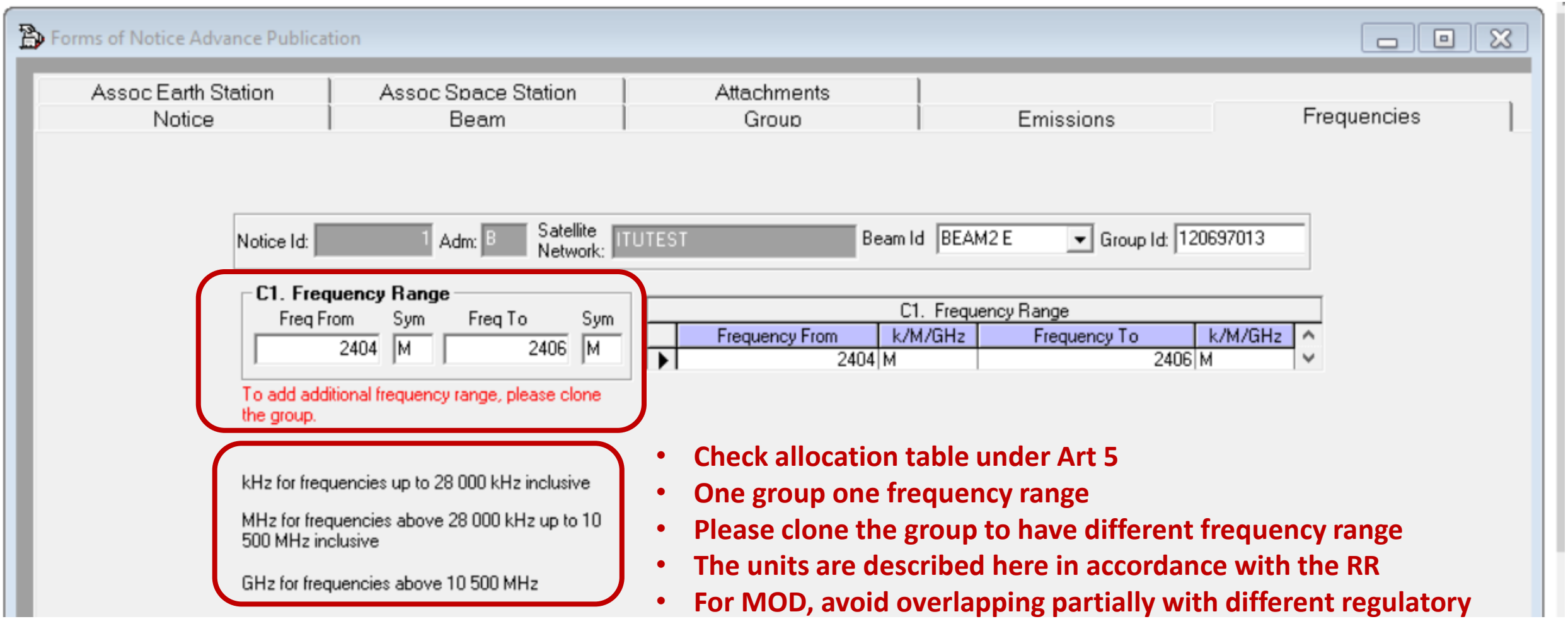
Carrier Frequencies

Capture



Frequency Range

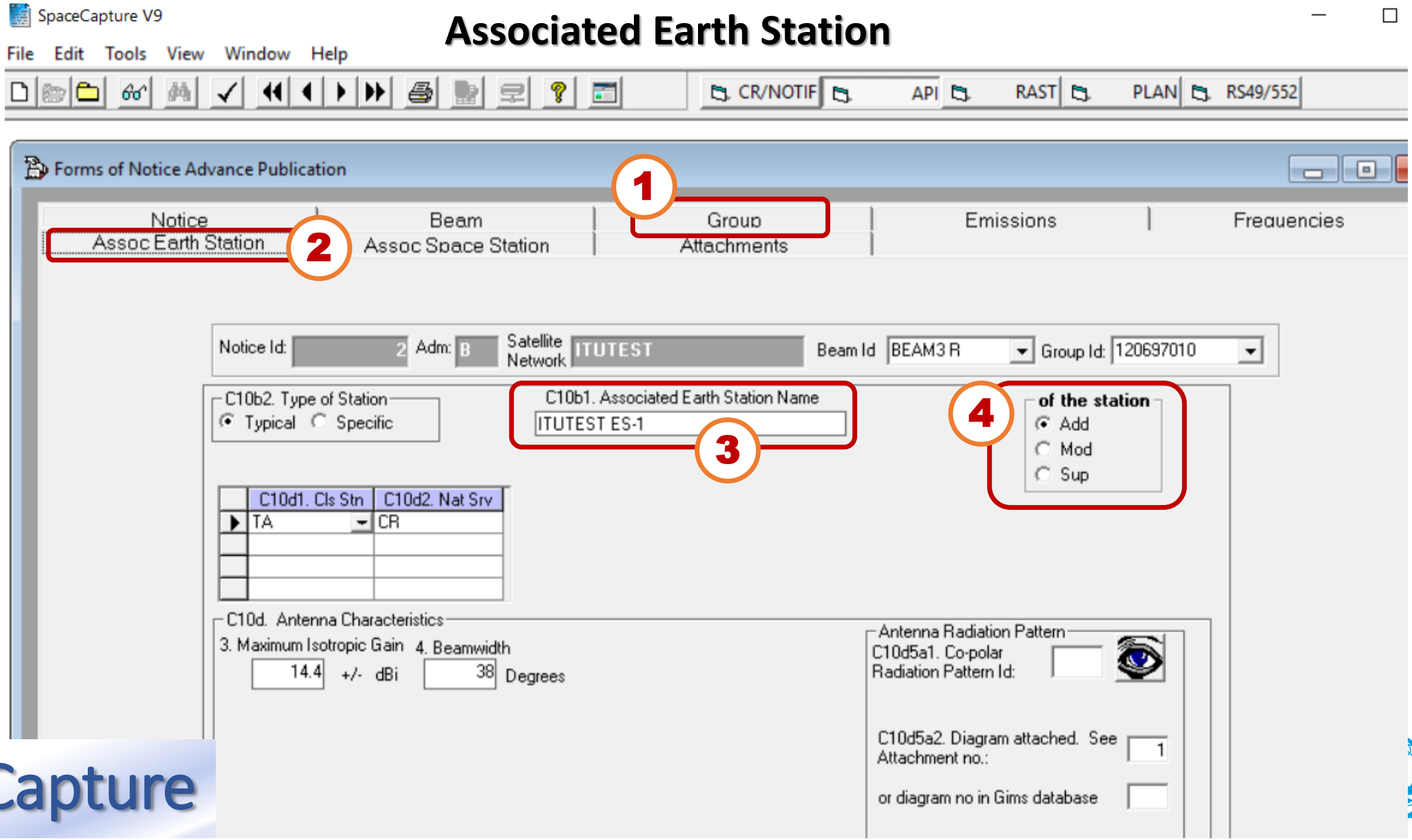
Please respect the allocation under RR Art 5



- Check allocation table under Art 5
- One group one frequency range
- Please clone the group to have different frequency range
- The units are described here in accordance with the RR
- For MOD, avoid overlapping partially with different regulatory dates submitted or published in the past

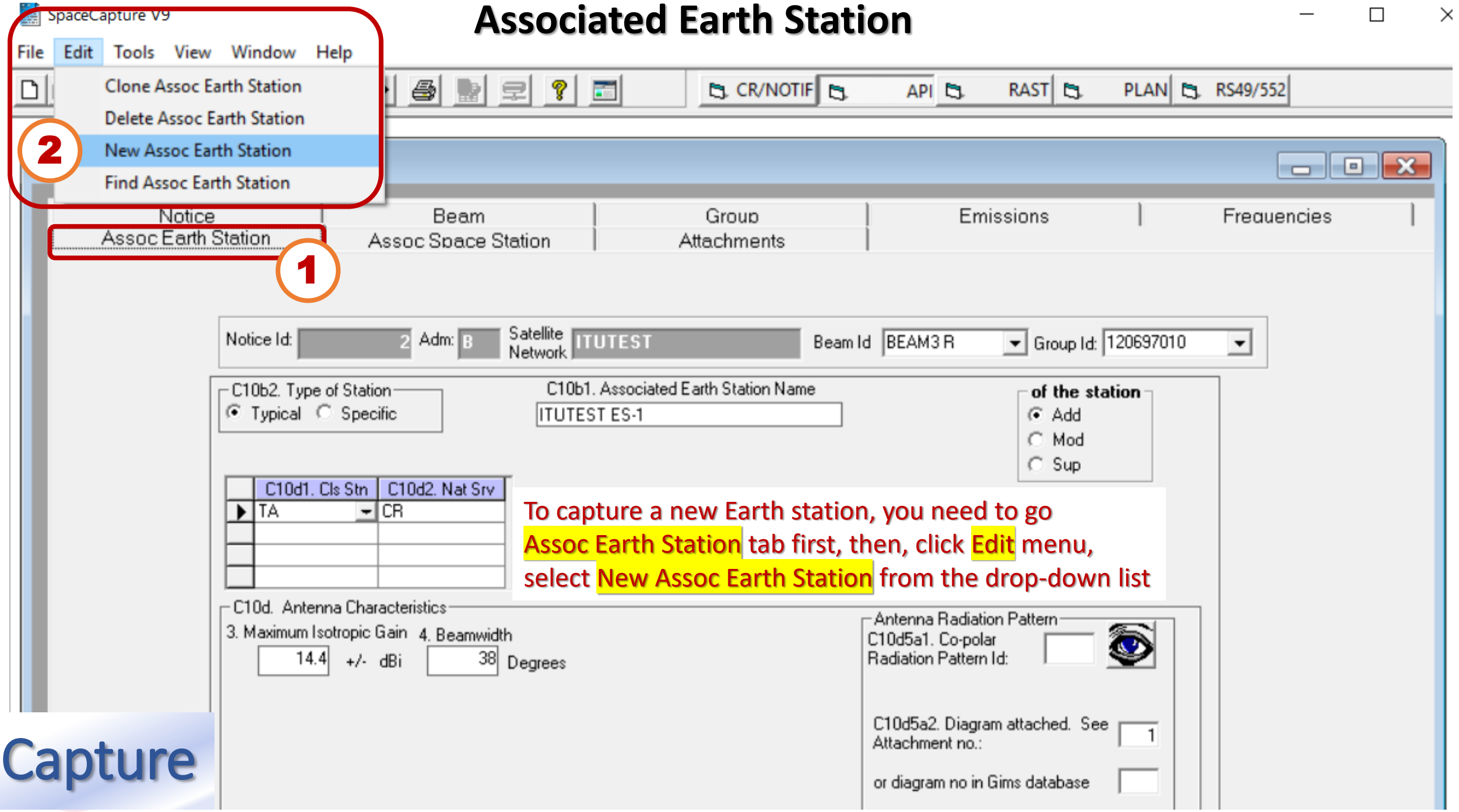
Capture

Associated Earth Station



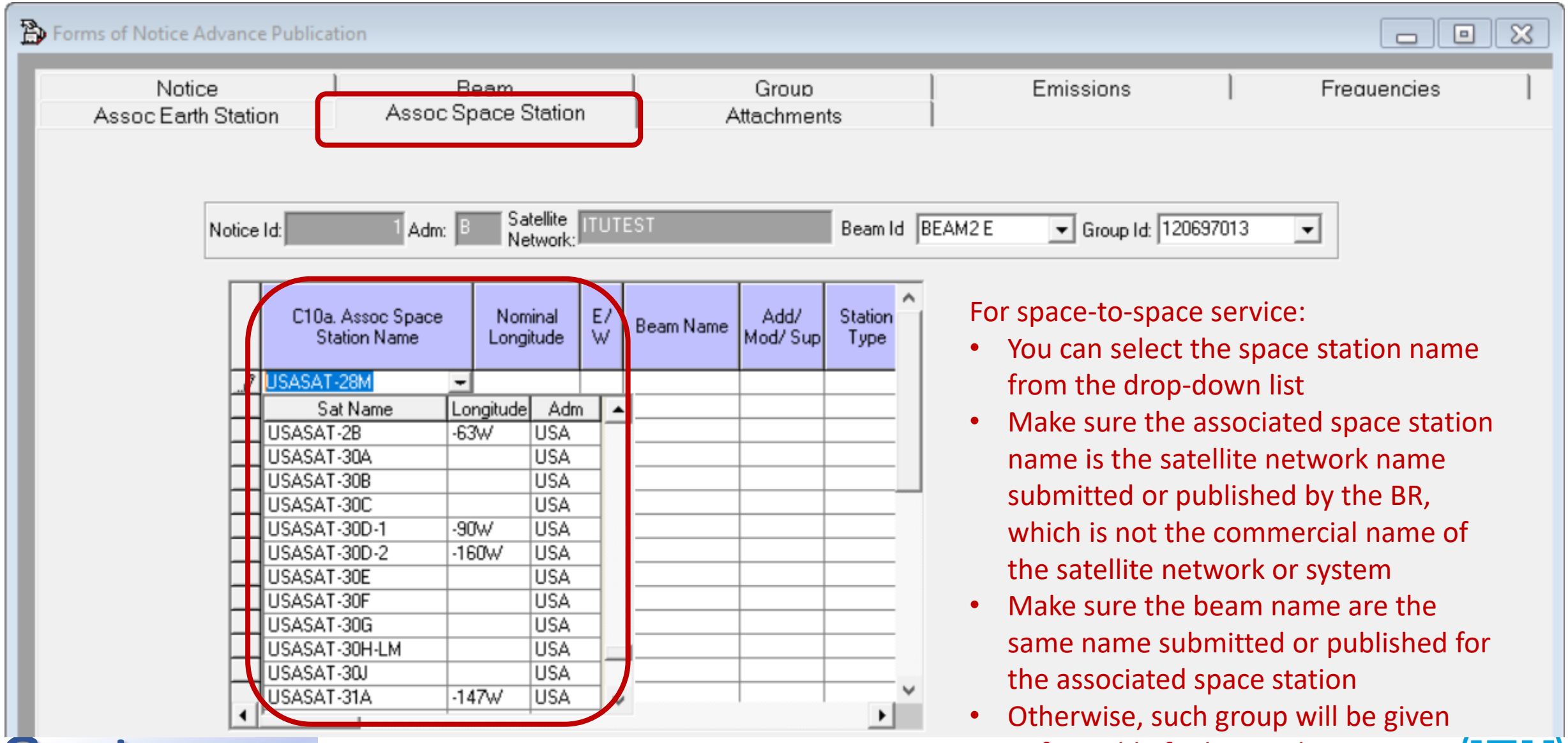
Capture

Associated Earth Station



Capture

Associated Space Stations

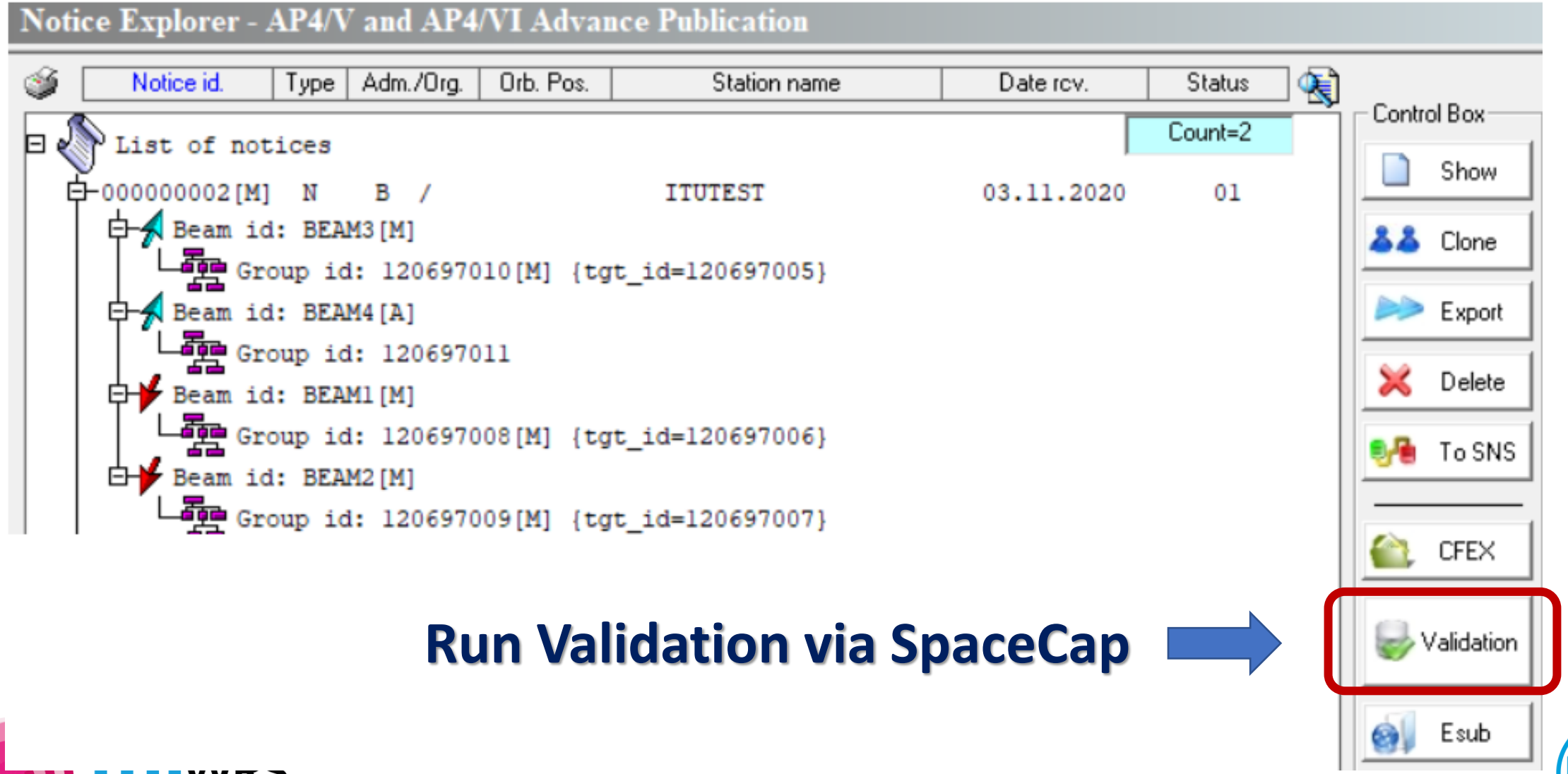


For space-to-space service:

- You can select the space station name from the drop-down list
- Make sure the associated space station name is the satellite network name submitted or published by the BR, which is not the commercial name of the satellite network or system
- Make sure the beam name are the same name submitted or published for the associated space station
- Otherwise, such group will be given unfavorable finding at the notification stage

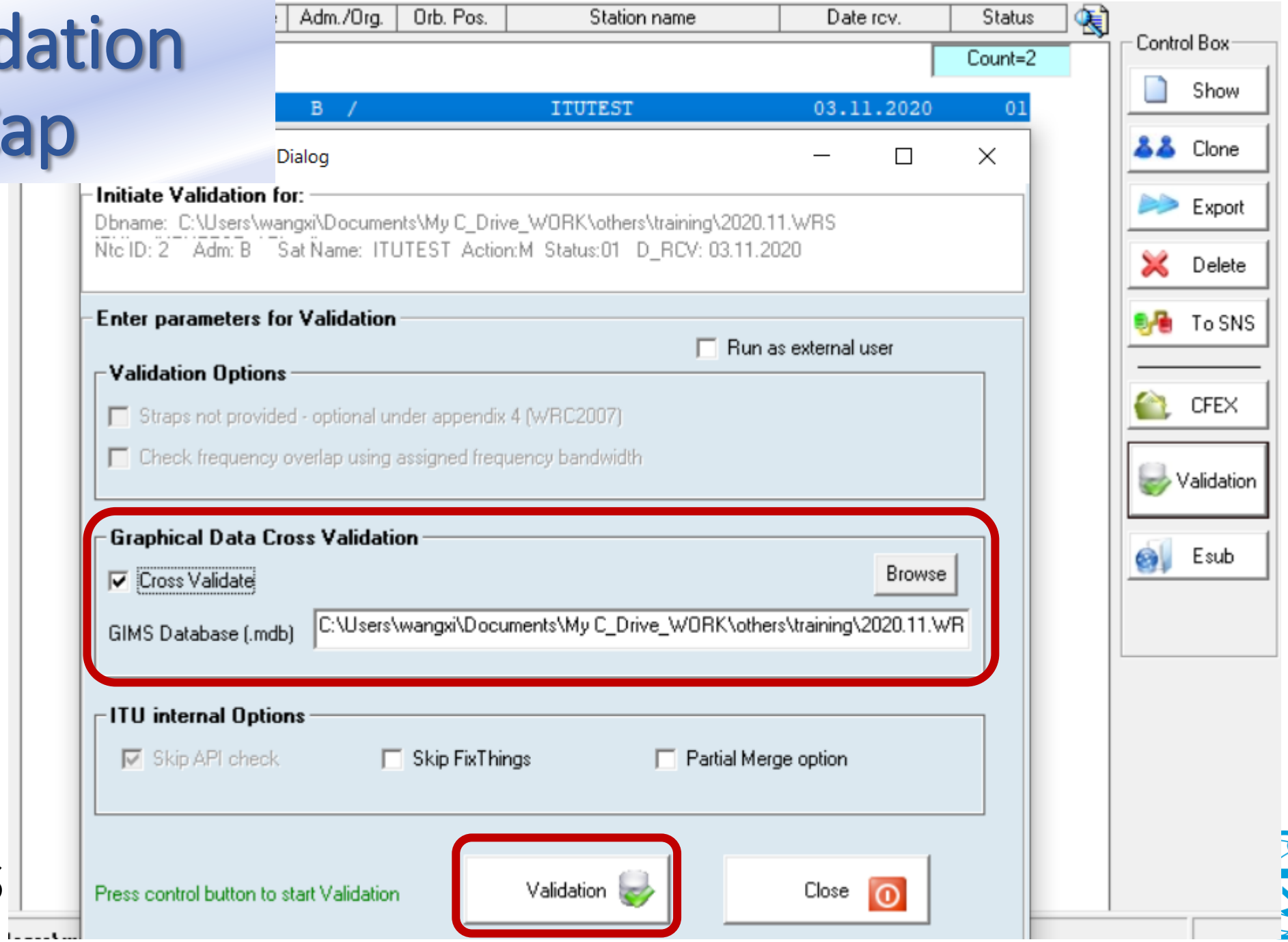
Capture

Cross_Validation via SpaceCap



Run Validation via SpaceCap

Cross_Validation via SpaceCap



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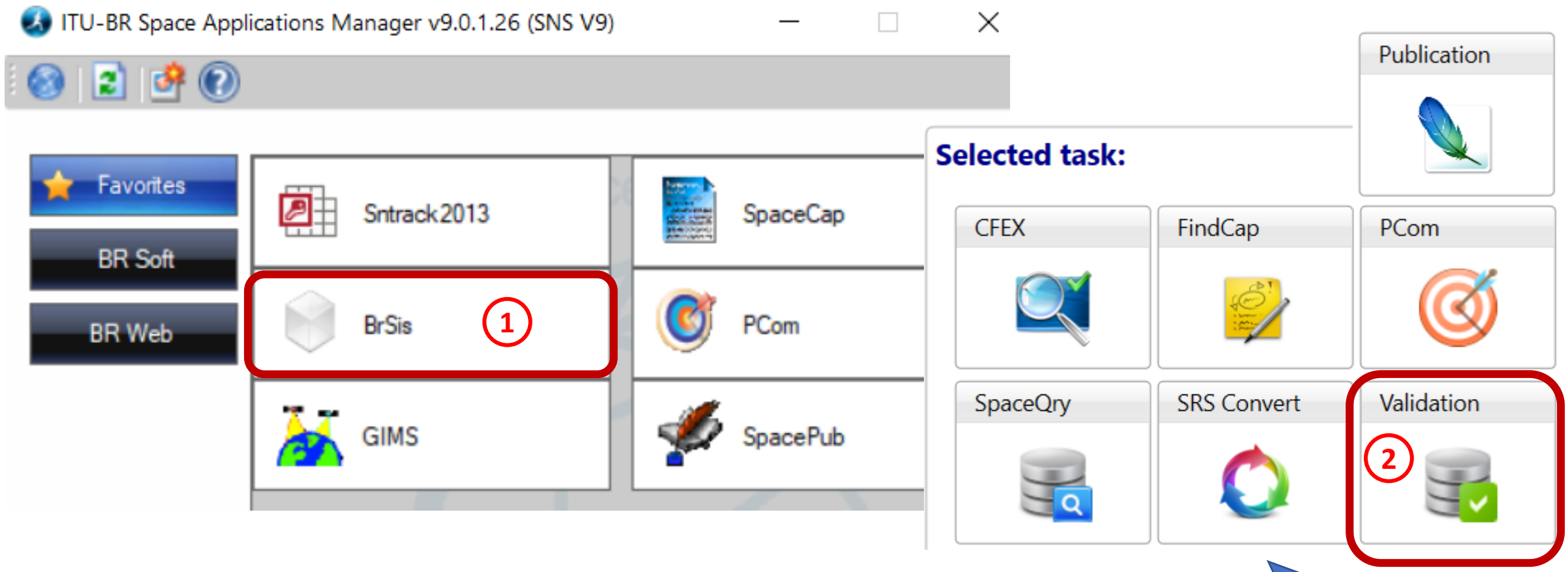
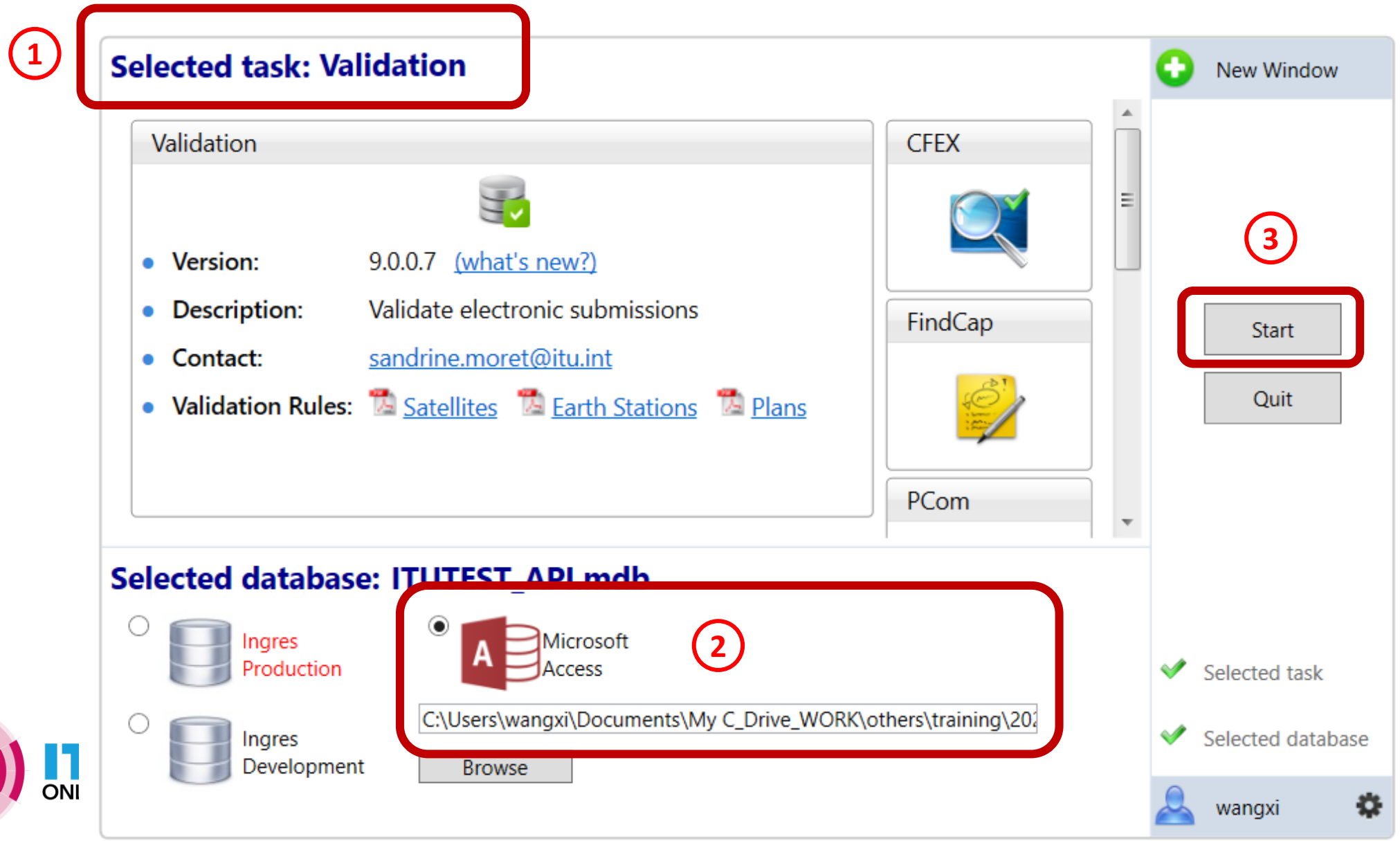
BRSIS Validation



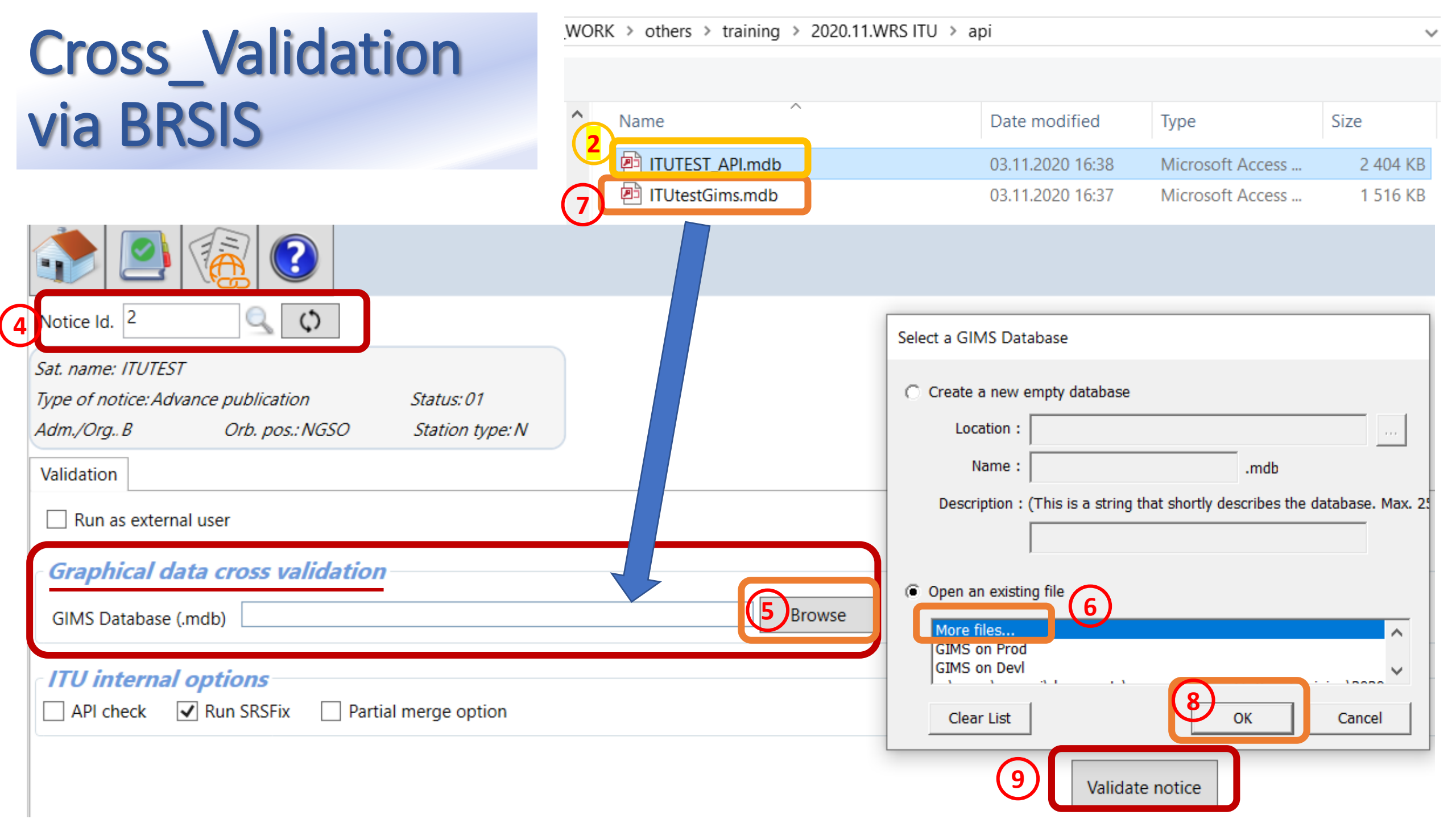
Run Validation via BRSIS

Validation

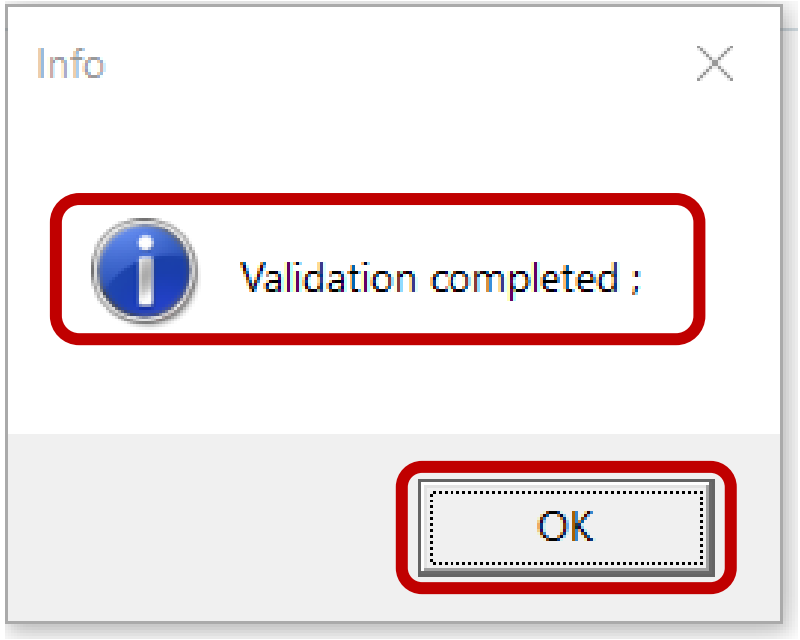
Space Information System (SNS v9)



Cross_Validation via BRSIS



Check Cross Validation Report



- Make sure that **validation completed**
- Make sure there is **no fatal error**
- If there is, fix before submitting
- Seek other's support to fix further
- If really can not fix, ask your administration to explain in the cover letter or notes for submission

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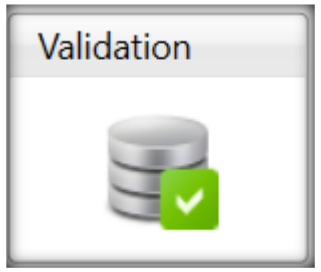
To sum up:

-- Capture both notice database and diagram/Gims database
-- Run Cross Validation

Appendix 4

Notice Database

BR SIS



Cross validation
Without fatal erros

Diagram Database

Use the latest BR software V9.0

Check completeness and **correctness**
to **establish a formal date of receipt**

CR/464 only GIMS mdb format
shall be receivable under **RES 55** (WRC-19).

Reply to the Bureau for clarification

- Administrations sometimes need to send revised mdb files
- To avoid these being treated as a modification with a new date of receipt, do not upload them like a new submission
- Please submit in e-Submissions system using "**others**" category, and attach a letter to explain that it is a reply to the Bureau's enquiry

  https://www.itu.int/ITU-R/go/space-submission
- It is also possible to send the replies by e-mail to the **BRmail@itu.int**
- As from 23 October 2019, the **e-Communications** system enable exchange of correspondence and other information between Administrations and the Bureau, as well as between Administrations (see CR/447, 450)

  https://www.itu.int/ITU-R/go/space-communications

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- **ITU-R Recommendations**
  http://www.itu.int/publ/R-REC/
- **ITU-R Reports**
  https://www.itu.int/pub/R-REP/
- **ITU-R CR CIR**
  https://www.itu.int/md/R00-CR-CIR/en

- **WRC-19 Final Acts**
  https://www.itu.int/en/mediacentre/Pages/CM01-2020-WRC19-Final-Acts.aspx

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  - https://www.itu.int/ITU-R/space/snl/index.html
- **SNS online** - *TIES account required, need to be an ITU member (member state, ITU-R sector member, associate or academia)*
  - https://www.itu.int/sns/
- **BR Space Service Support websites**
  - https://www.itu.int/en/ITU-R/space
  - *How to capture diagrams in Gims as images:* https://www.itu.int/ITU-R/go/space-AdditionalDataUnderAP4/en
  - *Small satellites:* https://www.itu.int/en/ITU-R/space/Pages/supportsmallsat.aspx

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- **Handbook for earth exploration satellite service**

https://www.itu.int/en/publications/ITU-R/pages/publications.aspx?parent=R-HDB-56-2011&media=electronic

- **Handbook for meteorological-satellite service**

https://www.itu.int/en/publications/ITU-R/Pages/publications.aspx?lang=en&media=electronic&parent=R-HDB-45-2017

- **Handbook for space research service**

https://www.itu.int/en/publications/ITU-R/pages/publications.aspx?parent=R-HDB-43-2013&media=electronic

Thank you!

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Questions to BRmail@itu.int or Xiuqi.Wang@itu.int