Assessment of the cost of providing wholesale roaming services and mobile voice termination in the EU/EEA countries – SMART 2017/0091

Assessment of the feedback received in the public consultation and outcomes of the draft cost model

February 2019

Introduction

- The European Commission (hereinafter, 'EC') has commissioned Axon Partners Group Consulting (hereinafter, 'Axon Consulting') to provide consulting services in relation to the "*Assessment of the cost of providing wholesale roaming services in the EU/EEA countries – SMART 2017/0091*" (the 'Project').

- This document summarises the work done by Axon Consulting in preparation for the second consultation (running from 18 February to 15 March 2019) on the mobile cost model, namely: (i) the feedback received in the 1st consultation process (ran from 29 October to 23 November 2018) and how we have dealt with stakeholders' comments to prepare the draft cost model for the 2nd consultation; (ii) the updates introduced in the model; and (iii) how the model reconciles with MNOs' realities in each country.

- The document is structured in 3 sections and an Annex, as follows:
  - Section 1: Assessment of the feedback received during the 1st consultation
  - Section 2: Updates to the cost model and new reconciliation exercise
  - Section 3: Scenarios analysis
  - Section 4: Concluding remarks and next steps
  - Annex A: Detailed assessment of the feedback to 1st consultation.

A well-defined set of steps has been undertaken in order to deal with the feedback received in the 1st consultation

1	Internal assessment of the feedback received.	Covered in section 1 of this document
2	Discussion of the assessment of the feedback received and agreement on the course of action with the EC and the Steering Committee (SC) of NRAs.	
3	New information requests to all NRAs and contacts with NRAs from countries where reconciliation discrepancies had been detected in the first draft model.	
4	Update of the cost model with the new information provided by NRAs and implementation of feedback received in the 1st consultation round.	Covered in section 2
5	Implementation of additional scenarios in line with feedback from stakeholders during 1st consultation to understand their implications on unit costs.	
6	Development of a new draft version of the model and supporting documentation for the 2nd consultation.	

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Overview of the approach adopted to assess the feedback received in the 1st consultation round

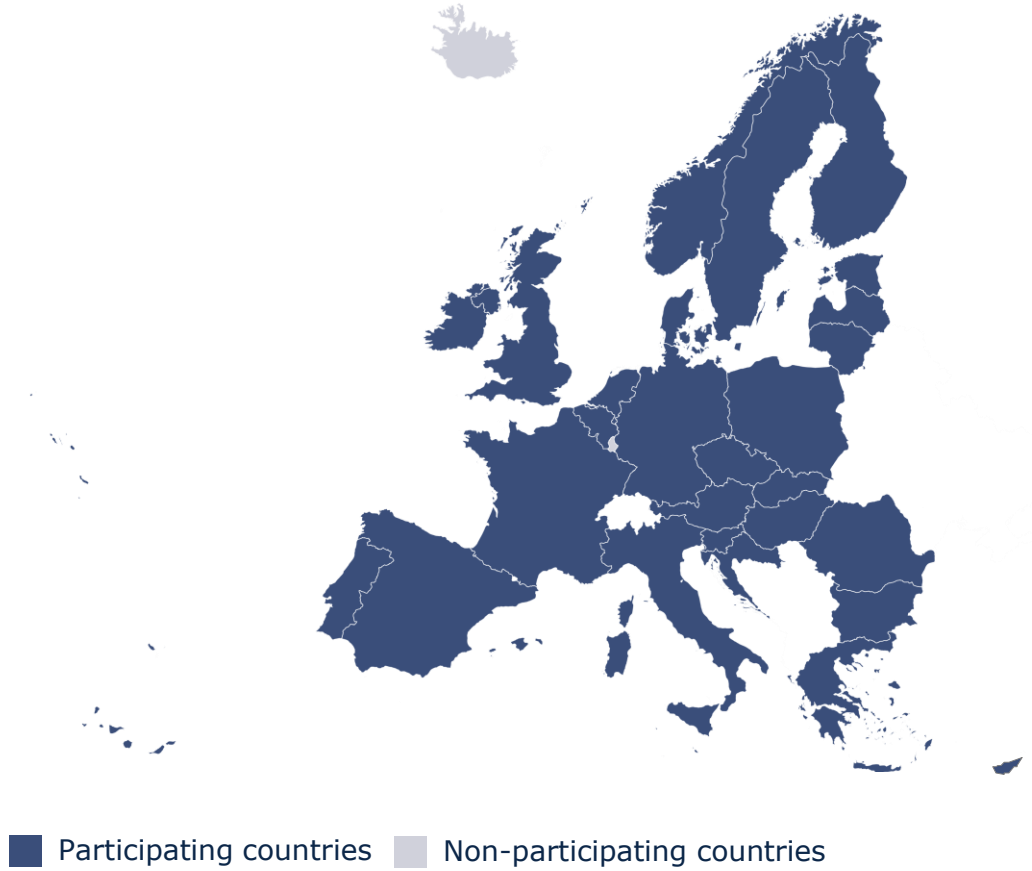
- This section includes a summary of the feedback received from stakeholders during the 1st consultation round and provides a high-level overview of the level of agreement reached with the industry. Additionally, a more detailed assessment of the feedback received during the 1st consultation can be found in Annex A.
- In order to assess the feedback received, the following approach has been adopted:
  - The level of agreement with the industry has been calculated taking only unique comments into consideration (i.e. verbatim comments from different local operations of a same operator group have been counted only once).
  - Answers disagreeing with the approach adopted but without supporting rationale have not been considered.
  - The assessment of the frequency of the comments presented in the Annex A has considered all the comments provided by stakeholders (counting all verbatim comments from different local operations of a same operator group).
- The following slides include i) a summary of the 1st consultation process and ii) a summary of the comments received on the methodology, the inputs and the outputs of the model.

Stakeholders were given 4 weeks to provide their initial views on the methodology, inputs and outcomes of the cost study

- Since the cost model and its supporting documentation were published (29 October), stakeholders had 4 weeks (until 23 November) to assess the inputs, algorithms and outputs employed/produced.
- As part of this process, stakeholders were expected to provide comments on:
  - **Costing methodology** adopted;
  - **Inputs** introduced in the model;
  - **Outcomes** of the model.
- Until the end of 2nd consultation (15 March) stakeholders can continue to familiarise with the cost model and provide feedback.

A very high response rate was registered for the 1st consultation. Virtually all countries submitted their feedback to the EC/Axon.

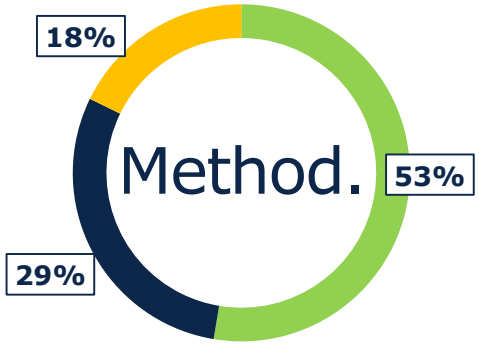
Participation rate of the 31 EU/EEA countries

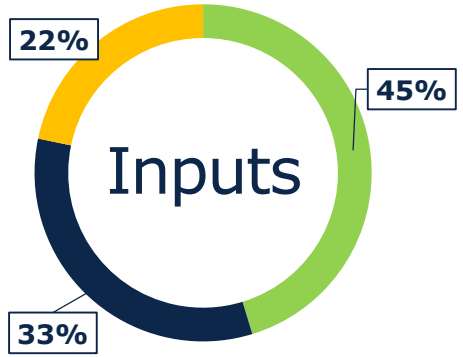


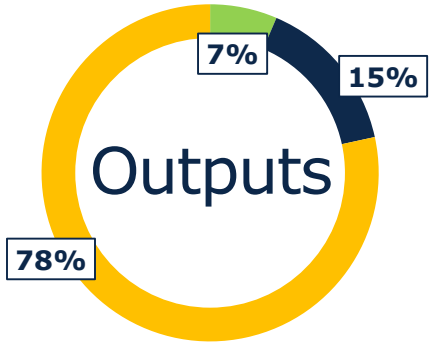
- 28 of the 31 EU/EEA countries submitted their feedback on the materials of the 1st consultation round.
- Only Iceland, Liechtenstein and Luxembourg decided not to participate.
- Stakeholders mostly submitted feedback through the template provided, making it easier to compare their position and extract meaningful conclusions.

The 1st consultation round showed a broad agreement on methodology and inputs, but disagreement on the outputs

Detailed comments and answers in Annex A







Agreement | Partial agreement | Disagreement

Main comments received:

- Time frame for review was insufficient.
- The LRIC+ methodology should be adopted.
- Standard/tilted annuities should be used.

Main comments received:

- Traffic disaggregation should be set per country. 4G traffic split is too aggressive.
- Actual demand should be more aligned with real market data.
- Unit costs are underestimated.
- Source of geo data is not representative.

Main comments received:

- The number of sites is underestimated.
- The cost base is underestimated.
- The costs per service are underestimated.

Note: A detailed assessment of all the feedback received is provided in Annex A to this presentation.

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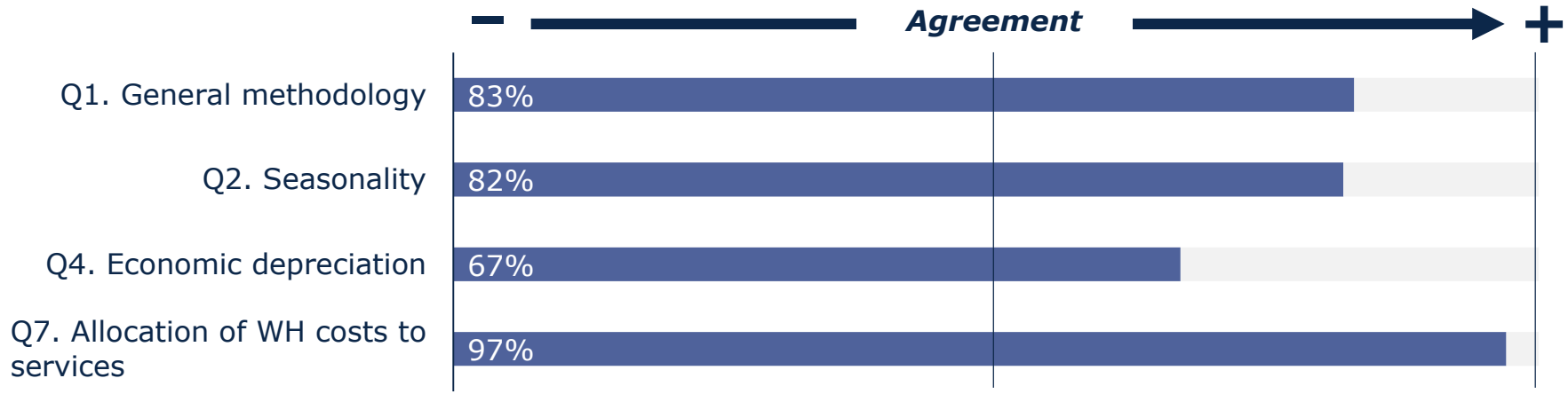
Methodology
Overview of stakeholders' position on the methodology (1/2)

Detailed comments and answers in Annex A

Percentage of responses that agree or partially agree with the approach adopted

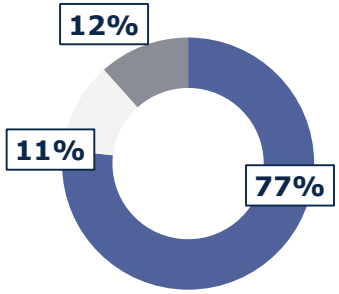


Note: Feedback to questions 3, 5, 6 and 8, which is of a more complex nature, is discussed in the next slide

Methodology
Overview of stakeholders' position on the methodology (2/2)

Detailed comments and answers in Annex A

VoLTE Scenario

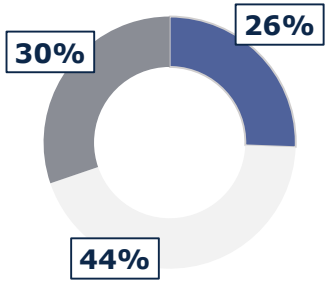


- Terminal adoption
- 4G only
- Other

Conclusion:
- VoLTE-ready terminal adoption used as base case in 2nd consultation.

Other: Real VoLTE usage

Economic depr.

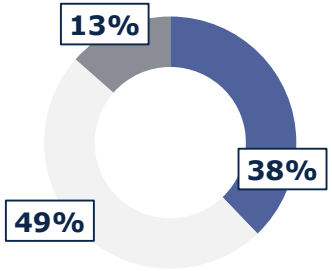


- Revenue-based
- Demand-based
- Other

Conclusion:
- Demand-based ED as base case in 2nd cons. (also aligned with FTR study).

Other: Standard/Tilted annuities

Increments

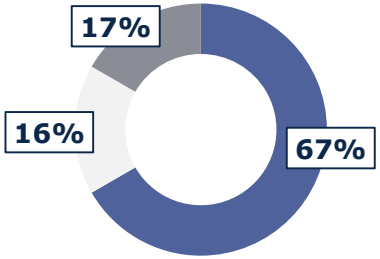


- Term, domest. & roam.
- Termination and other
- Other

Conclusion:
- Further views requested in 2nd consultation about both alternatives.

Other: Various kind of answers

Alloc. of WH costs



- Regression drivers
- GB
- Other

Conclusion:
- Regression drivers used as base case in 2nd consultation.

Other: Various kind of answers

Methodology – Executive overview of the feedback received

Stakeholders agreed with the methodological framework, although they complained about the time frame and the economic depreciation

- A broad agreement on the methodological framework was registered.
- Main areas of disagreement (agreement below or equal to 70%):

1. **Economic depreciation (Q4)**: Some stakeholders opposed the adoption of an economic depreciation methodology, arguing that tilted/standard annuities should be implemented instead. However, this methodological approach is already defined in the EC's 2009 recommendation* and the EECC** and is not subject to changes by the EC/Axon team.

2. **Time frame for review*****: Some stakeholders argued that the time frame for review (4 weeks) was not enough. It should be noted that the dates for the consultation rounds were announced as early as April 10 (during our kick-off Workshop) and that we have allowed for two consultation rounds (the second ending on 15 March), meaning that stakeholders will have virtually 5 months (since the launch of the 1st consultation on 29 October 2018 until the end of the 2nd consultation on 15 March 2019) to review the materials provided.

- On the other hand, in terms of stakeholders' feedback to questions with multiple answers, the approach to be adopted in the VoLTE scenario, the economic depreciation and the allocation of wholesale commercial costs is now in line with the views of the industry. In terms of the definition of the increments, the EC/Axon team recognizes that there was not a clear preference during the 1st consultation round, and therefore, we welcome further views from the industry on this point in this 2nd consultation round.

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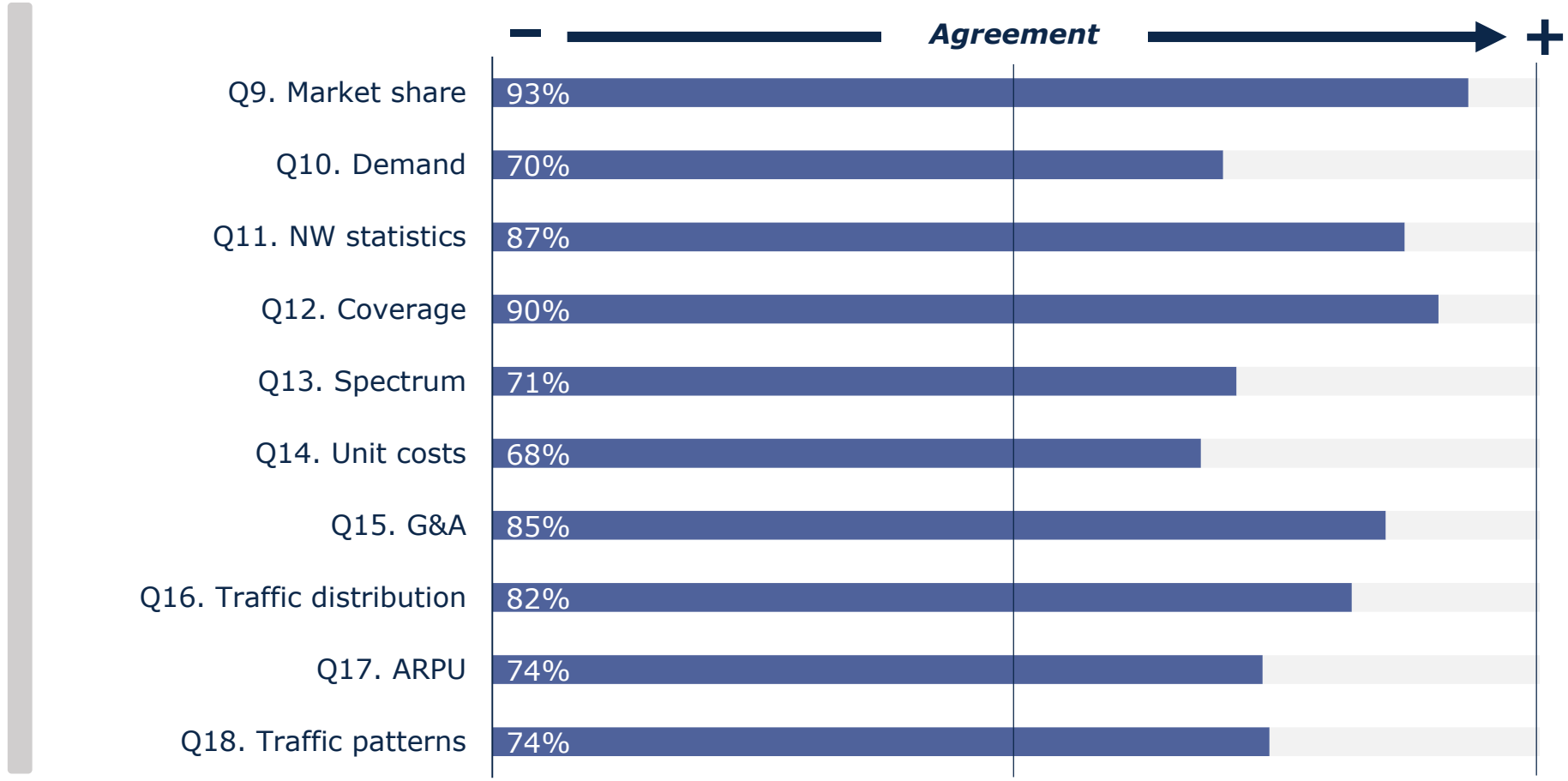
* EC's recommendation on fixed and mobile termination rates (2009/396/EC).
** European Electronic Communications Code.
*** While this was not an area in which we requested stakeholders' feedback, this topic was raised by multiple stakeholders and, therefore, has been included in this slide.

Inputs (1/2)
Overview of stakeholders' agreement with the inputs considered

Detailed comments and answers in Annex A

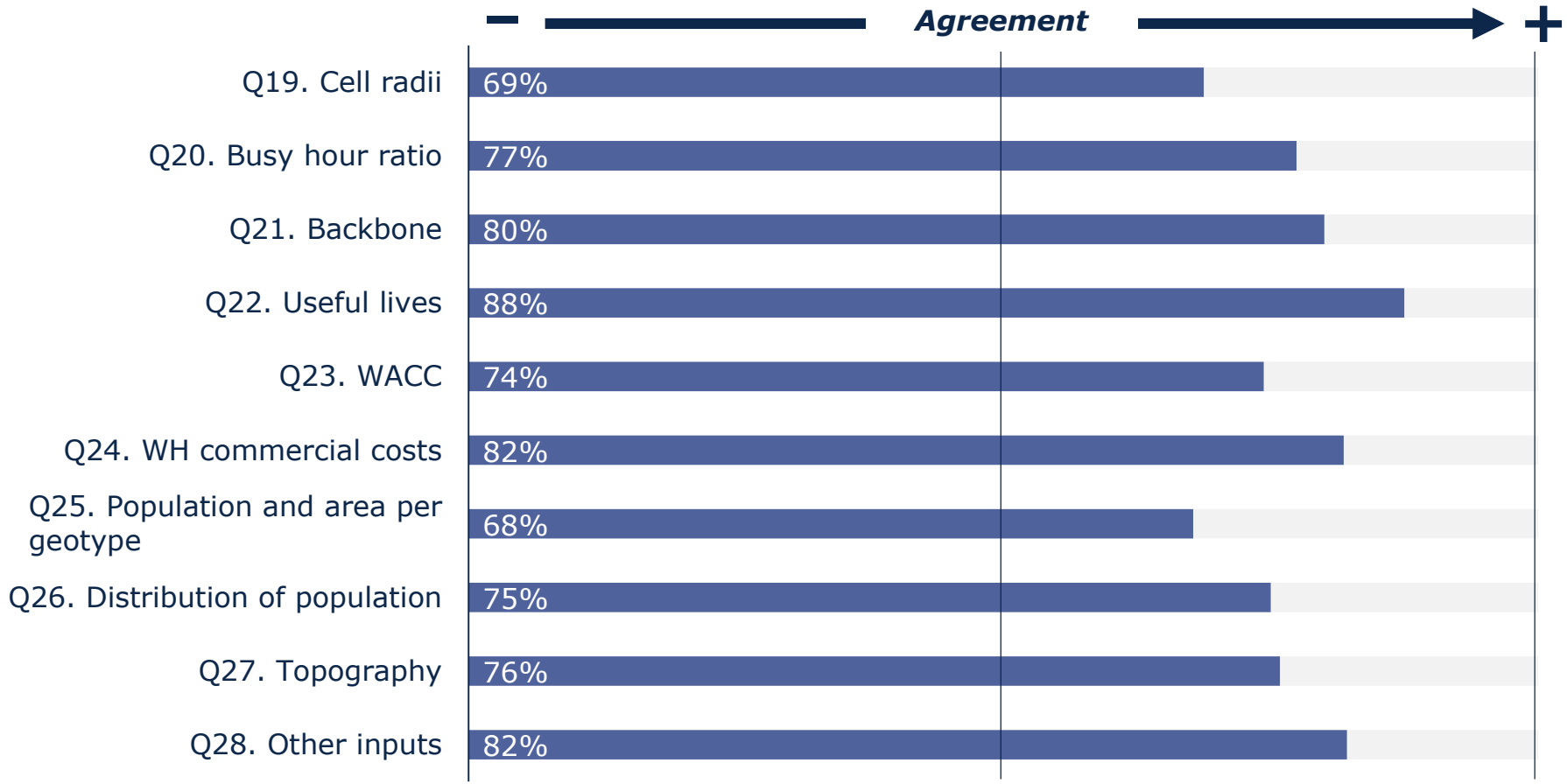
Percentage of responses that agree or partially agree with the inputs considered



Inputs (2/2)
Overview of stakeholders' agreement with the inputs considered

Detailed comments and answers in Annex A

Percentage of responses that agree or partially agree with the inputs considered



Inputs – Executive overview of the feedback received

There was a broad agreement on the inputs adopted, while some opposition was registered in 4 specific areas

- A broad agreement on the inputs was registered.
- Main areas of disagreement (agreement below or equal to 70%):

1. **Demand (Q10)**: Indications that the data originally reported by NRAs was not consistent with actual market data. These parameters have been corrected since the 1st consultation in cooperation with the NRAs.

2. **Unit costs (Q14)**: As the EC/Axon team agrees that unit costs for access-related assets may be driven by national macroeconomic conditions, we are considering country-specific unit costs for these assets in the 2nd consultation, as requested by some stakeholders. This assumption has also improved the reconciliation of the cost models with their national MNOs' realities.

3. **Cell radii (Q19)**: While an additional scenario has been included to illustrate the results obtained when country-specific figures are considered, this is not considered as the base-case given that in some countries the values reported do not reconcile with the realities of the networks of their MNOs.

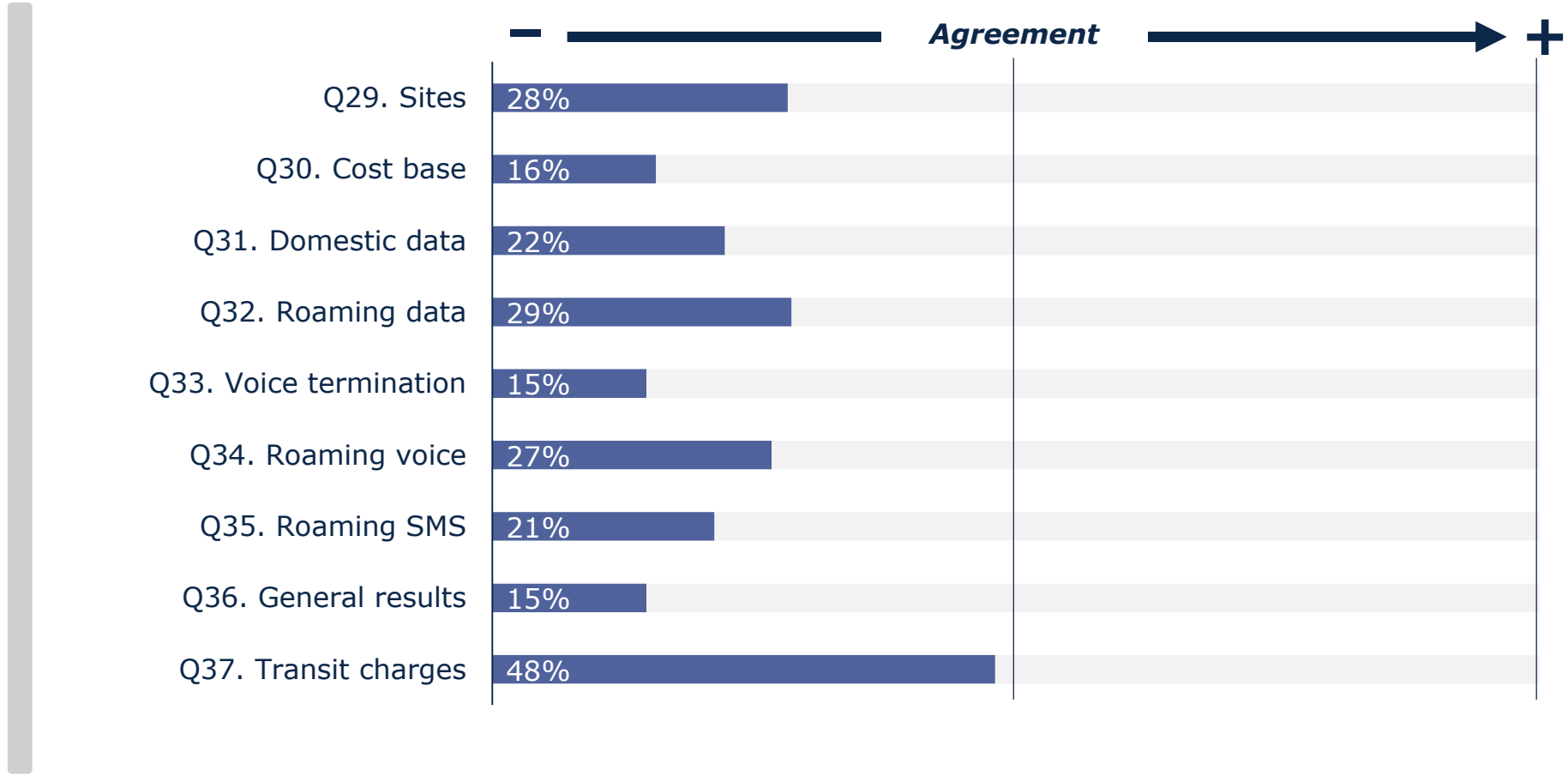
4. **Population per area and geotype (Q25)**: We received feedback questioning the differences between the geo information considered and that used in previous NRAs' cost models and/or info published by national statistical agencies. We maintain our preference for Eurostat in order to ensure that a common EEA-wide approach is adopted in the definition of the geographical inputs.

Outputs

Overview of stakeholders' agreement with the outputs considered

Detailed comments and answers in Annex A

Percentage of responses that agree or partially agree with the outcomes obtained



Outputs – Executive overview of the feedback received
Broad disagreement on the outcomes of the 1st draft model

- The EC/Axon team acknowledges stakeholders' opposition to the results produced by the 1st draft model. Most of the feedback received questioned the reconciliation of the results with the actual realities of the MNOs' in each country.
- While the EC/Axon team had already performed a reconciliation exercise for the 1st draft model based on the data provided by NRAs, the accuracy of the 2nd draft version of the model has been further improved by:
  a) Clarifying, together with some NRAs, the inputs originally reported*. This has led to the correction of some figures initially provided by the NRAs.
  b) Thanks to the feedback provided by stakeholders, and the outcomes of the discussions with some NRAs, the reconciliation has been improved, ensuring that the outcomes of the model in terms of number of sites and cost base fall within a ±20% confidence interval when compared to those of an average MNO in each country *(see section 2 of this presentation for further details)*.
- The objective of points a) and b) above has been to ensure the accuracy of the model while providing transparency to the industry on the reconciliation of the model with the MNOs' realities.
- In addition, section 2 of this presentation also includes a summary of the key factors that explain the main differences between the voice termination costs obtained in the EC/Axon's model and the results produced by several NRAs' cost models.

* This activity has only been performed with the NRAs from countries in which the inputs reported did not reconcile with the realities of the MNOs in the country, as identified by our initial reconciliation exercise in the 1st draft version of the model.

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Following the feedback received during the 1st consultation, two main types of updates/adjustments have been implemented

1. New/corrected inputs provided by NRAs

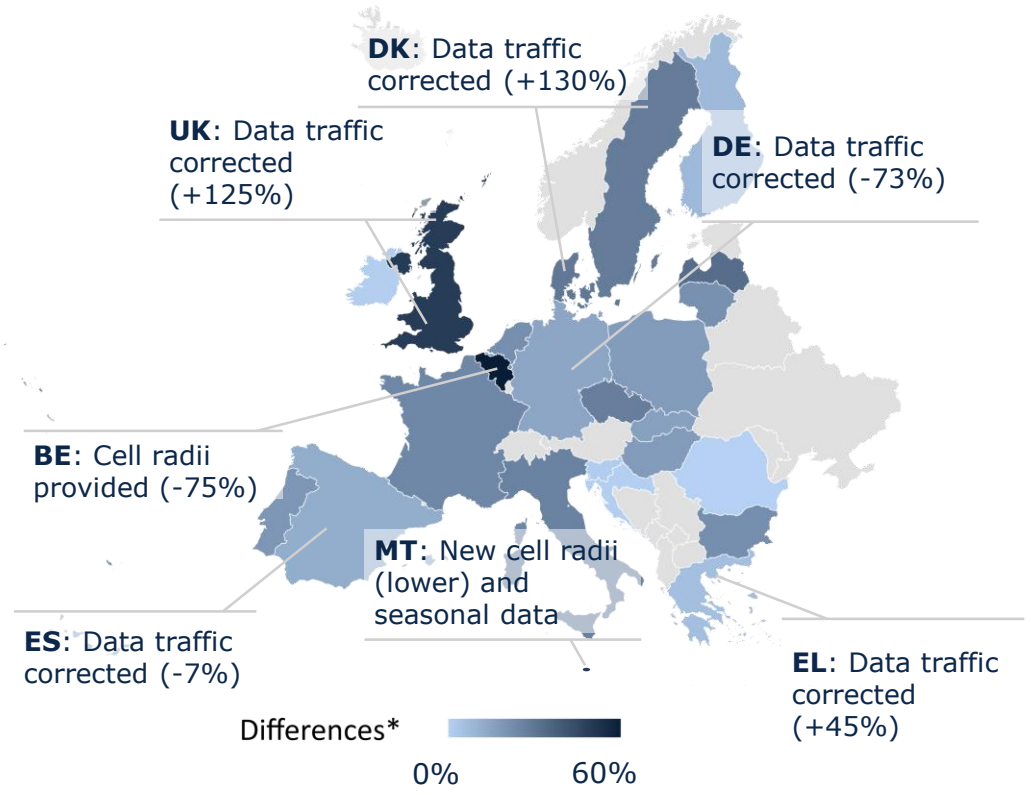
- As part of the 1st consultation process, or as a result of the additional requests made by Axon-EC, some NRAs either:
  - Provided new information that had not been shared with us before.
  - Corrected the information previously reported. Some of these corrections were highly relevant to the model.
- Such situations required an update of the inputs originally considered and mainly affected the countries were we had identified the greatest differences in the reconciliation exercise performed.

2. Requests for adjustments in the model

- In some instances stakeholders either:
  - Questioned the representativeness of the approaches adopted to define the inputs.
  - Detected areas of improvement in some of the algorithms implemented in the cost model.
  - Pointed out questions that let us find additional ways to improve the model.
- To address these comments, we have (i) implemented adjustments in the cost model and (ii) included additional scenario analyses.

1. The new/corrected inputs applied mostly to the countries in which we had identified greatest differences in the reconciliation exercise

Reconciliation differences (colours)* and examples of data corrections (brackets)



- The outcomes of the first consultation process showed that the data originally provided by some NRAs was not fully representative.
- As expected, these corrections or new data has contributed to a much closer reconciliation in those countries in which broader differences had been detected (e.g. BE, DK, MT or UK).

* Differences between modelled and real operators (in terms of access sites and costs) in the 1st draft cost model (i.e. before new information was provided).

2. There was also a need to implement some adjustments on the algorithms originally adopted

- Additionally, as per the feedback received to the first draft model, some adjustments have been introduced in the algorithms of the model, such as:
  - Voice incoming traffic from international has been included within the termination increment
  - The calculation of the busy hour percentage applicable to core network assets has been updated to ensure consistency with the approach adopted for access network assets.
  - The selection of the backhaul technology to be deployed is now based not only on the optimal solution for year n, but also assessing what is going to be the optimal solution in year n+5. This avoids technological switches over short periods of time.
  - Unit costs for access-related network elements are now set at country level.
- Most of these modifications had a negligible impact in the model's results.
- For the sake of transparency, all modifications introduced between the 1st and 2nd draft versions of the model have been documented through a "change log" worksheet within the model, and have also been reflected in the methodological approach document.

The reconciliation of the updated model with the MNOs' realities has been assessed again to ensure the reasonability of its results

- As described in the previous slides, the model has been updated based on:
  - New and adjusted inputs reported by NRAs
  - Improved algorithms

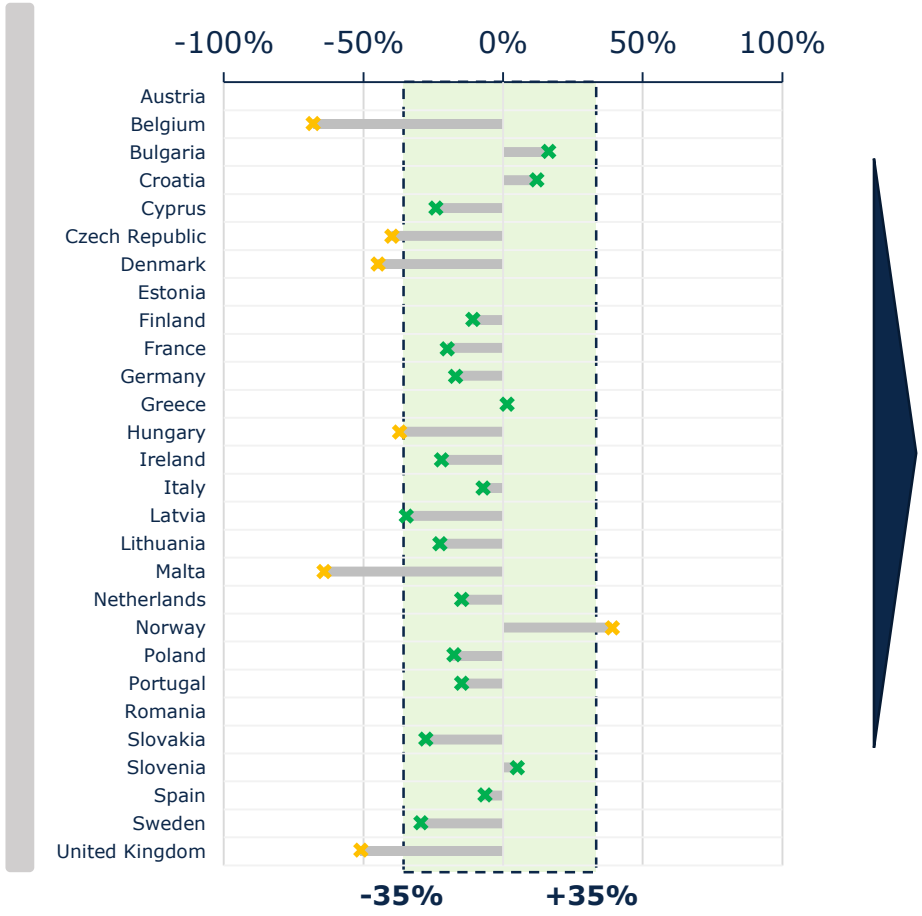
- In order to understand the reasonability of the new model's outcomes, we have assessed again how well the number of assets dimensioned per country, as well as the resulting cost base, reconciled with the MNOs' realities in each country. In particular, among other issues, we have verified that:
  - The number of sites calculated by the model for the reference operator are within a ±20% range from an average MNO* in each country.
  - The cost base (opex + depreciation, without cost of capital) calculated by the model for the reference operator is within a ±20% range from an average MNO* in each country.

- The detailed approach adopted to assess the reconciliation of the model's results with MNOs' realities has been described in detail in the Methodological Approach Document.
- The following exhibits illustrate the results obtained in the two comparisons performed.

* Given that the model does not represent any specific operator in the market, its results can't be compared with those of any specific operator. At the same time, the results of the model for a reference operator should not be expected to be just equal to the MNOs' average. This is why a ±20% range is accepted as valid.

Following the update, the model shows an improved reconciliation in terms of sites compared to the 1st draft (all countries within ±20%)

Reconciliation as per the 1st draft model*



Reconciliation as per the 2nd draft model*

* These charts illustrate the difference between the number of sites calculated by the cost model and the average number of sites of the MNOs in each country.

Note: Bars are not presented for countries in which we did not have enough information to perform the comparison.

A similar outcome is observed in the reconciliation of the total cost base per country

Reconciliation as per the 1st draft model*

Reconciliation as per the 2nd draft model*

* These charts illustrate the difference between the cost base calculated by the cost model and either the average cost base of MNOs in the country or that of a similar operator in terms of market share (details on the reference for comparison in each country will be provided in the documentation for the 2nd consultation round).

Note: Bars are not presented for countries in which we did not have enough information to perform the comparison.

The results are reasonably aligned with BEREC's price reports for roaming, although termination costs are below current MTRs

- As stakeholders will observe in the 2nd draft cost model that has been shared with them, the results for both data roaming (adding the provisional estimate by the EC of 0.2 EURcents/GB for transit charges) and voice roaming (adding the provisional estimate by the EC of 0.6 EURcents/min for transit charges and 0.9 EURcents/min for the average termination rates in the EEA) are reasonably aligned with the latest BEREC's benchmark data report*.

- On the other hand, the EC/Axon team also acknowledges that the voice termination costs obtained are below the mobile termination rates in place.
- The next slide provide an overview of the main factors identified that explain the differences between the voice termination costs produced by the EC/Axon's cost model and the NRAs' cost models.

- Be informed as well that the EC/Axon plan to circulate a high-level overview of the results produced for each Member State on 27 February.

* Source: https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/8251-international-roaming-berec-benchmark-data-report-october-2017-march-2018

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We have identified 6 factors that explain most of the differences between the voice termination costs obtained by the EC/Axon and NRAs

	Element	Description	Reduction in voice term.*
1	**Implementation of 4G**	Not included in some models. These models do not account for the improved traffic/investment ratio of 4G and calculate 2G/3G costs (much more expensive).	-26%
2	**Implementation of SingleRAN**	Not included in some models. SingleRAN equipment conveys all 3 access technologies and, therefore, is less sensitive to changes in the demand (lower pure LRIC)	-16%
3	**Security margin for access nodes**	Some models use a security margin of ~70%, higher than the 35% considered by EC/Axon. This makes networks much more incremental (higher pure LRIC).	-24%
4	**Capacity of core platforms**	The capacities of the core platforms considered in some models are well below the figures provided for this study, making them much more incremental.	-21%
5	**Unit costs**	The unit costs considered in some models are higher than the figures provided for this study, increasing the overall unit costs produced.	-14%
6	**Wholesale commercial costs**	Some models include hypothetical wholesale costs instead of info from stakeholders and others allocate them all to voice termination, increasing the result.	-23%

* Average impact on the pure-LRIC voice termination costs produced by NRAs' cost models when adjusted so that the same approach as in the EC/Axon's cost model is adopted. Calculated based on a thorough assessment of the cost models of UK, NO, DK, FR, ES and NL. Note that not all the elements apply to all NRAs' cost models, and therefore these percentages cannot be added up.

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Since the first draft model, we have included new scenarios to address stakeholder comments received during 1st consultation

- The first draft model included a number of scenarios for which we requested stakeholders' feedback.

- Additionally, feedback was received during the 1st consultation process that merited the assessment of new scenarios. Consistently, some new scenarios have been implemented in the second draft model.

- This section describes the scenarios available to stakeholders in the second draft model, as well as the rationale of the base case scenario considered (i.e. the scenario that is used to assess the reconciliation of the model with MNOs' realities in each country).

Scenarios included in the second draft model subject to consultation

Scenario	Alternatives	Base-case scenario*	Justification of the base case
VoLTE Scenario	• 4G Operator • Terminal Adoption	Terminal Adoption	Preferred approach by most of stakeholders (see section 1).
Annualisation criteria	• Economic depreciation based on ARPU • Economic depreciation based on demand	Economic depreciation based on demand	Preferred approach by most of stakeholders (see section 1).
Roaming increment	• Specific roaming increment • Joint roaming and domestic increment	Specific roaming increment	Ensures an equivalent approach for the regulation of roaming and voice termination (i.e. through separate individual increments).
Specific cost allocation	• Allocation based on GB • Allocation based on drivers	Allocation based on drivers	Preferred approach by most of stakeholders (see section 1).
Traffic split per technology forecasts	• Same percentages across EEA from 2020 • Country-specific projections	Same percentages across EEA from 2020	Maximise the consistency of the projections across country and facilitate the comparison of the results obtained in the different countries.
Cell Radii	• Mix EEA Average-Country specific figures • Country specific figures only	Mix EEA Average-Country specific figures	Avoid the lack of accuracy of the country-specific figures reported by some NRAs leading to a mis-reconciliation of the model's results with national MNOs' realities.
Threshold to identify seasonal patterns	• 10% • 30% • 50%	50%	In line with our suggestion in the 1st consultation. The 10% threshold leads to mis-reconciliations and the 30% threshold produces very similar results, in general, as the 50%.
Demand	• Conservative • Base-case / Average • Aggressive	Base-case	As per the approach defined in the 1st consultation. Conservative and aggressive scenarios added to assess the model's behaviour to changes in the demand forecasts.

* The base-case scenario represents the main scenario considered to produce the results. Nevertheless, other scenarios may be considered by the EC for the adoption of policy proposals.

New scenarios added

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Stakeholders can assess the results under different scenarios by using the cover sheet

Alternative scenarios defined in the model

Assessment of the cost of providing mobile telecom services in the EU/EEA countries
SMART 2017/0091

Quick controls

Execution mode	All countries
	execution.mode
Selected Country	Austria
	selected.country
VoLTE Scenario	Terminal Adoption
	selected.volte.adoption
Traffic split per technology forecasts	Same percentages across EEA from 2020
	selected.traffic.split.technology
Annualisation criteria	Economic depreciation based on demand
	selected.production.factors
Roaming increment	Specific roaming increment
	selected.roaming.increment.scenario
Specific cost allocation	Allocation based on driver
	selected.specific.cost.allocation
Cell Radii	Mix EEA Average – Country specific figures
	selected.cell.radii.scenario
Threshold to identify seasonality	50%
	selected.seasonality.scenario
Demand Forecast	Base Case
	selected.demand.scenario

RUN

CONTENTS

MAP

General check
OK

- The COVER sheet of the model allows stakeholders to produce results under different scenarios.
- However, they should be carefully assessed, as some scenarios do not reconcile with MNOs' data*, which implies that results are not representative (see next slide for scenarios that meet this requirement).
- Among the reconciled scenarios for a given country, the differences in the services' unit costs when compared with the base case scenario are typically within ±20%.

* An scenario is considered not to be reconciled with MNOs' data when the number of sites and/or the cost base it produces are outside ±20% the MNOs' average in the country.

4 out of the 18 scenarios included in the model do not reconcile. Results for these scenarios should be assessed with care

Scenario	Alternatives	Reconciliation
VoLTE Scenario	4G Operator	✗
	Terminal Adoption	✓
Annualisation criteria	Economic depreciation based on ARPU	✓
	Economic depreciation based on demand	✓
Roaming increment	Specific roaming increment	✓
	Joint roaming and domestic increment	✓
Specific cost allocation	Allocation based on GB	✓
	Allocation based on drivers	✓
Traffic split per technology forecasts	Same percentages across EEA from 2020	✓
	Country-specific projections	✓
Cell Radii	Mix EEA Average-Country specific figures	✓
	Country specific figures only	✗
Threshold to identify seasonal patterns	10%	✗
	30%	✓
	50%	✓
Demand	Conservative	✓
	Base-case / Average	✓
	Aggressive	✗

- There are some scenarios that deliver results which do not reconcile for all EEA countries.
- This is, while the results they deliver may still be reasonable (and may be reconciled) for a given country, they do not show a proper behaviour for all Member States.
- Stakeholders are recommended to avoid extracting relevant conclusions from the results produced by these scenarios.
- Please note that a combination of alternative scenarios could also provide unreconciled results.

✓ Results do reconcile for all EEA countries

✗ Results do not reconcile for all EEA countries

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The positive outcomes of the 1st consultation have allowed us to fine tune the model, making it ready for the 2nd consultation

- Most stakeholders provided feedback in the 1st consultation process, resulting in the collection of new inputs that allowed Axon/EC to fine tune the model and re-think some relevant methodological considerations.

- Based on the feedback received, a new version of the model has been produced, addressing most of the concerns expressed by stakeholders (notably the underestimation of sites and costs).

- Thorough documentation has been produced outlining the treatment given to stakeholders' feedback, the changes introduced to the cost model, and the new results produced.

- The new version of the model is fully aligned with the realities of the MNOs and is open for consultation through this second stage.

About the 2nd consultation process

- **All comments will have to be submitted by NRAs to the EC/Axon team by 15 March.**
- Stakeholders should focus their comments on the specific questions raised by the EC/Axon team in this 2nd consultation.
- Comments should be as precise and brief as possible, while making sure they are properly justified.
- Questions from operators should be addressed to their NRA (not to the EC or Axon).
- A working session on the cost models will be conducted only with NRAs on 26 February.
- While all comments received will be assessed and studied by the EC/Axon team, the new comments and answers section to be produced after the 2nd consultation round (equivalent to Annex A in this document) will focus only on comments that are i) significant for the results of the model and ii) have been thoroughly justified.
- The EC/Axon team will endeavour to provide answers to critical questions received from NRAs via email before 1 March.
- Each NRA has to provide only one filled-in template with all comments from stakeholders in its country.

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Any questions? Please, contact:

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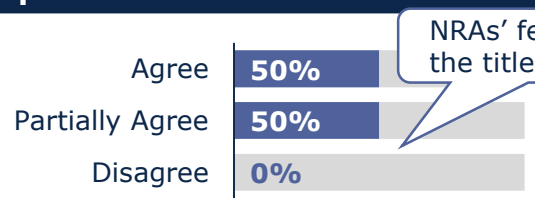
Annex A

Detailed assessment of the feedback provided to the 1st consultation

Overview of the slides drafted to assess stakeholders' feedback
Question 0: Example

Stakeholders' position

NRAs



NRAs' feedback on the titles' question

Operators

Operators' feedback on the titles' question

#	Relevant comments	Occurrences	EC/Axon's view
0.1	*[Description of the comment 0.1]*		*[Description of EC/Axon's view on comment 0.1]*
0.2	*[Description of the comment 0.2]*		*[Description of EC/Axon's view on comment 0.2]* ***Recommended action**: [description of recommended action]*
0.3	*[Description of the comment 0.3]*		*[Description of EC/Axon's view on comment 0.3]* ***Recommended action**: [description of recommended action]*

Numbering of the comments

Excerpt on the most relevant comments received on the titles' question

# of times a comment has been received (all individual replies have been considered)

EC/Axon's views on each relevant comments

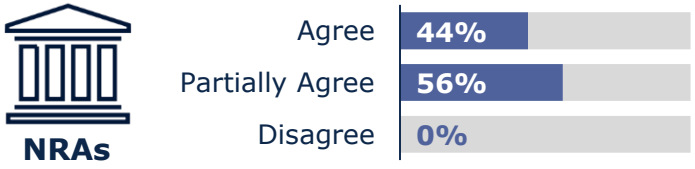
AXON

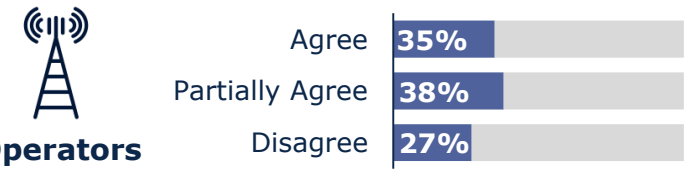
- Comment from <4 stakeholders
- Comment from 4-10 stakeholders
- Comment from >10 stakeholders

- No action required
- Action without impact on results
- Action with impact on results

Question 1: Do you agree with the methodological approaches adopted in the development of the cost model presented in Table 2.1 and Table 2.2? (1/3)

Stakeholders' position





#	Relevant comments	Occu.	EC/Axon's view
1.1	The timeframe for review has not been enough		Please be reminded that two consultation process have been set as part of this cost study: • 1st consultation: from 29 October to 23 November • 2nd consultation: from 18 February to 15 March 2019 Given that the objective of both consultation rounds is to gather stakeholders' feedback on the cost model and associated documentation, this effectively means that they are given virtually 5 months to review the materials submitted. This timeframe is substantially above the one typically provided in national processes launched by NRAs. Please note that this comment has also been provided to most other questions. This comment is not further reproduced for the sake of simplicity.
1.2	The LRIC+ cost standard should be adopted for the calculation of voice termination costs		In consistency with the EC's 2009 Recommendation on fixed and mobile termination rates, as well as with the recently published European Electronic Communications Code (EECC), termination rates will be determined based on the pure LRIC standard.
1.3	The timeframe considered in the model is not enough for a proper implementation of economic depreciation		While the main timeframe considered in the model goes only until 2025, the implementation of economic depreciation (see worksheet 7B CALC CAPEX) is performed over a 40-year time period, which is longer than the maximum useful life of any asset.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 1: Do you agree with the methodological approaches adopted in the development of the cost model presented in Table 2.1 and Table 2.2? (2/3)

#	Relevant comments	Occu.	EC/Axon's view
1.4	Descriptions of the routing factors and drivers should be improved, as in some cases they contradict the actual values used		Descriptions of the Routing factors and drivers have been reviewed and improved.
1.5	Differences of the results with other models from NRAs should be explained		Section 2 of this presentation includes an overview of the main elements driving the differences between the EC's cost model and the models of a sample of NRAs.
1.6	Results of other countries should be provided to all stakeholders		Results of all countries will be shared with stakeholders right after the workshop with NRAs (i.e. on 27 February).
1.7	Modelling until the year 2025 implies difficulties in terms of projections.		While we understand the complexities of producing accurate forecasts until 2025, this is the minimum timeframe to be accounted for to meet the EC's information needs for its 2019 roaming review.
1.8	Alternative methodologies to allocate common costs should be explored (no further justifications were provided).		The consideration of an effective capacity approach to allocate common costs was already approved in the 1st workshop. In addition, the majority of stakeholders showed an agreement with the approach currently adopted, and therefore we see no need to explore other alternatives.
1.9	Integer figures should be used for access elements.		The formulation has been adjusted in the cost calculations. The number of network elements included in the reports has been preserved with decimals as it better reflects the theoretical nature of the incremental cost assessment exercise.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

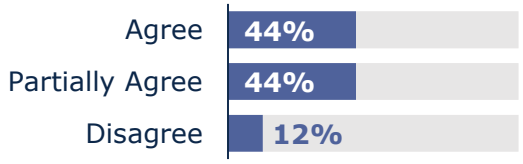
Question 1: Do you agree with the methodological approaches adopted in the development of the cost model presented in Table 2.1 and Table 2.2? (3/3)

#	Relevant comments	Occu.	EC/Axon's view
1.10	The VBA macros should be described to maximise the transparency of the model		The VBA macro only handles the execution of the model (i.e. it does not perform any calculation). Therefore, we do not see a need to provide detailed descriptions about the macro's operation. It should also be noted that there are already comments within the macro itself that describe its logic and execution steps.
1.11	The new wholesale rates should be set based on an analysis of the public information available and not a Bottom-Up model		The approach conducted is aligned with the EC's 2009 recommendation on MTRs and FTRs, as well as with the recently published EECC.
1.12	5G should be included in the model		As already described in Workshop 1, 5G would only be included if abundant information was provided in the data collection process. No stakeholders provided the complete set of data requested and only a few provided some information. Consequently, 5G was not included in the model.

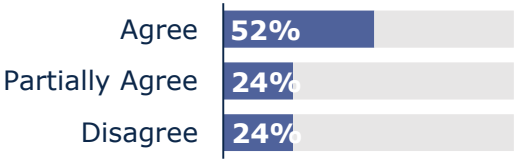
Question 2: Do you agree with the approach adopted to assess traffic patterns and seasonal behaviours in the cost model? (1/3)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
2.1	Seasonality should not be considered whatsoever as it has no bearing on network dimensioning		The existence of seasonal patterns implies that there is a heterogeneous distribution of traffic over the year. In turn, this has a direct impact in the determination of the reference busy hour traffic for network dimensioning. As such, whenever seasonality exists and it is relevant, it needs to be considered in the model.
2.2	The calculation of the busy hour shall be explained		Please refer to section 3.1.12. of the Methodological Approach Document.
2.3	Seasonality should be assessed at national level instead of at municipality level		Seasonality is strongly related to certain areas of a country. For instance, in ski resorts seasonal peaks should be expected in winter, while in coastal areas this peak would typically arise in summer. If both areas are analysed altogether, these peaks will blur and the likely effect could be that no relevant seasonality patterns are identified. Therefore, the assessment of traffic seasonality patterns has been kept at municipality level.
2.4	The information regarding the access nodes provided by stakeholders was not taken into consideration		As anticipated in Workshop 1, only the data from stakeholders who filled in, at least, the 'high-priority' information requested could be taken into consideration for this analysis.

Question 2: Do you agree with the approach adopted to assess traffic patterns and seasonal behaviours in the cost model? (2/3)

#	Relevant comments	Occu.	EC/Axon's view
2.5	The threshold defined for the identification of seasonal areas (50%) is too high		As detailed in the methodological approach document, this percentage was defined to ensure the representativeness and relevance of the analysis. This is, even though a more relaxed rule could have also been defined, it was important to define a rule that was strict enough to ensure that a potential consideration of seasonality would become relevant in the dimensioning of the network. A sensitivity analysis of this variable has been performed that shows that a) when a 10% threshold is considered it delivers results that do not reconcile well with MNOs' data, whereas b) a 30% threshold leads to results which are, in most cases, equivalent to those obtained with a 50% threshold. Therefore, and in the light of the results obtained, the 50% threshold has been considered to be valid and representative.
2.6	Base stations should be considered to be unevenly loaded in the busy hour		While we agree with this comment, in order to properly model such situation, detailed information per site (not provided by the stakeholder who issued this comment) would be required. Therefore, we do not see it feasible in light of stakeholders' reticence to provide detailed site information to account for such specific factors.
2.7	Seasonality considerations have changed for some countries from the latest cost study		The high-level treatment of seasonality for this cost model was already described in Workshop 1.
2.8	Seasonal patterns should be assessed on data+voice traffic instead of on data only traffic.		While we acknowledge the appropriateness of the comment received, this approach was selected for two reasons: • Data traffic represents +95% of the total network's load • Many stakeholders who provided access nodes information were only capable of providing data traffic. Therefore, the approach adopted allowed us to follow a homogeneous assessment of seasonality patterns across EEA countries, while still ensuring the representativeness of the outcomes.

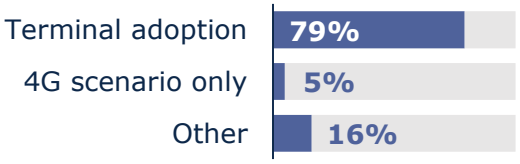
Question 2: Do you agree with the approach adopted to assess traffic patterns and seasonal behaviours in the cost model? (3/3)

#	Relevant comments	Occu.	EC/Axon's view
2.9	The structural growth adjustment should be implemented at geotype level, instead of at national level		A sensitivity analysis of the impact of this alternative showed that it had virtually no bearing on the outcomes of this exercise. Therefore, and given that there is not a methodologically correct option, the approach adopted in the 1st consultation has been kept.
2.10	The thresholds should be applied to the mode of the references and not the mean		Stakeholders did not provide solid arguments to discredit the usage of the mean for the evaluation of the thresholds and, therefore, no need for change is identified.
2.11	The effect of the growth of the traffic is higher than the effect of seasonality		The effect of the traffic growth was already accounted for in the seasonality assessment. This analysis proved that, in some cases, the effect of seasonality was higher than the traffic growth.

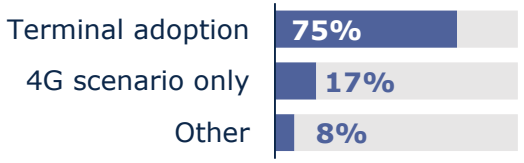
Question 3: In your opinion, what VoLTE adoption scenario should be considered to estimate the costs of providing wholesale roaming and mobile voice call termination services of an efficient operator? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
3.1	The traffic disaggregation per technology should be defined at country level.		While historical traffic disaggregation was indeed defined at country level, we acknowledge stakeholders' comments in terms of the approach to be adopted for the projected trends. Two different scenarios have been defined in the new version of the model to understand the implications of adopting country-specific trends vs EEA averages.
3.2	Technology disaggregation forecasts should be justified.		The technological disaggregation introduced is based on an EEA-average of the countries reporting information from 2020 onwards. Please refer to section 3.1.8. of the methodological approach document for further indications.
3.3	"Terminal adoption" and "4G-only operator" alternatives should be supported by the cost model because both could be relevant.		The two alternatives have been kept in the new version of the model. However, as per the feedback received to the first consultation, only the results obtained under the "terminal adoption" alternative will be considered by the EC.
3.4	The model should take 5G networks into consideration		The consideration of 5G in the cost model was discarded given the lack of information provided by stakeholders when requested. It is noteworthy that, even the stakeholders who now requested the consideration of 5G, did not provide any of the 5G information requested in the data collection process.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

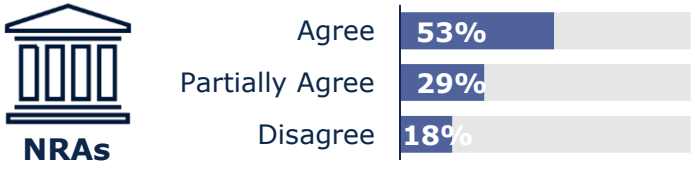
No action required
Action without impact on results
Action with impact on results

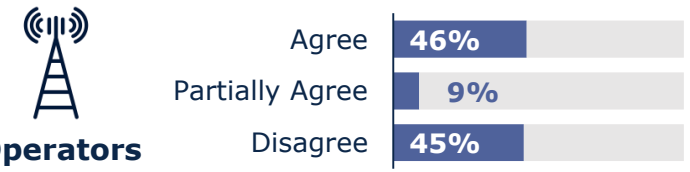
Question 3: In your opinion, what VoLTE adoption scenario should be considered to estimate the costs of providing wholesale roaming and mobile voice call termination services of an efficient operator? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
3.5	The model has to be run twice in order to update the values in the 'COVER' worksheet		The model has been updated to address this issue.

Question 4: Do you agree with the formula used for the implementation of the economic depreciation? (1/2)

Stakeholders' position





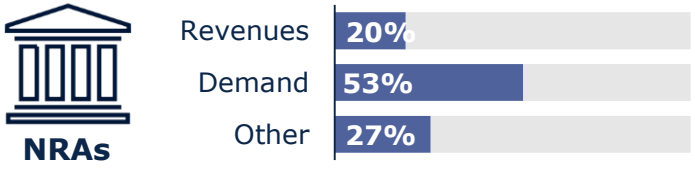
#	Relevant comments	Occu.	EC/Axon's view
4.1	Standard/Tilted annuities should be adopted in the model		While these methodologies could certainly be valid and we acknowledge that they have been successfully implemented by some NRAs, the EC's 2009 Recommendation on fixed and mobile termination rates is clear in requiring the implementation of an economic depreciation method. As such, economic depreciation has been implemented in most NRAs' Bottom-Up models and is also the selected approach in the EC's cost study.
4.2	The alpha factor considered in the implementation of economic depreciation in the model should be 1 in the first year to represent the fact that investments take place in the beginning of each year.		Even though this aspect was already implemented as agreed with the Steering Committee, we have observed that it was not implemented for all the increments. Consequently, the alpha factor considered in the model for the increments 2 to 4 has been adjusted to reflect this comment.
4.3	Economic depreciation should only be used for termination services. A different methodology should be used for roaming services.		No arguments have been provided to proof that a different methodology would be more appropriate for roaming services. Moreover, as described in the 1st workshop, depreciation is implemented at asset level, limiting the possibility to apply different methodologies at service level.

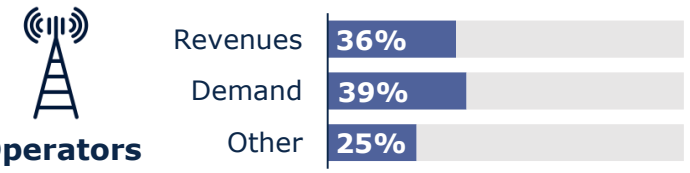
Question 4: Do you agree with the formula used for the implementation of the economic depreciation? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
4.4	The considerations followed to recover assets which are fully dismantled should be reviewed, as it results in fluctuations in the costs of the services.		We appreciate the comment received and acknowledge that differences in the dismantling year of some assets (specially those with equipment modularity, such as backhaul links) between the "total network" and the "termination" increment could have led to inconsistent incremental costs. We have therefore adjusted the mechanism used to model these elements to avoid such situations (further details on its treatment are provided in the model itself).
4.5	An economic depreciation methodology that annualises CapEx and OpEx is preferred.		While we agree that there are several alternative implementations of the economic depreciation approach, the current formulation has been accepted by most stakeholders. Therefore, we do not see a solid reason to change the current approach.
4.6	The calculation of resource additions should be reviewed to avoid an undesired impact in costs of fluctuations in the number of resources.		The comment is appreciated. The calculation of additions has been adjusted by ensuring that no resources are uninstalled if they are expected to be required again in the upcoming five years.
4.7	The timeframe considered in the model is not enough for a proper implementation of economic depreciation		Please refer to feedback provided to Q1.3.

Question 5: In your opinion, what is the production factor that should be used in the implementation of economic depreciation?

Stakeholders' position

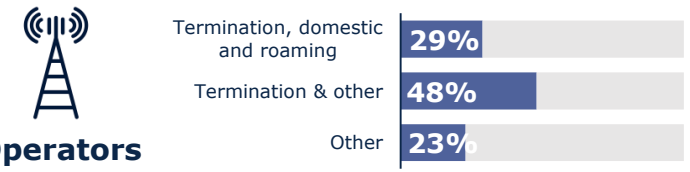




#	Relevant comments	Occu.	EC/Axon's view
5.1	A check-sum should be included to ensure economic depreciation algorithms are working properly		A checksum validating that the net present value of the network elements is preserved was already included in the cost model in worksheet '7B CALC CAPEX'
5.2	A hybrid approach that combines revenues and demand should be adopted		No justifications were provided to illustrate the benefits of this alternative and no advantages are identified when compared with the other two alternatives. Therefore, this alternative has not been implemented.

Question 6: In your opinion, what option should be used in defining the increments considered in the model?

Stakeholders' position



#	Relevant comments	Occu.	EC/Axon's view
6.1	FAC should be used to allocate costs to services other than termination (no further justifications were provided).		The model calculates the LRIC+ costs for services other than termination, which is consistent with the cost standard adopted by the EC when it first set the wholesale charges for roaming.
6.2	International incoming traffic should be included within the termination increment.		While neither the EC's 2009 recommendation nor the EECC are clear on the treatment of international incoming traffic, it is true that it may make sense to include international incoming traffic within the same increment as national incoming traffic, specially in the light of potential upcoming regulations. Accordingly, the international incoming traffic has been included within the termination increment in the new version of the model.
6.3	The formulas included in worksheet 7E should be adjusted so as to properly account for the incremental costs of each increment.		We agree with the comment received. The formulas considered in worksheet 7E of the model have been adjusted to reflect this comment.
6.4	Too much costs are allocated to subscribers' SIM cards		Under the regulatory policy module of the model (sheets 10A, 10B, 10C) –relevant for cost assessment - no costs are allocated to subscribers' SIM cards.

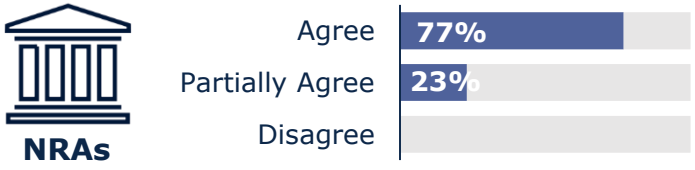
AXON

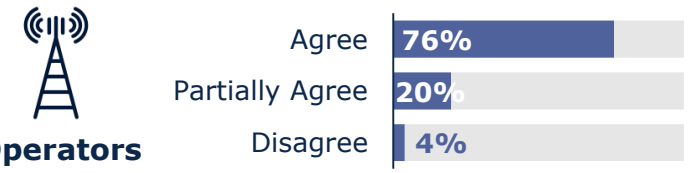
Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 7: Do you agree that the list of services considered should contribute to the recovery of wholesale specific costs? (1/2)

Stakeholders' position





#	Relevant comments	Occu.	EC/Axon's view
7.1	Wholesale commercial costs should also be allocated to outgoing voice and SMS services to international destinations		We acknowledge the appropriateness of this comment. Wholesale commercial costs have been allocated to these services in the new version of the model.
7.2	The categories considered for wholesale specific costs should be further explained.		The categories considered for wholesale commercial costs are equivalent to those used in the previous cost study. In addition, these categories were presented during the first workshop held with stakeholders and further details were included in the data request shared with them.
7.3	It should be considered that wholesale specific costs are associated to the subscribers.		As identified in the previous cost study (and confirmed through this new cost study), there is a clear relationship between wholesale commercial costs and traffic, which most stakeholders have accepted. Therefore, we do not see a need to adjust the approach currently adopted.
7.4	Some wholesale commercial cost categories are not applicable to all the services (e.g. negotiation costs are not relevant for domestic off-net calls)		Negotiation costs may include clearing activities that are still relevant for these services. Therefore, we are of the opinion that these relationships should be preserved.

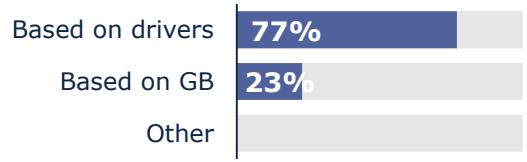
Question 7: Do you agree that the list of services considered should contribute to the recovery of wholesale specific costs? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
7.5	MMS should be considered in the model, including the calculation of wholesale commercial costs.		In our view, MMSs play an irrelevant role in the dimensioning of today's networks due to their low materiality. At the same time, there are no regulatory obligations with regards to these services. The stakeholder that issued this comment has neither provided any quantitative data to proof the relevance of these services in its network.
7.6	Additional cost categories such as tributes and other support costs should be incorporated.		The wholesale cost categories were already defined in the previous cost study and presented in Workshop 1, with no major arguments received against them.
7.7	Reconciliation of the inputs provided by stakeholders cannot be performed based on the data included in the cost model		The model considers a linear regression in order to ensure that costs can be projected to future years based on the expected traffic and to preserve the confidentiality of the information.

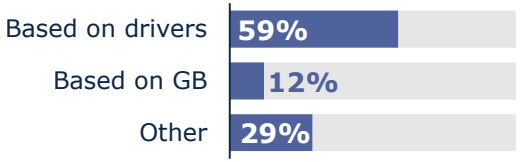
Question 8: In your opinion, how should wholesale specific costs be allocated to services?

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
8.1	Volume-based drivers should be used based on the traffic from each country		Indeed, the model already calculates the regressions based on volume-related drivers from each of the countries.
8.2	The regressions show a low statistical significance		While a higher statistical significance would have been preferred, the outcomes obtained are considered to be sufficient to ensure the representativeness of the exercise performed.
8.3	The allocation was already provided in the data request template. There is no need to define a methodology.		A very limited number of stakeholders were able to provide a reasonable split of wholesale commercial costs per service. Therefore, these costs had to be treated altogether and a methodology to allocate them to services was required.

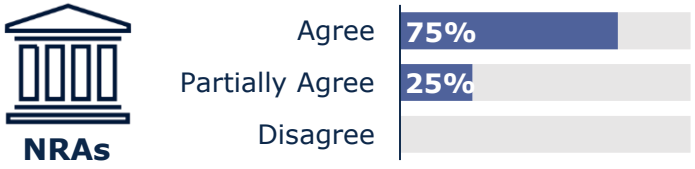
AXON

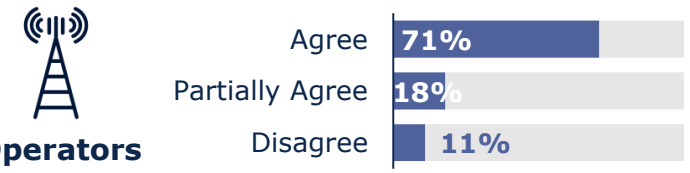
Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 9: Do you agree with the validation, treatment and definition of the market share inputs? (1/2)

Stakeholders' position





#	Relevant comments	Occu.	EC/Axon's view
9.1	The model should take into consideration the true market share of each MNO		As defined in the EC's 2009 Recommendation, and as adopted by virtually all EEA NRAs, a Hypothetical Efficient Operator with a market share equal to 1/#MNOs in each country shall be considered.
9.2	The minimum market share considered should be 30%		As defined in the EC's 2009 Recommendation, a 20% market share is considered to be the minimum efficient scale for the reference operator.
9.3	One MNO is a new entrant and relies heavily on national roaming agreements. Therefore, a 33% market share should be adopted for this country.		The indications and justifications provided by the NRA are deemed appropriate and applicable. The market share applicable in this country has been adjusted to 33%.
9.4	How will the average results be calculated?		Discussions about how the EC will determine the new applicable roaming and MTR wholesale charges will take place at a later stage.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

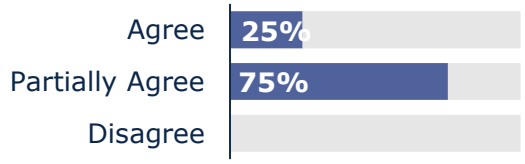
Question 9: Do you agree with the validation, treatment and definition of the market share inputs? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
9.5	MVNO growth should be considered when assessing the market share of the efficient operator.		As per the EC's Recommendation on fixed and mobile termination charges, the market share should be set only in relation to the number of MNOs in the market. Traffic growth driven by MVNOs is already accounted for in the demand input.
9.6	The existence of joint ventures between the MNOs may distort the market share considered		While we understand the complexities of such scenarios, we still believe that the adoption of the 1/N approach is representative enough for the cost modelling exercise.

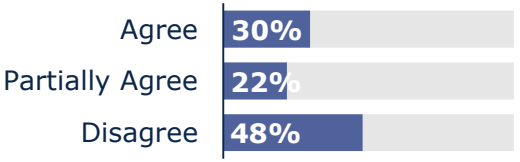
Question 10: Do you agree with the validation, treatment and estimation of the values for demand inputs? (1/4)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
10.1	The historical demand information considered does not fully match the real market data.	🔴	As described in the methodological approach document, the historical demand considered in the model was directly extracted from the information reported by stakeholders in the data gathering process. Additionally, when no data was reported, it was estimated as thoroughly described in that document. The cases in which stakeholders have provided new information have been reviewed and adjusted if required. On the other hand, comments questioning the demand information considered but which failed to provide evidences and/or new information, have not been taken into consideration.
10.2	The trends considered for the number of roamer days employed for the projection of roaming traffic should be made more conservative/aggressive.	🟢	Opposite comments have been received in terms of how roamer days trends should be defined. Some stakeholders argued that these should be flat, while other indicated that they should exhibit a growth of up to 10% per year. The approach adopted is, therefore, found to be in between stakeholders' indications and, consequently, is deemed representative enough for this exercise.
10.3	The growth projected for the number of subscribers in some countries is not realistic.	🟢	As indicated in the methodological approach document, the subscribers' growth projected in the countries in which this comment was received was extracted from the data provided by each NRA.

AXON

🟢 Comment from <4 stakeholders
🟡 Comment from 4-10 stakeholders
🔴 Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 10: Do you agree with the validation, treatment and estimation of the values for demand inputs? (2/4)

#	Relevant comments	Occu.	EC/Axon's view
10.4	Further explanations on the logic adopted to rejected data should be provided, as some of the inputs discarded may be considered to be valid by the reporting country.		The mechanisms used to identify outlying values that were rejected were described in the Methodological Approach Document. The explanations provided have been reviewed in some cases to maximise the clarity and transparency of the approach adopted.
10.5	Data traffic forecasts for a country are not realistic (no further justifications were provided).		Stakeholders from the country in which this comment was received did not provide data traffic forecasts. As such, these forecasts were calculated as described in section 3.1.2.3 of the methodological approach document. The stakeholder who issued this comment did not provide any alternative forecasts.
10.6	Given the high differences in data consumption per country, different average data sessions per country should be considered		During the analysis of this information, two main elements were found: • The response rate registered for this specific input was relatively low. • The assessment of the information provided did not point out to a clear relationship between data consumption and the average data session. Consequently, and given that this input would have been defined as an EEA average for most countries in any case (due to the lack of data), it was decided to consider a homogeneous figure for all EEA countries.
10.7	Too many gaps had to be filled in by Axon to define the complete demand input for a country		Stakeholders from that country did not provide several pieces of the demand information requested and, therefore, they had to be estimated based on EEA averages. No additional information has been provided to allow us to fill in these gaps with actual market data.
10.8	Trends not aligned with 5G expected traffic.		As the model does not consider 5G access networks, it would be inconsistent to include the demand that would be handled by this network.

Question 10: Do you agree with the validation, treatment and estimation of the values for demand inputs? (3/4)

#	Relevant comments	Occu.	EC/Axon's view
10.9	How does the growth of M2M subscriptions affect the results of the cost model?		The effect of subscribers in the model is limited to the dimensioning of the HSS/HLR platforms, so the evolution of M2M subscriptions plays a limited role in the cost model. In terms of traffic, we expect this growth to have been already accounted for in the demand related information provided by stakeholders in the data gathering process.
10.10	Further explanations should be provided regarding how incomplete data has been extrapolated. For instance, how has data that was provided by only some of the operators in the country been calculated for the whole market?		As described in the Methodological Approach Document, this adjustment is performed by dividing the reported amount over the sum of the market share of the reporting operators.
10.11	Updated traffic inputs for the whole year 2018 should be used for roaming.		As described in the Workshop 1, no further data gathering rounds will be carried out. The usage of information from previous years to adopt cost-based regulatory decisions is a standard practice among the industry (e.g. common process adopted by NRAs to set MTRs).
10.12	The impact of bundled products on demand growth is not considered		Given that bundled products were already commercialised in the 2015-2017 period, the historical growth rates that have been used as a reference for the projections should already account for this factor.
10.13	Using thresholds to assess the validity of the information provided is questionable		The usage of thresholds has proven to be a good practice. Actually, the NRA from the country in which this comment was issued provided new updated demand information correcting the original data that had been discarded.
10.14	Data growth in a country was reported to decrease every year from 2019 and, therefore, it should pass criterion A		While this holds true from 2019, it was not the case from 2018 to 2019, when an acceleration of data growth was provided. Therefore, and according to the definition of the criterion A, the information provided by that country was rejected.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

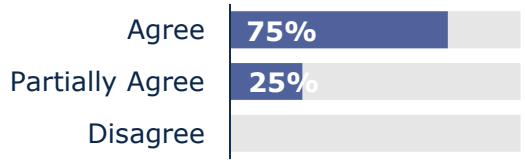
Question 10: Do you agree with the validation, treatment and estimation of the values for demand inputs? (4/4)

#	Relevant comments	Occu.	EC/Axon's view
10.15	The outcomes of the analysis may be biased because they only consider information from 9 countries.		A sample of 9 countries is still considered to be representative enough to understand the expected data traffic projections into the future. At the same time, these patterns are not expected to deviate significantly between countries.

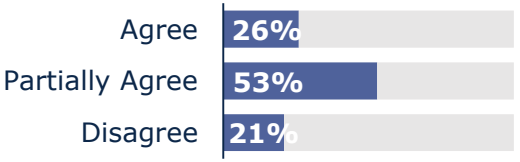
Question 11: Do you agree with the validation, treatment and estimation of the value for the network statistics inputs? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
11.1	The validation thresholds employed to identify outliers are questionable		While we do understand there may be some disagreement with the currently employed thresholds, it is also our view that any other thresholds employed could also be questioned by stakeholders. The currently adopted figures felt appropriate in the light of the figures received in the data gathering process.
11.2	Could the difference between the percentage of uncompleted calls over the total (busy) for domestic and roaming traffic seen in a country be explained by users generating more calls when roaming?		This input is based on the data reported by the stakeholders.
11.3	Downlink percentages should be reviewed for a country based on the latest data provided		The new figures reported as part of the 1st consultation round have been taken into consideration.
11.4	Calculations performed should be shared with stakeholders		As for all the other internal calculations performed to come up with the model's inputs, no further information will be disclosed to stakeholders. At the same time, these calculations are not considered to play a critical role in the determination of the model's outcomes.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 11: Do you agree with the validation, treatment and estimation of the value for the network statistics inputs? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
11.5	A cross-check of the number of sites and costs for past years shows significant differences with actual operator data.		Please see section 2 of this presentation
11.6	LTE spectral efficiency should be defined at 1,4 bps/Hz.		Spectral efficiency for access technologies has been reviewed.

AXON

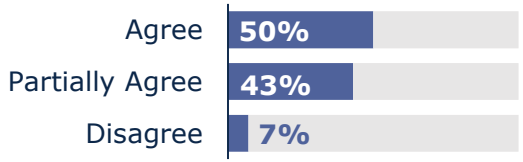
Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

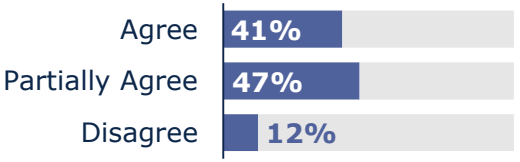
Question 12: Do you agree with the validation, treatment and estimation of the value for the coverage inputs? (1/3)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
12.1	The coverage levels specified need to ensure consistency with the applicable obligations.		It is our understanding that coverage data (actual and projected) provided by stakeholders already took such obligations into consideration. Therefore, we do not identify a need to modify the input considered.
12.2	Traffic migrations between geotypes (day/night shifts) should be considered		While we may agree that such traffic migrations between geotypes could exist, no data has been found available neither any supporting information has been provided to implement this comment. Therefore, no such migrations have been considered.
12.3	The geographical information considered differs from other national references and the existing cost models		While we understand different sources may include different information, only the Eurostat database ensured a common treatment of geographical information across the EU/EEA.
12.4	The formula included in section 3.1.4.3 of the Methodological Approach Document to calculate the coverage inputs should be reviewed, as there is a subindex which is incorrect.		This aspect has been corrected in the mentioned formula.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 12: Do you agree with the validation, treatment and estimation of the value for the coverage inputs? (2/3)

#	Relevant comments	Occu.	EC/Axon's view
12.5	It is unclear why data reported was discarded for coverage (no further justifications were provided).		As detailed in section 3.1.4.2 of the Methodological Approach Document, no values had to be adjusted as a result of the review of this input. Whenever inconsistencies were found they were clarified with the pertinent NRAs.
12.6	2G coverage forecasts in rural areas could be flat in a country.		As suggested, the 2G coverage trends in that country for the rural geotype have been left flat.
12.7	Coverage should be evaluated by band in the cost model.		The model calculates the most appropriate band to provide the coverage levels reported by stakeholders based on the availability of spectrum in each band, the characteristics of the access technology and the cell radius associated to each band, geotype and technology. This is a common approach adopted in Bottom-Up cost models.
12.8	Values considered appear to be low in the public version of the model for a country.		It should be noted that the coverage values in the public version of the model were modified to ensure the confidentiality of the information. The actual data used in the confidential version of the model was extracted from the information reported by the stakeholders in each country.
12.9	The characteristics of the geotypes defined should be further clarified.		The definition of the geotypes is based on the degrees of urbanization (DEGURBA) defined by Eurostat. Please refer to Annex A of the Methodological Approach Document for further information.
12.10	One stakeholder tried to add an additional geotype (Urban-seasonal) to the cost model, without success.		We do not expect stakeholders to change the geotypes already defined and have no control on that.
12.11	Are the figures considered for coverage in the model the same for all other countries?		The figures are country specific based on the data provided by each stakeholder.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

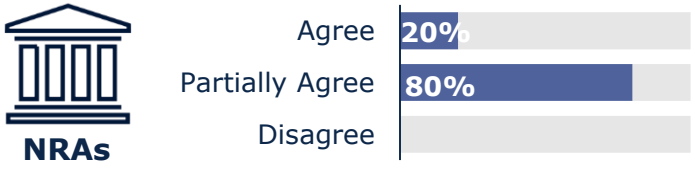
No action required
Action without impact on results
Action with impact on results

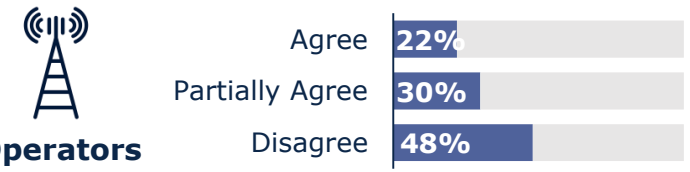
Question 12: Do you agree with the validation, treatment and estimation of the value for the coverage inputs? (3/3)

#	Relevant comments	Occu.	EC/Axon's view
12.12	There is no way to manually adjust the geotypes defined (e.g. create a new geotype)		We recognise this situation and confirm that the definition of the geotypes is not expected to be changed/adjusted by stakeholders.
12.13	Are traffic routes considered in the model?		As indicated in the comments to Workshop 1, "*Transport routes will be considered as an independent geotype in the model if, as per the data reported in the Forms, this geotype is expected to be relevant in most EEA countries*". Once the data collection process was completed, we identified that only a minority of stakeholders provided this information and, hence, this geotype was not disaggregated in the cost model. This means there is not a differentiated treatment of traffic routes coverage in the model.

Question 13: Do you agree with the validation, treatment and estimation of the value for the spectrum inputs? (1/3)

Stakeholders' position





#	Relevant comments	Occu.	EC/Axon's view
13.1	Spectrum holdings should specifically be defined at country level.		The spectrum input will not typically match any given MNO due to their different spectrum holdings. Therefore, a methodology needs to be defined in terms of how the reference operator's spectrum will be set. The current approach ensures a common treatment of spectrum across the EU/EEA while adapts the spectrum available in each country to its realities.
13.2	700 MHz and 3500 MHz bands are not considered		Our understanding is that these bands are going to be primarily used for 5G deployments. Consequently, given that 5G has not been included in the model, these bands should not be considered.
13.3	Spectrum costs are underestimated		Spectrum costs are based on the data provided to the EC/Axon team by the NRAs. No alternative information has been provided to us.
13.4	Values cannot be easily explained (no further justifications were provided).		The definition of this input is provided in section 3.1.6 of the Methodological Approach Document.

AXON

- Comment from <4 stakeholders
- Comment from 4-10 stakeholders
- Comment from >10 stakeholders

- No action required
- Action without impact on results
- Action with impact on results

Question 13: Do you agree with the validation, treatment and estimation of the values for spectrum inputs? (2/3)

#	Relevant comments	Occu.	EC/Axon's view
13.5	It should be considered that 900 MHz spectrum is only used for 2G given that there are no contiguous 5 MHz blocks available in a country		We have adapted the spectrum input in that country based on the new indications provided.
13.6	The useful lives defined for spectrum are not aligned with the spectrum concession periods		We understand stakeholders' concerns with regards to this input and admit that, while adopting EEA average useful lives for most of the assets is reasonable, it is also true that the different spectrum concession periods per country have a direct impact on their costs. Consistently, country-specific useful lives have been defined for spectrum licenses.
13.7	The reference operator should have either 40 or 50 MHz in the 2600 MHz band in a country.		The spectrum defined for the reference operator in that country is indeed 50 MHz for the 2600 MHz band.
13.8	It should be considered that spectrum is more valuable at the centre of the band than at the edges.		As the model considers a reference operator which represents the average of the MNOs in the country, this effect is averaged out in the definition of this input.
13.9	Sensitivity analysis should be performed for TDD spectrum (no further justifications were provided).		Given the low rate of deployment of TDD networks in the EEA, we concluded that its impact would be limited on a EU-wide basis. Additionally, only a very limited number of stakeholders provided information about TDD networks when requested in the data gathering process.
13.10	The introduction of the 2600 MHz band in a country is probably assumed to happen too early (2020).		Based on the indications provided, we have adjusted the introduction year of the 2600 MHz band in that country.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

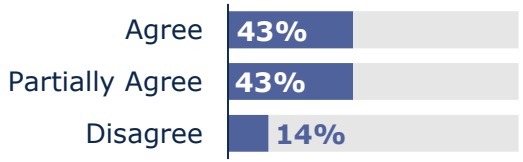
Question 13: Do you agree with the validation, treatment and estimation of the values for spectrum inputs? (3/3)

#	Relevant comments	Occu.	EC/Axon's view
13.11	Adding more spectrum to 4G has a relatively small impact.		This is usually the case in Bottom-Up models that consider Single-RAN equipment, given that the sites are shared across all three access technologies and usually 4G capacity is not the limiting factor as of today (2G/3G typically is).
13.12	5G costs should be included		Please refer to feedback provided to Q1.12.
13.13	The 1800 and 2100 MHz bands should be used entirely for 4G in a country from 2020		A common EEA approach has been defined in the usage of the spectrum bands per technology. Additionally, the approach presented would imply that no high spectrum bands would be available for 2G and 3G which could constitute a too-aggressive assumption for the cost model.

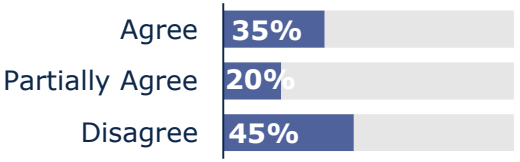
Question 14: Do you agree with the validation, treatment and estimation of the values for unit cost inputs? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
14.1	Own national figures should be used instead of EEA averages.		Firstly, no reasons are identified (nor have been presented) that justify that the cost of an asset depending solely on a provider's quote should fluctuate significantly from country to country. Therefore, the approach adopted aimed at maximising consistency across EU/EEA. Having said that, it is true that some differences exist in the unit costs of access-related assets (e.g. sites), as these do depend on country-specific factors. Consequently, two different scenarios have been implemented in the new version of the model: • EEA-averages only (spectrum costs are always set specifically for each country). • Country-specific figures for access-related assets and EEA-averages for transmission and core.
14.2	Unit costs for core elements have to be consistent with their capacity.		Both the unit costs and the capacities of the core elements have been set based on data reported by stakeholders.
14.3	Unit costs of some network elements are underestimated.		Given that the unitary cost inputs were defined as an EEA average, it is acknowledged that some of the references were above the average and it could be argued that the figures were underestimated (the opposite also holds true).

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

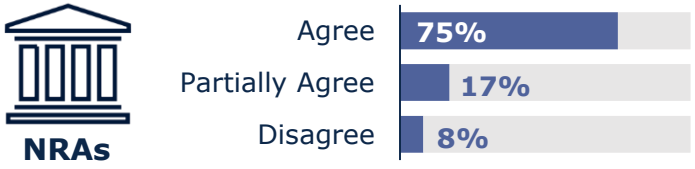
No action required
Action without impact on results
Action with impact on results

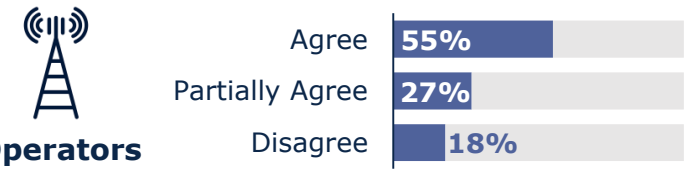
Question 14: Do you agree with the validation, treatment and estimation of the values for unit cost inputs? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
14.4	Spectrum costs should be calculated based on replacement costs.		There is no robust way to calculate the replacement costs of spectrum in each country, as spectrum costs use to depend significantly on uncertain processes (e.g. outcomes of an auction). Therefore, actual spectrum costs are used in the model.
14.5	Spectrum costs should be reviewed based on the latest information provided by a country.		As a CCA approach is adopted, only data from the most recent auctions was considered in the definition of the spectrum inputs.
14.6	The OSS system is missing		Only the most relevant network elements (in terms of costs) have been considered in the model. Additionally, discussions about the network elements to be considered already took place in Workshop 1 and in the data collection process.
14.7	There are negative values in the cost allocation process		The existence of negative values in the incremental cost calculation is expectable, specially in modular network elements, as more units of a particular modularity may be required without the traffic from an increment than when all the traffic is considered (thus, leading to negative costs for a particular element). Note however, that the overall incremental costs are always positive.
14.8	Unit costs should consider the specific situation of new entrants and small operators, who are expected to have higher costs.		Such cases are not expected to have a relevant influence for the reference operator, which is considered to have an efficient scale (at least 20%).

Question 15: Do you agree with the validation, treatment and estimation of the G&A input? (1/2)

Stakeholders' position





#	Relevant comments	Occu.	EC/Axon's view
15.1	All potential G&A departments should be considered		We appreciate the comment received and have included the costs from the wholesale department staff into the calculation of the G&A percentage.
15.2	The G&A percentage is underestimated		While we appreciate the comment provided, no indications have been received that may justify why stakeholders believe G&A is underestimated. Therefore, no adjustments are deemed necessary as a result of this comment.
15.3	G&A should be based on a different driver (for instance related to the market share), as these are not correlated with network costs.		Based on our experience, there is a closer relationship between G&A costs and Gross Book Value than between G&A costs and the number of subscribers. No evidences have been provided indicating why market share would be a better driver.
15.4	The G&A percentage should be calculated at national level		Given the narrow range observed among the references available, and the fact that many countries did not provide this information (i.e. they would need an EEA average of the G&A in any case), we see no reason to change the approach currently adopted.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

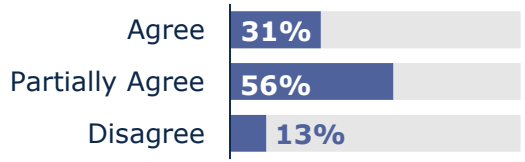
Question 15: Do you agree with the validation, treatment and estimation of the G&A input? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
15.5	G&A costs should be explained in further detail as no descriptions were included.		Details regarding the main aspects associated with G&A were discussed during the first workshop and the data request process. In addition, its components are detailed in section 3.1.7 of the Methodological Approach Document.
15.6	The model calculates the G&A as the product of the G&A percentage and investment (instead of GBV)		We appreciate the comments provided and acknowledge this situation. We have adjusted the model accordingly so that G&A is calculated as the product of the G&A percentage and GBV, instead of investment.
15.7	G&A values should be crosschecked against other sources, as it is difficult to validate otherwise.		The information about the G&A figures was cross-checked against the different stakeholders who provided enough information to calculate this percentage. Further indications were provided in section 3.1.7 of the Methodological Approach Document.

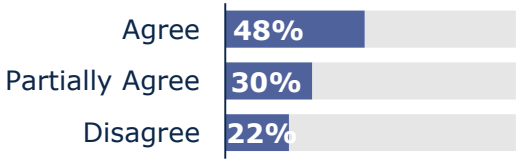
Question 16: Do you agree with the validation, treatment and estimation of the traffic distribution per technology inputs? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
16.1	4G traffic split is too aggressive		See response to Q3.1.
16.2	Technological disaggregation trends should be country-specific.		See response to Q3.1.
16.3	Latest inputs for traffic disaggregation should be considered for a country.		The new information reported by that country has been considered in the model.
16.4	Trends should not be considered to be always linear.		While a linear interpolation is certainly performed between 2018 and 2019, actual data (country-specific or from an EEA average) is employed for all the other years.

AXON

- Comment from <4 stakeholders
- Comment from 4-10 stakeholders
- Comment from >10 stakeholders

- No action required
- Action without impact on results
- Action with impact on results

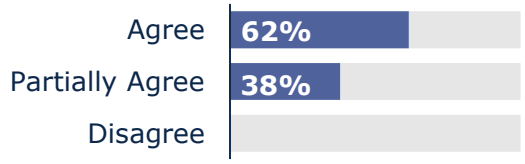
Question 16: Do you agree with the validation, treatment and estimation of the traffic distribution per technology inputs? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
16.5	The split of subscribers by technology exhibits an unexpected trend for 3G and 4G in 2018 in a country		We have adjusted this input accordingly to ensure a smooth trend in the migration of subscribers towards 4G in that country.
16.6	In a country, data was discarded for a different reason than the one included in the Methodological Approach Document.		We have improved the explanation provided in the Methodological Approach Document.
16.7	Demand distribution should be an outcome of the cost model and not an input.		The demand distribution per technology is an intrinsic factor of the MNOs' operations (as demand is) and is highly influenced by the capabilities of the end-devices. Therefore, in order to properly represent the situation in each country, this should be defined as an input.
16.8	Explanations should be provided on the logic behind the traffic split forecasts considered		Detailed explanations were provided in section 3.1.8. of the methodological approach document.

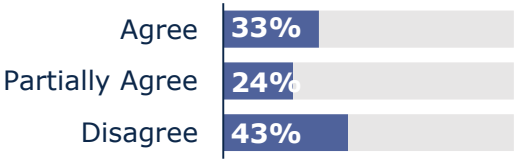
Question 17: Do you agree with the validation, treatment and estimation of the ARPU input? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
17.1	An ARPU of 10 does not appear to be correct		As outlined in the methodological approach document, ARPU is only used to set up the depreciation patterns when an ARPU-based economic depreciation is used. As such, given that interest was only on the evolution of ARPU, a reference value of 10 was introduced for the year 2015 (this reference value could have been set at 1 or 100, with no impact on the results).
17.2	ARPU should be defined at national level		As indicated in the answer above, only ARPU trends are required in the model. Therefore, wide variations in the absolute ARPU values among countries have no impact on the results. At the same time, from the data provided, it was clear that most stakeholders expected a very similar ARPU evolution over the next years across the EEA. Therefore, a common ARPU evolution trend across the EEA is still seen as the most suitable approach to be adopted.
17.3	ARPU trends should be reviewed (Some suggest a flat evolution should be considered, while others request a decreasing trend).		ARPU trends are based on the actual data reported by stakeholders.
17.4	ARPU (revenues) should not be included in a cost model.		ARPU is used to implement the revenue-based economic depreciation, as described in the 1st workshop.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

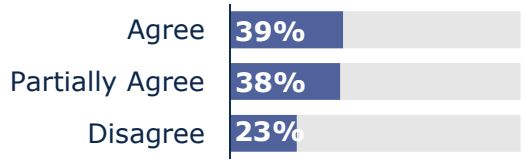
Question 17: Do you agree with the validation, treatment and estimation of the ARPU input? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
17.5	It may be complex to project ARPU		ARPU projections were provided by stakeholders and the expected trends were notably similar between countries.

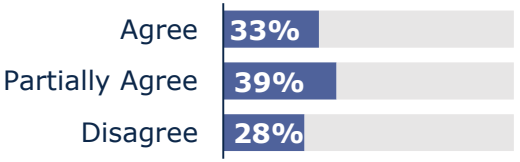
Question 18: Do you agree with the validation, treatment and definition of the traffic patterns and seasonal behaviours? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
18.1	Seasonality was not considered for all countries.		As described in Workshop 1, seasonality was only considered for the countries in which at least one MNO reported all the high-priority information in the worksheet "ACCESS NODES".
18.2	Seasonality is not relevant		Please refer to feedback provided to Q2.1.
18.3	The threshold defined for the identification of seasonal areas (50%) is too high		Please refer to feedback provided to Q2.5.
18.4	Further clarifications should be provided regarding how the busiest month per geotype is calculated based on the data reported at municipality level.		The seasonality assessment considers the traffic in the busiest month in each of the municipalities. This traffic is then added up and divided over the total traffic in the geotype to calculate the percentage of traffic to be considered in the cost model.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 18: Do you agree with the validation, treatment and definition of the traffic patterns and seasonal behaviours? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
18.5	Urban-seasonal geotypes should also be defined in a country		As per the rules defined in section 3.1.10. of the Methodological Approach Document, no relevant seasonality was identified in urban areas in that country that merited the disaggregation of this geotype.
18.6	Seasonality should only be considered for roaming services		The relevant information received for domestic services shows that these are also subject to seasonality in some cases.
18.7	The thresholds should be applied to the mode of the references and not the mean.		Please refer to feedback provided to Q2.10.
18.8	Seasonal patterns should be assessed on data+voice traffic instead of on data only traffic.		Please refer to feedback provided to Q2.8.
18.9	The structural growth adjustment should be implemented at geotype level, instead of at national level		Please refer to feedback provided to Q2.9.
18.10	The effect of the growth of the traffic is higher than the effect of seasonality		Please refer to feedback provided to Q2.11.
18.11	2017 is not a representative year for the assessment of seasonality as there was no complete RLAH		Given that seasonality is assessed on the overall traffic of a country and the fact that roaming traffic represents only a small percentage of the total country's traffic, 2017 is considered to be fully representative for the assessment of seasonal patterns.

AXON

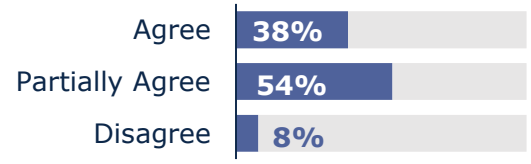
Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

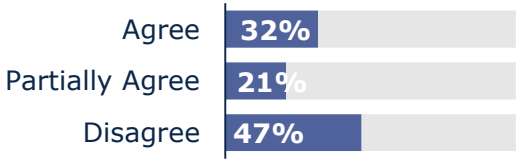
Question 19: Do you agree with the validation, treatment and estimation of the values of the cell radii? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
19.1	Cell radii is too high/low		Given that the cell radii inputs were mostly defined as an EEA average, it is acknowledged that some of the references were above/low the average and could argue that the figures were set too high/low in their model. The references received which deviated significantly from the average were already recognised individually, as explained in the methodological approach document. On the other hand, the countries in which the cell radii were set as per the average either i) reported data close to the average or ii) did not report information. Nevertheless, when new information has been provided by stakeholders, this has been fed into the model.
19.2	Country specific information should be used		We have included two different scenarios for the treatment of cell radii in the model: • Mix country specific and EEA-averages (current approach). • Country-specific figures only. The definition of the inputs for these two scenarios is provided in the Methodological Approach Document.
19.3	It is unclear why data reported was discarded		As detailed in the Methodological Approach Document, average EEA values were typically considered as a first alternative. Only in the cases where significant differences were found, country specific cell radii were considered.

 Comment from <4 stakeholders

 Comment from 4-10 stakeholders

 Comment from >10 stakeholders

No action required

Action without impact on results

Action with impact on results

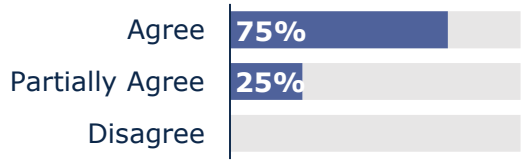
Question 19: Do you agree with the validation, treatment and estimation of the values of the cell radii? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
19.4	Cell breathing should be considered in the 3G access network		3G cell breathing is already accounted for in the cost model through a number of different dimensioning factors (e.g. security margin, pole capacity and soft-handover).
19.5	Coastal regions should be considered separately.		To the best of our knowledge, these regions have not been treated separately by NRAs in the past. Additionally, no specific data has been submitted in order to quantify the impact of this comment. Therefore, no changes are deemed necessary.
19.6	QoS parameters are not considered for voice services		Quality of Service is considered in the model for voice services through the application of the Erlang B formula.
19.7	According to Descriptive Manual p. 15 there is an uncovered area. Hexagon based formula should be used.		While the circles in the exhibit illustrate the cell radii over the hexagonal grid, the formulation implemented is indeed considering an hexagonal cell (refer to the descriptive manual of the model for further indications).
19.8	It is unclear which bands are mapped to LTE LOW, MID or HIGH		800 and 900 MHz are considered as low bands, 1800 MHz is considered as mid band while 2100 and 2600 MHz are considered as high bands.
19.9	The inputs considered should be in line with those considered in the NRAs' cost models		We agree that stakeholders should have provided inputs that were consistent with the values considered in the existing Bottom-Up models in their own countries.

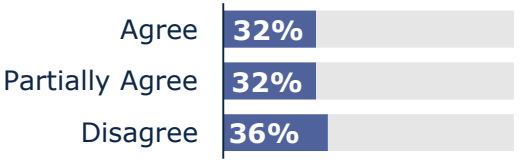
Question 20: Do you agree with the validation, treatment and estimation of the percentage of traffic in the busy hour and in weekdays input? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
20.1	Week-day traffic values for Voice and data were switched		We acknowledge this issue and have adjusted it in the new version of the model.
20.2	Increases in the busy hour percentage show a decrease in the unit cost for some services		The model considers different busy hours for the different services. Accordingly, it is common that increasing the busy hour of one of the services results in a decrease of the cost of other services, as the allocation based on routing factors takes into consideration the busy hour traffic of each service.
20.3	EEA averages are far from describing the situation correctly for a country (no further justifications were provided).		No information was provided by stakeholders from the country in which this comment was generated.
20.4	Base stations should be considered to be unevenly loaded in the busy hour		Please refer to feedback provided to Q2.6.
20.5	Further justifications should be provided on the threshold defined to discard data provided by stakeholders (5%)		As detailed in the Methodological Approach document, no inputs were discarded based on this threshold. Therefore, we do not see it as critical.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

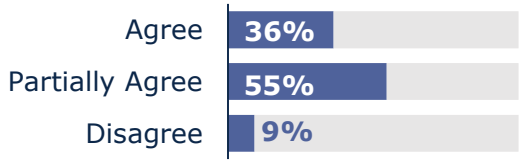
Question 20: Do you agree with the validation, treatment and estimation of the percentage of traffic in the busy hour and in weekdays input? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
20.6	Busy hour may take place on weekends		The calculations implemented in the model already recognise whether the busiest day takes place in a typical weekday or in the weekend.
20.7	Busy hour for active subscribers should be justified.		Busy hour for active subscribers is only used for subscribers' signaling (just because of them being active) and its relevance in the model is residual. This is why no thorough indications are provided about it.
20.8	Busy hour should be disaggregated by geotype		The busy hour in a day is considered to be the same in all geotypes, as extremely detailed data on the busy hour per would be required otherwise. However, it should be noted that the final percentage of traffic in the busy hour was indeed disaggregated per geotype when the high relevant information at site level was provided (sheet "ACCESS NODES" of the data request). When this information was not provided, a country average had to be used.
20.9	Clarifications on the modifications made to the inputs provided by stakeholders should be provided		Detailed explanations are provided in the Methodological Approach Document.
20.10	Busy hour is too low for a country		The busy hour input for that country is based on the actual data provided by the NRA in the data collection process.
20.11	The median may be better than the average		No justifications were provided by the stakeholder who issued this comment. Therefore, we consider the average of the EEA figures to be a representative input when no data was provided/accepted for a particular country.

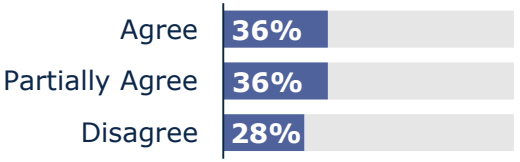
Question 21: Do you agree with the validation, treatment and definition of the backbone input? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
21.1	The backbone network dimensioned is too small when compared with the realities of the country.		We appreciate these comments and the new data/clarifications provided by some stakeholders. We have redefined the backbone dimensioning in a few countries based on the detailed indications provided by their stakeholders.
21.2	The core nodes locations are not fully representative and lead to inaccurate results		
21.3	Everything should be based on Scorched-Earth/Everything should be based on Scorched-Node (including routes).		Differing views were gathered in terms of the dimensioning approach adopted. In our view, adopting a purely scorched earth approach would lead to significant deviations from the actual networks and many country-specific factors could be overlooked. On the other hand, extending the application of scorched-node to the dimensioning of the routes themselves would require detailed data per country which, in many cases, was not provided in the data collection process. Therefore, we do not identify a need to adjust the approach currently adopted, which exploits all the information available and i) ensures that the network dimensioned resembles the actual backbone networks of MNOs while ii) is flexible enough to accommodate changes in its design without requiring of highly detailed data from MNOs.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

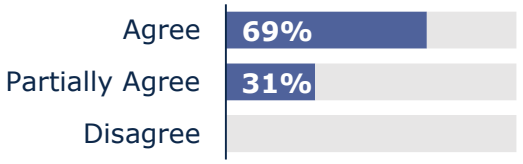
Question 21: Do you agree with the validation, treatment and definition of the backbone input? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
21.4	Dimensioning of backhaul links should be revisited, as the distances shown are very low.		The modelled backhaul network considers that in order to reach the controller placed in the core network the access site hops to a hub, which in turn hops to other hubs sequentially until the controller is reached. We have clarified this aspect in the descriptive document of the cost model and have also adjusted the calculation of the average traffic per hub to consider the fact that hubs are sequentially connected to each other.
21.5	Network infrastructure sharing should be considered in the transmission network		On one side, the model already considers the sharing of the transmission network infrastructure in terms of leased lines. On the other side, for microwave-related assets, the cost implications of such commercial agreements would be expected to have been reflected in the unit cost inputs reported.
21.6	NRA models could be used as a source to cross-check these inputs		On one hand, the reconciliation exercise on the outputs performed by Axon is provided in section 2 of this presentation. On the other hand, we agree that the NRAs should have ensured the reasonability of the inputs they reported as part of the data gathering process based on the data internally considered in their own cost models.
21.7	The number of MGW and MSC is underestimated for Spain		Consistently with the CCA methodology, the MGW and MSC platforms have been dimensioned according to the capacity reported by stakeholders, while allowing a reasonable security margin. We understand the current number of platforms of the MNOs may be higher, as they may have older assets with lower capacity, which would only be captured under a HCA methodology.
21.8	Confidentiality should be adjusted to level 2 in a country		It should be noted that while the data used for the determination of the number of core nodes is based on data provided by the stakeholders, the location of these is based on the actual cities existing in each country (not the actual locations of the core nodes reported by operators), as detailed in section 3.1.13 of the Methodological Approach Document. At the same time, we confirm this information was already treated as level 2 (not disclosed to any other countries).

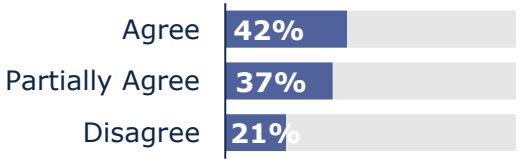
Question 22: Do you agree with the validation, treatment and definition of the useful lives inputs? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
22.1	The useful life for dark fibre ports is overrated (it should be 5 years)		As indicated in the methodological approach document, useful lives were defined as an EEA average. Therefore, it is understandable that the figures considered were below/above those provided by some stakeholders. Based on the comments received, the useful life of all fibre links has been set to 30, while no other adjustments have been introduced, as there was a broad level of agreement among responding stakeholders.
22.2	Useful lives are too long		
22.3	A more detailed assessment of the useful lives applicable to co-located sites should be made		
22.4	Ports' asset lives should be reduced to 8 years		
22.5	Asset life for backhaul fibre links should be 30 years instead of 20		
22.6	Asset life for backbone fibre links should be 20 years instead of 30		
22.7	Useful lives for software equipment should be 2 years		
22.8	Useful life for spectrum should be aligned with the concession period.		Please refer to feedback provided to Q13.6.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

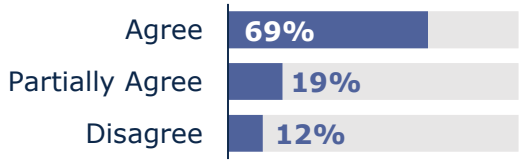
Question 22: Do you agree with the validation, treatment and definition of the useful lives inputs? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
22.9	NRA models could be used as a source to cross-check these inputs.		Please refer to feedback provided to Q21.6.
22.10	It is unclear why the data reported was discarded.		Justifications were provided in section 3.1.14. of the methodological approach document.

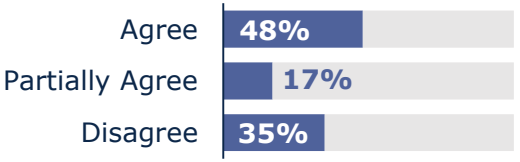
Question 23: Do you agree with the validation, treatment and definition of the WACC input? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
23.1	Standardisation in the calculation of the WACC should be ensured. The NRAs don't typically follow the exact same methodology.		While it is true that the NRAs may not follow the exact same methodology, these WACCs are approved and typically used for many purposes, including the development of bottom-up models in each Member State. In addition, we have ensured that the WACCs calculated in each country do not deviate significantly from the average observed in the EEA.
23.2	WACC values should not be lower than the NRA WACC.		Values reported by NRAs were taken as-is, with the exception of the cases that were reported to be in real terms, which were adjusted by inflation (please refer to section 3.1.15. of the methodological approach document).
23.3	An uncertainty factor (1%) should be used to calculate results for a period longer than one year.		We see no need to adjust the WACC already calculated by NRAs. At the same time, we note that NRAs have also typically used this – or an older – WACC to set wholesale rates for more than one year.
23.4	The WACC for fixed networks alternatively reported by a country should be considered.		The new WACC reported by that country has been considered.

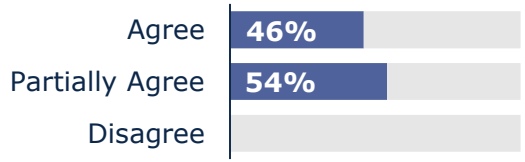
Question 23: Do you agree with the validation, treatment and definition of the WACC input? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
23.5	The actual nominal pre-tax WACC calculated by the NRA should be used (instead of real WACC + conversion to nominal)		We agree with this comment and we have used this reference whenever available. Additionally, when new information has been reported by NRAs, this has been considered in the new version of the model.
23.6	NRA models could be used as a source to cross-check these inputs		Please refer to feedback provided to Q21.6.
23.7	WACC values should not be confidential for a country		WACC for that country was not reported as confidential.
23.8	Average EEA WACC calculated should be published		The EEA average WACC was only used for Estonia, as no data was reported, and originally for Greece, as its input was not within the validation range. Actual country data was used for all the other countries. Accordingly, we do not see a need to disclose the EEA average WACC.
23.9	New WACC provided by a country should be used		The new WACC reported by that country has been considered in the new version of the model.
23.10	The WACC considered in a country is overestimated.		The official figure reported by the NRA from that country was considered.

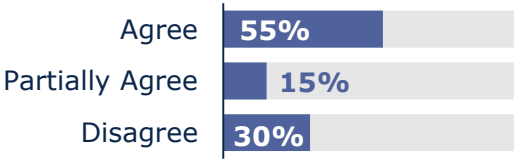
Question 24: Do you agree with the validation, treatment and estimation of the wholesale specific costs inputs? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
24.1	Further details should be reported on the robustness of the statistical model used, in order to assess the validity of the results.		We have reviewed the explanations provided in the Methodological Approach Document and improved them whenever feasible.
24.2	Wholesale specific costs are only partly sensitive to increasing volumes and, therefore, the regressions lead to unreasonable results		Given that only one comment was received questioning the overall reasonability of the regression trends obtained, we see no need to change the overall approach adopted.
24.3	Average data session should be defined at country level		Please refer to feedback provided to Q10.6.
24.4	1000 should be used as the conversion factor between MB and GB		We have ensured consistency in the conversion between units in the cost model. However, from a technical perspective a conversion of 2^10 = 1024 is usually preferred.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 24: Do you agree with the validation, treatment and estimation of the wholesale specific costs inputs? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
24.5	NRA models could be used as a source to cross-check these inputs		Please refer to feedback provided to Q21.6.
24.6	A mark-up should be considered to calculate wholesale specific costs		In our view the current implementation is more robust than the alternative suggested, while at the same time it keeps consistency with the previous cost study.
24.7	Excessive outliers identified in financial and clearing costs		Having re-assessed the values discarded we concluded that no further action was required.
24.8	Wholesale costs calculated are too low when compared with the actual data provided by the stakeholders.		The current assessment of wholesale specific costs is based on a regression from all reporting stakeholders and it is therefore expectable that the figures reported by stakeholders fall below/above the outcomes of the regression.
24.9	All wholesale commercial costs should be allocated to roaming services, based on the split already provided by stakeholders		Please refer to feedback provided to Q8.3.
24.10	There may be country-specific factors explaining the existence of some outliers.		Values reported were only classified as outliers when they significantly deviated from the rest. Therefore, we believe that the likelihood of these being due to country-specific factors is negligible.

AXON

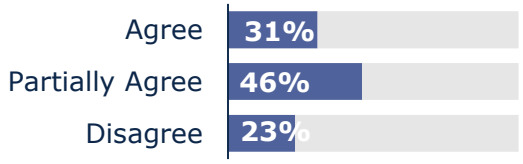
Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

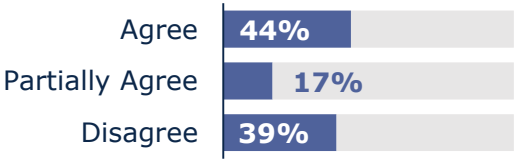
Question 25: Do you agree with the approach adopted to calculate the population and area per geotype? (1/3)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
25.1	The geographical information considered differs from other national references		Please refer to feedback provided to Q12.3.
25.2	The sample area considered is too high		The objectives of defining a sample area are to i) identify inhabited areas of the country, ii) assess population distribution in rural areas and iii) assess the topography of rural areas. As such, the sample area considered is in line with the area of a typical mobile site that could be expected in a flat rural area, which is consistent with the dimensioning rules considered in the cost model for the access network.
25.3	The populated area of the country is wrongly considered to be joint (i.e. all populated areas are considered to be in a single cluster, without non-populated areas in between)		This is a common drawback of most bottom-up models, as they can't (and should not be expected to) reach the accuracy levels of operators' network design tools. Therefore, while we understand this concern, it is also true that based on the geographical analysis performed, we have identified that a very small percentage of the area of any country is inhabited (defined as no population living within a sample area). Consequently, the impact of such approach should be expected to be very limited.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 25: Do you agree with the approach adopted to calculate the population and area per geotype? (2/3)

#	Relevant comments	Occu.	EC/Axon's view
25.4	The sum of the area per geotype does not add up to total area of the country		This is because the sum of the area of the geotypes represents the total populated area of the country, which is usually lower than the total area of the country. On the other hand, with regards to the total area displayed in the inputs of the model, it is based on the total area of the country as reported by Eurostat (https://ec.europa.eu/eurostat/statistics-explained/images/8/87/Land_cover%2C_2015.png)
25.6	The percentage of rooftop sites in a country is too high		The percentage of rooftop sites in that country has been calculated based on the data reported by stakeholders in the data collection process (i.e. number of tower sites and number of rooftop sites).
25.7	The topography assessment should also be performed in non-rural areas		Based on our experience, the impact of this assessment in non-rural areas is very limited. Therefore, while we agree this analysis may be interesting, we have prioritised other areas of relevance within the timeframe available.
25.8	NRA models could be used as a source to cross-check these inputs		Geographical data should not be extracted from the NRAs' cost models as this would lead to inconsistencies among the considerations adopted to define the different geotypes in the EC's cost model. A harmonized reference such as DEGURBA is preferred.
25.9	Traffic migrations between geotypes (day/night shifts) should be considered		Please refer to feedback provided to Q12.2.
25.10	Integer figures should be used for access elements.		Please refer to feedback provided to Q1.9.

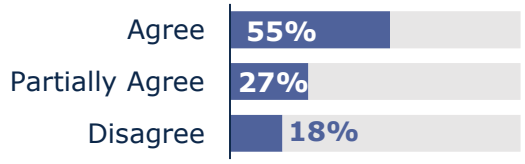
Question 25: Do you agree with the approach adopted to calculate the population and area per geotype? (3/3)

#	Relevant comments	Occu.	EC/Axon's view
25.11	The VBA macros should be described to maximise the transparency of the model		The VBA macro only handles the execution of the model (i.e. it does not perform any calculation). Therefore, we do not see a need to provide detailed descriptions about the macro's operation. It should also be noted that there are already comments within the macro itself that describe its logic and execution steps.
25.12	Indoor coverage is not captured in the model		Indoor coverage is already expected to have been accounted for in the cell radii inputs provided by stakeholders through the data collection process.
25.13	Busy hour should be disaggregated by geotype		Please refer to feedback provided to Q20.8.

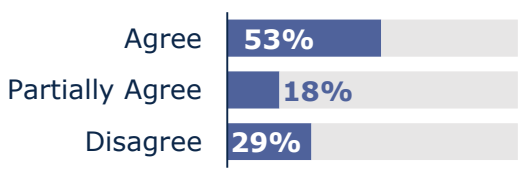
Question 26: Do you agree with the approach adopted to assess the distribution of population in rural areas? (1/2)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
26.1	The "b" value obtained is too high for a country; it would be better to estimate it based on data provided by operators.		No detailed evidence has been provided to clarify why the "b" value obtained for that country is seen as too high. On the other hand, the data provided by operators would not be detailed enough to perform this assessment in the level of detail required.
26.3	NRA models could be used as a source to cross-check these inputs		Please refer to feedback provided to Q25.8.
26.4	Rural area is not in line with local statistical agencies		Please refer to feedback provided to Q12.3.
26.5	Geotypes should not be considered to be homogeneous, as population is not distributed evenly across the area		This simplification is typical of bottom up models. The geotypes are defined in order to ensure that the areas considered are as homogeneous as possible; However, in order to consider the maximum level of accuracy, the model would have to work on a per-site basis which is not feasible. In any case, the effect of this issue should be mostly apparent in rural areas, where the geotype is not considered to be homogeneous.

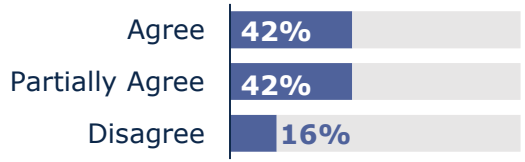
Question 26: Do you agree with the approach adopted to assess the distribution of population in rural areas? (2/2)

#	Relevant comments	Occu.	EC/Axon's view
26.6	"b" parameter should be calculated separately for Mountainous and Non-mountainous areas		The calculation of the 'b' parameter implicitly considers the differences between mountainous an non-mountainous, as the non-mountainous areas are considered to be the most sparse.
26.7	The sample area considered is too high		Please refer to feedback provided to Q25.2.

Question 27: Do you agree with the approach adopted to assess topography in rural areas? (1/3)

Stakeholders' position

NRAs



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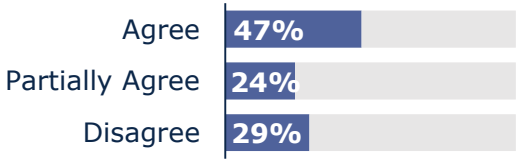


#	Relevant comments	Occu.	EC/Axon's view
27.1	Geographical inputs are not in line with national sources (NRA model, or statistical agencies)		Please refer to feedback provided to Q12.3.
27.2	The values included in the model do not match those presented in exhibit 3.15		We appreciate the indications received on this subject. Indeed, we have noted that the title of the table included in the model said "Non-mountainous" when it should have said "Mountainous". We have adjusted the title accordingly to avoid confusions.
27.3	The 300m threshold for mountainous areas is not appropriate		While we understand this threshold may be subject to discussion, no alternative figure has been provided and no detailed justifications were submitted. Therefore, and given that there was one single comment pointing this out, we see no need to change this threshold.
27.4	Topography should be assessed for urban and suburban areas too		Please refer to feedback provided to Q25.7.

Question 27: Do you agree with the approach adopted to assess topography in rural areas? (2/3)

#	Relevant comments	Occu.	EC/Axon's view
27.5	Coverage in mountainous areas should not be considered as the last priority (as it may be relevant for ski areas)		We understand and agree with this comment. Nevertheless, given the panEuropean nature of this study, and as indicated in Workshop 1, some very specific country issues, such as the coverage of ski stations, can't be addressed in full.
27.6	NRA models could be used as a source to cross-check these inputs		Please refer to feedback provided to Q25.8.
27.8	The split between rooftop and tower sites in a country should reflect the wider use of rooftop sites in urban areas and tower sites in rural areas.		We appreciate the new information provided. The percentages considered have been updated for that country.
27.9	More than one measurement for altitude should be taken for each sample		Indeed, as described in section 3.2.4. of the methodological approach document, 9 points were considered to assess the topography of each sample.
27.10	The mountainous area considered for two countries is too low		We see no significant differences between the mountainous areas considered in these two countries (see Figure 3.16 of the methodological approach document) and their topography (see https://upload.wikimedia.org/wikipedia/commons/3/38/Europe_topography_map_en.png).
27.11	The sample area considered is too high		Please refer to feedback provided to Q25.2.

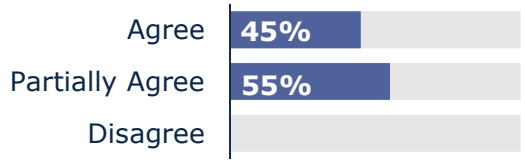
Question 27: Do you agree with the approach adopted to assess topography in rural areas? (3/3)

#	Relevant comments	Occu.	EC/Axon's view
27.12	Calculate the square roots of the differences in heights from the average height to best measure "unevenness"		While we agree with the comment, we actually want to assess the difference between the highest and lowest points in an area. The word "height differential" may be more suitable than "unevenness".

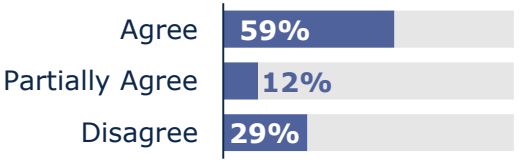
Question 28: Do you agree with the approach adopted to define the standard and low materiality inputs? (1/3)

Stakeholders' position

NRAs



Operators



#	Relevant comments	Occu.	EC/Axon's view
28.1	Voice blocking probability should be lower. Comments received did not specify if they referred to the blocking probability to be considered in access or core networks		We recognise that it may be more realistic to consider a lower blocking probability for the design of the core networks. As such, while keeping the 2% blocking probability for the access network, we have reduced this percentage to 0.2% in the core network.
28.2	Values for GB and Gb are not consistently used across the model		We appreciate the comment received and have adjusted such situations.
28.3	Voice bitrate shall be lower than the one considered		While we understand stakeholders' comment, a higher bitrate has been preserved to account for an additional security margin.
28.4	Access and backhaul network dimensioning inputs are not low in materiality		While we agree with this comment, we would like to point out that these inputs are defined based on a standard, as indicated at the heading of the section.
28.5	Some inputs are different that in some NRAs' Bottom-Up models.		While we understand that different NRAs may consider different inputs in their cost models and that, therefore, the nature of this exercise will bring in some differences in this comparison, the values considered are within the range of those typically adopted by other NRAs in Europe.

AXON

Comment from <4 stakeholders
Comment from 4-10 stakeholders
Comment from >10 stakeholders

No action required
Action without impact on results
Action with impact on results

Question 28: Do you agree with the approach adopted to define the standard and low materiality inputs? (2/3)

#	Relevant comments	Occu.	EC/Axon's view
28.6	NRA models could be used as a source to cross-check these inputs		We have considered the best international practices and standards in the definition of these inputs.
28.7	SMS size is not consistently used throughout the model		We appreciate the comment received and have reviewed such situations in detail.
28.8	There should be a minimum of 2 VoLTE platforms for redundancy.		We agree with the comment received and have included a minimum redundancy for VoLTE platforms.
28.9	Single RAN load should be lower as an average of the network.		The SingleRAN maximum load has been lowered to 65% in the model.
28.10	Maximum backhaul distance with MW should be lower for LTE, as higher frequencies are used to transmit the higher bandwidth required by data networks.		As singleRAN equipment is used, the distance of MW links is independent of the underlying access technologies employed. Therefore, we see no need to adjust the current input.
28.11	These inputs should be defined at country level		These inputs have been defined as an EEA average due to their low materiality in the results of the cost model.

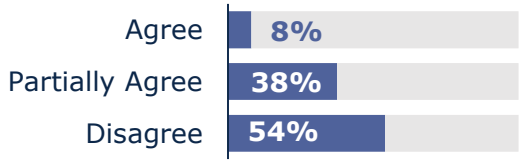
Question 28: Do you agree with the approach adopted to define the standard and low materiality inputs? (3/3)

#	Relevant comments	Occu.	EC/Axon's view
28.12	Calculate the square roots of the differences in heights from the average height to best measure "unevenness"		While we agree with the comment, we actually want to assess the difference between the highest and lowest points in an area. The word "height differential" may be more suitable than "unevenness".

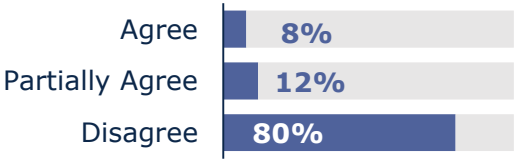
Question 29: Do you agree that the number of access sites calculated for the reference operator is reasonable for the operations in your country?

Stakeholders' position

NRAs



Operators

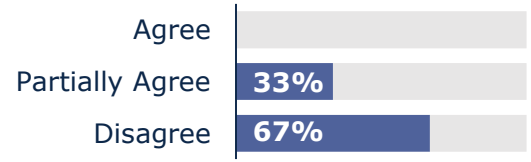


#	Relevant comments	Occu.	EC/Axon's view
29.1	The number of sites calculated is too low		Please refer to section 2 of the presentation
29.2	The calculation of the model's coverage shows differences with theoretical exercises		No supporting information was shared by the stakeholder issuing this comment to allow us to assess its appropriateness.
29.3	Rooftop/tower split is not representative for a country		No information has been provided by the stakeholder issuing this comment to justify why the split considered is not representative for that country.
29.4	Number of 2G elements is too low in a country		The model calculates the 2G elements strictly required to comply with the coverage and capacity constraints inherent to this technology. While we recognise that MNOs may have more 2G sites for historical reasons or because they install all access technologies in most of their sites, the KPI the stakeholder is looking at represents the strict number of 2G sites required. No indications have been received pointing out an issue in the 2G cell radii adopted or the capacity considered for 2G access elements.

Question 30: Do you consider that the annual cost base produced for the reference operator is reasonable for the operations in your country?

Stakeholders' position

NRAs



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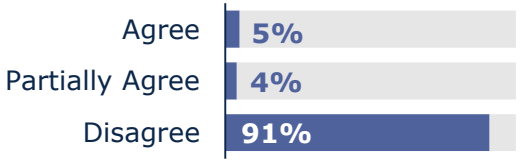
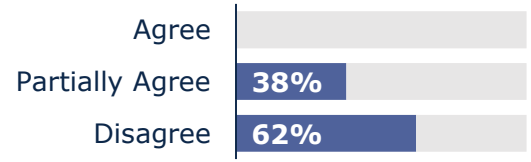


#	Relevant comments	Occu.	EC/Axon's view
30.1	Costs are too low		Please section 2 of the presentation

Question 31: Do you consider that the unit costs obtained for the domestic data service are reasonable for an operator with the scale of the reference operator in your country?

Stakeholders' position

NRAs



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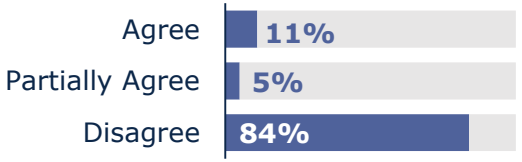
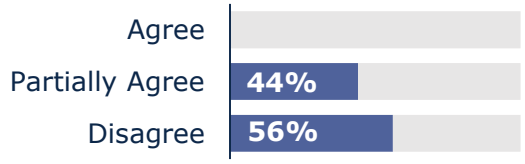


#	Relevant comments	Occu.	EC/Axon's view
31.1	Costs are too low/high		Please section 2 of the presentation

Question 32: Do you consider that the unit costs obtained for the roaming-in data service (within the EU/EEA) are reasonable for an operator with the scale of the reference operator in your country?

Stakeholders' position

NRAs



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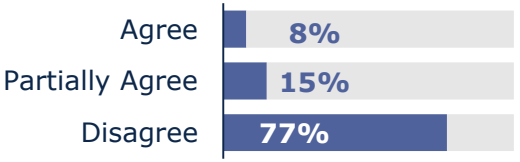
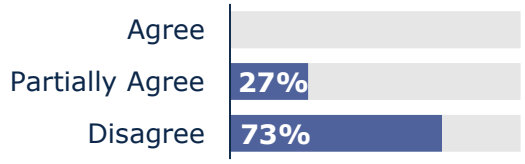


#	Relevant comments	Occu.	EC/Axon's view
32.1	Costs are too low		Please section 2 of the presentation
32.2	Backhaul costs should be reviewed for a country		We appreciate the indications provided in terms of the backhaul network and its dimensioning has been reassessed (see further details in the cost model itself).

Question 33: Do you consider that the unit costs obtained for the voice termination service are reasonable for an operator with the scale of the reference operator in your country?

Stakeholders' position

NRAs



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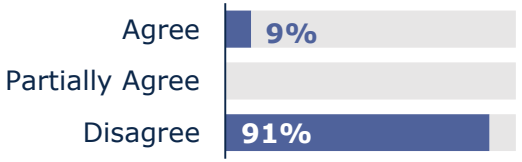
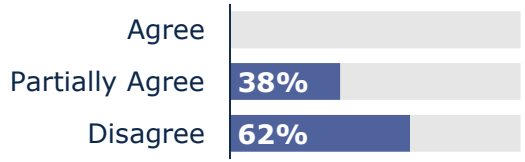


#	Relevant comments	Occu.	EC/Axon's view
33.1	Costs are too low		Please section 2 of the presentation
33.2	Results are fluctuating		This is a common pattern for MTR as per the implications of the pure LRIC standard. While these fluctuations have been reduced in the new version of the model, they still exist due to the nature of the exercise.

Question 34: Do you consider that the unit costs obtained for the roaming-in voice service (within the EU/EEA) are reasonable for an operator with the scale of the reference operator in your country?

Stakeholders' position

NRAs



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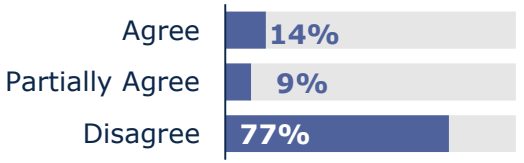
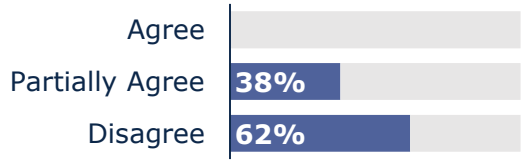


#	Relevant comments	Occu.	EC/Axon's view
34.1	Costs are too low		Please section 2 of the presentation

Question 35: Do you consider that the unit costs obtained for the roaming-in SMS service (within the EU/EEA) are reasonable for an operator with the scale of the reference operator in your country?

Stakeholders' position

NRAs



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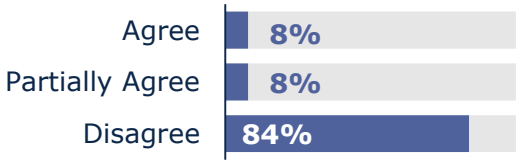
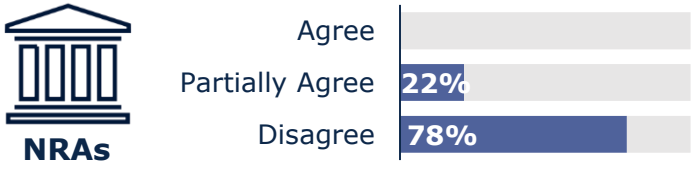
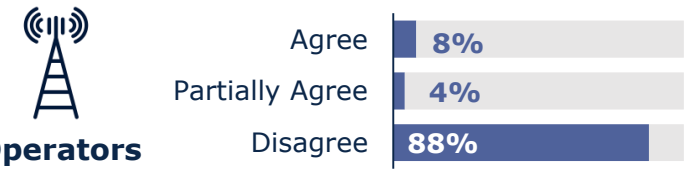


#	Relevant comments	Occu.	EC/Axon's view
35.1	Costs are too low		Please section 2 of the presentation
35.2	Volumes for SMS roaming in the calculations of the cost model diverge from collected data for a country		The new demand inputs provided by that country have been considered in the new version of the cost model

Question 36: In general, do you consider that the results produced by the model are reasonable for an operator with the scale of the reference operator in your country?

Stakeholders' position



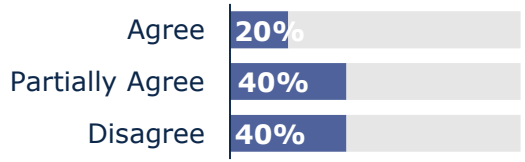


#	Relevant comments	Occu.	EC/Axon's view
36.1	Costs are too low		Please section 2 of the presentation

Question 37: Do you agree with the EC's preliminary estimates of voice and mobile data transit charges, namely 0.2-0.4 EUR cents/min and 0.1-0.3 EUR/GB, respectively?

Stakeholders' position

NRAs



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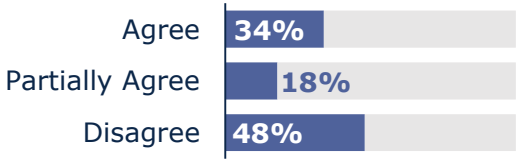

#	Relevant comments	Occu.	EC's view*
37.1	Costs are too low/high		In view of several comments to the 1st consultation, as well as the analysis conducted by the EC in parallel to the consultation, it seems appropriate to consider the following average transit prices per service: (i) 0.4-0.6 €c/min for voice (ii) 0.05-0.08 €c/SMS and (iii) 0.1-0.2 €/GB. The EC invites comments on these average estimates in the 2nd consultation.

* This issue is solely dealt with by the EC and is not directly related with the EC/Axon's cost model.