# Cost of Providing Roaming Wholesale Services

*Overview of comments to the First Consultation on the Model*

April 2024

# Introduction

- **Engagement**: Axon Partners Group Consulting (hereinafter, 'Axon') has been commissioned the study "*Cost of Providing Roaming Wholesale Services – CNECT/2022/OP/0065*" (the 'Project') by the European Commission (hereinafter, 'EC').

- **Objective of the study**: Estimate the cost of providing wholesale roaming services and wholesale voice call termination by mobile network operators in each EU/EEA country, needed for the Roaming review planned for 2025 as well as for any other further review where termination costs are relevant (i.e., future update of the Euro Rate for mobile termination).

- **Purpose of this document:** Evaluate the comments received from stakeholders during the first round of public consultation regarding the new cost model.

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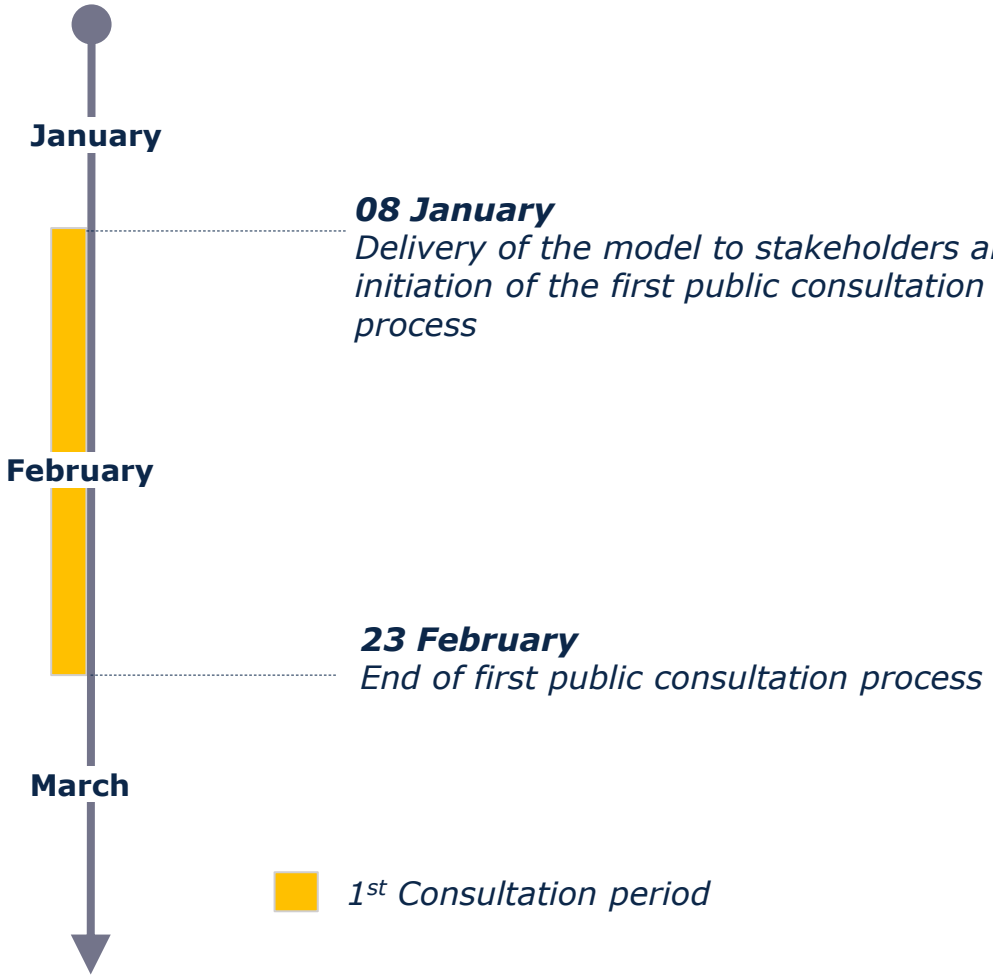
# Contents

# Stakeholders were given 7 weeks to review and provide their insights on the updated model as part of the first consultation process




- The cost model and its supporting documentation were shared with stakeholders on 8 January 2024.
- The 1st consultation period took place between 8 January 2024 and 23 February 2024, giving stakeholders 7 weeks to submit their feedback.
- As part of this process, stakeholders have provided their comments on:
  - **Methodology aspects** updated in the model;
  - **Inputs** introduced in the model;
  - **Outcomes** of the model.
- A 2nd consultation period will take place between April and May, with a duration of 5 weeks.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# Some quick facts about the outcomes of the 1st consultation round on the model…

**19** countries have participated of this process

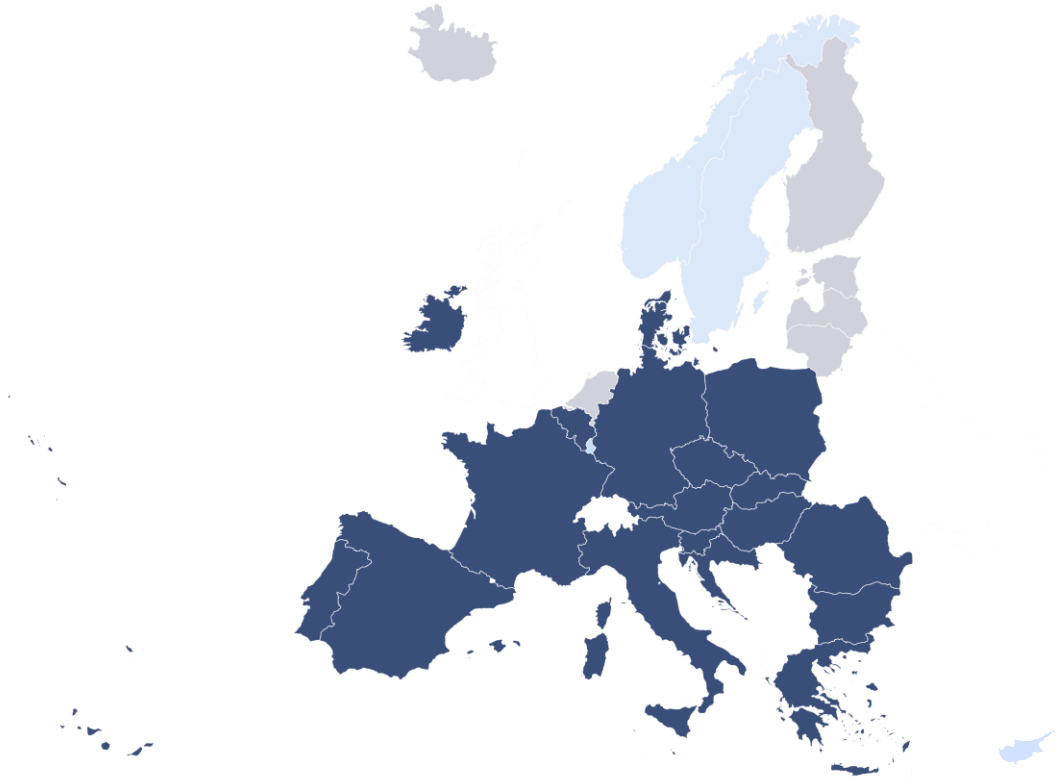
**51** different stakeholders have provided feedback

**593** responses have been received from stakeholders

**79%** of the responses were issued by operators

# A total of 19 EU/EEA countries have provided their feedback during the first consultation on the model

## Participation of the 30 EU/EEA countries



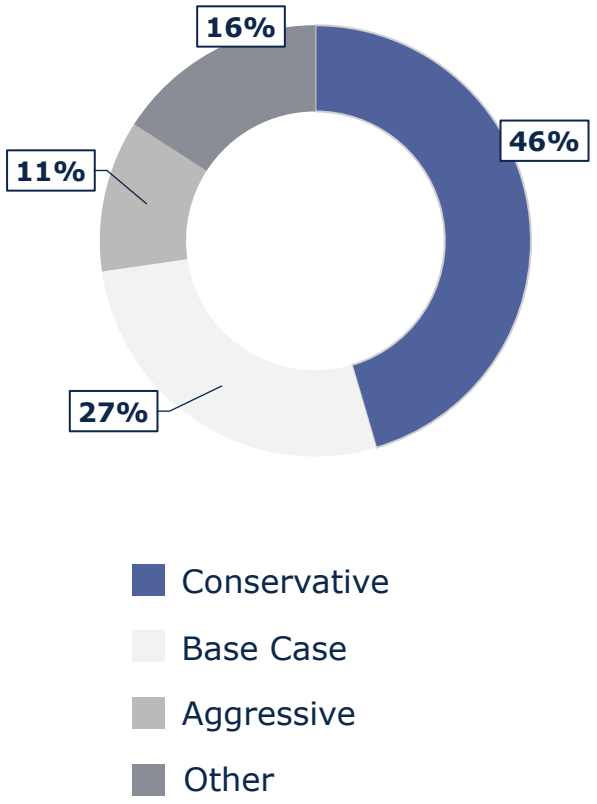
- Participating countries in the study
- Participating countries in the study without specific feedback in the consultation
- Non-participating countries

# Stakeholders were requested to provide their feedback on several topics, which may be classified in 6 main groups

- Demand scenario
- Inputs
- Incorporation of 5G
- Separation of M2M services
- Outputs
- Transit charges

# Demand scenario
## Stakeholders have shown their preference for the Conservative Scenario

**Preferred demand scenario**




**Summary of main feedback received**

**Conservative**

- Data volume growth is not as substantial as it used to be in the past (growth rates tend to decline).
- The EC's intention to update the model every few years minimizes any potential disadvantage related to the adoption of the conservative scenario.

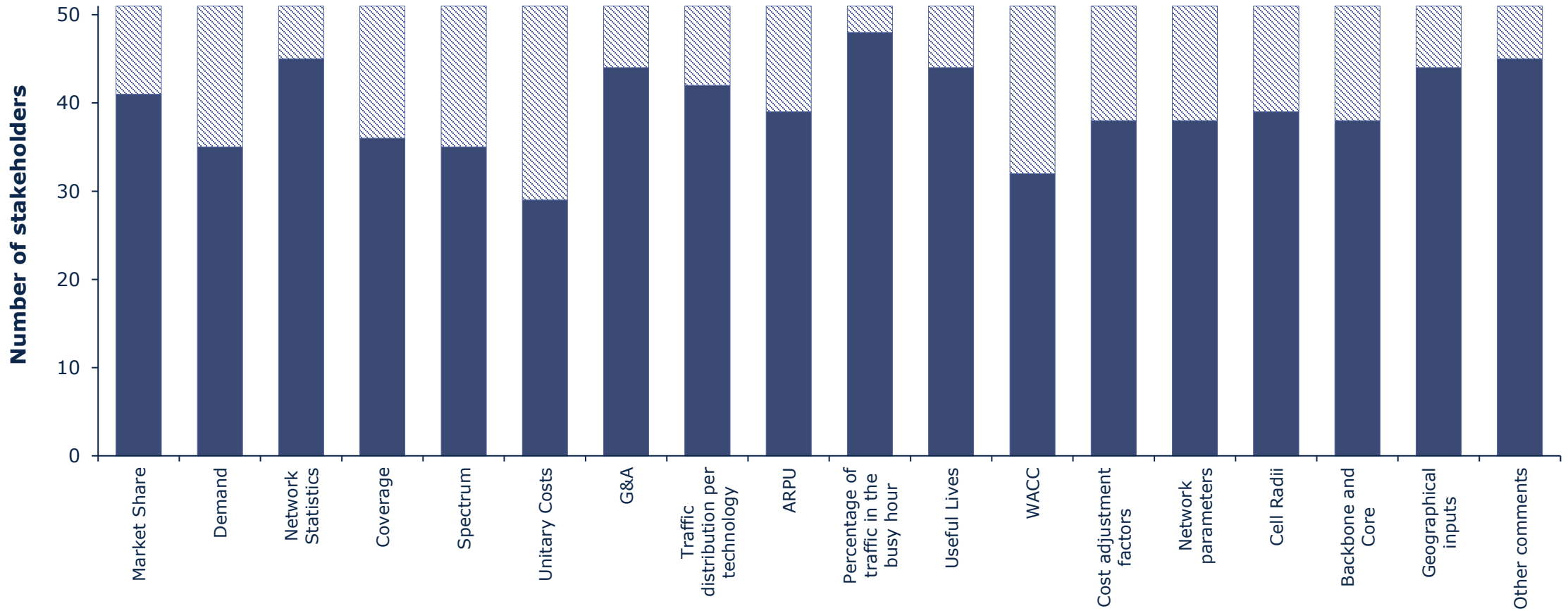
**Base Case**

- Considering that this scenario is mostly based on the historical growth rates of data volumes, there is no reason (nor available information) that justifies a deviation from this option.

**Aggressive**

- The development of 5G will lead to a high increase of data volumes consumed by subscribers.
- Although the growth in mobile data volumes seems to be slowing down, several industry experts still forecast more aggressive traffic growths in the future.

# Inputs
## A high level of acceptance has been observed regarding the various model's inputs



# Inputs

## The received feedback from stakeholders can be classified in 4 main groups of comments

| Group | Description | EC/Axon's view |
|---|---|---|
| **I.1 Difference between specific-operator *vs* reference-operator figures** | ▸ Some operators have raised comments indicating the existing differences between the figures they provided and those employed in the model. | ▸ The modelled operator is not intended to represent operator-specific characteristics, and instead, it represents an average reference operator[1]. |
| **I.2 Difference between real *vs* anonymised figures** | ▸ Some stakeholders indicate certain differences between the figures submitted during the data collection process and those finally used in the model. | ▸ Such differences can be found in the non-confidential version of the model. As explained in section '2. The consultation process' of the 'Consultation Document', these figures had been anonymised (i.e., they didn't correspond to the real figures) |
| **I.3 Dismissing the approach used to derive the model's inputs** | ▸ Several doubts or comments have been raised by stakeholders regarding the definition of inputs within the model. | ▸ The approach for the definition of inputs is comprehensively described in the 'Methodological Approach document'. We invite stakeholders to carefully read this documentation for a complete understanding of the approach used in the definition of inputs. |
| **I.4 Suggestions of alternative figures** | ▸ A number of stakeholders have suggested alternative figures to those employed in the model, which should better represent their market realities. | ▸ These cases have been carefully evaluated by EC/Axon, leading, when considered appropriate, to updates in the model's inputs of each specific country. |

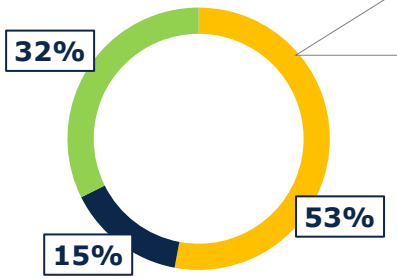
[1] As defined in the Methodology, the modelled operator in each country is based on the concept of "Hypothetical Efficient Operator". This implies that employed inputs are intended to represent an average reference operator in the mobile market of the analysed country. For such purpose, model's inputs are commonly derived by means of averages from the various operators in that country, or alternatively, from EU/EEA averages (when inputs should not fluctuate significantly among countries). Complete details about the approach adopted for each input are included in the Methodological Approach document.

# Incorporation of 5G

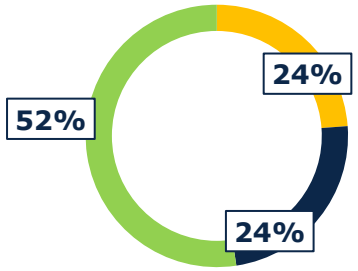
While various comments have been received regarding the 5G incorporation, no one of them would justify modifications to the adopted implementation

## Expressed Position

Before removing duplicate comments from the same telecom groups[1]




After removing duplicate comments from the same telecom groups[1]




Agreement
Partial agreement
Disagreement

## Main sources of disagreement

**32%**. A first large telecom group expressed that i) they miss different 5G network elements, ii) the assumed spectrum is not available in reality iii) a change of coverage to 100% generally leads to limited changes in results.

**32%**. A second large telecom group stated that the model often assumes a decrease in access sites when traffic is shifted towards 5G.

**21%**. A third large telecom group stated that the impact in cost/investment of the 5G inclusion should not be overestimated *(no evidence is provided by this group)*.

**16%**. Other comments

## EC/Axon's view

- i) The stakeholder does not mention which 5G elements are missing ii) spectrum inputs are derived from the data informed by each country[2] iii) this is explained as 4G and 5G coverage are already at very high levels[3].
- Please refer to next slide. Inputs show that operators are in favour of conservative demand increases (x1.9), despite 5G is able to handle around 6x times more traffic.
- A *Reconciliation Assessment*[4] was already accomplished to ensure that the cost base of the modelled operator is realistic for each country.
- Please refer to section 2 for the detailed assessment of the rest of the comments.

**Conclusion**

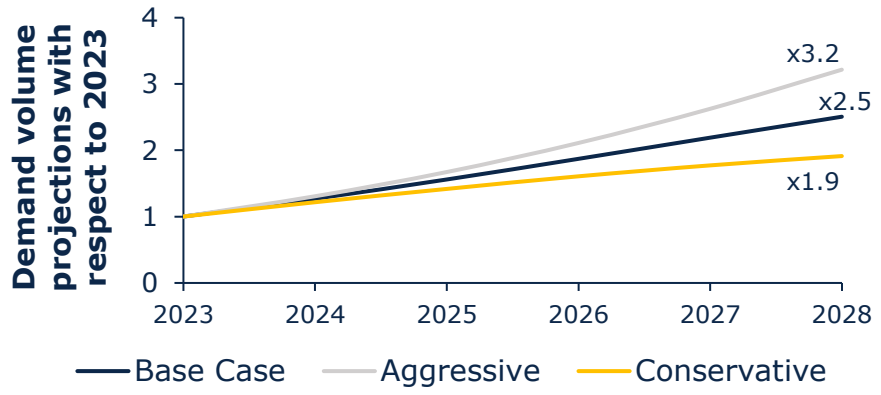
EC/Axon do not identify any relevant arguments that justify the need of modifying the 5G implementation.

[1] We have noticed that some comments provided by operators belonging to one and the same telecom commercial groups operating in the EU/EEA region present exactly the same content in their argument (copy and paste). Hence, a second chart is displayed after removing the duplicities introduced by the repetitive feedback of these telecom commercial groups.
[2] In this high-level comment, the stakeholder does not even submit any particular example of spectrum band which is incorrectly assumed.
[3] The average EU/EEA 5G coverage in the year 2023 was already around 80%, and it is expected to reach levels of around 95% at the end of the modelled period. The average EU/EEA 4G coverage in the year 2023 was already above 99%, entailing that virtually the whole population already benefits from 4G coverage.
[4] Please refer to the exercise performed by EC/Axon during the model's update, as described in section '5.2.1' of the 'Methodological Approach document', for further details.

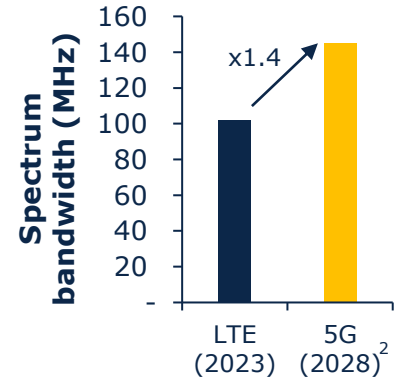
# Incorporation of 5G

## The decrease in the number of access sites is justified in light of the expected demand growths for next years

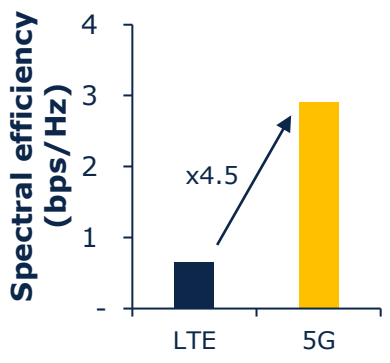
**EU/EEA[1] Demand evolution (2023: Base =1)**




**EU/EEA[1] Spectrum ev.**




**Spectral efficiency**




- On EU/EEA average, demand projections are expected to multiply the data traffic volumes by x1.9, x2.5 and x3.2, between the year 2023 and 2028[3], respectively for the three available scenarios: conservative, base case and aggressive.
- While in 2023 the dominant technology is 4G (handling 85% of the data traffic in that year, as an EU/EEA average), it is assumed that in 2028, the dominant technology will be the 5G.
- The 5G introduces two major improvements in performance related to:
  - Higher spectrum bandwidths (MHz) when compared with 4G, as a result of the more recent spectrum auctions as well as the re-farming from 2G/3G, by x1.4, as an EU/EEA average.
  - Higher spectral efficiencies, by x4.5.
- Broadly speaking, the combination of both effects implies that a 5G site should be able to handle around 6x more traffic than a 4G site.
- Considering the magnitude of data volumes increases assumed (all below 6x, and recognizing that stakeholders are even showing their preference for the conservative scenario with a x1.9), it is justified that the model estimates that, in certain countries, 5G networks would require less sites than 4G networks.

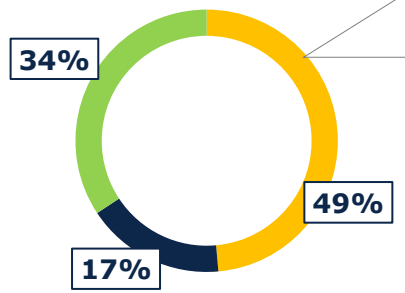
[1] EU/EEA average.
[2] The bandwidth of the spectrum band 26GHz has been excluded, as this band is intended to be mostly used for small-cells, which are disabled in the model.
[3] The year 2028 is assumed as reference year for this comparison, to avoid any misrepresentation that the introduction of 6G networks could imply. To this respect, it should be noted that the model does not consider 6G networks, which are expected to be deployed during the decade of 2030.

# Separation of M2M services

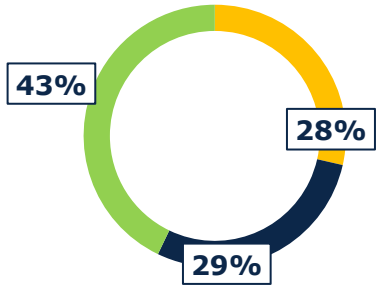
In light of the feedback received, we have included a new scenario in the model submitted to the second public consultation, allowing the allocation of costs based on customers

## Expressed Position

Before removing duplicate comments from the same telecom groups[1]




After removing duplicate comments from the same telecom groups[1]




Agreement
Partial agreement
Disagreement

## Main sources of disagreement

**44%.** A first large telecom group mentioned that i) the adopted approach does not reflect the broad variety of M2M use cases ii) costs should not only be allocated on a traffic-basis but also on a customer-basis iii) the definition of M2M services should be standardized before any regulation is imposed.

**38%.** A second large telecom group stated that fixed costs should be allocated relying on a customer-basis instead on a traffic-basis approach.

**19%.** Other comments. However, a few stakeholders indicate the impossibility of distinguishing M2M and traditional traffic.

## EC/Axon's view

- i) This topic was already treated during Workshop 1, where EC/Axon expressed that M2M use cases are not relevant from a network (and therefore costing) perspective ii) Even if an allocation based on traffic is the preferred method[2], we have also implemented a new allocation based on customers. This has been introduced at the request of the EC who, in light of the received feedback, wishes to have results under both approaches for informative purposes. iii) The model's purpose is not to standardize the definition of the M2M service nor to impose any form of regulation, but rather to informatively assess the cost of the service.
- Regarding the comment from the second large telecom group, please refer to point ii) above.
- Regarding other comments, please refer to point iii) above.

**Conclusion**

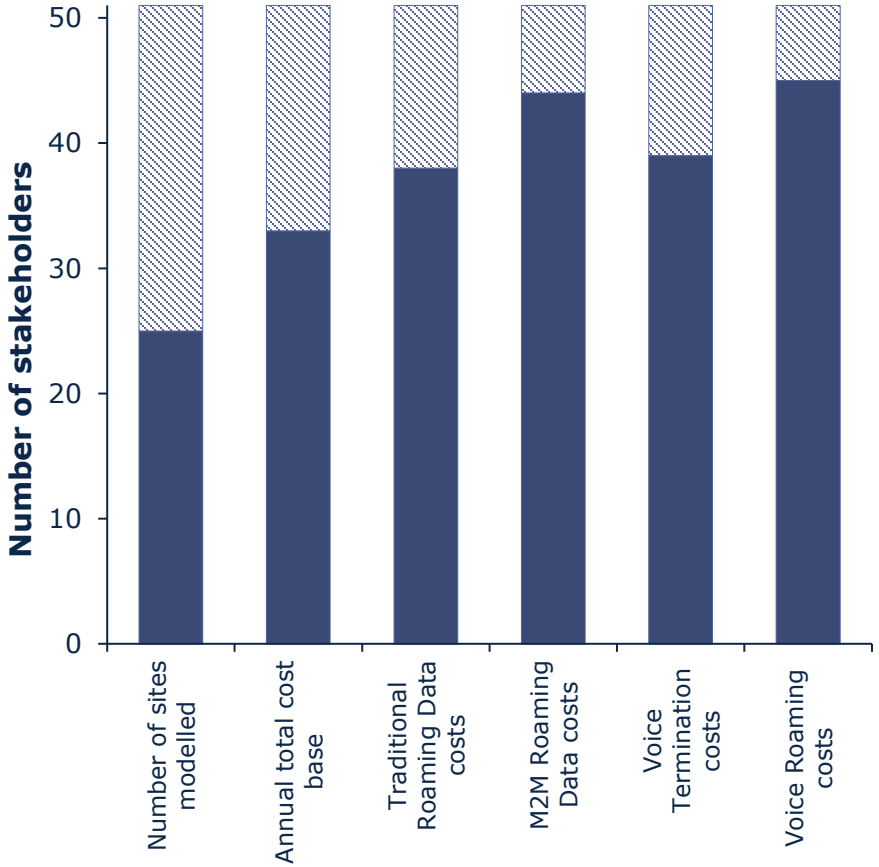
The EC/Axon team has included a new scenario in the model submitted to the second public consultation, allowing the allocation of costs based on customers (see new sections 2.6 and 4.2.1. of the Methodological Approach document for further details).

[1] We have noticed that some comments provided by operators belonging to one and the same telecom commercial groups operating in the EU/EEA region present exactly the same content in their argument (copy and paste). Hence, a second chart is displayed after removing the duplicities introduced by the repetitive feedback of these telecom commercial groups.
[2] Main reasons are: i) The suggested alternative based on customers implies a paradigm shift in the approach historically employed for the cost allocation in bottom-up models worldwide (including those of the EC), hence, also altering the manner in which costs for traditional services have been historically recognized when setting wholesale prices. ii) No clear causal relationship exists between the number of customers and their costs, as demonstrated by the received inputs, and as explained in section '4.2. Separation of M2M services' of the 'Methodological Approach document' iii) Any cost allocation based on customers may have relevant subjective implications (e.g., should it be considered equivalent the cost or the expected revenue of a M2M vs a traditional customer?)

# Outputs

## The received feedback from stakeholders can be classified in 6 main categories comments

### Expressed Position




Participant stakeholders in agreement (agreement it assumed when no feedback has been provided for the analysed output)

### Most relevant comments

**Number of modelled sites**

- The number of sites calculated decreases at the end of the modelled period.
- The number of sites calculated does not represent the reality of the operator.

**Annual cost base and services' results**

- Stakeholders claim that, given their disagreement with the model's inputs, this is translated into a disagreement with the produced results.
- Other various comments show the stakeholders' misconception between the results produced by the model and the applicable wholesale prices established by the EC.

### EC/Axon's view

**Number of modelled sites**

- Please refer to a previous slide particularly reserved for this topic.
- The modelled operator represents an average reference operator.

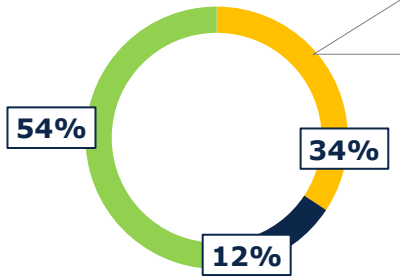
**Annual cost base and services' results**

- Feedback regarding inputs has been carefully assessed, including any necessary adjustment. Please refer to section 2 for the detailed assessment.
- The utilization of the model's results for the setting of wholesale prices will be accomplished in a subsequent legislative process, to be carried out by the EC.

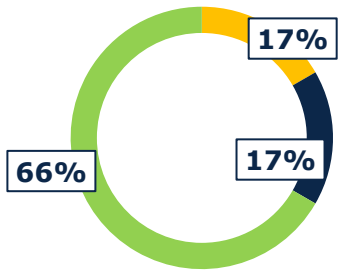
# Transit charges
## A reasonable level of acceptance is observed for the proposed transit charges

| Expressed Position | Main sources of disagreement | EC/Axon's view |
|---|---|---|

Before removing duplicate comments from the same telecom groups[1]




After removing duplicate comments from the same telecom groups[1]




Agreement
Partial agreement
Disagreement

**50%**. No comment provided.

**33%**. Proposed transit charges are low.

**17%**. Proposed transit charges are high.

- We appreciate the stakeholders' comments. However, the consulted ranges of transit charges represent the upper and lower averages of the data collected from the stakeholders themselves, and the same data collection exercise was entirely conducted in the previous project SMART 2017/0091. Additionally, the consulted averages include outliers, that is, stakeholders who have reported either very high or very low charges.

**Conclusion**

Based on the comments received and the percentage of agreement, the EC/Axon team has set the data transit charge at 0.095 EUR/GB and the voice transit charge at 0.4 EUR cents per minute in the second public consultation.

[1] We have noticed that some comments provided by operators belonging to one and the same telecom commercial groups operating in the EU/EEA region present exactly the same content in their argument (copy and paste). Hence, a second chart is displayed after removing the duplicities introduced by the repetitive feedback of these telecom commercial groups.

# Contents

# **Question 0:** Illustrative Example

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| 1 | *[Description of the comment 1]* | | *Description of EC/Axon's view on comment 1]* |
| 2 | *[Description of the comment 2]* | | *Description of EC/Axon's view on comment 2]* |
| 3 | *[Country] [Description of the comment ...* | | *Description of EC/Axon's view on comment 3]* |



EC/Axon's views on each relevant comments

Numbering of the comments

Excerpt on the most relevant comments received on the titles' question (generally focused on disagreements or partial agreements)

Country-specific comments are prefaced with the country name

# of times a comment has been received*

A light orange background is used for comments that imply an update within the model

- Comment from <5 stakeholders
- Comment from 5-15 stakeholders
- Comment from >15 stakeholders

*Responses provided by operators belonging to the same commercial telecom group, but with exactly the same content in their argument (copy and paste) have been considered only once in the counting.

# **Question 1:** What domestic data demand forecast scenario (Base Case, Aggressive and Conservative) do you expect to better represent the traffic evolution in your country? (1/3)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *1.1* | Stakeholders opting for the **Conservative scenario** rely on the following main arguments:<br>- It better represents stakeholders' predictions or market trends<br>- Data volume growth is not as substantial as it used to be in the past (growth rates tend to decline)<br>- The intention of the Commission to run the model every few years to adjust the wholesale caps minimizes any disadvantage related to the adoption of a conservative traffic scenario and at the same time safeguards roaming providers investments performed in a critical moment for the whole sector<br>- Higher demands could result in too optimistic results in terms of costs efficiency.<br>- Network capacity cannot grow in line with potential traffic demand, due to non-availability of suitable spectrum bands and appropriate site locations for grid densification.<br>- Infinitely increasing traffic growth is not desired as this would sharply increase energy consumption, what is in conflict with climate neutrality goals.<br>- It better accounts for the geopolitical current situation, which makes unpredictable the usage of roaming services from the mass market at least for the next few years. |  | We observe that different arguments are raised by stakeholders to defend each of the alternatives presented (see also next slide).<br><br>The positions provided by stakeholders to this question clearly favour the alternatives of Conservative and Base Cases. |
| *1.2* | Stakeholders opting for the **Base Case scenario** rely on the following main arguments:<br>- It better represents stakeholders' predictions or market trends<br>- Given that growth rates are mostly based on historical data, it is the most appropriate approach.<br>- There is no available information that would justify not sticking to the estimates based on the historical growth rates.<br>- No significant changes in users' behaviour are expected in the short/mid-term. |  | |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# **Question 1:** What domestic data demand forecast scenario (Base Case, Aggressive and Conservative) do you expect to better represent the traffic evolution in your country? (2/3)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *1.3* | Stakeholders opting for the **Aggressive scenario** rely on the following main arguments:<br>- It better represents stakeholders' predictions or market trends<br>- The development of 5G will lead to a high increase of data volumes consumed by subscribers.<br>- Several industry experts still forecast more aggressive traffic growths in the future.<br>- Innovative services justify this option, such as improved video resolution (HD, 4K and 8K), higher consumption of HD live sports, short-form video on social networks, "metaversization" of use cases, augmented reality (AR), virtual reality (VR), artificial intelligence (AI), etc. | 🟢 | We observe that different arguments are raised by stakeholders to defend each of the alternatives presented (see also previous slide).<br>The positions provided by stakeholders to this question clearly favour the alternatives of Conservative and Base Cases. |
| *1.4* | A few stakeholders even propose more aggressive options than the three scenarios assumed in the model, by relying on certain studies from international institutions such as GSMA or Ericsson. | 🟢 | |
| *1.5* | The forecast of the traffic must be done per Member State, with assumptions based on local circumstances. | 🟢 | We note that, as described in section '3.1.2. Demand' of the Methodological Approach document, even if a homogenous approach has been employed for forecasting demand volumes, such procedure already takes into account the specificities of each Member State (e.g. in terms of historical data growth observed in such Member State, when applicable) |
| *1.6* | Demand figures present sharp fluctuations. | 🟢 | Please refer to general comment I.2. of the Executive Summary for further details. |
| *1.7* | The Beta value for base-reference scenario is 82.6%. However, we do not know where this value comes from. Moreover, there is no information on how the 70% value (conservative case) and the 90% value (aggressive case) have been identified. | 🟢 | As described in section '3.1.2. Demand' of the Methodological Approach document, the 82.26% is the "Average Change in YoY growth rate" shown in Exhibit 3.2., where information in terms of "Change in YoY growth rate" has been derived from the previous Exhibit 3.1. Please refer to the document for further details. Regarding the 70% and 90% parameters, these do not arise from any specific calculations, since they are basically used to introduce a deviation over the Base Case (with a Beta of 82.26%), downwards for the Conservative Case (70%) and upwards for the Aggressive Case (90%). |

🟢 Comment from <5 stakeholders
🟡 Comment from 5-15 stakeholders
🔴 Comment from >15 stakeholders

# **Question 1:** What domestic data demand forecast scenario (Base Case, Aggressive and Conservative) do you expect to better represent the traffic evolution in your country? (3/3)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *1.8* | Differences between the results of the three different scenarios are small. |  | This is explained as variations between demand scenarios cannot be considered relevant either. In other words, if the demand assumptions used to create the different scenarios are not markedly distinct, then it is expected that the outcomes derived from these scenarios will not show significant differences either. |
| *1.9* | [Denmark] According to the national telecom statistic "Telestatistikken" we have not seen any decline in mobile data traffic growth rate in the past years. Here, the typical yearly increase is +30%. We do therefore not see any tendency of declining data traffic which is Axon's preconditions in all three of the implemented scenarios. Axon should develop a scenario with non-declining growth rate. |  | Despite the stakeholder's comment, after having assessed the mentioned source "Telestatistikken", we observe that yearly growths for data services have been as follows: 21% for 2022, 26% for 2021 and 36% for 2020. Thus, contrary to the stakeholder's statement, it can be observed that yearly growths are actually decreasing over the years, in alignment with the assumptions adopted in the model. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

**Question 2:** Do you agree with the validation, treatment and definition of the model's inputs?

1. Market Share
2. Demand
3. Network Statistics
4. Coverage
5. Spectrum
6. Unitary Costs
7. General and Administration Expenses (G&A)
8. Traffic distribution per technology
9. ARPU
10. Percentage of traffic in the busy hour
11. Useful Lives
12. WACC
13. Other inputs

# 1. Market Share
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.1.1* | The model should consider the lowest market share for the reference operator. Otherwise, certain market player's costs are underestimated. | | While we appreciate the stakeholder's comment, we do not identify any solid reason to deviate from an approach which is consistent with:<br>- The approach historically used by EU/EEA NRAs in their development of mobile LRIC cost models for the setting of the MTR.<br>- The approach previously adopted in the EC's project SMART 2017/0091.<br>- Guidelines included in both the EC's 2009 Recommendation on MTR/FTR and the EECC. |
| *2.1.2* | [Germany] Three stakeholders suggest that the model should consider a market share of 25% instead of 33%. Reason is that a 4th MNO has launched its network recently, with its own spectrum. | | Based on the received feedback, we have considered it appropriate to update the market share of the reference operator in the model of Germany, from 33% to 25%. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 2. Demand (1/3)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.2.1* | Compared with the version of the last model (from SMART 2017/0091), demand figures notably differ, what seems unrealistic. | | These differences are explained as figures for the year 2022 in the previous model were estimated by means of forecasts (not being available when the project was initiated in 2017), while in the new model, such figures are based on real data corresponding to such year 2022. |
| *2.2.2* | In different countries, we have observed that the demand is too high. | | The demand input used in the model is aligned with the new figures received from all countries during the data collection process. The lack of evidence from the operator providing this comment prevents further analysis. |
| *2.2.3* | Demand forecasts should be performed differentiating between human and non-human SIMs (M2M), given the different usage pattern between them. | | As outlined in section '4.2. Separation of M2M services' of the Methodological Approach document, the information received during the data collection process for differentiating traffic between M2M services and traditional services presented several limitations. This is the reason why we opted for unified demand forecasts. |
| *2.2.4* | [Poland] The total number of SIM cards and the Data volume for 2022 differ when compared with the corresponding NRA market report. | | i) In the case of SIM cards, we have adjusted the total number of subscribers in the model for Poland in the year 2022, in order to align it with the Polish market report in such year 2022 (59.3M); ii) In the case of the data volume, the Polish NRA has clarified that the reason of the observed difference is the fact that a certain set of services (e.g., data cards/keys/modems) are not considered in the NRA market report. Hence, no modification is needed in this case. |
| *2.2.5* | [Hungary] The actual number of SIM cards is higher than the value used in the model. Additionally, the future trend of SIM cards have 3 peaks. | | We clarify that situations mentioned by this operator are related to the anonymization process introduced in the version shared with operators (NON-CONFIDENTIAL). Please refer to general comment I.2. of the Executive Summary for further details. |
| *2.2.6* | [Germany] We expect an annual growth rate in mobile data traffic consumption per user of at least 20% in the coming years, which is a higher growth rate than that used in the base case of the model. | | Data growth rates in the model for Germany have been established based on the projections directly reported by this country during the data collection process. Even if these projections would logically vary depending on each individual operator, reported projections by German as a whole, which consider simultaneously all German market players, show that this country expects growth rates below 20%. |
| *2.2.7* | [Portugal] One operator has indicated various presumably strange evolutions for the demand data traffics, between the years 2024 and 2025. | | We clarify that situations observed by this operator are related to the anonymization process introduced in the version shared with operators (NON-CONFIDENTIAL). Please refer to general comment I.2. of the Executive Summary for further details. |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# 2. Demand (2/3)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.2.8* | [Greece] Data traffic growth in first four years (period 2022 to 2026) is 37% on average, while next four years (period 2026 to 2030) is 14% on average. This is significantly low and lower when contrasted with the rule of base growth assumption (80% of last year growth). | | We clarify that the situation indicated by this operator is related to two effects:<br>- The rule of the 80% applies to the data consumption per user (not to the total annual consumption). This aspect, linked together with the decrease informed by Greece for the number of expected subscribers over the future years, justifies the behavior observed in data traffic assumed in the model.<br>- It is also worth mentioning that the operator is assessing a version of the model (the NON-CONFIDENTIAL one) with anonymized figures. Please refer to general comment I.2. of the Executive Summary for further details. |
| *2.2.9* | [Denmark] It does not seem that the annual growth in Domestic Data Traffic as noted under "DEMAND&REVENUE TRENDS" in the Data Request Form is correct implemented in the model. | | As explained in section '3.1.2.3. Input validation, treatment and definition – Forecast demand' of the Methodological Approach document, trends presented by Denmark did not pass the validation process as they did not meet the "Criterion A - Accelerating growth trend". Instead, the approach explained in sub section 'Projection of domestic data traffic' was employed as alternative. |
| *2.2.10* | [Denmark] SMS volumes should be revised according to the new updated inputs. | | We have updated the SMS demand volumes in the model of Denmark, to take into account the new information received from this country. |
| *2.2.11* | [Slovakia]: There was missing the recommendation how to treat the traffic from United Kingdom. | | The traffic from United Kingdom should be reflected in the model as Non-EU/EEA, taking into account that, in the first year of the modelled period (2022), United Kingdom was not part of the EU. In any case, we also outline that the consideration of the traffic from United Kingdom as either EU/EEA or Non-EU/EEA has a negligible impact in results. |
| *2.2.12* | [Ireland] The number of subscribers appears out of sync with QKDR data. | | We have updated the number of subscribers in the model of Ireland, to take into account the new information received from this country. |
| *2.2.13* | [Romania] 2022 total market SMS roaming traffic volumes in the model are not in line with actual data provided, and should be revised to reflect national circumstances. | | Following a thorough analysis of the new data and explanations provided by Romania, we have proceeded to adjust the SMS roaming traffic volumes in the model. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 2. Demand (3/3)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.2.14* | [Spain] The three different demand scenarios seem not to be correctly parameterized in the model for the Spanish market. The results obtained for the three scenarios are almost identical. | | We confirm that the fact that Spain has provided data traffic growth trends which have been accepted during the validation process (please refer to section '3.1.2.3. Input validation, treatment and definition – Forecast demand' of the Methodological Approach document) implies that data demand traffic among the different scenarios remains unchanged. As explained in sub section 'Projection of domestic data traffic' under such section 3.1.2.3, the three different demand scenarios are only considered when the projections had to be determined by the EC/Axon team, as these could be subject to a higher degree of uncertainty. However, this was not the case of Spain since, as previously mentioned, the received projections were accepted and employed. |
| *2.2.15* | [Spain] Demand evolution for voice services do not seem to correctly apply the historical annual growths towards future projections. | | We clarify that, as explained in the Methodological Approach document, voice projections are performed at subscriber level (minutes per user), and finally multiplied by the forecasted number of subscribers. That is, projections are not performed with total annual voice volumes. This explains the evolution observed by this stakeholder. |
| *2.2.16* | [Spain] We understand that for the demand in the Spanish case it is necessary to distinguish between domestic demand and roaming demand because the COVID pandemic led to drastic reductions in the number of visitors during the years 2020 and 2021. Therefore, we agree with the figures used for domestic demand but not for roaming. For roaming, the model takes the average annual growth figures for the period 2017-2019 but these figures do not reflect the reality of the Spanish market where double-digit growth in visitor numbers has been achieved in recent months (Official Spanish Statistics) and is expected to continue to grow well in the coming years. Furthermore, the data consumption of a user in 2017-2019 differs from that of a user in 2023 due to the availability of better devices on average and the deployment of 5G, which allows higher data transmission speeds. Therefore, we believe that for the Spanish market in the case of roaming communications, an average between the growth of the years 2017-2019 and that of the years 2022-2023 can be used, which would reflect a better approach to reality. | | After a careful review of the evidence presented by this stakeholder, we have considered it appropriate to update the roamer days forecast, making use of a growth by value of 1.9%, in line with the growth experienced by tourists' arrivals in Spain between the years 2023 and 2019, based on the information from the INE (National Institute of Statistics). Therefore, this assumption considers a higher growth for roaming services than the one initially assumed in the model of Spain.<br><br>On the other hand, regarding the stakeholder's comment about the data consumption per user, we note that the approach implemented for roaming services already considered a higher data consumption in 2023 when compared with that in 2017-2019, which already allows capturing any increase as a result of the 5G technology. Hence, no modification is necessary to this respect. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 3. Network Statistics
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.3.1* | The data in "Source Date" has remained unchanged since 2018, even though the Idle Traffic has been significantly reduced. | | As shown in the model shared with stakeholders, the "Source Date" indicates that the input has been updated based on the new information requested to operators as of September 22, 2023. |
| *2.3.2* | [Romania] One operator indicates that inputs for "Uncompleted calls not taken" are significantly lower than the data provided. | | We note that no information was provided by Romania regarding that input during the data collection process. Hence, an EU/EEA average was used. |
| *2.3.3* | [Croatia] Download percentages are not aligned with the data provided. | | We observe that the employed input completely corresponds with the provided data. Please refer to general comment I.1. of the Executive Summary. |
| *2.3.4* | [Ireland] Uncompleted Call Rate (Blocked Calls) is well in excess of the Licence Requirements for Call Completion Rate. | | We clarify that inputs "Percentage of uncompleted calls over the total (busy) or (not taken)" do not correspond to blocked calls, as indicated by the stakeholder in its comment, but to calls that have not been answered by the receiver for different reasons (e.g., phone disconnected or out of coverage). |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 4. Coverage (1/3)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.4.1* | Assumptions should not fall short of the requirements set in frequency auctions. | | If applicable, any requirement regarding coverage obligations should have already been considered in the coverage input reported by stakeholders when responding to the data collection process, as referred in the data request template. For this reason, we confirm that the cost model is already considering any coverage obligation, if applicable. |
| *2.4.2* | Coverage data provided is not split in geotypes, thus, we would like to know how this split was obtained. | | Please refer to section '3.1.4.3. Input definition' of the Methodological Approach document for the details on the approach followed for the disaggregation of the national coverage information into the various geotypes. |
| *2.4.3* | It would be clearer if within this tab it clearly stated that these coverage figures are for population coverage %. | | Please note that the worksheet description (cell B4) already indicates: *"The **percentage of population covered** in each geotype under each mobile access technologies (by year) is input in this worksheet"* |
| *2.4.4* | [Hungary] One operator indicates population coverage for 5G in the model looks very optimistic both for URBAN ([CONFIDENTIAL]% in year 2023) and SUBURBAN ([CONFIDENTIAL]% in year 2025) geotypes. According to this operator, its rollout plan is more realistic, with the [CONFIDENTIAL]% total population coverage in year 2026. | | Please refer to general comment I.1. of the Executive Summary. |
| *2.4.5* | [Malta] Local MNOs may switch off one of the legacy RAN technologies beyond 2026. | | In cases where no particular shutdown of 2G/3G technologies was informed by the corresponding countries (such as Malta) during the data collection process, it was assumed, by adhering to a conservative approach, that these technologies remain available until the end of the modelled period. Nevertheless, any required shutdown could be considered in future model updates, if finally applicable. |
| *2.4.6* | [Belgium] The coverage rate of 5G in suburban areas will rise from 59% in 2024 to 97% in 2025, which should be supported by further evidence. The rural 5G coverage unexpectedly rises from 0% in 2025 to 89% in 2027. | | 5G coverage inputs used in the model have been derived from the coverage information reported by Belgium in the data collection process. Additionally, please refer to section '3.1.4.3. Input definition' of the Methodological Approach document for the details on the approach followed for the disaggregation of the national coverage information into the various geotypes. |
| *2.4.7* | [Germany] One operator indicates that the coverage for 2G in Germany is at 100%, while the values for 4G/5G are already higher but still need improvement. | | The model has taken into account the coverage information as reported by Germany in the data collection process. Please refer to general comment I.1. of the Executive Summary |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# 4. Coverage (2/3)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.4.8* | [Croatia] The shutdown of 3G networks should be considered in Croatia from the year [CONFIDENTIAL]. | | We observe that no particular shutdown of 3G technologies was informed by Croatia during the data collection process. Considering also that only one operator seems to have the 3G shutdown in its plans (i.e., no comments have been received from other operators in this regard), we have opted for assuming, by adhering to a conservative approach, that the 3G technology remains available for the reference operator until the end of the modelled period. |
| *2.4.9* | [Croatia] It is unrealistic that there will be 100% URBAN and SUBURBAN 5G coverage in 2024. | | Please note that the 5G coverage has been derived from the coverage information as reported by Croatia during the data collection process. Please refer to section '3.1.4.3. Input definition' of the Methodological Approach document for the details on the approach followed for the disaggregation of the national coverage into the geotypes. |
| *2.4.10* | [Romania] 5G coverage is too high. | | Please refer to general comment I.1. of the Executive Summary. |
| *2.4.11* | [Bulgaria] It is not feasible to forecast complete 100% coverage of 5G technology between 2022 and 2028. | | The model shows 100% of 5G coverage only for Urban and Suburban geotypes, but not for Rural. Analysing the overall country-level coverage, the coverage inputs adopted in the model (at geotype level) are aligned the coverage reported by Bulgaria during the data collection process. To this respect, please refer to section '3.1.4.3. Input definition' of the Methodological Approach document for the details on the approach followed for the disaggregation of the national coverage information into the various geotypes. |
| *2.4.12* | [France] The roll out of 5G and population varies a lot depending on the spectrum band. A distinction between 5G coverage in 3.5 GHz and other frequency bands should be made. | | In the model, the selection of the spectrum bands utilized by each access technology (and geotype) is directly performed in the dimensioning (block 6) based on the optimization algorithms. |
| *2.4.13* | [France] As regard 2G and 3G coverage, as announced by operators, 2G will be switched off between [CONFIDENTIAL] and 3G between [CONFIDENTIAL] . | | We note that the cost model for France already considers the shutdown of 2G and 3G networks, in alignment with the coverage information provided by France during the data collection process. This is reflected by means of the coverage input, in years from which the coverage is assumed to be zero. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 4. Coverage (3/3)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.4.14* | [France] The coverage rate of 5G in suburban areas will rise from [CONFIDENTIAL]% in 2022 to [CONFIDENTIAL]% in 2023, which should be supported by further evidence. Also, the rural 5G coverage unexpectedly rises from [CONFIDENTIAL]% in 2023 to [CONFIDENTIAL]% in 2024. There are no insights on the adoption of voice over 5G and the surprising decline of VoLTE as of 2023. |  | 5G coverage inputs have been derived from the coverage information reported by France and Slovakia in the data collection process. Please refer to section '3.1.4.3. Input definition' of the Methodological Approach document for the details on the approach followed for the disaggregation of the national coverage into the geotypes. Regarding the point about voice traffic, we remark that the decline in VoLTE traffic does not take place in the model until the year 2028 (not 2023, as indicated by the operator), as it can be seen in worksheet '1I INP TECHNOLOGY DIS'. Please refer to section '3.1.8.3. Input definition' for details on the approach followed for determining traffic distribution per technology. |
| *2.4.15* | [Slovakia] The coverage rate of 5G in suburban areas will rise from [CONFIDENTIAL]% in 2022 to [CONFIDENTIAL]% in 2023, which should be supported by further evidence. Also, the rural 5G coverage unexpectedly rises from [CONFIDENTIAL]% in 2023 to [CONFIDENTIAL]% in 2024. There are no insights on the adoption of voice over 5G and the surprising decline of VoLTE as of 2023. |  | |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# 5. Spectrum (1/2)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.5.1* | [Malta]<br>- There may also be market interest for the 26,000 MHz band by some operators beyond the year [CONFIDENTIAL].<br>- The cost model should better reflect the input provided by local MNOs for the spectrum allocations and use per technology.<br>- It is not sufficiently clear what assumptions were taken on Dynamic Spectrum Sharing (DSS). | | - The 26,000 MHz band has been incorporated from year [CONFIDENTIAL], as suggested based on the new indications received from Malta.<br>- Spectrum bands assumed in the model of Malta have been reviewed based on the indications provided by this country.<br>- We clarify that any assumption regarding DSS is already implicit in the spectrum input within the model, particularly, in the distribution reflected for spectrum bands among access technologies (e.g., if 20MHz are dynamically shared on a 50%-50% basis between 4G and 5G, 10MHz are assumed allocated to each access technology). |
| *2.5.2* | [Slovakia] One operator indicates that the shutdown of 3G networks should be considered in Slovakia. | | We note that the shutdown of 3G networks is already implemented in the cost model for Slovakia, as can be observed in the spectrum input, where no spectrum band is allocated to the 3G technology from 2024 onwards, based on the information received during the data collection process. |
| *2.5.3* | [Germany] One operator indicates that the frequency spectrum used in the model has not been auctioned at this bandwidth. | | We note that all spectrum bands have been included in the model based on the information received during the data collection process from Germany. The lack of detail in the operator's comment impedes to further assess this point. |
| *2.5.4* | [Germany] The spectrum amount of reference operator in 3.6 GHz is not in line with reality: only 300 MHz are available, split among 4 players. | | The spectrum amount for the 3.6 GHz band has been updated from 100 MHz to 80 MHz (result of rounding up the calculation = 300 MHz / 4 MNOs). |
| *2.5.5* | [Czech Republic] One operator indicates that the 700 MHz spectrum is not used for LTE, but only for 5G. | | Please refer to general comment I.1. of the Executive Summary. |
| *2.5.6* | [Czech Republic] One operator has informed that it does not expect 2G services after year [CONFIDENTIAL]. | | We observe that the 2G shutdown was not specifically informed by Czech Republic during the the data collection process. Thus, considering that only one operator seems to have the 2G shutdown in its plans (i.e., no comments have been received from other operators in this regard), we have opted for assuming, by adhering to a conservative approach, that the 2G technology remains available for the reference operator until the end of the modelled period. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 5. Spectrum (2/2)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.5.7* | [Romania] In the 3,400-3,800 MHz band, the bandwidth should be increased (from the current 50 MHz) to align with the reality of the market in Romania, which has a total of 310 MHz, being a market with 4 MNOs. | | Based on indications received, the bandwidth for the 3,400-3,800 MHz band has been increased from 50 MHz to 80 MHz in the model of Romania (result of rounding up the calculation = 310 MHz / 4 MNOs). |
| *2.5.8* | [Croatia]<br>- The model does not consider the 3G sunset.<br>- Spectrum in 3,400-3,800 MHz band should be decreased from 130 MHz to 100 MHz.<br>- Spectrum in 26 GHz band should be decreased from 300 MHz to 200 MHz. | | - Please refer to point 2.4.8.<br>- The 3,400-3,800 MHz bandwidth has been updated from 130 MHz to 100 MHz based on the new indications received.<br>- The 26 GHz bandwidth has been updated from 300 MHz to 200 MHz based on the new indications received. |
| *2.5.9* | [Ireland] 5G spectrum for 700MHz and 2,100MHz looks too low. | | We observe that the use of spectrum for these 5G bands informed by Ireland during the data collection process was very limited. |
| *2.5.10* | [Bulgaria] This country has updated the input data about utilization of the 800 MHz spectrum band in the country. | | Based on the new information received, we have accordingly updated the spectrum input in the model of Bulgaria to accordingly reflect the utilization of the 800 MHz spectrum band. |
| *2.5.11* | [Portugal] No operator has more than 40 MHz in the 2,600 MHz band. Regarding the 1,800 MHz band, the 3 major MNOs have 40 MHz. | | The bandwidth has been updated to 40 MHz for both 1,800 MHz and 2,600 MHz bands, based on the new indications received. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 6. Unitary Costs (1/2)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.6.1* | Some stakeholders indicate that the CapEx unit costs and CapEx trends, of certain core equipment, differ from the submitted information. | | Please refer to the general comment I.1. of the Executive Summary. |
| *2.6.2* | It is not clear how the model is capable to include the fact that some sites are not owned by the operator but are rented form an external company ("TowerCo"). | | Unit costs used in the model already represent the average CapEx/OpEx of a site employed by the reference operator, considering both owned and rented sites (to third parties such as other operators or TowerCos). Thus, during the data collection process held with operators, unit costs were already gathered with this objective in mind, as indicated in the data request template itself: *"Unit costs should represent a weighted average mix of CapEx (typically with a greater magnitude in the case of owned sites) and OpEx (typically with a greater magnitude in the case of rented sites) as applicable"*. |
| *2.6.3* | Costs have significantly decreased compared to the assumptions made in 2019. However, this assumption may not be justifiable, considering that providers have long-term contracts with suppliers. | | Unit costs have been completely updated considering the new information received from stakeholders during the data collection process. This up-to-date information is considered to be more realistic of their operations at the present time. This had led to decreases for unit costs of certain network elements but also to increases for others. |
| *2.6.4* | The model should properly account for the expected reduction of potential equipment manufacturers due to cyber security reasons according to the latest EU Commission actions. | | This topic was already treated in the comments received to Workshop 1, where EC/Axon expressed the following: *"The incorporation of possible unforeseen events that require a special treatment would be assessed in due course by the EC.[… ]"* |
| *2.6.5* | Please provide clarifications regarding the technical description of "SingleRAN site equipment.Cabinet.# of Cabinets" and calculation of the unitary price for "SingleRAN site equipment.5G Bands.# of bands". | | - Technical description of "SingleRAN site equipment.Cabinet". Single RAN refers to the Radio Access Network (RAN) equipment that allows the simultaneous provision of telecommunication services under different standards (GSM, UMTS, LTE and 5G) on a single architecture. The Cabinet particularly refers to the compact unit used to house the radio access elements.<br>- Calculation of the unitary price for "SingleRAN site equipment.5G Bands.# of bands". Please refer to section '3.1.6. Unitary Costs' of the Methodological Approach document for the details on the approach adopted for calculating its unitary price. |
| *2.6.6* | Some essential nodes (STP, DRA, DEA) of mobile network seems to be missing. | | Network elements listed by the stakeholder are not considered in the model due to their low materiality and, in alignment with the international practice. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 6. Unitary Costs (2/2)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.6.7* | [Malta, Romania, Bulgaria, Croatia, Portugal] These countries have provided updated data/indications regarding the costs of spectrum licences. | | A review of costs for spectrum licences has been performed in the models of all these countries, taking into account the new data/indications received. |
| *2.6.8* | [Malta] It may be more appropriate to consider at least two distinct per user unit costs for the 5G core equipment, as one would expect that MNOs in larger countries would be in a better position to negotiate a lower unit cost. Such an approach would also be consistent with that adopted in the cost model for the VoLTE platform. | | The option of two distinct per user unit costs was not considered appropriate, among other reasons, because the level of information received from reporting operators did not present enough granularity to perform such separation. It should also be outlined that the design adopted for the 5G Core follows a different approach to that of VoLTE platforms, since while the design of 5G Core is performed on a per-user basis, the design of the VoLTE platforms is performed on a per-platform basis. The need of considering different sizes for VoLTE platforms used by large and small countries led to such differentiation. However, this differentiation is already implicitly captured for the 5G Core, being directly performed on a per-user basis (i.e. a larger cost is already assumed for larger countries). |
| *2.6.9* | [Czech Republic] One operator claims that the cost of one site (tower) should be over [CONFIDENTIAL figure] and rooftop over [CONFIDENTIAL figure]. | | Figures suggested by the operator are unrealistically high, when compared with the data received from all other EU/EEA operators and hence cannot be accepted. Additionally, the operator does not present any evidence that justifies the employment of these figures. |
| *2.6.10* | [Croatia] - Usage of the cost values based on EEA averages is not correct. Such an approach puts small countries in a disadvantaged position because of the stronger negotiating power of the big countries. Also, there is no transparent definition of used criteria for defining EEA average, so proposal is to use national averages.<br>- It is not logical that HW&SW costs vary between rooftop and tower location types. The difference between these two types is related to passive infrastructure costs only (i.e. mast, construction costs, etc.) | | - It is worth mentioning that EEA averages are only used for the unit costs of transmission and core network elements. The international practice has shown that prices for these elements do not tend to fluctuate significantly depending on the country or the operator's scale (the same applies to potential discounts). This is also reinforced by the idea that the recovery of annual cost of the reference operator in each country has been checked through the 'Reconciliation assessment' described in section 5.2.1. of the Methodological Approach document.<br>- We note that, contrary to what the stakeholder indicates, the referred differentiation of HW&SW is not used in the model for passive elements, such as it is the case of sites (towers or rooftops). |
| *2.6.11* | [Italy] One operator states that it understands that costs assumed for spectrum are only a small portion of the bid/renewal costs (an instalment of the last bid for 5G spectrum) and the related useful life is the one of the whole assignment (17 years). | | We clarify that the spectrum costs included in the model correspond to the (whole) price per MHz assumed to be paid for the acquisition of spectrum bands, corresponding to whole spectrum duration. The same applies not only to 5G but to all technologies (2G/3G/4G). |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# 7. General and Administration Expenses (G&A)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.7.1* | Some stakeholders indicate that the input employed in the model for G&A overhead differs from their internal figures. |  | Following the approach previously employed in SMART 2017/0091, we have opted for utilizing the same G&A overhead across all countries, based on an EU/EEA average. This assumption relies on the fact that, following the principle of efficiency, no significant variations among operators should be expected for this input.<br><br>Please refer to the general comment I.1. of the Executive Summary. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# 8. Traffic distribution per technology (1/2)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.8.1* | The discontinuation of UMTS was mainly compensated by moving traffic towards 5G. However, it is not comprehensible for us which products in the M2M (Machine-to-Machine) applications utilize this technology. | | Firstly, it should be mentioned that the definition of the particular M2M applications that make use of the 5G technology is irrelevant for modelling purposes. Despite this, it is broadly known that the 5G technology will enhance the M2M communications by offering faster speeds, low latency, higher devices density, etc. An example of applications that will rely on this technology can be identified in the following EC's study (see exhibit in page 9): link. |
| *2.8.2* | The increase in voice usage in 2G does not comply with the "HD Voice" quality standard. | | We clarify that the traffic distribution per technology used in the model has been derived from the information provided by operators during the data collection process, where for most of countries, operators assume a continuous reduction of voice traffic handled through 2G networks over the years, in favour of more modern technologies. |
| *2.8.3* | [Hungary] It is unclear how the figure for 5G traffic has been determined for M2M data services. | | As described in the Methodological Approach document, one of the challenges encountered when modeling M2M services was the limitations in the information received, which in some cases, presented a considerable number of inconsistencies. As a way of example, in the case of Hungary for 5G data traffic, the percentages received for the 'DATA' category (with the combination of traffic for M2M and traditional services) did not fall between the range established by two values from the sub-categories 'DATA - Traditional data services provided to end-customers' and 'DATA - M2M/IoT data services'. Due to these encountered limitations, a standardized approach was adopted for all countries in the definition of the M2M traffic distribution, relying on EU/EEA average ratios, as explained in section 'Separation of M2M services' of the Methodological Approach document. |
| *2.8.4* | [Hungary] The traffic distribution per technology for voice and data assumes a faster allocation to 5G than the reported one. | | Please refer to general comments I.1. and I.2. of the Executive Summary. |
| *2.8.5* | [Czech Republic] One operator has informed that it does not expect 2G services after year [CONFIDENTIAL]. | | Please refer to comment 2.5.6. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 8. Traffic distribution per technology (2/2)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.8.6* | [Croatia] The shutdown of 3G networks should be considered in Croatia from the year [CONFIDENTIAL]. |  | Please refer to point 2.4.8. |
| *2.8.7* | [Ireland]<br>- Subscribers: there are very few dedicated technology subscriber SIMs left (i.e. GSM/UMTS), typically most SIMS will have 4G or 4G/5G capability with Circuit Switch Fall Back (CSFB to GSM and UMTS);<br>- Voice: Main voice will now be VoLTE and CSFB to GSM (as UMTS has started to be retired); and<br>- Data M2M: here is mainly GSM, we expect this to decrease from about 2025 onwards and LTE, 5G to increase. |  | - Subscribers: we clarify that the split per subscriber has been derived from the information provided by Ireland during the data collection process in table 'DOMESTIC SUBSCRIBERS' of worksheet 'HISTORIC DEMAND&REVENUE'.<br>- Voice and Data M2M: given the absence of specific data from Ireland during the data collection process, EU/EEA averages were used. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# 9. ARPU
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.9.1* | A few stakeholders comment that the ARPU trends for next years are optimistic while others see them as pessimistic. | | We are of the view that, given the divergence among opinions that the ARPU trends may commonly present, opting for an EU/EEA average value provides a balanced representation, in consistency with the methodology adopted in SMART 2017/0091. |
| *2.9.2* | An EU/EEA average has been used for the ARPU, instead of the provided figures. | | |
| *2.9.3* | There is no reason to provide the ARPU, if this should be cost oriented model. | | As outlined in section '3.1.9. Average Revenue per User (ARPU)' of the Methodological Approach document, the ARPU is exclusively used to implement the cost recovery pattern of the CapEx expenditures over their applicable useful lives.<br>In other words, even if the model relies to certain extent in the ARPU projections (and only when the cost annualisation method is selected by the user as "Economic depreciation based on ARPU" from the model's COVER worksheet), results produced by the model are still fully consistent with the principle of cost-orientation. |
| *2.9.4* | [Romania] The ARPU in the model is too high compared to data provided. | | As outlined in section '3.1.9. Average Revenue per User (ARPU)' of the Methodological Approach document, the ARPU has been normalized by making use of a reference ARPU of 10 EUR/month (same for all countries) in the year 2022. This however has no impact in the results since, as also described in such section: *"Please note that the reference ARPU considered has no bearing on the costs produced by the model. Given that ARPU is only employed for the implementation of economic depreciation under a revenues-based production factor, it is only relevant to understand its trend. Therefore, the reference ARPU considered for 2022 could be set to 1, 10 or 100 and the model would deliver the same results as long as the ARPU trend defined in the input is preserved"*. |
| *2.9.5* | [Portugal] Even though we provided ARPU in the data collection process, our country is classified in page 99 of the Methodological Approach document as "Not all High-priority information provided". | | This classification was established since Portugal did not provide ARPU trends from 2024 onwards. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 10. Percentage of traffic in the busy hour and in weekdays
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.10.1* | The "Percentage of traffic in the busiest hour of the day – users" used in the model is significantly lower than the data provided. | | Following the approach adopted in SMART 2017/0091, we had initially opted for assuming a unique value, equal to all countries. However, in light of the stakeholder's comment, and considering that the level of information received from the different countries during the data collection process presents in general a high level of quality, we have considered appropriate to include specific values for each country, based on the received data. |
| *2.10.2* | [Portugal] In 111 page of the Methodological Approach document, our country is classified as "Not all High-priority information provided", despite we provided the "% Percentage of users/devices that are connected in the busy (peak) hour to the operator's network" during the data collection process. | | The reason why this country is classified as "Not all High-priority information provided" is because it did not provide all the requested information in table 'HOURLY TRAFFIC DISTRIBUTION' of worksheet 'TRAFFIC STATISTICS' during the data collection process. That information was also relevant for the particular page referred by the stakeholder. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 11. Useful Lives
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.11.1* | It is not clear how Axon was able to include such a granularity concerning the lifetime of different equipment, when these have not been previously asked. | | We clarify that resources lives were requested at asset category level, being these categories later mapped to the complete list of modelled equipment, based on the approached detailed in section '3.1.12. Useful Lives' of the Methodological Approach document. |
| *2.11.2* | Given M2M's reliance on 2G we expect the lifes to be extended, thus, leading to a lengthened depreciation profile. | | We outline that the model works with technical useful lives (which may differ from financial ones). This implies that any extended utilization of the 2G technology, if applicable, should not impact the useful lives adopted in the model for 2G related elements. |
| *2.11.3* | [Malta] The useful life for the 26,000 MHz band should be considered similar to that of the 700 MHz band. | | Based on the new indications received, in the model for Malta, the useful life for the 26,000 MHz band has been considered equal to that of the 700 MHz band. |
| *2.11.4* | [Belgium] There is an issue with the lifetimes used for spectrum licenses. These are much longer than the duration foreseen in the auction. | | Please refer to general comment I.2. of the Executive Summary. |
| *2.11.5* | [Bulgaria] The allocation of spectrum in the 700 MHz and 800 MHz bands was conducted through a single procedure, thus it is inaccurate to assign different useful lifespans to the licenses. The spectrum in the 26,000 MHz band was allocated for a duration of 20 years. | | Please refer to general comment I.2. of the Executive Summary. |
| *2.11.6* | [Greece] One operator indicates some differences between its internal useful lives and those used in the model. | | Please refer to general comment I.1. of the Executive Summary. |
| *2.11.7* | [Croatia] One operator claims that the useful lives for spectrum licenses are not in line with spectrum costs (licences) used in the model. | | As clarified with the NRA of Croatia, the useful lives considered in the model are appropriately aligned with the duration granted to the spectrum licenses in this country. It should be noted that, even if spectrum licences in this country present a possible extension for an additional period of 5 years, this must be accompanying by an additional extension fee, in an equivalent proportion to the initial payment (and logically based on the new time extension). Hence, no modification is needed in this case. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 12. WACC (1/2)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.12.1* | Some operators claim that the WACC is too low. | | We clarify that, as explained in section '3.1.13. WACC' of the Methodological Approach document, the WACC value is not the outcome of any Axon's calculation. Instead, the WACC values assumed as input in the model have been directly provided by the corresponding NRAs during the data collection process. |
| *2.12.2* | If we get information on parameters used in Axon's WACC calculation, we may be able to comment in more detail. | | |
| *2.12.3* | [Germany] The NRA has provided an updated WACC figure, by value of 5.06%. | | The WACC has been updated with the new figure reported by Germany. |
| *2.12.4* | [Germany] One operator indicates that it does not agree with the WACC calculated by the NRA in its country, as already pointed out in previous comments to it. | | We are of the view that the NRA's position must prevail. |
| *2.12.5* | [Romania] The NRA has provided a new calculated WACC value [CONFIDENTIAL], to replace the current EEA average used for this country. | | The WACC has been updated with the new figure reported by Romania. |
| *2.12.6* | [Spain] This country has provided an updated WACC figure, by value of 5.55%. | | The WACC has been updated with the new figure reported by Spain. |
| *2.12.7* | [Poland] There is a considerable decrease of the WACC with respect to the previous 2019 model. The WACC should be higher to reflect the challenging mobile environment. Such a low WACC is lower than the value set by the NRA for FTTH services and Legacy services. | | As explained in section '3.1.13. WACC' of the Methodological Approach document, no specific WACC value was received from Poland during the data collection process. Thus, an EEA average was used. However, based on the received feedback, we have considered it appropriate to update the WACC in the model of Poland, making use of the WACC set by the Polish NRA for Legacy services. |
| *2.12.8* | [Greece] One operator suggests a new WACC figure, based on figure employed in its Accounting Separation. | | When clarifying this topic with the NRA of Greece, the NRA has facilitated a new WACC value to be used for the model of Greece, which has been updated accordingly within the model of this country. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 12. WACC (2/2)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.12.9* | [Italy] One operator indicates that the WACC figure value used in the model is the value set by the NRA for the period 2019-2021 (not in used anymore). The actual WACC value fixed by the NRA in 2023 is of 7.40%. The Model should provide the value for the termination rates and for roaming for the period 2022 to 2032 the actual value of 7.40% should be used. | | Based on the feedback received from Italy, we have considered it appropriate to update the WACC in the model of this country with the latest WACC figure available, by value of 7.49%. |
| *2.12.10* | [Italy] With decision n. 152/23/CONS Agcom has lauched the national public consultation about the fixed access market analysis. Agcom plans to notify a draft decision to EC as soon as possible. Within this proceeding, Agcom has proposed the review of the WACC, proposing a value equal to 7.49% for the years 2024-2028. Since the time horizon covered by the Italian market analysis will overlap with that covered by the review of roaming costs, Agcom suggests to check whether the final decision on the fixed access market analysis will adopt before the conclusion of the ongoing process of reviewing roaming costs, in order to define the WACC value for this exercise coherent with the one adopted for the fixed access market. | | |
| *2.12.11* | [France] This country has provided an updated WACC value, by value of [CONFIDENTIAL]%. However, considering that the reported WACC is for fixed activities (in the absence of mobile activities regulated by a market analysis), such WACC should be adjusted to add a risk premium, in a similar manner to FTTH networks and the Commission Recommendation (EU) 2024/539. | | The WACC has been updated with the new figure reported by France.<br>However, the addition of a risk premium is not considered suitable, as the risk premium is commonly recognized to be applicable for FTTH networks, but not for mobile networks. To this respect, the addition of a risk premium would also imply a deviation from the approach adopted by all other EU/EEA countries, which do not recognize a risk premium for mobile activities. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 13. Other inputs (1/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| ***Cost adjustment factors*** | | | |
| *2.13.1* | Inflation rates do not correspond to values published by the IMF.<br>Some countries (namely Germany, Italy, France and Czech Republic) have also claimed that inflation rates assumed in their models were higher/lower than the real figures in these countries. |  | After reviewing the inflation rates used in the model, we have noticed that, as a result of an issue identified in the cross-referencing formulas used when preparing the model's inputs, certain countries presented incorrect inflation figures. Inflation rates for all these countries have been updated with the corrected IMF figures. |
| *2.13.2* | Some stakeholders refer to the differences existing in inflation rates between the model and values calculated by other national or international institutions. |  | We note that the majority of the existing differences were related to the issue described in point 2.13.1. In other cases, while we acknowledge that certain (minor) differences may exist between figures published by the IMF and those published by other national/international institutions, these are presumably the result of the different methodologies adopted for the calculation of the inflation rates among institutions. Despite this, the use of the IMF source is preferred due to its international recognition, at the same time that it provides a homogenous approach across all countries. |
| *2.13.3* | [Spain] One operator claims that the "% of staff costs over network OpEx" differs from its internal figures. |  | Please refer to general comment I.1. of the Executive Summary. |
| ***Network parameters*** | | | |
| *2.13.4* | Certain stakeholders have suggested alternative figures for some of the network parameters considered in the model, namely:<br>-1 stakeholder in German suggests a different blocking probability.<br>-1 stakeholder in Portugal suggests a different value for the voice bitrates of 4G/5G.<br>-1 stakeholder in Spain suggests a different duration for the PRB and for the percentage of TDD bands dedicated to downlinks.<br>-1 stakeholder in Romania suggests the same usage for all geotypes (urban, rural and suburban) |  | We observe that the received suggestions correspond in all cases to very punctual cases – as only one stakeholder suggests a new figure in each case -, thus implicitly entailing the acceptance of all other stakeholders involved in the process.<br>Considering also that all these network values correspond in most of cases to standardized parameters, which should not fluctuate significantly among countries or operators, as well as the fact the majority of them were already approved in SMART 2017/0091, we see no solid reasons to modify them. |
| *2.13.5* | It is not clear clear if the methodology considers different bit rates for GSM HR and GSM VAMOS CS calls. |  | We clarify that the model considers a unique average bitrate for GSM calls, reflected in the parameter "2G GSM Channel Bitrate" of worksheet '2A INP NW' within the model. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# 13. Other inputs (2/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.13.6* | It is unclear what is the rationale to report voice traffic in minutes rather than GB, after the sunset of 2G and 3G technologies and the rollout of 5G. | | Unit costs for voice services are finally reported based on minutes, being this the relevant unit for regulatory purposes (i.e., the MTR is established on a per-minute basis). However, this does not preclude that, when dimensioning the network in the block 6 of the model, each access technology is designed taking into account its own technical characteristics (e.g., in the case of voice services, 2G traffic is converted to Erlangs while the 4G/5G traffic is converted to Mbps). |
| *2.13.7* | The decrease in the 4G spectral efficiency from 1.06 - 1.24 to 0.6 - 0.7 indicates a significantly poorer bandwidth compared to 2019. | | The 4G spectral efficiency has been updated to better align with the levels of performance currently observed in the EU/EEA countries, when attending to the spectrum bandwidth available and the levels of traffic handled. |
| *2.13.8* | [Greece] One operator suggests different capacities for the core equipment. | | Please refer to general comment I.1. of the Executive Summary. |
| *2.13.9* | [Poland] There is no apparent change in the network due to the discontinuation of 3G. | | Considering that only one operator seems to have the 3G shutdown in its plans (i.e., no comments have been received from other operators in this regard), we have opted for assuming, by adhering to a conservative approach, that the 3G technology remains available for the reference operator until the end of the modelled period. |
| *2.13.10* | [Romania] For the percentage of subscribers that are simultaneously active in the Core Dimensioning Parameters, we provided a considerable higher figure than the value used in the model. | | Please refer to comment 2.10.1. |
| ***Cell Radii*** | | | |
| *2.13.11* | A few stakeholders show their disagreement with the cell radii figures employed in the model. | | As explained in the Methodological Approach document, considering that cell radii inputs should not vary over the years, for consistency with the previous process, these inputs have been maintained from the previous SMART 2017/0091. |
| *2.13.12* | The same cell radii is used for all technologies and all frequency bands. This is a very rough simplification. | | We note that the model considers a differentiated cell radii depending on the frequency band, as displayed in worksheet '2C INP CELL RADIUS'. Regarding differences among technologies, please refer to comment 2.13.14. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 13. Other inputs (3/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.13.13* | There is no explanation about how the 'Mountainous cell radii reduction', by value of 65%, was obtained. | | As explained in the Methodological Approach document, considering that cell radii inputs should not vary over the years, for consistency with the previous process, this input has been maintained from the previous SMART 2017/0091. At that time, this value was defined as the expected and standard reduction in cell radii that mountains typically induce, based on Axon's estimates. |
| *2.13.14* | Depiction of 5G cell radius identical to 4G cell radius based on the frequency spectrum and the shorter range of 5G is not reasonable. | | The international practice shows that, within the same spectrum band, signal propagation characteristics are not, on broadly, considerably influenced by the employed access technology. |
| *2.13.15* | Cell radii in the model is used to define number of sites needed for coverage but implicitly also for the calculation of the number of capacity sites. Model assumes that within cell radius, equal capacity exists in all pixels of the area regardless of the distance from site. In principle, this could be correct if cell radius is constrained to rational distance from the site, but it is not valid when high radius is considered. Values used in the model are considered significantly high to be used for capacity purposes (especially for high bands). | | Please refer to comment 2.13.11. |
| *2.13.16* | It is not transparent how the algorithm considers the dependence of the cell radius on the frequency band and orography. | | We clarify that, in the model's inputs (see worksheet '2C INP CELL RADIUS'), cell radii inputs already present differentiated values per frequency band and geotype. In the particular case of the mountainous geotype, to account for effect of the orography, the cell radius is adjusted according to the formula available in cell C28 of worksheet '2D INP DIST POP RURAL': "Cell radii" x (1 – "Mountainous cell radii reduction"). |
| *2.13.17* | [Germany] The determination of mountainous areas being above 300m is willfully chosen and does not reflect the MNOs' efforts to cover hilly areas. Therefore, the determination of 5.6% mountainous areas in Germany does not reflect reality. | | Contrary to the operator's statement, the utilization of 300m relies on the technical assumption described in the Methodological Approach document, already employed in SMART 2017/0091: *"Calculating the Fresnel zone (Fresnel zone is a series of concentric prolate ellipsoidal regions of space between and around a transmitting antenna and a receiving antenna system.) clearance of a 900MHz signal, an obstacle higher than 30m at a distance of 1/10th from the sample side would start blocking the signal behind the obstacle. At the same time, an unevenness of 30m at a distance of 1/10th from the sample side would equate to an unevenness of 300m across the sample side. Taking this into consideration, all the samples with an unevenness higher than 300m were considered to be mountainous."* |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 13. Other inputs (4/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.13.18* | [Malta] We consider that the cell radii being considered for Malta are significantly higher than actual values. It is worth pointing out that in the case of Malta, there are various country specificities including indoor coverage difficulties (due to several factors such as stone buildings, thick-walled buildings especially in historic areas), high population density, significant increase in high-rise buildings across Malta during the past few years, etc. which could be leading to smaller cell radii than those currently being considered in the cost model. |  | After having carefully assessed the new information and evidences submitted by Malta, cell radii inputs have been updated in the model of this country. It should be noted that, given the particularities of Malta, this country was already recognized with a special treatment in SMART 2017/0091, where country-specific figures were being employed for the cell radii inputs (instead of EU/EEA averages). |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# 13. Other inputs (5/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| ***Backbone and Core*** | | | |
| *2.13.19* | A few stakeholders refer to certain differences existing between the number of core elements estimated by the model (or the maximum capacities assumed for the core elements) and those existing in their networks. | | Please refer to general comment I.1. of the Executive Summary. It should also be noted that, considering the wide range of capacities that may exist regarding core network platforms, the alignment between the unit costs of core equipment and the associated capacities is achieved by using EEA averages in both cases. |
| *2.13.20* | 5G core elements have not been added. | | As explained in section '4.1. Incorporation of 5G' of the Methodological Approach document, the design of the core equipment for 5G networks relies on a dimensioning based on a per-user basis. Please refer to such sections for further details. |
| *2.13.21* | There is no apparent change in the network due to the 3G shutdown. | | The 3G shutdown of core elements, whenever applicable, is automatically introduced by the model in the dimensioning algorithms of block 6. |
| *2.13.22* | According to the "Source Date," the data has been changed, but this is not the case. | | The source data was updated in the EC's version (containing all countries) as new countries with respect to 2019 have been incorporated in this new project. However, due to the reasons explained in section '3.3 Other inputs' of the Methodological Approach document, backbone inputs have been preserved from SMART 2017/0091, given the higher levels of quality in the information received during such project. |
| *2.13.23* | [Hungary] Minimum number of core platforms is not enough. | | |
| *2.13.24* | [Romania] The average distance assumed in the backbone inputs is very short. | | The lack of justified evidence by these operators prevent us from further assessing this comment. |
| *2.13.25* | [Malta] The model for Malta considers [CONFIDENTIAL platform units] for the MME, SGW, PGW, PCRF, HSS and CSCF. While this would suffice from a capacity point of view, however, it does not seem enough for network redundancy and resiliency. Hence, the minimum number of core platforms per network for the previous list should be [CONFIDENTIAL platform units]. Such an update would better reflect the inputs provided by the local MNOs. | | Similar to the approach adopted in SMART 2017/0091, in the case of these core elements, the redundancy/resiliency for small-size countries is assumed to be implicitly captured with the modularity of the modelled core equipment. In other words, while the model installs core equipment with capacities commonly lying in the range of 3 to 8 million subscribers (derived from EU/EEA averages), capacities required in small-size countries are below 1 million subscribers. |
| *2.13.26* | [Ireland] It is not clear whether the 122km is aggregated bulk backhaul (i.e. from the Radio Network Nodes) to core. Units would be helpful as well as an explanation. Additionally, Data centres with core function are less distributed than they once were, we would expect the distance to be around 50km between sites. | | We clarify that units employed are km and that the backhaul segment (from access sites to controllers) is not considered as part of the backbone related inputs. On the other hand, regarding the distribution of core sites and backbone distances, even if we understand that certain (while not substantial) modifications may have taken place in the core sites and the backbone rings during last years, given the lack of new information received during the data collection process about the core network, we have opted for keeping the backbone inputs from the previous SMART 2017/0091. |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# 13. Other inputs (6/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| ***Geographical inputs*** | | | |
| *2.13.27* | [Hungary] The rural geotype should have much lower proportion. | 🟢 | The lack of evidence from this stakeholder prevents us from further assessing the point. |
| *2.13.28* | [Romania]:<br><br>One operator indicates:<br>- The model does not seem to consider population density.<br>- The map of the INS (Romanian Statistic Institute) shows completely different info for URBAN areas when compared with Eurostat.<br>- In Romania, it is not true that the SUBURBAN geotype is virtually fully covered. Additionally, in Romania, the population is not uniformly distributed inside municipalities, especially in SUBURBAN.<br><br>*[This comment continues on the next slide]* | 🟢 | - As described in the Methodological Approach document (see section '3.2. Geographical inputs'), municipalities are assigned to geotypes by using the GISCO's database. At the same time, Annex A describes the criteria employed in GISCO's database which among others, rely on the population density. Please refer to the Methodological Approach document for further details.<br>- Regarding the different classification of areas into geotypes between the INS (Romanian Statistic Institute) and Eurostat's GISCO database, we observe that these still look reasonably aligned. In any case, this difference is plausibly justified as the INS does not follow the same geographical classification criteria than Eurostat's GISCO database. In addition to that, the INS only considers two levels of disaggregation (urban and rural), while Eurostat's GISCO considers three levels (later transposed in the model into urban, suburban and rural). Nevertheless, given the need of utilizing a uniform and homogenous database across the EU/EEA countries, the use of Eurostat's GISCO database is preferred, in consistency with the previous SMART 2017/0091.<br>- We observe that, despite the operator's comment, with the exception of the 5G technology, which is still being deployed, the SUBURBAN geotype is assumed to be fully covered in all other access technologies (with population coverage of 100%). Hence, considering that the number of access sites installed for coverage requirements is basically driven by the access technology with the higher population coverage, the situation indicated does not exert any relevant impact.<br><br>*[This comment continues on the next slide]* |

🟢 Comment from <5 stakeholders
🟡 Comment from 5-15 stakeholders
🔴 Comment from >15 stakeholders

# 13. Other inputs (7/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.13.28* | - Regarding "Topography of the terrain":<br>• Results show Romania RURAL as being ~20% mountainous, when in fact it is at least 30% mountainous, based on INS.<br>• The unevenness is very roughly computed, based on a single elevation measurement on each sample.<br>• The Fresnel zone clearance is considered only for 900MHz. It would be appropriate to consider the Fresnel zone clearance for other bands too (e.g., 2,100MHz band). In Romania we are forced to use 2,100MHz in RURAL in the Eastern part of the country due to interferences coming from Ukraine.<br>• There should also be a split based on orography for URBAN and SUBURBAN. There are important URBAN municipalities in Romania that are spread on hilly terrain (e.g. Brasov, Iasi, Cluj – Napoca).<br>• The elevation information was extracted from Google Elevation API, but accuracy of this source is not uniform throughout Europe. SRTM data would be more appropriate.<br>• The algorithm preference for covering non-mountainous areas contradicts the digital divide policies, as most remote municipalities are in mountainous areas. |  | - Regarding "Topography of the terrain", we do not identify any robust reason to deviate from an approach that was already accepted and applied in SMART 2017/0091. Particularly, for each of the points raised by the operator:<br>• In a similar manner to a previous point, the difference with respect to the INS result is presumably due to distinct criteria adopted for the determination of mountainous areas. Our approach has been specifically designed to capture the particularities of signal propagation in telecom networks - what is not the case of the INS -. Additionally, INS data is considering non-populated areas (areas where no population is established), which are excluded from our geographical analysis, as they do not need to be covered. These various reasons explain the variations observed.<br>• As indicated in section '3.2.4. Topography of the terrain' of the Methodological Approach document, each sample considers 9 elevation measurements, not a single one, as suggested by the operator.<br>• The 900 MHz was used as reference band, being in the low spectrum range, as this is the relevant range used by operators to deal with coverage constraints. Even if the utilization of a higher spectrum band may be necessary in very exceptional circumstances, such as the case mentioned by the operator, these cases which are applicable only to the immediate border between Ukraine and Romania, are expected to have a negligible impact at national level.<br>• As indicated in section '3.2.4. Topography of the terrain' of the Methodological Approach document: *"In the case of urban and suburban areas, given that the number of sites to be deployed typically depends on the capacity they need to handle, their topography was not assessed"*.<br>• Concerning the operator's questioning about the accuracy of the Google Elevation API or the algorithms used in the model, the lack of any evidence received prevent us from further assessing this point. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# 13. Other inputs (8/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.13.29* | [Croatia] We do not agree with steps applied to assess the seasonality per geotype. In Croatia, there is a high seasonality pressure during also in urban areas. Therefore, we believe that the applied steps should be adjusted so that urban areas are also classified as seasonal. | 🟢 | We clarify that, in the case of Croatia, seasonality is considered relevant, but only under the scenario 'Threshold to identify seasonality - 10%'. |
| *2.13.30* | [Spain]<br>- The cost model considers that the rural population of Spain amounts to 1.9 million people, while figures of the Spanish Administration for the year 2020 show that this population reaches 7.5 million people. This difference is also confirmed in terms of the surface area, where the Spanish Administration considers a rural area of 84% of the country's surface, while the model considers 63%.<br>- There is also a significant difference in the percentage of seasonal population growth in rural areas with respect to non-seasonal population growth between the model data (2.27 times) and the data calculated by the Spanish national statistics institute and collected by different media throughout Spain. | 🟢 | - We observe that contrary to the operator's statement, the model of Spain presents a rural population of 6.4 million people, which can be considered a value reasonably close to the 7.5 million people estimated by the Spanish Administration. The difference in population and surface is plausibly justified as the Spanish Administration does not follow the same geographical classification criteria than Eurostat's GISCO database. In addition to that, the Spanish Administration only considers two levels of disaggregation (urban and rural), while Eurostat's GISCO considers three levels (later transposed in the model into urban, suburban and rural). However, given the need of utilizing a uniform and homogenous database across the EU/EEA countries, the use of Eurostat's GISCO database is preferred, in consistency with the previous SMART 2017/0091.<br>- While we have not been able to identify the origin of the figure mentioned by the stakeholder (2.27), we clarify that the none of the model's inputs refers to population growth (as mentioned by the operator), since such inputs reflect the percentage of traffic in the busiest month (% of monthly traffic over the whole year). Hence, any conclusion extracted by the operator in this regard seems presumably misleading. |
| *2.13.31* | [Spain] The model assumes a surface area of 498,502 $Km^2$ when the total surface area of Spain is larger, 505,970 $km^2$. | 🟢 | After having assessed the stakeholders' comment, we have identified that presumably, Canarias Islands in the case Spain and Azores and Madeira Islands in the case of Portugal, are not considered in the surface available in Eurostat's database. Hence, we have accordingly updated the surface used in the models for these two countries. |
| *2.13.32* | [Portugal] The country total area is lower than Portugal actual area (mainland and islands), which is 92,212 $Km^2$. It seems that Azores and Madeira Islands area was not considered. | 🟢 | |
| *2.13.33* | [Italy] Italy does not appear as seasonal country. However, the model should consider the seasonality of Italy, due to its touristic vocation, equal or higher that considered countries (namely Spain, Croatia, Greece, France, Malta). The fastest solution would be to incorporate Italy with the same driver used for similar country like France, Spain or Greece. | 🟢 | As specified in section '3.1.10. Traffic patterns and seasonal behaviours' of the Methodological Approach document, the reason why the seasonality cannot be assessed for Italy is the lack of the necessary information: "*when not all high priority information was provided by NRAs (and therefore, was not possible to carry out an assessment of traffic patterns) a flat traffic pattern was considered*". The extrapolation of data from other countries for Italy is not a valid alternative, since the geographical and seasonality assessment needs to be performed individually for each country at municipality level. |

🟢 Comment from <5 stakeholders
🟡 Comment from 5-15 stakeholders
🔴 Comment from >15 stakeholders

# 13. Other inputs (9/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.13.34* | [Portugal] We would like to understand why there are countries that present seasonality, despite they have been classified as "No information" in page 103 of the Methodologic Approach document. | | As explained in section '3.1.10. Traffic patterns and seasonal behaviours' of the Methodological approach document, *"[…]in the event that a country has not reported new information to assess the seasonality pattern or information was discarded during the validation process, inputs available on the previous EC's model from SMART 2017/0091 have been maintained"*. Therefore, countries that have not reported information but presented seasonality in the model from SMART 2017/0091, their seasonality patterns are based on the previous information. |
| *2.13.35* | [Czech Republic] One operator indicates that the output of the model also shows a small proportion of towers out the total sites, which is inconsistent with the reality and submissions of the operator. | | Please refer to general comment I.1. of the Executive Summary. |
| *2.13.36* | [Denmark] Like in the former model, we do not see that reliable data has been provided to support modelling a seasonality effect. | | As specified in section '3.1.10. Traffic patterns and seasonal behaviours' of the Methodological Approach document, the reason why the seasonality cannot be assessed for Denmark is the lack of the necessary information: "*when not all high priority information was provided by NRAs (and therefore, was not possible to carry out an assessment of traffic patterns) a flat traffic pattern was considered*". |
| ***Other comments*** | | | |
| *2.13.37* | -It is also important to consider the substitution of services of SMS such as iMessage, Messenger, Viber, Whatsapp, Signal, etc., where more traffic is generated since 2012 than through SMS.<br>-Services provided parallelly such as data, voice and SMS should be considered as twin products as each of them utilize network coverage and capacity through spectrum. | | - We stand out that the traffic related to the applications listed by the stakeholder is already considered within the model through the volumes of data services.<br>- We also confirm that model already recognizes the traffic of all these products. However, the fact that these products may be sold by means of bundled packages (simultaneously combining some of them) to the end-customers has not impact from a network point of view (and therefore, from a costing perspective). |
| *2.13.38* | We are concerned by the methodological treatment of negotiation and contract management/regulatory costs. The consultants reject 6 data points where the value is 0 or very low, but accept outlier data points where it is extremely high (many multiples of other accepted data points). This seems to entail serious risks of bias. | | As it can be observed in the chart presented in section '3.1.14.3. Input definition' of the Methodological Approach document, these values were discarded as they presented figures unreasonably below (close to zero) the expected pattern from all other available data points. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 13. Other inputs (10/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| ***Other comments*** | | | |
| *2.13.39* | - A TAP might contain multiple records from data sessions from multiple roamers and voice/SMS call records as well.<br>- As per point 4 of the "Cost of Providing Roaming Wholesale Services – CNECT/2022/OP/0065" there is an option to use TAP for costing, however, it is not specified if it was used, or otherwise. |  | - Even if a TAP may contain in certain cases several data sessions and voice/SMS call records, the need of working, for comparability purposes, with common and homogenous units among all received data, implies that a unique assumption must be adopted to this respect when converting units of traffic volume (GB, min and SMS) into TAPs. In this regard, conversions adopted are described in detail in section '3.1.14.3. Input definition' of the Methodological Approach document.<br>- The utilization of the cost allocation of wholesale specific costs based on TAPs is reflected by means of the choice *"Allocation based on the drivers"* from the model's COVER worksheet. Further details in this regard are provided in section '2.3. Allocation of wholesale specific costs' of the Methodological Approach document. The utilization of this approach for setting wholesale prices will be decided in the subsequent project phase. |
| *2.13.40* | The status of the output under the regulatory-based cost allocation is yet unclear, as Axon does not provide information on how it intends to use it. |  | We clarify that the utilization of the cost model for the setting of wholesale rates will be accomplished in a subsequent legislative process, to be carried out by the EC in conjunction with the European Parliament and the Council, where the results obtained by models of all countries will be considered. |
| *2.13.41* | The way the inputs are processed in the model to derive unit costs outputs cannot be assessed properly. The description of methodology does not allow to assess how data is processed in the model or to understand the impact of parameters' setting choices on the unit costs outputs. For example, changing certain reference parameters does not provide significant differences in the unit cost output. |  | The model shared during the public consultation offers complete transparency to stakeholders regarding its inputs, calculations and outputs, allowing them to trace and understand, if desired, impacts of the different inputs and/or scenarios. This model has been shared together with several documents (covering around 300 pages), with complete details about the model's logic and functioning. In addition to that, EC/Axon have remained available for clarifying any doubt that stakeholders could have. |
| *2.13.42* | We are surprised with the lack of documentation and transparency. The fact that it is not possible to evaluate the individual impact of each value/scenario is of highest concern. |  | |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# 13. Other inputs (11/11)
*Inputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *2.13.43* | - The usage factors of the MSC-S and MGW in '3B MAP ROUTING FACTORS' are different for GSM and UMTS on-net voice traffic, when compared with '3A MAP SERV2DRIV'.<br>- Different blocking and idle traffic parameters are being considered between worksheets '3A MAP SERV2DRIV' and '3B MAP ROUTING FACTORS', for the following list of network equipment: Controllers – 2G, Controllers - 3G, Backbone, MSC-S/MGW, MME, SGW, PGW, PCRF, CSCF, SBCs and 5G Core equipment. |  | Usage parameters have been aligned in the model for the corresponding network equipment, in both worksheets '3A MAP SERV2DRIV' and '3B MAP ROUTING FACTORS'. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# **Question 3:** Do you agree with the modelling implementation adopted by Axon/EC team for the incorporation of the 5G technology within the model? (1/4)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *3.1* | 5G should be incorporated only for data services, not for voice. | | The utilization of voice (apart from data) for 5G networks has been determined based on the data collected from operators during the data collection process, which have indicated the expected utilization of 5G networks also for the conveyance of voice traffic in the upcoming years. |
| *3.2* | We miss different 5G network elements. | | We observe that this stakeholder does not mention any of the 5G network elements it apparently misses. |
| *3.3* | The allocated 5G spectrum is not available in reality and thus leads to an overestimation of the efficiency. | | We clarify that the spectrum input in the model has been aligned with spectrum allocations informed by each corresponding country. |
| *3.4* | A change of 5G coverage in the model to 100% leads to very low changes in results. Cell radii assumed in 5G for long distances seems overestimated. | | While the impact of the change in 5G coverage varies considerably depending on the analysed country, in general, the situation mentioned by the stakeholder is due to the following reasons:<br>- The average EU/EEA 5G coverage in the year 2023 was already around 80%, and it is expected to reach levels of around 95% at the end of the modelled period. This shows that the model is already assuming a high level of 5G coverage since the very beginning, what is aligned with the EU/EEA market realities.<br>- The average EU/EEA 4G coverage in the year 2023 is above 99%, entailing that virtually the whole population already benefits from 4G coverage. This implies that an increase of the 5G coverage should not generally be translated into an increase of the number of modelled sites, but basically an upgrade of the already existing ones to incorporate 5G. This upgrade however does not require such a large investment when compared with the deploying of a site from scratch. |
| *3.5* | One operator indicates that it does not operate the 4G/5G frequencies in the TDD mode, but rather in the FDD mode. | | While we appreciate the operator's indication, we clarify that the model is intended to represent a reference operator in each country. Thus, considering that there are other operators in the operator's country that are using the TDD mode, this has been accordingly reflected in the model. |
| *3.6* | As of today, the usages of 5G remain limited due to a relatively low level of deployment and adoption. Thus, the impact of 5G on the costs of the modelled mobile operator should not be overestimated. It is of upmost importance that effective investment strategy is rigorously considered rather than theoretical optimisation. | | The proper recovery of costs incurred by the reference operator in each country is guaranteed through the 'Reconciliation assessment' described in section 5.2.1. of the Methodological Approach document. This exercise was performed to ensure that the cost base of the modelled operator is already realistic for each country. |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# **Question 3:** Do you agree with the modelling implementation adopted by Axon/EC team for the incorporation of the 5G technology within the model? (2/4)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *3.7* | The 5G NSA service is already available but, in case of roaming, we only see the cumulated quantities of 4G and 5G usage. The 5G SA service will be available only after a few years time, and its new cost elements are still partly unknown yet. |  | The utilization of a 5G Standalone Network, including all needed elements for the provision of 5G services, is aligned with the methodological approach previously defined in the Phase 1 of the project (see *presentation 'Overview of comments to the Methodology presented in Workshop 1'*). It is worth noting that this approach is consistent with the long-term and forward-looking principles followed by this kind of bottom models.<br><br>Regarding the determination of costs for the 5G core network, this exercise has been accomplished based on the best level of available data from the reporting operators, opting for a dimensioning on a per-user basis, as explained in the Methodological Approach document. |
| *3.8* | Greater consideration must be given to the fact that 5G is being set up as a "non-stand-alone". This means that 5G rollout is initially an upgrade of existing 4G sites with 5G equipment. The expansion of 5G as a "stand-alone", i.e. on the basis of independent sites, will only take place gradually over the next few years. |  | |
| *3.9* | We have not provided the 5G core elements inputs at all, as we did not have any of the 5G core elements in 2022. Axon claims that it has used total costs, dividing them by the number of subscribers, what could be a bit distorted. |  | |
| *3.10* | Increased spectral efficiency at 5G vs. 4G cannot be assumed in any FDD frequency band. The re-farming of a 4G band to 5G does not increase spectral efficiency. |  | Despite the operator's comment, it is well known that one of the main features introduced by the 5G technology with respect to the 4G technology is the enhancement of the spectral efficiency, as also demonstrated by the figures received from EU/EEA operators during the data collection process. |
| *3.11* | The model appears to work in a way where shifting traffic towards 5G technology leads to less sites simulated. It is true that additional frequency spectrum and efficient 5G technology leads to better service quality especially in crowded areas. However, it definitely does not reduce the number of necessary sites needed to fulfil regulated coverage obligations. |  | Please refer to the Executive Summary of this presentation for the detailed explanation on why the number of access sites is decreasing for certain countries. |
| *3.12* | The criteria to model the rollout of small cells cannot be capacity-driven. Instead, small cells are usually deployed following coverage need criteria, since small cells are deployed to cover special areas, even if the actual traffic they are going to generate during the whole year can be much lower that its theoretical capacity. |  | As explained in section '4.1. Incorporation of 5G ' of the Methodological Approach document, the consideration of small-cells has been disabled in the model given the limited usage informed by operators for the short-medium term. Despite this, based on the feedback received to Workshop 1, where the methodology for modelling small-cells sites was consulted with stakeholders, it is expected that the roll-out of small-cells sites is mostly influenced by traffic constraints rather than by coverage constraints (which, if any, should exert a limited impact). |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# **Question 3:** Do you agree with the modelling implementation adopted by Axon/EC team for the incorporation of the 5G technology within the model? (3/4)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *3.13* | Average spectral efficiency factors are too low: i) For 4G, it is 0.65 bps/Hz while in the previous 2018 model it was 1.15 bps/Hz ii) For 5G, it is 2.91 bps/Hz while industry standards indicate > [CONFIDENTIAL] bps/Hz |  | Regarding the 4G spectral efficiency, please refer to point 2.13.7.<br>Regarding the 5G spectral efficiency, we outline that value adopted in the model is aligned with the new information received from EU/EEA countries during the data collection process, about the average effective spectral efficiency observed in their networks. The figure suggested by the operator, considerably higher than the received average values, presumably corresponds to nominal figures that are not achieved in the practice. |
| *3.14* | One operator indicates that:<br>- The cost of the nodes SEPP (for 5G SA roaming) should be incorporated in the model.<br>- Regarding transport network modelling, the operator provides some suggestions [of CONFIDENTIAL nature] about aspects related to Aggregation, Distance site to Hub, and Capacity Calculation. |  | - As explained in the section '4.1. Incorporation of 5G' of the Methodological Approach document, the design of the core equipment for 5G networks does not consider the different platforms/solutions, and instead, such dimensioning has been introduced on a per-user basis (i.e., the number of units for the network resource is assumed equivalent to the number of users), already covering all needed functions within the 5G core.<br>- While we appreciate the operator's suggestion, we point out that the modelling of the transport networks (backhaul and backbone) for 5G has been implemented in an equivalent manner to that already existing for 4G networks in the EC model, as agreed during the Phase 1 of the project based on the stakeholders' feedback. Additionally, we also observe that the stakeholder's proposals seem in general to be very specific of its own operations, while may not necessarily represent other operators. For these reasons, keeping the initial modelling for transport networks is the preferred option. |
| *3.15* | [Germany] The country has a lot of low mountain ranges where sufficient coverage is more complex to be established. Therefore, the model does not simulate real life properly, as more sites are needed to operate a mobile network in Germany. |  | We point out that, with the purpose of reflecting the different characteristics in terms of signal propagation in mountainous, the model of every country (including that of Germany) already takes into account the constraints related to the topography of the terrain. Please refer to section '3.2.4. Topography of the terrain' of the Methodological approach document for further details about how the mountainous and non-mountainous areas are determined per country. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# **Question 3:** Do you agree with the modelling implementation adopted by Axon/EC team for the incorporation of the 5G technology within the model? (4/4)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *3.16* | Regarding the lack of data to undertake 5G core equipment, the model could focus on the most relevant 5G core functionalities (UPF, UDM, AMF, FMF) and model them on the equivalence of the 4G EPC equipment (PGW-U, FGW-U, PGW-C, SGW-C, HFF). The approach using a dimensioning on a per-user basis instead of a design of the core network is not fully representative of the 5G roll-out costs. | | The adopted approach on a per-user basis is considered to be the most suitable approach based on the available information. The approach suggested by the stakeholder would imply discarding the information received during the data collection process, in order to rely in theoretical assumptions. |
| *3.17* | The model should include DSS. | | Please refer to comment 2.5.1. |
| *3.18* | - The model doesn't take into account the increase of the overhead costs (upfront cost) implied by the roll-out in the 3.5 TDD spectrum band on an existing site which may require an update of the electrical system from 1-phase electrical system to a 3-phase one.<br>- The type of MIMO with different antennas and different orders hasn't been considered. In France, 8, 32 and 64 TR MIMO are used according to the geotype.<br>- 5G SA specificities have not been considered, especially as regards the fact that 3.5 GHz frequency licenses already require the operator to virtualize their core networks.<br>- The migration from 4G to 5G requires a transformation of the 4G core network to separate the control plan from the user data plan and the modification of the network architecture. | | We observe that the stakeholder has repeated the same comment as in its feedback provided to Workshop 1. Pleaser refer to the EC/Axon's position as expressed at that time.<br>Regarding the presumably higher costs due to the roll-out of certain 5G functionalities, in both the electrical system and the core networks, no information received from operators during the data collection has reflected such a case. |
| *3.19* | [Italy] Although Agcom is conscious that operators did not provide any information about the use of small cells, it is quite surprising that the number of small cells is null for all the years covered by the model (until 2032). This is the only aspect which, in Agcom view, could require more attention in the modelling implementation of 5G technology adopted for Italy. We could suggest to adopt an approach coherent with that adopted in countries close to Italy in terms of development of 5G technology. | | As explained in section '4.1. Incorporation of 5G ' of the Methodological Approach document, the consideration of small-cells has been disabled in the model for all countries (not only for Italy), given the limited usage informed by operators for the short-medium term. |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# **Question 4:** Do you agree with the modelling implementation adopted by Axon/EC team for the separation of the M2M services within the model? (1/3)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *4.1* | -We do not understand why M2M is being modelled as M2M service fees are not subject regulation. Therefore, M2M cost modelling goes beyond the scope of the Delegated Act.<br>-We could not find any reason why M2M should be separated from other services. | | This topic was already treated in the comments received to Workshop 1, where the EC expressed the following: *"The EC has considered appropriate to separate them as this disaggregation may be ultimately relevant for regulatory purposes"* and *"Considering the particular EC's interest in knowing the specific costs of M2M services for potential regulatory purposes, we have considered appropriate to collect data that should allow the separation of M2M services."* |
| *4.2* | The M2M implementation does not reflect the broad variety of use cases as well as the existing and yet developing price models for M2M services. | | This topic was already treated in the comments received to Workshop 1, where we expressed the following: *"Even if many different use cases may exist in the provision of M2M services, from the network perspective, we emphasize that they will all entail the transmission of data traffic in an equivalent manner"*. Hence, even if the various use cases may be potentially relevant when assessing or defining price schemes in a subsequent stage, the objective of the bottom-up model is focused on the calculation of costs, where such use cases do not play any role. |
| *4.3* | The data sample for M2M is not comprehensive (only 3 countries forecasted M2M). Data quality for M2M traffic is also not sufficient (considerable number of inconsistencies). | | EC/Axon are perfectly aware of the limitations presented by the information received during the data collection process from operators regarding M2M services, as indicated by the EC/Axon's team with full transparency in the Methodological Approach document shared with stakeholders. Despite this, as also summarized in the referred document, EC/Axon have developed a methodology with the best level of available data to overcome with the identified gaps. |
| *4.4* | The model ignores that today, there are many different ways for MNOs to decide whether a device is using M2M or non-M2M traffic. Before using any cost model for M2M, the definition of M2M for all MNOs in Europe would have to be standardized. | | The purpose of the model is not to standardize and define M2M services beyond what is outlined in Recital 249 of Directive 2018/1972. The current aim of the cost assessment for M2M services is for informational purposes, to provide the European Commission with better insight into the market itself. |
| *4.5* | We cannot distinguish whether SIM cards are used for M2M communication or for "classic" communications. | | |
| *4.6* | The complete separation of M2M services' reporting in wholesale roaming is still a pending issue. | | |
| *4.7* | There is no final agreement, nor guidelines, on what is considered M2M and what isn't. For instance, some players argue that a hotspot is M2M, others don´t. Likewise, there is no final agreement on how to identify this traffic. | | |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# **Question 4:** Do you agree with the modelling implementation adopted by Axon/EC team for the separation of the M2M services within the model? (2/3)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *4.8* | Even though a lot of M2M devices do only use very small amounts of data traffic, if costs are only expressed per GB, such devices will never be allocated with the costs of the network. | | Pleaser refer to the Executive Summary of this presentation.<br><br>As explained there, the EC/Axon team has included a new scenario in the model submitted to the second public consultation, allowing the allocation of costs based on customers, in alignment with the feedback received from some stakeholders. |
| *4.9* | The approach leaves the aspect aside, that there is a huge portion of fix costs (both, Capex and Opex) which needs to be distributed across all customers irrespective of their individual usage. A significant number of cost factors are driven by the pure existence of a connectivity device (e.g., cell tower). Costs for such elements are not traffic driven and therefore an appropriate cost distribution factor needs to be developed (Example: In a cell, there are 1,000 NB-IoT Sims and one ordinary streaming customer located. Cost distribution via traffic could potentially lead to quite misleading results). | | |
| *4.10* | Signaling is not a negligible cost. Role of 2G is currently non negligible and will remain so until a credible phase out plan will be defined. More than a traffic based M2M approach it would be advisable to purse a mixed wholesale model based on monthly fee per M2M SIM plus a traffic PPU. | | |
| *4.11* | It is believed that a relevant number of M2M devices will generate very low or no volumes of communications, while representing a proportionally high cost of signaling. It is therefore crucial that Wholesale M2M is also charged on a fee per IMSI basis. | | |
| *4.12* | The methodology for M2M is not suitable, where the industry asks for contracts for permanent roaming, the model used for the regulation of RLAH is not at all adapted to the M2M market. Since 2015, the BEREC had already flagged the subject of M2M with warnings that were never taken into account, a new model for M2M must be remade. | | |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# **Question 4:** Do you agree with the modelling implementation adopted by Axon/EC team for the separation of the M2M services within the model? (3/3)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *4.14* | It is essential that the model delivers the relevant results without underestimating the costs/investments. The costs of M2M services by 2G/3G/4G technologies (and the traditional services to end-customers) are simply given by the unit cost multiplied by the related traffic by technology, which amounts to simply weighting the costs by the traffic that the technology is supporting. However, this does not bring any useful information on the range of network investment considered to handle specific M2M traffic. | | It should be noted that, in a mobile network, network elements are simultaneously shared between traditional and M2M services. This is the reason why the approach suggested by the operator of estimating separated investments required by M2M (and traditional) services is not practicable. Despite this, if the stakeholder is interested in the total investment required in the mobile network, this information is available in the table 'Investment' of the worksheet '7B CALC CAPEX' within the model. |
| *4.15* | The model assumes a high percentage of traffic for M2M use cases in 5G, which is simply not the reality. Many M2M devices only use the 2G/3G or 4G technologies and this situation will continue for a long time (e.g., more than 10 years or even longer). | | The split of M2M traffic per access technology has been derived based on the information received from operators during the data collection process. We also observe that the stakeholder does not propose any alternative figures as part of its comment. |
| *4.16* | It is known that M2M services will require specific technologies, such as LTE-M or NB-IOT, which will represent additional costs to mobile operators. | | During the data collection process, despite it was requested, operators did not inform about additional costs needed to run LTE-M or NB-IOT technologies. |
| *4.17* | The primary concern of MVNO Europe is that the separation of M2M services within the model leads to different/higher calculated costs (and potentially in future wholesale caps) for M2M data traffic, and/or could potentially ultimately lead to the introduction of one-off and recurring per-SIM fees specific to M2M/IoT that are unrelated to data traffic. This could result in distortions of competition between MNOs and (IoT) MVNOs. | | The separation of M2M services was already treated in the comments received to Workshop 1, where the EC expressed the following: *"The EC has considered appropriate to separate them as this disaggregation may be ultimately relevant for regulatory purposes"* and *"Considering the particular EC's interest in knowing the specific costs of M2M services for potential regulatory purposes, we have considered appropriate to collect data that should allow the separation of M2M services."*<br><br>On the other hand, regarding the utilization of a price per-SIM, as explained in the Executive Summary of this presentation, the EC has considered it appropriate to include a new scenario in the model allowing to capture this possibility. However, any decision regarding the utilization of this or any other price scheme will be subject to a subsequent legislative process, to be carried out by the EC in conjunction with the European Parliament and the Council. |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

**Question 5:** Do you consider that the outputs produced by the model are reasonable for an operator with the scale of the reference operator in your country?

1. Number of sites modelled
2. Annual total cost base
3. Service level results for Traditional Roaming Data costs (EUR/GB)
4. Service level results for M2M Roaming Data costs (EUR/GB)
5. Service level results for Voice Termination costs (EURcents/min)
6. Service level results for Voice Roaming costs (EURcents/min)

# 1. Number of sites modelled (1/4)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.1.1* | Starting from a certain year, the numbers of sites is projected to decrease despite increasing traffic volumes. | | Please refer to the Executive Summary of this presentation for the detailed explanation on why the number of access sites is decreasing for certain countries. |
| *5.1.2* | The number of sites should not decrease since operators still have to fulfil coverage requirements. | | Algorithms included in the model already capture any constraint related to coverage requirements. However, the decrease in the number of sites observed for some countries is not associated to coverage constraints, but to those sites that are installed to additionally fulfil traffic requirements. |
| *5.1.3* | It is unclear how specific assumptions are incorporated such as site sharing, mobile sites transfer to infrastructure companies and the leasing of sites for those tower companies. | | Please refer to comment 2.6.2. |
| *5.1.4* | The number of sites in the model seems highly dependent on very small changes of traffic inputs. If one decreases domestic traffic in the model only slightly, the model's results for sites decreases dramatically. | | After a careful review of the model, we have verified that any variation in domestic traffic is translated to a perfectly reasonable variation in the number of sites. The lack of evidence/example from the stakeholder submitting this comment prevents us from further assessing it. |
| *5.1.5* | The number of modeled sites for achieving coverage in 4G/5G is too low and does not correspond to the reality. | | The lack of evidence/figures from the stakeholder submitting this comment prevents us from further assessing it. |
| *5.1.6* | [Spain] One operator indicates that there are significant differences between the number of sites provided for the year 2023 and those calculated by the model. | | After having evaluated the model of Spain in detail, we observe that the lower number of sites calculated for the modeled reference operator is perfectly logical. This observation is especially true when considering that the market share of this modeled reference operator is also lower, by a close magnitude, than that of the operator submitting this comment. |
| *5.1.7* | [Romania] The number of sites is low, considering the mandatory coverage obligations imposed through the spectrum license. | | We observe that the number of sites calculated by the model of Romania is reasonably aligned with the average number of sites installed by all Romanian operators (e.g., difference below 10% for 2023). While the operator submitting this comment does not inform its number of sites, it should be noted that this operator holds a higher market share than the modeled reference operator (with 25% market share). Therefore, it is logical to expect that the number of sites required by this operator is higher than those estimated by the model. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 1. Number of sites modelled (2/4)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.1.8* | [Malta] The number of sites being considered for Malta is significantly lower than the actual values. There are various country specificities in Malta which could be leading to higher number of sites than those estimated by the cost model, including indoor coverage difficulties (due to several factors such as stone buildings, thick-walled buildings especially in historic areas), high population density, significant increase in high-rise buildings across Malta during the past few years, etc. Additionally, the number of access sites calculated for the reference operator should be reconciled per technology. | | We point out that, after the update of the cell radii inputs (please refer to comment 2.13.18), the new number of sites estimated by the model of Malta has slightly increased, leading to a more appropriate reconciliation with the real number of sites installed by local operators.<br>Regarding the reconciliation between calculated sites and real sites for each access technology, we observe that, after the update of the cell radii inputs, these are also reasonably aligned. However, in this case, stakeholders cannot expect a flawless reconciliation, given that the current status of the real networks is highly conditioned by the historical deployments, particularly in the case of 2G/3G networks. However, given that a bottom-up model, due to its nature, evaluates traffic requirements at the present time, it is logical to observe a lower number of estimated sites in the case of 2G/3G networks. In other words, the model's results show that, if operator would deploy networks nowadays, the number of 2G/3G sites to be deployed would be lower. |
| *5.1.9* | [Malta] The outcome of the cost model also shows a significant decrease in the number of 5G sites in 2025. | | As the stakeholder itself points out, this result is due to the introduction of the spectrum band of 700 MHz in the year 2025, what is considered a completely logical result (i.e., the introduction of this band relaxes the need of sites in the network). Despite this, we remark that the model does not actually assume a decrease in sites, as it can be observed in worksheet "7B CALC CAPEX" (table "Resources Volume Consolidation" in row 236), where an adjustment is introduced in the number of 5G sites (see element "SingleRAN site equipment.5G Bands.# of bands"), keeping it constant between the years 2024 and 2025. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 1. Number of sites modelled (3/4)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.1.10* | [Greece] One operator indicates that the model underestimates 2G and 5G sites, when compared with its own access sites. | | Regarding 2G sites, please refer to comment 5.1.8. The same explanation applies here, in what relates to the reconciliation between calculated sites and real sites for each access technology.<br>Regarding 5G sites, we observe, based on the available data, that the operator submitting this comment has more sites than the average number of 5G sites when considering all operators in the country. Considering that the model represents a reference operator (somehow representing an average operator of the market), this lower number of 5G sites is therefore justified. |
| *5.1.11* | [Belgium] One operator indicates that the number of sites estimated by the model is lower than the real number of sites deployed by such operator. Possibly national or regional constraints (e.g. regarding EMF-norms) impact the results, implying that substantially more sites than put forward in the model must be deployed. | | To ensure a better reconciliation between the number of calculated and real sites of Belgian operators, we have considered it appropriate to slightly adjust the cell radii inputs of suburban/rural geotypes. It should be noted that, given the particularities of Belgium, this country was already recognized with a special treatment in SMART 2017/0091, where country-specific figures were being employed for the cell radii inputs (instead of EU/EEA averages). |
| *5.1.12* | [Czech Republic]: The number of sites estimated by the model is significantly lower than the real number of sites deployed by operators. Even the smallest MNO has substantially higher number of sites. | | Based on the feedback received, and after having carefully evaluated the model of Czech Republic, we have considered appropriate to introduce the following adjustments, aimed at enhancing the reconciliation between the number of calculated and real sites of local operators:<br>- No utilization of the spectrum band of 1,800 MHz is assumed for 2G, in line with the utilization reported by Czech operators.<br>- Cell radii inputs have been updated, making use of the 'Low cell radii dataset' for all geotypes and frequencies (the definition of the datasets is included in section '3.1.11. Cell Radii' of the Methodological Approach document elaborated during SMART 2017/0091 - link).<br>- 2G and 4G coverages in the rural geotype has been slightly increased, to align them with figures from SMART 2017/0091. Even if slightly lower coverage levels had been reported by Czech Republic in this project when compared with SMART 2017/0091, no decrease in coverage seems presumably justified for these two technologies. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 1. Number of sites modelled (4/4)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.1.13* | [Ireland]:<br>-2G sites. We expect 2G to remain roughly constant until the M2M transfers over (potentially 2027-2030) so a less aggressive decrease is needed.<br>-3G sites. We expect this to decrease at a faster rate with operator retirement of 3G services occurring from 2024 onwards.<br>-5G sites. We expect 5G bands to also be used for small urban sites.<br>-From ComReg site viewer, taking a simple average, there are around 2300 sites per operator, a lot of which will be shared sites.<br>-Even in rural areas you can see that there are very few, if any, single technology sites. In general, rural sites tend to have at least a circuit switched and an OFDM based technology, i.e., UMTS or GSM, and LTE, LTE+ or NR |  | -2G sites and 3G sites. We observe that the evolution of 2G and 3G sites is well aligned with the expected levels of traffic assumed for these two technologies, based on the technical split assumed for the cost model of Ireland.<br>-5G sites. We note that this is actually aligned with the model's design, as it can be identified in section 'Step 4. Required access elements' of the Descriptive Manual, where the dimensioning of small-cell sites is described. We also remark that different network resources have been reserved in the model for these network elements, namely: "Small cell.Active unit.# of small cells".<br>-Average number of sites. The lack of information about sites in the format requested during the data collection process from Ireland, prevents us from appropriately assessing any reconciliation between the number sites estimated by the model and real sites (among other reasons, as the weight of shared sites is unknown). Despite this, based on the available references from SMART 2017/0091, the number of sites calculated in the model for Ireland is in a reasonable range.<br>-Regarding the reconciliation for each access technology, please refer to comment 5.1.8. The same explanation applies here. |
| *5.1.14* | [Croatia] The number of modelled sites is more than doubled compared to the number of sites that any operator in Croatia currently has. Additionally, the number of sites modelled is also completely different from the number of sites modelled in previous Axon model where this number was less than 20% above the number of sites of biggest mobile operators in Croatia. |  | After assessing the comment received from this stakeholder, we have considered it appropriate to adjust the spectral efficiency inputs of 4G networks in the model of Croatia, keeping the same values from previous SMART 2017/0091, in order to ensure a better reconciliation between the number of sites estimated by the model and the real number of sites in Croatia. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# 2. Annual total cost base (1/2)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.2.1* | We suggest verifying the way of calculating the depreciation in 7B section when transposing from detailed network elements (rows 1859-...) through "Production Factor x Unit Costs x Alpha factor" into groups (rows 2089...). Capex produced is significantly lower than the original one given by dimensioning of the network. |  | We clarify that the Capex figures presented in the two tables specified by the stakeholder may not necessarily align. Specifically, any disparities observed are attributed to adjustments made in the 'ADJUSTMENT FOR BACKHAUL AND BACKBONE ASSETS' table of worksheet 7B. In this table, depreciation of backhaul and backbone elements is carried out on a grouped basis, rather than at the individual asset level. |
| *5.2.2* | Staff costs for the core network cannot be derived as a *"percentage add-on"* to the component costs because the ratio between labour costs and platform/equipment costs is totally different between access and core network. Therefore, a dedicated assessment about labour costs for the core network is needed for both, the set-up of new technology/platforms and also for operating the systems. |  | While the stakeholder suggests treating separately the staff cost component between access and core elements, we observe that neither particular figures or evidence (which justifies the proposed approach) have been provided as part of its response. Additionally, this approach was already established in the previous SMART 2017/0091 with no other stakeholder showing its disagreement with it. For all these reasons, we find no justification to alter the current approach. |
| *5.2.3* | Some stakeholders simply refer to the feedback provided in other questions (e.g. unit costs, number of sites modelled, etc.) to justify their disagreement with the annual total cost base. | N/A | Please refer to EC/Axon's views as expressed in other questions. |
| *5.2.4* | [Czech Republic] One operator indicates that the annual cost calculated by the cost model is underestimated when compared with the figure operator's internal figure extracted from its financial statements. |  | We observe that the operator does not provide any detail about its cost structure, thus impeding us to further assess the indicated difference. Despite this, it should also be mentioned that the bottom-up model, due to its nature, only considers cost components related to the operation of the mobile network. In other words, it does not incorporate any costs that may be related to retail activities such as marketing, advertising, shops, customer care, etc. which commonly represent a significant portion of operator's financial costs, but which are not relevant for the regulatory purpose of the model. This could be the reason that presumably leads to the observed difference by the operator. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# 2. Annual total cost base (2/2)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.2.5* | [Spain] There is no obvious reason to explain how total costs' growth rate should drop from [CONFIDENTIAL (positive value )%] in 2023 to [CONFIDENTIAL (negative value)%] in 2027. Besides, they are not correlated with the variations in the number of sites. | | In the first place, given the nature and particularities of bottom-up models, it should be remarked that stakeholders may not expect, in general, flawless evolutions in the results, as these ultimately depend on multiple parameters and assumptions that may influence results in various directions over the years (illustrative examples of aspects that may influence the results are: the split of traffic between the different access technologies over the years, phase outs of certain technologies, the annual recovery pattern introduced by the economic depreciation, etc.). In any case, if any stakeholder has particular interest in understanding, for instance, any variation between two years, the model shared during the public consultation offers complete transparency to stakeholders regarding its inputs, calculations and outputs, in order to understand the reasons behind the observe differences.<br><br>Having said this, we clarify that, for the particular cases raised by the stakeholder in its comment, main reasons that justify the variations are as follows:<br><br>- 2023: the increase in costs is associated to the additional 4G related network elements needed in the modelled network to handle the increase in traffic with respect to previous year.<br>- 2027: the decrease in costs is associated with the migration of traffic towards 5G technologies, with better cost-efficiency performance than older technologies. |
| *5.2.6* | [France and Slovakia] There is no obvious reason to explain how total costs' growth rate should drop from [CONFIDENTIAL (positive value )%] in 2025 to [CONFIDENTIAL (negative value)%] in 2027. Besides, they are not correlated with the variations in the number of sites. | | Please refer to previous comment 5.2.5, as the same explanations apply here:<br>- 2025: see explanation for year 2023 in the referred comment.<br>- 2027: see explanation for year 2027 in the referred comment. |
| *5.2.7* | [Belgium] There is no explanation how the total costs' growth rate should evolve from [CONFIDENTIAL (positive value )%] in 2023 [CONFIDENTIAL (negative value)%] in 2026 to [CONFIDENTIAL (positive value )%] in 2027. Besides, they are not correlated with the variations in the number of sites. | | Please refer to previous comment 5.2.5, as the same explanations apply here:<br>- 2023: see explanation for year 2023 in the referred comment.<br>- 2026: the decrease in costs is mostly related to the phase out of 3G networks.<br>- 2027: the increase is related to the additional costs required to handle the increase in traffic handled by the network. |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# 3. Service level results for Traditional Roaming Data costs (EUR/GB) (1/3)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.3.1* | We cannot reproduce how the costs for data transport have been modelled. | 🟢 | We remark that the model offers complete transparency to stakeholders regarding its inputs, calculations and outputs. |
| *5.3.2* | Some stakeholders simply refer to the feedback provided in other questions (e.g. unit costs, demand, total cost base, etc.) to justify its disagreement with the results produced for the service. | N/A | Please refer to EC/Axon's views as expressed in other questions. |
| *5.3.3* | Paragraph 7 of Regulation (UE) 2022/612 provides explicitly that *"an internal telecommunications market cannot be said to exist while there are differences between domestic and roaming prices".* These differences still exist today considering that the actual wholesale data roaming caps provided by the current regulation, although reduced, are still high compared to the domestic prices. This is the reason why the sustainability mechanism continues to be used still today mostly by smaller operators and MVNOs in order to maintain their competitiveness in the market.<br>We invite to reconsider the value of the wholesale data roaming prices proposed and to reduce them at the level of the domestic one. | 🟢 | We observe that the stakeholder's comment is outside the scope of the current consultation, focused on the determination of services' unit costs, and not in prices.<br>Any applicable wholesale prices will be determined in a subsequent legislative process, to be carried out by the EC in conjunction with the European Parliament and the Council. |
| *5.3.4* | [Spain] There is a very slight decrease between 2024 and 2025 and then a sharp drop in 2026. | 🟢 | We clarify that the drop in 2026 is justified, among other reasons, due to the significant migration of traffic towards the 5G technology (with better cost-efficiency performance than 2G/3G/4G) in such year. |

🟢 Comment from <5 stakeholders
🟡 Comment from 5-15 stakeholders
🔴 Comment from >15 stakeholders

# 3. Service level results for Traditional Roaming Data costs (EUR/GB) (2/3)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.3.5* | [Spain] The level of roaming data unit costs is forecasted from 0.59 in 2024 to 0.30 in 2032 in the network-based cost allocation version. The levels calculated for the years 2022 and 2023 are also well below the current wholesale cap level of 1.55 EUR/GB in 2024. The very important gap between Axon's cost and the wholesale cap is an economic risk for MNOs, as it seems that there would be room for a dramatic decrease which would destabilize the market. | 🟢 | EC/Axon clarify that the setting of wholesale caps based on the results of the cost models is an activity which will be accomplished in a subsequent stage of this project.<br>It is also important to mention that, in a similar manner to the approach followed in previous wholesale price setting processes adopted by the EC regarding wholesale termination and roaming caps, results obtained from models of all countries will be considered at that stage. |
| *5.3.6* | [France] The level of roaming data unit costs is forecasted at [CONFIDENTIAL] from 2022 to 2032 in the network-based cost allocation version. The levels calculated for the years 2022 and 2023 are well below the current wholesale cap level of 1.55 EUR/GB in 2024. The very important gap between Axon's cost and the wholesale cap is an economic risk for MNOs, as it seems that there would be room for a dramatic decrease which would destabilize the market. | 🟢 | |
| *5.3.7* | [Slovakia] The level of roaming data unit costs is forecasted at [CONFIDENTIAL] from 2022 to 2032 in the network-based cost allocation version. The levels calculated for the years 2022 and 2023 are well below the current wholesale cap level of 1.55 EUR/GB in 2024. The very important gap between Axon's cost and the wholesale cap is an economic risk for MNOs, as it seems that there would be room for a dramatic decrease which would destabilize the market. | 🟢 | |
| *5.3.8* | [Poland] In section 10B, the model produces CAPEX INCREMENTAL COST categories with negative values for years 2030-2032 for Data Roaming services. We believe that any model should not produce incremental costs below zero in any case. | 🟢 | We inform that the negative values identified have arisen as a consequence of the anonymization process implemented in the version shared with operators (NON-CONFIDENTIAL version). However, this issue did not occur in the internal version utilized by the EC and shared with the NRAs (CONFIDENTIAL version). |

🟢 Comment from <5 stakeholders
🟡 Comment from 5-15 stakeholders
🔴 Comment from >15 stakeholders

# 3. Service level results for Traditional Roaming Data costs (EUR/GB) (3/3)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.3.9* | [France and Slovakia] The model gives a doubtful result for the unit costs of data services. Data roaming cost should be strictly higher than domestic data cost, but this is not the case in years 2022, 2024 and 2026. | | The fact that the data roaming cost should be strictly higher than domestic data cost is not necessarily true. Among other reasons, domestic and roaming services are assessed in the model with different traffic patterns as well as different increments (i.e., their incrementality may be different), at the same time that domestic services make use of certain network equipment which are not employed by roaming services (such as the GGSN, Billing System, PGW and PCRF), which may also result in higher costs being allocated to domestic services. |
| *5.3.10* | [Italy] The model provide results for Italy that are unrealistic if compared to actual retail prices in the market. | | Despite no relationship must necessarily exist between calculated costs by the model and applicable retail prices, after evaluating the evidence submitted by this stakeholder, we have observed the following:<br>- All retail tariffs employed in the comparison presented by the operator correspond to bundled packages with extremely high data volumes (a minimum volume of 100 GB), which may not necessarily represent an average user in Italy. This aspect seems to be clearly distorting any relevant comparison.<br>- Furthermore, any robust comparison would require to know in detail the real consumption finally made by users over the whole allowance of the package, as this consumption may be in most of cases very far away from the total data volume allowance. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 4. Service level results for M2M Roaming Data costs (EUR/GB)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.4.1* | We cannot reproduce how the costs for data transport have been modelled. | | Please refer to comment 5.3.1. |
| *5.4.2* | It seems unrealistic that data roaming costs will continuously decrease after 2024. | | The continuous decrease in data roaming costs is mostly justified due to the following reasons: i) overall increase in data consumption traffic used by subscribers, what leads to economies of scale ii) migration of data traffic from legacy technologies (2G/3G) towards newer technologies (4G/5G) with better cost-efficiency performance. |
| *5.4.3* | Some stakeholders simply refer to the feedback provided in other questions (e.g. unit costs, demand, total cost base, etc.) to justify its disagreement with the results produced for the service. | N/A | Please refer to EC/Axon's views as expressed in other questions. |
| *5.4.4* | [Belgium] The level of roaming data unit costs is 1 EUR/GB in 2022, 0.93 EUR/GB in 2023, forecasted from 0.8 in 2024 to 0.42 in 2032. Levels calculated for the years 2022 and 2023 are below the current wholesale cap level of 1.55 EUR/GB in 2024. However, the gap between Axon's cost and the wholesale cap is small, which is clearly an economic risk for MNOs, as any change to regulated wholesale charges would destabilize the market. | | Please refer to comment 5.3.5. |
| *5.4.5* | [Poland] In section 10B, the model produces CAPEX INCREMENTAL COST categories with negative values for years 2030-2032 for Data Roaming services. We believe that any model should not produce incremental costs below zero in any case. | | Please refer to comment 5.3.8. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 5. Service level results for Voice Termination costs (EURcents/min) (1/2)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.5.1* | It seems that the allocation of network usage for voice termination has been changed since the last model. This seems to allocate too many costs to voice services compared with data services. We could not retrace this effect. | 🟢 | Please refer to comment 5.3.1. We also clarify that the allocation procedure remains equivalent to that of SMART 2017/0091. |
| *5.5.2* | Voice termination costs seem to be way too low. They are less than the half of the current MTRs. It is not realistic that these costs should have decreased so much since 2019. | 🟢 | The decrease observed in voice termination costs is mostly justified due to the migration of traffic from legacy technologies (2G/3G) towards newer technologies (4G/5G), with a better cost-efficiency performance. At this stage, it is also important to establish a differentiation between the cost produced by the cost model and the applicable MTR. To this respect, while individual costs are produced for each country, the applicable MTR (so-called Single Eurorate) will be determined in a subsequent legislative process carried out by the EC in conjunction with the European Parliament and the Council, where the results obtained by models of all countries will be considered. This approach will be equivalent to that followed in the previous equivalent wholesale price setting processes, meaning that the cost produced by an individual country will not necessarily be transposed into the applicable MTR. |
| *5.5.3* | There is an issue in the model with the result of voice termination and voice roaming, as results provided in the sheet '9G OUT RESULTS - NW' and '10C OUT RESULTS - POLICY' do not match. | 🟢 | We clarify that this is not an issue of the model. It is worth noting that while the sheet '9G OUT RESULTS - NW' displays the results produced from a network perspective, the '10C OUT RESULTS - POLICY' displays the results produced from a regulatory policy perspective. Please refer to section '6. Regulatory policy allocation module' of the Descriptive Manual for further details on the logic and the differences between both modules. For the avoidance of doubt, we also clarify that results produced under the regulatory policy perspective will be the relevant ones for the setting of wholesale charges. |
| *5.5.4* | Some stakeholders simply refer to the feedback provided in other questions (e.g. unit costs, demand, total cost base, etc.) to justify its disagreement with the results produced for the service. | N/A | Please refer to EC/Axon's views as expressed in other questions. |

🟢 Comment from <5 stakeholders
🟡 Comment from 5-15 stakeholders
🔴 Comment from >15 stakeholders

# 5. Service level results for Voice Termination costs (EURcents/min) (2/2)
*Outputs*

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.5.5* | [Spain] One operator indicates that the latest figures calculated by its accounting system, on a current cost basis, provides figures of around [CONFIDENTIAL cents per minute] which are higher than figures of estimated by the EC's cost model. Any amount below these figures implies that operators are making a loss on this service. | | While we appreciate the operator's comment, we notice that figures submitted by the operator are not comparable with results produced by the EC/Axon's cost model due to the different nature of both tools, for example: i) top-down vs bottom-up architecture; ii) FDC (Fully Distributed Cost) vs pure LRIC cost standards; and iii) operator specific vs average reference operator in the market.<br><br>For this reason, figures proposed by the operator are not suitable for regulatory purposes, as they basically do not follow the methodological principles pre-established by the EC in the EECC for the setting of wholesale termination rates. |

Comment from <5 stakeholders
Comment from 5-15 stakeholders
Comment from >15 stakeholders

# 6. Service level results for Voice Roaming costs (EURcents/min)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *5.6.1* | There is an issue in the model with the result of voice termination and voice roaming, as results provided in the sheet '9G OUT RESULTS - NW' and '10C OUT RESULTS - POLICY' do not match. |  | Please refer to comment 5.5.3. |
| *5.6.2* | Roaming figures for the years 20 and 21 are conditioned by the COVID 2019 pandemic and therefore may lead to biased results in the subsequent years. |  | We note that years 2020 and 2021 were in fact intentionally removed from the cost model to avoid any distortion that the COVID pandemic could potentially introduce in results. |
| *5.6.3* | Some stakeholders simply refer to the feedback provided in other questions (e.g. unit costs, demand, total cost base, etc.) to justify its disagreement with the results produced for the service. | N/A | Please refer to EC/Axon's views as expressed in other questions. |
| *5.6.4* | [Spain] One operator indicates that the cost shows a huge decrease between 2025 and 2026, before rising and stabilizing from 2027 onwards. The operator does not understand the sharp decrease in 2026. |  | We clarify that the drop occurred in the models of Spain and Portugal is mostly due to the following reasons: i) the phase out of 3G networks ii) the migration of traffic from 2G networks to 4G, with better cost-efficiency performance. |
| *5.6.5* | [Portugal] There is a significant drop on the voice roaming cost from 2024 to 2025. |  | |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

# **Question 6:** Do you agree with the EC's preliminary estimates of voice and mobile data transit charges, namely 0.3-0.5 EURcent/min and 0.07-0.1 EUR/GB, respectively? (1/2)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *6.1* | Transit charges are high. | | The consulted ranges of transit charges are based on the benchmark collected from stakeholders in the data collection exercise. Additionally, the consulted averages include outliers, that is, stakeholders who have reported either very high or very low charges. |
| *6.2* | Transit charges are low. | | |
| *6.3* | While proposed transit charges are reasonable, it may depend on the country and/or the operator, potentially requiring higher charges. | | |
| *6.4* | Small operators do not benefit from the same volume discounts than larger operators. Thus, an EU average transit rate will penalize small operators. | | |
| *6.5* | A termination fee of 0.3-0.5 EURcent/min for voice cannot be justified. Based on our models for 2025-2026, we see termination fees of significantly less than 0.2 EURcent/min. | | We clarify that the proposed rates in section '7. Transit charges' of the Methodological Approach document do not refer to the Termination Fees, as understood by the stakeholder in light of its comment, but to Transit Fees. Please refer to such section for further details on the meaning and applicability of Transit Fees. |
| *6.6* | The substantial variations in information reported by the various operators is difficult to be justified in a mature market such as the international carrier business, which relies on open online auctions and that should result in consistent values across operators. Given that the variation is likely the result of unprecise or incorrect values provided by operators in the data collection process, we suggest requesting the data directly to international carriers as a further benchmark. | | The data collection was limited to MNOs and MVNOs since the gathering of data proceeded via NRAs, which, in principle, do not have a clear insight into unregulated, competitive transit markets. However, the Commission will, in the future, consider consulting stakeholders such as international transit operators and collecting data from them if it is deemed necessary and feasible. |

Comment from <5 stakeholders

Comment from 5-15 stakeholders

Comment from >15 stakeholders

# **Question 6:** Do you agree with the EC's preliminary estimates of voice and mobile data transit charges, namely 0.3-0.5 EURcent/min and 0.07-0.1 EUR/GB, respectively? (2/2)

| # | Relevant comments | Occur. | EC/Axon's view |
|---|---|---|---|
| *6.7* | International connectivity should also be factored in within the cost model since the conveyance of roaming and international traffic depends on international connectivity. Furthermore, the transit charges do not take into account any CAPEX and OPEX incurred by operators for investments related to international connectivity (e.g., submarine cables). |  | The international connectivity is only relevant for retail services (services provided by the operator to their own end-customers), but not in the case of roaming services provided to wholesale customers. Thus, its inclusion is not considered pertinent. |

 Comment from <5 stakeholders

 Comment from 5-15 stakeholders

 Comment from >15 stakeholders

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## Any questions? Please, contact:


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