AXON

Excellence in Business

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

Consultation document

Axon Partners Group

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Contents

1 Introduction

The European Commission (hereinafter "EC") commissioned Axon Partners Group Consulting S.L.U. (hereinafter "Axon Consulting" or "Axon") for the "*Assessment of the cost of providing wholesale roaming services in the EU/EEA countries – SMART 2017/0091"* ('the Project').

As described during Workshop 1 held on 10 April 2018 at the EC's headquarters, the EC deemed relevant to develop a new cost study to understand the costs of providing mobile services in EU/EEA countries. With such objective in mind, the EC/Axon team has developed a Bottom-Up Long Run Incremental Cost (hereinafter 'BULRIC') model that calculates the costs of providing mobile services in the EU/EEA countries.

The outcomes of this model are expected to inform the EC's decision on both (i) the need to review the wholesale roaming price caps[1] and (ii) set a single maximum mobile termination Euro Rate across the EU[2]. Stakeholders should not, in any case, expect any regulatory decision to be adopted solely based on the information produced by the cost model subject to this consultation.

The EC/Axon team has decided to involve stakeholders in this first (out of two) public consultation processes[3] to provide transparency and gather feedback to improve the outcomes of the cost study.

The objective of this document is to introduce stakeholders to the consultation process. This document includes an overview of the consultation process, namely, a description of the: (i) files submitted for consultation; (ii) roles of each party to the consultation (NRAs and operators); (iii) procedure to submit comments; (iv) treatment of confidential information; and (v) questions for consultation.

The EC/Axon team invites stakeholders participating in this consultation round to follow the indications presented in the remainder of this document.

[1] In the context of the RLAH regulation.

[2] As included in the draft European Electronic Communications Code (EECC). Latest version available from June 2018 can be accessed through the following link: http://data.consilium.europa.eu/doc/document/ST-10692-2018-INIT/en/pdf.

[3] See further indications on the different phases of the Project in the presentation of Workshop 1 held in Brussels on 10 April 2018 and shared with NRAs and operators.

2 The consultation process

The main objectives of this consultation are to:

- Provide full transparency to the industry with regards to the methodology, inputs and outcomes of the cost model developed to calculate the costs of providing mobile telecommunications services in the EU/EEA countries.
- Gather feedback from stakeholders on the methodology, inputs and outputs of the model.
- Maximise the accuracy and representativeness of the results for each of the countries included in the cost study.

This consultation is the first of the two consultations that the EC/Axon team will organise with the industry over the lifespan of this study (the second consultation being scheduled for the period 18 February- 15 March 2019). The two consultation processes will be similar, and stakeholders will be able to provide comments on the methodology, inputs and outputs of the model in the same manner in the two processes.

The following sub-sections provide further indications on:

- Description of files submitted to consultation
- Roles of each party
- Procedure to submit comments
- Confidentiality of the information

2.1 Description of files submitted to consultation

As part of the consultation round, the EC has shared the following documents with NRAs:

- **Main Consultation Document** (this document)**:** provides an introduction to the consultation and gives general indications on the consultation process.
- **Annex 1 – Draft Cost Model (including a CONFIDENTIAL and NON-CONFIDENTIAL version to share externally):** Cost model for mobile networks in Microsoft Excel format. This document includes the calculations, inputs and outputs of the model developed by the EC/Axon team and has been shared with each NRA via its dedicated country folder in the CIRCABC platform created by the EC for this project, named "Wholesale roaming cost study_2019". For confidentiality reasons, only two colleagues from each NRA have been granted access to the country folder in CIRCABC

containing the data relating to its own country (see section 2.4 for further indications on the treatment of confidentiality).

NRAs should note that two versions of the cost model have been shared with them.

- Annex 1- Draft cost model - Internal version: Microsoft Excel file '20181029 - Axon - Mobile Cost Model v30.5 **CONFIDENTIAL** – *Country Name*'.

  This is the CONFIDENTIAL version of the cost model. This version of the cost model should be for internal (i.e. NRA) use only and should not be shared with M(V)NOs. This version includes the same input and output data as considered by the EC/Axon team in their internal version of the models for each NRA. This version will provide NRAs with a clear picture on the actual costs produced by the model for their own country, without any adjustments due to the anonymization of confidential data.

- Annex 1- Draft cost model - Anonymised version: Microsoft Excel file '20181029 - Axon - Mobile Cost Model v30.5 **NON-CONFIDENTIAL** – *Country Name*'.

  This is the NON-CONFIDENTIAL version of the cost model. In this version of the cost model, confidential information has been anonymised to allow NRAs to circulate it to relevant M(V)NOs. The procedure used to anonymise confidential information is described in section 2.4 below.

- **Annex 2 - User manual:** This document is an introduction to the cost model, describing the worksheets it contains and providing guidance on how to run it.
  - Annex 2 – User manual of the model: PDF file '20181029 - Axon - User Manual'.
- **Annex 3 – Descriptive manual:** This technical document provides transparency on the way the model works and describes the main algorithms implemented.
  - Annex 3 – Descriptive manual: PDF file '20181029 - Axon - Descriptive Document'.
- **Annex 4 – Methodological approach document:** This detailed document describes the methodology adopted to develop the model, the specific steps followed in the definition of the inputs used and the main outputs obtained. This document includes all the consultation questions.
  - Annex 4 – Methodological approach document: PDF file '20181029 - Axon - Methodological approach document'.
- **Annex 5 – Template for the provision of comments**: This Excel file is to be used by stakeholders to provide their comments to the questions raised by the EC/Axon team in Annex 4.
  - Annex 5 – Template for the provision of comments: Excel file '20181029 - Template for providing comments to the EC's cost model'.

- **Annex 6 – Seasonality assessment:** The calculations performed by the EC/Axon team to assess traffic patterns and seasonality behaviours have been shared with the NRAs that provided this information. The information included in this file is confidential and can't be circulated to MNOs.
  - Annex 6 – Seasonality assessment: Microsoft Excel file '20181029 – **CONFIDENTIAL** - Seasonality Assessment – *Country Code*'.

  For those countries that did not provide this information but would like to understand the analysis and assessment of traffic seasonality, Annex 4 provides a detailed description of the methodology used.

2.2 Roles of each party

The following subsections (i) describe the roles of the main parties from which the EC/Axon team are seeking responses to this consultation: NRAs and operators; and (ii) provide indications and suggestions on how to organise their work during the consultation process.

2.2.1 NRAs' role

Equivalently to the approach followed in previous processes within this study (such as during Workshop 1 and the data gathering), NRAs are expected to act as the interface between the EC/Axon team and national operators. They are also expected to be operators' point of contact with the EC. This allows the EC/Axon team to take into account NRAs' history and knowledge in regulating telecoms markets nationally and ensures that NRAs are in the "driver's seat" during the entire process, avoiding as well that national operators may bypass NRAs' previous national regulatory provisions.

In particular, NRAs are expected to conduct the following tasks:

- **Share with their national operators the general consultation files uploaded to the folder "General" (and, within this, into sub-folder "Consultation 1-29 Oct-23 Nov") in CIRCABC.** This includes the following files:
  1. Main Consultation Document (this document)
  2. Annex 2 – User manual of the model: PDF file '20181029 - Axon - User Manual'
  3. Annex 3 – Descriptive manual: PDF file '20181029 - Axon - Descriptive Document'
  4. Annex 4 – Methodological approach document: PDF file '20181029 - Axon Consulting - Methodological approach document'
  5. Annex 5 – Template for the provision of comments: Excel file '20181029 - Template for providing comments to the EC's cost model'

- **Share with their national operators the NON-CONFIDENTIAL version of the cost model that can be found in each country folder in CIRCABC in sub-folder "3. Replies to 1st Consult_29Oct – 23Nov 2018".** The name of the relevant file should be:

  Annex 1- Draft cost model - Anonymised version: Microsoft Excel file '20181029 - Axon - Mobile Cost Model v30.5 NON-CONFIDENTIAL – Country Name'

- **Define internal deadlines and procedures with the operators to allow to consolidate feedback from operators in the template provided.** Equivalently to the previous processes, the EC/Axon team understands that each country has its own regulations, habits and/or processes in place regarding timing and submission of feedback by operators. Therefore, NRAs are expected to set the internal deadlines they deem appropriate to receive feedback from the operators, in order to allow NRAs time to (i) integrate all feedback from operators in the template provided by the EC/Axon team and (ii) submit it to the EC/Axon team no later than the deadline of 23 November.

- **Analyse the consultation files and provide comments to these in the template provided together with the consultation materials in the folder "General".** Please remember to include supporting evidence and any information considered necessary to support your arguments.

- **Upload the filled-in template (including the NRA and national operators' feedback to the consultation) in the NRA's country folder (sub-folder "3. Replies to 1st Consult_29Oct-23Nov 2018") in the CIRCABC space before the deadline of 23 November** (see section 2.3).

2.2.2 Operators' role

Operators are the owners of the information and have the first-hand experience with the networks modelled. Therefore, their contribution is crucial to maximise the accuracy of the study. In particular, operators are expected to conduct the following tasks:

- **Analyse the consultation files and fill in the template with the feedback on the consultation materials.** Please remember to include supporting evidence and any information considered necessary to support your arguments.

- **Deliver the filled-in template to the NRA (on the date agreed) and following its indications in terms of timings and processes.**

2.3 Procedure to submit comments

The EC/Axon team invites comments on the materials that are part of this consultation from all stakeholders. The following rules should be respected by NRAs when submitting their comments:

- Stakeholders should focus their comments on the specific questions raised by the EC/Axon team in the Template for providing comments.
- Comments should be as precise and brief as possible, while making sure they are properly justified with supporting information and evidence.
- Any questions from operators should be addressed to their national regulatory authority (not to the EC or Axon).
- The EC/Axon team will endeavour to provide answers to critical questions received from NRAs via email before 8 November. Due to the vast number of stakeholders involved, NRAs are expected to issue questions to the EC/Axon team only if critical to successfully carry out the review of the consultation materials.
- Each NRA will only be able to provide one filled-in template with comments. The document submitted will have to integrate the comments generated by the NRA itself and the comments collected by the NRA from its national operators.
- NRAs will have to review the comments submitted by their national operators and filter out repeated comments (e.g. comments with the same objective/meaning). In these cases, please indicate how many operators provided the same comment.
- Comments will have to be uploaded to the CIRCABC space[4] and, more specifically, to the subfolder "3. Replies to 1st Consult_29Oct - 23Nov 2018" within your country's main folder. For any issues regarding access to the CIRCABC platform, please get in touch with JARVI-KOUKONEN Anne (CNECT): Anne.Jarvi-Koukonen@ec.europa.eu and TUOVILA Tarja (CNECT): Tarja.Tuovila@ec.europa.eu.
- **All comments will have to be submitted by NRAs to the EC/Axon team by 23 November.**

The EC/Axon reserves the possibility to dismiss the comments that do not comply with the indications provided above and/or that have been provided outside the template for the provision of comments.

[4] Click to access to the CIRCABC space.

2.4 Confidentiality of the information

The information included in the anonymised draft cost model shared with each NRA has been adjusted to account for potential confidentiality issues according to the indications provided by the NRAs in the data collection process, in particular:

- **Confidentiality Level 0 – Public Level**: This confidentiality level was associated with information available in the public domain that could be directly shared with or used in other NRAs' models to fill any potential gaps. Consequently, the inputs that had been provided under this confidentiality level have not been adjusted in the anonymised model.
- **Confidentiality Level 1 – National Level**: This confidentiality level was associated with information that could not be disclosed to NRAs from other countries (unless it was anonymised or averaged with data from other NRAs). It could, however, be disclosed to national stakeholders in the consultation process. Therefore, the inputs that had been provided under this confidentiality level have not been adjusted in the anonymised model (as they can be shared nationally). We can also confirm that inputs with this confidentiality categorisation in one country have not been used to populate the model of another country.
- **Confidentiality Level 2 – Operator Level**: This confidentiality level was associated with information that could not be disclosed to any party involved in the process besides the NRA that provided it (unless it was anonymised or averaged with data from other operators/countries). The inputs classified under this confidentiality level have not been included as such in the anonymised model but have been adjusted (i.e. those values are not the true values).

  The table below indicates how confidential data has been anonymised in each of the model's input worksheets:

Worksheet	Input	Data treatment
1A MARKET SHARE	Market Share	This input is obtained from the number of MNOs per country, which is publicly available, and therefore, has not been anonymised in any country.

Worksheet	Input	Data treatment
1B INP DEMAND	Demand	When actual demand information was reported as confidential, it has been adjusted by multiplying the actual data by a random factor between 0.7 and 1.3 (i.e. variations ±30%). Regarding demand trends, in most cases an EEA average was considered to maximise consistency across NRAs' models and, therefore, there was no need to anonymise the inputs considered. Nevertheless, when NRAs' data was used and it was reported as confidential, trends have been anonymised with a random factor between ±10 percentage points.
1C INP NW STATISTICS	Voice network statistics	Confidential information has been anonymised by multiplying the actual data by a random factor between 0.7 and 1.3 (i.e. variations of ±30%).
	Data network statistics	Confidential information for the percentage of data traffic in the downlink has been anonymised by multiplying it by a random factor between 0.9 and 1.1 (i.e. variations of ±10%). When this anonymization has resulted in a percentage of data traffic in the downlink above 95%, we have used a number below 95% to keep its reasonability.
1D INP COVERAGE	Population coverage	Confidential information for the percentage of population covered has been anonymised by multiplying it by a random factor between 0.9 and 1.1 (i.e. variations of ±10%). When this anonymization has resulted in a percentage of population covered above 100%, we have used a number below 100% to keep its reasonability.
1E INP SPECTRUM	Spectrum bandwidth	This input is defined specifically for the reference operator and therefore, is a result of a data treatment exercise performed by Axon using input data from all EEA operators as well as publicly available references. Consequently, this input is not subject to confidentiality issues and has not been anonymised.
1F INP UNITARY COSTS	All unit costs except spectrum costs	These inputs have been obtained as an EEA average (including always more than one reference). Therefore, they are not subject to confidentiality issues and have not been anonymised.
	Spectrum Unit cost	Confidential information has been anonymised by multiplying the actual data by a random factor between 0.7 and 1.3 (i.e. variations of ±30%).

Worksheet	Input	Data treatment
1G INP COST ADJ FACTORS	Cost adjustment factors	This information has been extracted from public sources and is not subject to confidentiality issues. Therefore, it has not been anonymised.
1H INP COST OVERHEADS	G&A expenses percentage over GBV	This input has been obtained as an EEA average (including more than one country) and is not subject to confidentiality issues. Therefore, it has not been anonymised.
1I INP TECHNOLOGY DIS	Technological disaggregation of traffic	When historical technological disaggregation was reported as confidential, it has been adjusted by multiplying the actual data by a random factor between 0.7 and 1.3 (i.e. variations of ±30%).
1J INP ARPU	ARPU	This input has been obtained as an EEA average (including more than one country) and its trend has been referenced to the year 2015 (2015 = 10). Therefore, it is not subject to confidentiality issues and has not been anonymised.
2A INP NW	Network parameters	Network parameters are either based on publicly available data or on EEA averages (including more than one country). Therefore, they are not subject to confidentiality issues and have not been anonymised.
2B INP GEO	Geographical parameters except those listed below.	These parameters have been extracted from public sources (and processed through Axon's own analyses) and are not subject to confidentiality issues. Therefore, they have not been anonymised.
	Percentage of rooftop sites and traffic percentages in the busy month.	Confidential information has been anonymised by multiplying the actual data by a random factor between 0.7 and 1.3 (i.e. variations of ±30%)
2C INP CELL RADIUS	Cell radii	Confidential information has been anonymised by multiplying the actual data by a random factor between 0.7 and 1.3 (i.e. variations of ±30%).
2D INP DIST POP GEOT	Distribution of population in rural geotypes	This data comes from an analysis carried out by Axon based on publicly available data. Therefore, it is not subject to confidentiality issues and has not been anonymised.
2E INP BUSY HOUR	Busy hour	Confidential information has been anonymised by multiplying the actual data by a random factor between 0.9 and 1.1 (i.e. variations of ±10%).
2F INP BACKBONE & CORE	Core & Backbone Networks	This input is defined specifically for the reference operator and therefore, is a result of a data treatment exercise performed by Axon based on information provided by EEA operators. Consequently, this input is not subject to confidentiality issues and has not been anonymised.

Worksheet	Input	Data treatment
2G INP RESOURCES LIFE	Resources life	These inputs have been obtained as an EEA average (including always more than one reference). Therefore, they are not subject to confidentiality issues and have not been anonymised.
2H INP WACC	WACC	Confidential information has been anonymised by multiplying the actual data by a random factor between 0.7 and 1.3 (i.e. variations of ±30%).
2I INP ERLANG	Erlang tables	The Erlang tables are publicly available and not subject to confidentiality issues. Therefore, they have not been anonymised.
2J INP SERVICE SPEC COSTS	Cost regressions	These inputs have been obtained as an EEA average (including always more than one reference). Therefore, they are not subject to confidentiality issues and have not been anonymised.
	Traffic related information	Confidential information has been anonymised by multiplying the actual data by a random factor between 0.7 and 1.3 (i.e. variations of ±30%).

Table 2.1: Summary table of confidential information treatment [Source: Axon Consulting]

When an input has been anonymised and, therefore, does not represent the real value considered internally by the EC/Axon, it has been formatted as follows:

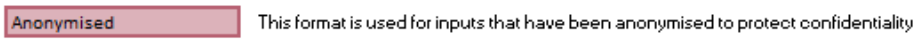

Exhibit 2.1: Colour code employed for anonymised inputs [Source: Axon Consulting]

3 Questions for consultation

This section includes a summary of the questions included in this Consultation round. Please refer to "Annex 4 – Methodological approach document" (for a more detailed explanation of all the questions included below) and "Annex 5 – Template for the provision of comments" (for a more detailed explanation on the feedback expected by stakeholders).

#	Question
1	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? Otherwise, please describe your rationale in detail, in particular, how it is consistent with the provisions in the 2009 Recommendation and the EECC, and provide supporting information and references.
2	Question 2: Do you agree with the approach adopted to assess traffic patterns and seasonal behaviours in the cost model? Otherwise, please describe your preferred approach in detail and provide supporting information and references.
3	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? Please justify your choice.
4	Question 4: Do you agree with the formula used for the implementation of the economic depreciation? Otherwise, please describe your preferred approach in detail and provide supporting information and references.
5	Question 5: In your opinion, what is the production factor that should be used in the implementation of economic depreciation? Please, justify your choice.
6	Question 6: In your opinion, what option should be used in defining the increments considered in the model? Please, describe your preferred approach in detail and provide supporting information and references.
7	Question 7: Do you agree that the list of services considered should contribute to the recovery of wholesale specific costs? Otherwise please justify your answer and provide supporting information and references.
8	Question 8: In your opinion, how should wholesale specific costs be allocated to services? Please justify your opinion in detail and provide supporting information and references.
9	Question 9: Do you agree with the validation, treatment and definition of the market share inputs? Otherwise please describe your rationale in detail and provide supporting information and references.
10	Question 10: Do you agree with the validation, treatment and estimation of the values for demand inputs? Otherwise please describe your preferred approach in detail and provide supporting information and references.
11	Question 11: Do you agree with the validation, treatment and estimation of the value for the network statistics inputs? Otherwise please describe your rationale in detail and provide supporting information and references.

#	Question
12	Question 12: Do you agree with the validation, treatment and estimation of the value for the coverage inputs? Otherwise please describe your rationale in detail and provide supporting information and references.
13	Question 13: Do you agree with the validation, treatment and estimation of the value for the spectrum inputs? Otherwise please describe your rationale in detail and provide supporting information and references.
14	Question 14: Do you agree with the validation, treatment and estimation of the values for unit cost inputs? Otherwise please describe your rationale in detail and provide supporting information and references.
15	Question 15: Do you agree with the validation, treatment and estimation of the G&A input? Otherwise please describe your rationale in detail and provide supporting information and references.
16	Question 16: Do you agree with the validation, treatment and estimation of the traffic distribution per technology inputs? Otherwise please describe your rationale in detail and provide supporting information and references.
17	Question 17: Do you agree with the validation, treatment and estimation of the ARPU input? Otherwise please describe your rationale in detail and provide supporting information and references.
18	Question 18: Do you agree with the validation, treatment and definition of the traffic patterns and seasonal behaviours? Otherwise, please describe your rationale in detail and provide supporting information and references.
19	Question 19: Do you agree with the validation, treatment and estimation of the values of the cell radii? Otherwise please describe your rationale in detail and provide supporting information and references.
20	Question 20: Do you agree with the validation, treatment and estimation of the percentage of traffic in the busy hour and in weekdays input? Otherwise please describe your rationale in detail and provide supporting information and references.
21	Question 21: Do you agree with the validation, treatment and definition of the backbone input? Otherwise please describe your rationale in detail and provide supporting information and references.
22	Question 22: Do you agree with the validation, treatment and definition of the useful lives inputs? Otherwise please describe your rationale in detail and provide supporting information and references.
23	Question 23: Do you agree with the validation, treatment and definition of the WACC input? Otherwise please describe your rationale in detail and provide supporting information and references.
24	Question 24: Do you agree with the validation, treatment and estimation of the wholesale specific costs inputs? Otherwise please describe your rationale in detail and provide supporting information and references.

#	Question
25	Question 25: Do you agree with the approach adopted to calculate the population and area per geotype? Otherwise please describe your rationale in detail and provide supporting information and references.
26	Question 26: Do you agree with the approach adopted to assess the distribution of population in rural areas? Otherwise please describe your rationale in detail and provide supporting information and references.
27	Question 27: Do you agree with the approach adopted to assess orography in rural areas? Otherwise please describe your rationale in detail and provide supporting information and references.
28	Question 28: Do you agree with the approach adopted to define the standard and low materiality inputs? Otherwise please describe your rationale in detail and provide supporting information and references.
29	Question 29: Do you agree that the number of access sites calculated for the reference operator is reasonable for the operations in your country? Please describe your rationale in detail and provide supporting information and references.
30	Question 30: Do you consider that the annual cost base produced for the reference operator56 is reasonable for the operations in your country? Please describe your rationale in detail and provide supporting information and references.
31	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 operator56 in your country? Please describe your rationale in detail and provide supporting information and references.
32	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 operator56 in your country? Please describe your rationale in detail and provide supporting information and references.
33	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 operator56 in your country? Please describe your rationale in detail and provide supporting information and references.
34	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 operator56 in your country? Please describe your rationale in detail and provide supporting information and references.
35	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 operator56 in your country? Please describe your rationale in detail and provide supporting information and references.

#	Question
36	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 operator56 in your country? Please describe your rationale in detail and provide supporting information and references.
37	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? Otherwise, please indicate your estimate(s) for transit charges and provide evidence supporting your estimate(s).

Table 3.1: Summary of public consultation questions [Source: Axon Consulting]

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