AXON

Excellence in Business

Assessment of the cost of providing wholesale voice call termination services on fixed networks in the EU/EEA countries – SMART 2018/0014

DATA GATHERING MANUAL – *SUMMARY OF THE REQUESTED INFORMATION*

Axon Partners Group

10/12/2018

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 voice call termination services on fixed networks in the EU/EEA countries[1]" ('the Project').

As described during Workshop 1 held on 23 October 2018 at the EC's headquarters[2], the EC has deemed relevant to carry out a cost study to understand the costs of providing fixed termination voice services in EU/EEA countries.

The current phase of the Project involves gathering information regarding fixed telecommunication networks from the 31 EU/EEA countries. Therefore, we are issuing a Data Request Form (hereinafter, "the Form") attached to this document that should be returned to the EC with the requested information, following the instructions described in this document.

In order to anticipate this information request, we have divided the Form into two excel files, the first one delivered at an earlier date than the second one, as follows:

▶ 20181204 – Axon Consulting – Data Request Form for the EC's FTR cost model – 1st Request.xlsx: Shared with stakeholders on 4th December 2018 (hereinafter "1st Request").

▶ 20181210 – Axon Consulting – Data Request Form for the EC's FTR cost model – 2nd Request.xlsx: To be shared with stakeholders on 10th December 2018 (hereinafter "2nd Request").

Please note that both excel files are complementary and independent. Therefore, stakeholders should start working on providing the information of the 1st request from the day it is delivered (rather than waiting until the 2nd request is delivered on 10 December 2018).

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[1] SMART 2018/0014

[2] A video version of the workshop is available at:
https://webcast.ec.europa.eu/fixed-termination-rates-workshop-23-10-2018

Important Notes:

▶ The Data Request Form will be composed of two separate Excel Files shared with you on different dates: (i) 4th December and (ii) 10th December.

▶ As the two Excel files are independent, work to reply to each should start as soon as the EC/Axon team delivers each Data Request Form.

The objective of this document is to provide thorough descriptions of the worksheets included in the Form, the information requested in each section of these worksheets and the explanations about how information should be calculated and provided. Please note that excel files are already thoroughly commented and explained, so the manual is just complementary.

Note that a separate document "General Instructions" has been shared including: a description of the data gathering process, the role of each party involved, the deadlines and the contact protocols and a description of the format of the Form Files and instructions to fill them in.

Important Note: We strongly recommend that the document "Data Request Manual – General instructions" is read by any person in charge of filling in, providing and/or reviewing information requested in the Form. Additionally, the reader can refer to this document for a more detailed description of the information requested in each worksheet.

In case you have questions regarding the information requests and/or the descriptions provided in the Form, we advise consulting this document prior to addressing any question to your national regulatory authority, in line with the approach described at our Workshop on 23 October 2018.

2. Summary of the information requested on the 1st Request

The purpose of this section is to provide a detailed description of the information to be filled in the 1st Request.

2.1. General organisation of the information requested

The information requested has been grouped in modules with similar requirements to ensure that the NRAs/operators can distribute worksheets belonging to each module to the department that is better suited to gather the information. The blocks of worksheets included in the 1st Request are outlined below in the following modules:

▶ Introductory worksheets

▶ Market information

▶ Network

▶ Finance

The table below outlines the main contents of each block:

Data Request Form		
Worksheet name	**Description/Comments**	**Section**
General considerations	This worksheet contains the main considerations to bear in mind when filling in the Form.	2.2.1
Contact	This worksheet contains the contact information of the people responsible for introducing and reviewing the information in the Form. This information is required in case further clarifications are needed.	2.2.2
Country	This worksheet includes the identification of the country from which the data is reported.	2.2.3
Market information		
Market players	This worksheet includes market information (number of operators, market share) and its relation to the Form. This information will be used to determine the size of the reference operator and to extrapolate any partial information provided by the NRAs.	2.3.1
Historic Demand	This worksheet includes information on historic demand (e.g. voice traffic). This information will be used to determine the scale and capacity requirements of the modelled operator.	2.3.2

Data Request Form		
Worksheet name	**Description/Comments**	**Section**
Demand Trends	This worksheet includes information on forecasted demand (e.g. subscribers, traffic). This information will be used to determine the scale and capacity requirements of the modelled operator.	2.3.3
Network		
Traffic Statistics	Traffic statistics (including voice calls statistics and daily traffic patterns) are included in this worksheet. This information will be used to parametrise some inputs related to the network of the reference operator.	2.4.1
Finance		
Fixed Asset Register	Fixed Asset Register (FAR) corresponding to FY 2017. This information will be used to assess the reasonability of the results of the reference operator in terms of capital expenses when compared with the realities of each national market.	2.5.1
Useful Lives	Useful lives of the network elements are to be included in this worksheet. This information will be used to annualise the CapEx of the assets.	2.5.2
WACC	Information related to the WACC (Weighted Average Cost of Capital) is requested in this worksheet. This information will be used to assess the cost of capital associated to network elements.	2.5.3

Exhibit 2.1: Summary of the contents of the worksheets included in the Form

The contents of each of the presented blocks are detailed in the sections below.

2.2. Introductory worksheets

The introductory section is intended to provide an overview of the main contents and guidelines of the Form. It also requests information related with the personnel responsible for providing/reviewing the information. The main worksheets included in this section are listed below:

▶ General considerations

▶ Contact

▶ Country

2.2.1 General considerations

This worksheet provides general guidelines addressed to the user to fill in the Form in an efficient and effective manner. Users should read and understand these considerations before getting into filling in the Form. These considerations are related with:

▶ Priority levels

▶ Confidentiality levels

Priority levels

The structure of the contents presented in the Form is fixed. Users are not able to insert/delete rows/columns or descriptions included in the Form. Users are expected to fill in the cells where an input is expected. In addition, they can change the format (to indicate the confidentiality level described below) and the shape of the cells to ease reading to each person's preferences.

The input cells are categorized based on the priority of the requested data:

▶ **High priority**: Cells with a cream-coloured background. The information requested is critical for the development of the cost study.

▶ **Medium priority**: Cells with a blue-coloured background. The requested information, even though not of critical nature, should be provided if possible to improve the accuracy of the model.

If the information requested is not available or it is insufficient, users should provide an estimate and include adequate explanations of the values and sources used in the space reserved for comments.

See the document "Data Request Manual – General Instructions" for further general considerations when filling in the Form.

<u>Confidentiality levels</u>

In addition, a specific methodology has been designed in order to ensure that proper treatment is given to all sorts of confidential information.

To understand the level of confidentiality of each dataset reported by NRAs, these should classify the information provided according to the following confidentiality levels:

▶ **Confidentiality Level 0 – Public Level:** This confidentiality level should be associated with information which is available in the public domain and could be directly shared with or used in other NRAs' models to fill any potential gaps. In order to associate this level 0 to a piece of information, the cell(s) should be left **unchanged** (i.e. leaving the background of the original Form. See the document "Data Request Manual – General Instructions" about the colour code of the Form).

▶ **Confidentiality Level 1 – National Level:** This confidentiality level should be associated with information that cannot be disclosed to NRAs from other countries (unless it is anonymised or averaged with data from other NRAs). This information can, however, be disclosed to national stakeholders in the version of the model to be shared with the NRA. In order to associate this level 1 to a piece of information, the cell(s) should be coloured in **yellow** (RGB code: R255-G255-B000), as indicated below:

Exhibit 2.2: Example of cell background for Confidentiality Level 1 information

▶ **Confidentiality Level 2 – Operator Level:** This confidentiality level should be associated with information that cannot be disclosed to any party involved in the process (unless it is anonymised or averaged with data from other operators/countries). When the model is shared to public consultation, the inputs classified under this confidentiality level will not be shared with NRAs from other countries nor with the operators from the subject country (e.g. to avoid national operators having access to information from other national operators). Therefore, this information will be anonymised or averaged before the model is shared. In order to associate this level 2 to a piece of information, the cell(s) should be coloured in **orange** (RGB code: R255-G192-B000), as indicated below:

Exhibit 2.3: Example of cell background for Confidentiality Level 2 information

2.2.2 Contact

The purpose of this worksheet is to gather contact information of the personnel responsible for filling in and reviewing the information that is provided. As we are aware that completing the Form is likely to involve multiple stakeholders, it is important to identify the person responsible for each of the worksheets. This will allow us to go through a smooth clarification process if necessary.

In particular, we request the following contact details for each worksheet included in the form:

▶ **Personnel filling in the data request**: Contact details (name, email, phone number and institution) of the person in charge of filling in each worksheet.

▶ **Personnel reviewing the data request**: Contact details (name, email, phone number and institution) of the person in charge of reviewing each worksheet.

If there is more than one person involved in providing/reviewing data, include the contact details of everyone involved in the same cell. Alternatively, if a single person is going to be responsible for the different fields of information, please include his/her contact details in each row.

2.2.3 Country

The purpose of this worksheet is to unequivocally identify the country which is filling the data request. This will allow us to have more traceability of the different data request handled along the process.

In particular, we request that the NRA choses, from the list provided, the country which the data is referring to.

2.3. Market information

This section provides details on the following worksheets and how to fill them:

▶ Market players

▶ Historic Demand

▶ Demand Trends

2.3.1 Market players

The worksheet "MARKET PLAYERS" requests information regarding the operators providing fixed telecom services in the corresponding market. This information is requested to determine the size of the reference operator, as well as to be able to understand the representativeness of any partial information provided by the NRA and extrapolate it to the entire market if possible.

We expect NRAs to be the best positioned to provide this information.

The table in the worksheet should be filled in with the following information:

Column "Operator" should be filled with the name of the operators in the market (preferably with their commercial name and, alternatively, with their legal entity name), including the most relevant fixed national operators. Other smaller operators can be grouped together into a row called "others".

► **Column "Market Share (%) 2018" of telephony lines:** The market share of each operator should be included in terms of the percentage of active telephony lines of the operator over the market total. This calculation should be based on 2018 average telephony lines (on a monthly basis) as per the following formula:

$$Average\ Telephony\ Lines = \frac{\sum_{i=JAN}^{DEC} \text{Telephony lines}_{Month_i}}{12}$$

Where telephony lines $_{Month_i}$ represents the number of lines at the end of the month "i".

By line we mean a unique access carrier reaching customer's premises. In the case of business solutions providing more than one voice channels (for instance Full ISDN including 30 voice channels), please account them as voice channels. Please, do not include lines that do not have voice services (e.g. broadband only lines).

Alternatively, if the data required to calculate the average number of active telephony lines in the year according to the formula above is not available, the average could also be obtained from the year-start and year-end line figures, as outlined below (if this approach is followed, please indicate so in the column "Comments"):

$$Average\ Telephony\ Lines = \frac{\text{Telephony lines}_{01/01/2018} + \text{Telephony lines}_{31/12/2018}}{2}$$

If none of the above options are available, please use the active telephony lines' figure you consider more representative of the 2018 status and explain it in the space provided for comments.

▶ **Column "Considered in the data request?":** Please include one of the following options:

- "Yes": If the information included in the Form is always considering this operator.

- "No": If the information included in the Form is never considering this operator.

- "Partially": If the information provided in the Form is considering this operator in some cases. If this option is included, please outline in what cases the information from this operator has been considered.

▶ **Column "Comments":** Please include here any other comments you consider relevant, apart from those requested above.

2.3.2 Historic Demand

Worksheet "HISTORIC DEMAND" requests information corresponding to historic traffic. The demand information is of significant importance and it will be a key input for the implementation of the BULRIC model, given that the dimensioning algorithms are designed based on a bottom-up approach. This information will also be used to determine the scale of the modelled operator and the capacity required in its network.

In particular, the following sections are requested, explained furtherly in the remainder of this section:

▶ Fixed Lines

▶ Fixed Voice Traffic

Fixed Lines

The data requested in this section is expected to be used to calculate the overall traffic requirements to model network capacity. In particular, information on fixed lines[3] should be provided for the 2015-2018 period. Fixed lines information should be provided as an

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[3] By line we mean a unique access carrier reaching customer's premises. In the case of business solutions providing more than one voice channels (for instance Full ISDN including 30 voice channels), please account them as voice channels.

"Average number of fixed telephony lines" (i.e. broadband-only lines should not be counted).

The values provided should represent the average of each year.

In the case that the information is available for each month, please calculate the average of all months. In the case that the information available represents figures at the end of the year, please provide the average between the beginning and the end of each year. Please explain the methodology you have applied in the space provided for comments.

Fixed Voice Traffic

The data requested in this section is expected to be used to calculate the overall traffic requirements to model network capacity. In particular, information on voice traffic should be provided for the 2015-2018 period. This information should correspond to the total voice traffic in the market (all operators) per year.

We acknowledge that in some cases 2018 data may not be fully available due to year closure processes. We encourage stakeholders to provide the best estimation based on the available data (e.g. extrapolation of information from first three quarters) and describe in the comments the approach followed for the estimation along with the sources of information used.

Voice traffic should include all traffic generated by or terminated on the fixed subscribers of all fixed national operators (FNOs). If information is not available for some operators, provide the available information and kindly explain the missing information in the space provided for comments.

This information should be provided in minutes[4]. Figures provided should include all traffic handled by national networks. It means that it should include both billed and free traffic included as a part of a bundle. In the case that the total traffic allowance in a bundle is not used, please include only the traffic actually used.

Voice traffic should be disaggregated into the following categories:

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[4] Minutes should refer to the total duration of the calls, without taking into account the ringing time nor calls that are not completed (because the receiver is busy or the call is not taken). Minutes should not be rounded.

- ▶ Voice On net: Voice call from a fixed subscriber of a given operator to another subscriber hosted in the same fixed network.

- ▶ Voice Off-net to fixed national: Voice call from a fixed subscriber of a given operator to another subscriber hosted in a different fixed network in the same country (another fixed operator).

- ▶ Voice Off-net to mobile national: Voice call from a fixed subscriber of a given operator to another subscriber hosted in a mobile network in the same country. If the operator provides both fixed and mobile services, minutes from fixed customers to mobile customers within its network must be counted here.

- ▶ Voice Off-net to international: Voice call originated in a given national fixed operator and terminated in the network of an operator in a different country (including both, EU/EEA countries and Non-EU/EEA countries).

- ▶ Voice Incoming from fixed national: Voice call originated in a national fixed operator and terminated in the network of a different national fixed operator.

- ▶ Voice Incoming from mobile national: Voice call originated in a national mobile operator and terminated in the network of a national fixed operator.

- ▶ Voice Incoming from international: Voice call originated in an international fixed or mobile operator (from either, an EU/EEA country or a Non-EU/EEA country), and terminated in the network of a national fixed operator.

- ▶ Voice transit: Voice Call Voice call observed in operator A, which has been originated in operator B and has as destination operator C. Please note that operator A should be an FNO, while operators A and B may be FNO, MNO or even operators in other countries

- ▶ Other voice traffic: Other voice calls not included in above categories which make use of the PSTN, IMS or equivalent voice switching network of the FNOs. Please specify in the comments the services included in this category, including the origination and destination point and a description of which of the network elements of the MNO are using.

We acknowledge that in some cases the disaggregation requested above is not available[5]. In such case, please provide your best estimation and explain the approach and information used for such estimate in the space provided for comments.

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[5] Please note that, even if some NRAs are not collecting such level of detail, the operators should be in general able to obtain it from their systems/databases, at least for the most recent years.

2.3.3 Demand Trends

Worksheet "DEMAND TRENDS" requests information to forecast historic demand provided in the previous worksheet.

We understand that it is difficult to provide accurate forecast information. However, we expect stakeholders to be in a better position than us to estimate the likely demand in the near to medium future. In the case that the information available on your side is not in the requested format/disaggregation/time period, use estimates based on internal information or your best knowledge to adapt it to the Form. In these cases, add notes in the space reserved for comments indicating the considerations you have taken.

Even if forecasts can be applied based on the information gathered on the historical information, national players (NRAs and operators) are expected to be able to provide a more accurate forecast based on their own experience and other information they can have access to. Actually, it is common that telecom operators develop their own forecasts for internal purposes (e.g. business planning) and therefore we understand that this information could already be available off-the-shelf (at least for a number of years and with a more or less limited degree of granularity).

Please note that figures provided should be representative of all traffic handled by national networks. It means that it should consider both billed and free traffic included as a part of a bundle. If the total traffic allowance in a bundle is not used, please consider only the traffic that is expected to be actually used.

In particular, the following sections are requested, which are further explained in the remainder of this section:

▶ Fixed Lines

▶ Fixed Voice Traffic

Fixed Lines

Considering the general approach explained above, we are requesting the information corresponding to trends for fixed lines for the 2019-2021 period. If forecasts for the 2022-2025 period are also available, please provide them. Information should be reported as an **"Average number of fixed telephony lines"** (i.e. broadband-only lines should not be counted).

Please see section 2.3.2 regarding how to consider and account the fixed lines.

If the information requested is not available (or it is only partially available), please provide the available information and include comments about the missing information.

Fixed Voice Traffic

Considering the general approach explained above, in this section, we are requesting the information corresponding to trends for voice traffic (in terms of minutes) for the 2019-2021 period. If forecasts for the 2022-2025 period are also available, please provide them.

Information should be reported in terms of average consumption per telephony line and month expected in the upcoming years the following services:

▶ Voice On-net

▶ Voice Off-net to fixed national

▶ Voice Off-net to mobile national

▶ Voice Off-net to international

▶ Voice Incoming from fixed national

▶ Voice Incoming from mobile national

▶ Voice Incoming from international

▶ Voice transit[6]

▶ Other voice traffic[6]

Please refer to section 2.3.2 for the description of these services.

If the information requested is not available (or it is only partially available), please provide the available information and include comments about the missing information.

2.4. Network

This section provides details on the following worksheets and how to fill them:

▶ Traffic statistics

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[6] In this case the value should be provided in terms of total yearly minutes.

2.4.1 Traffic statistics

This sheet requests information that is to be used to parametrise the network of the reference operator. It includes information regarding characteristics of voice traffic.

The information requested in this worksheet is structured in the following sections:

▶ Voice call statistics

▶ Hourly traffic distribution

The contents requested in each of these sections are detailed in the subsections below. In the case that the information available on your side is not in the requested format/disaggregation/time period, please use estimates based on internal information or your best knowledge to adapt it to the Form. In these cases, please add notes in the space reserved for comments indicating the considerations you have taken.

Voice call statistics

The objective of this section is to characterise specific aspects related to voice calls, which are going to be used in the model, for instance, to calculate factors that are dependent on the number of calls.

The parameters that are requested for this purpose are:

▶ **Uncompleted calls over total calls percentage – busy (percentage of total calls)**: This parameter should represent the percentage of calls that are not finished because the receiver is busy, over the total number of call attempts.

▶ **Uncompleted calls over total calls percentage - not taken (percentage of total calls)**: This parameter should represent the percentage of calls that are not finished because the receiver, even if not busy, is not responding to the call, over the total number of call attempts.

▶ **Average call duration (minutes)**: This parameter should represent the average duration of completed calls (without taking into account ringing time).

▶ **Average ringing time (minutes)**: This parameter should represent the average duration of ringing per call (including both completed and uncompleted calls).

These values should be provided for the set of voice services listed below:

▶ Voice On-net

▶ Voice Off-net to fixed national

▶ Voice Off-net to mobile national

▶ Voice Off-net to international

▶ Voice Incoming from fixed national

▶ Voice Incoming from mobile national

▶ Voice Incoming from international

These services include both outgoing and incoming calls. The values to be reported in this section should be representative of all the operators in the market.

Please also ensure that these figures provided are representative of the latest measurements available.

Hourly traffic distribution

The objective of this section is to gather information to calculate the busy hour traffic percentage in the network for the voice services.

The information listed below is requested with the aforementioned level of disaggregation:

▶ **Hourly traffic distribution for voice services.** These values should represent the hour-by-hour percentage distribution of voice services' traffic for an average weekday (the row should add up to 100%).

▶ **Percentage of voice traffic in workdays (not weekends) over the total yearly traffic**. This KPI represents the percentage of total traffic in workdays (not weekends) over the total yearly traffic for voice services.

The values to be reported in these sections should be representative of all the operators in the market.

Please also ensure that these figures provided are representative of the latest measurements available for an average weekday (Monday to Friday, both included, provided that they are not bank holiday). If information is easily available for a longer period of time, please include it, ensuring that only weekdays are considered. Please explain the period considered in the calculation in the cells provided for such purpose.

2.5. Finance

This section provides details on the following worksheets and how to fill them:

▶ Fixed asset register

▶ Useful lives

▶ WACC

2.5.1 Fixed asset register

The worksheet "FIXED ASSET REGISTER" requests information regarding some asset categories for the end of Fiscal Year (FY) 2017.

Stakeholders should provide this information for end of the FY2017 either (i) in their national currency (specifying this in their response); (ii) converted to Euros using an exchange rate (specifying which exchange rate has been used in their response).

The table in this worksheet is to be filled with the following information:

▶ **"Asset Category"** includes the lists of assets categorised between fixed network and non-network. A further disaggregation of fixed network assets has been included.

▶ **"Gross Book Value (GBV)"** should be filled in with the GBV of the corresponding assets at the end of FY 2017. The GBV refers to the original (historical) price paid for an asset, without any depreciation deduction.

▶ **"Net Book Value (NBV)"** should be filled in with the NBV of the corresponding assets at the end of FY 2017. The NBV is the value of the asset after taking into account depreciation and other accounting charges.

▶ **"Annual depreciation"** should be filled in with yearly depreciation of the corresponding assets throughout FY 2017. If a depreciation mechanism other than straight line depreciation is used to calculate this parameter, please indicate it in a comment.

▶ **"Percentage of GBV associated to fixed services"** should be filled in with the percentage of assets costs that should be allocated to fixed services (therefore excluding the percentage related to mobile services when assets are shared). While we understand that there may not be an 'official' split of these elements, an ad-hoc estimate should be performed for the sake of this exercise.

We appreciate all data to be provided under the IFRS accounting standard. However, if a different accounting standard is used, please indicate it in the space reserved for comments. The information requested in this worksheet is of medium priority and its provision will positively contribute to the accuracy of the model.

The information requested in this section corresponds to the following elements:

▶ **Fixed Network,** composed of the following categories[7]:

- Access network

- Transmission network

    - Passive elements (cable and civil infrastructure)

    - Legacy active elements (PDH/SDH equipment)

    - NGN active elements (Ethernet equipment, IP/MPLS, etc.)

- Core network

    - Core network sites

    - Core network specific for fixed voice services (Legacy equipment)

    - Core network specific for fixed voice services (IP equipment)

    - Core network specific for other services

    - Core network shared among fixed voice and other services

    - Other (please specify in the space reserved for comments)

▶ **Non-network elements:** Assets that are used to support the operations of the fixed network but are not used directly in the network itself, such as CRM platforms.

NRAs can report the FARs of the operators all together (summed up) or separately.

FAR information will be used to assess the reasonability of the results of the reference operator in terms of capital expenses when compared with the realities of each national market.

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[7] Please note that even if some of the asset categories described above are not subject to modelling under our study, it is important to receive the requested information to be able to compare figures with financial statements and identify potential mistakes.

2.5.2 Useful lives

The worksheet "USEFUL LIVES" requests information regarding technical useful lives of the network elements, which will be used to depreciate the capital-related expenses of each resource category.

If a range of useful lives are reported for any resource category, we expect to receive an explanation of their detailed applicability in the space reserved for comments. This description should include the useful lives used for the different network elements considered under that resource category, as well as their weighted average (in terms of Gross Book Value[8]).

The table in this worksheet contains the following information:

▶ **"Resource Category"** includes the resource categories for which their useful lives are requested.

▶ **"Useful Life (Years)"** should be filled in with the useful life (in years) corresponding to each resource category in the FY 2018 (if not available, then, F2017).

In the case that there is an approved set of regulatory useful lives, we request that this is provided by NRAs. Only if this set does not exist or is incomplete, this should be requested from operators.

The values provided in this worksheet should be representative of all operators in the market. NRAs should aggregate the information reported by operators by means of a simple average of the data points reported for each asset category.

2.5.3 WACC

The worksheet "WACC" requests information related to the Weighted Average Cost of Capital (WACC) which is going to be used in the model to assess the cost of capital associated to network elements. This worksheet is directed to the NRAs, as they are expected to be in the best position to provide the information.

Since WACC is necessary to calculate the cost of capital related to operator's network assets, a table is included in this worksheet to capture it.

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[8] Defined as the original (historical) price paid for an asset, without any depreciation deduction.

The EC's guidelines for the calculation of WACC are expected to be finalised during the execution of this project by means of an independent process. However, they are not ready yet.

Consequently, provided that there is already certainty in your country on the reference average WACC for the fixed telecommunications sector, please provide the pre-tax value that you consider should be used in the cost study for your particular country. Please provide, if available, reference to the formula/methodology adopted to calculate the WACC in the space reserved for comments.

The table in this worksheet is to be filled with the following information:

▶ **"Pre-tax nominal WACC"** should be filled in with the latest reference of average Pre-Tax nominal WACC for the fixed telecommunications sector. If there are different values for each operator, and these vary significantly, kindly document them and explain the differences in the space reserved for comments.

▶ **"Reference year":** should be filled in with the reference year corresponding to the WACC figure reported in the previous field.

▶ **"Source"** should be filled in with the source of the WACC value provided.

3. Summary of the requested information on the 2nd Request

The purpose of this section is to provide a detailed description of the information to be filled in the 2nd Request (see Excel file) delivered on the 10th of December 2018.

3.1. General organisation of the information requested

The information requested has been grouped in modules with similar requirements to ensure that the NRAs/operators can distribute worksheets belonging to each module to the department that is better suited to gather the information. The blocks of worksheets included in the request are outlined below in the following modules:

▶ Introductory worksheets

▶ Network

▶ Finance

The table below outlines the main contents of each block:

Data Request Form		
Worksheet name	**Description/Comments**	**Section**
General considerations	This worksheet contains the main considerations to bear in mind when filling in the Form.	Already explained in section 2.2.1
Contact	This worksheet contains the contact information of the people responsible for introducing and reviewing the information in the Form. This information is required in case further clarifications are needed.	Already explained in section 2.2.2
Nomenclature	This worksheet contains the nomenclature used throughout the Form including a high-level map with an overview of the core network to be dimensioned in the cost model.	☐
Country	This worksheet includes the identification of the country from which the data is reported.	Already explained in section 2.2.3
Network		
Core nodes	Information related with core nodes is to be included in this worksheet.	3.3.1

Data Request Form		
Worksheet name	**Description/Comments**	**Section**
Equipment unit Cost	This worksheet contains the unit costs of the network elements. This information will be used to calculate the investment and costs associated to the modelled network. Please note that this requirement has been split into two worksheets for practical issues: ▶ Equipment Unitary Costs - Core Network Elements ▶ Equipment Unitary Costs - Active Transmission/ Switching elements	3.3.2
Finance		
Wholesale Specific costs	Specific costs associated to the provision of fixed wholesale services. This information will be used to assess the specific costs associated to the fixed termination.	3.4

Exhibit 3.1: Summary of the contents of the worksheets included in the Form

The contents of each of the presented blocks are detailed in the sections below.

3.2. Introductory worksheets

The introductory section is intended to provide an overview of the main contents and guidelines of the Form. It also requests information related with the personnel responsible for providing/reviewing the information. The main worksheets included in this section are listed below and are equivalent to those included in 1st Request:

▶ General considerations

▶ Contact

▶ Country

Additionally, the 2nd Request includes the following worksheet, described in detail below:

▶ Nomenclature

3.2.1 Nomenclature

This worksheet provides a brief description of the vocabulary and network elements considered in the Form. Particularly it includes the following items:

▶ Overview of the modelled fixed core network

▶ List of abbreviations and acronyms used in the Form

No information is requested in this worksheet.

3.3. Network

The network module involves worksheets with requests regarding operators' networks. This module includes the following worksheets:

▶ Core nodes

▶ Equipment Unit Costs

The sections below detail the main information that is requested in each of these worksheets.

3.3.1 Core nodes

The worksheet "CORE NODES" requests information regarding core nodes of fixed national operators. The information gathered in this worksheet is going to be used to determine the core network topology of the reference operator. The following list presents the sections included in this worksheet and summarises the information that is expected to be gathered through this worksheet.

▶ Network Core Equipment

▶ National Interconnection Points

▶ International Interconnection Points

In the case that the information available on your side is not in the requested format/disaggregation/time period, please use estimates based on internal information or your best knowledge to adapt it to the Form. In these cases, please add notes in the space reserved for comments indicating the considerations you have taken.

Network Core Equipment

The purpose of this section is to gather information regarding the core equipment used by each operator.

In particular, operators are expected to provide the following data regarding the core network equipment:

▶ Number of elements: Number of elements employed in the network of each core equipment.

▶ Total operating capacity: Total capacity of the equipment employed (i.e. total operator's capacity).

▶ Capacity units: Corresponding to the measurement units of the dominant technical constraint (e.g. Mbps, Erlangs, BHCA, Subscribers, Transactions/sec etc.). Only the most constraining capacity factor/unit should be reported. This means that, in the case that certain equipment has several capacity constraints (e.g. in terms of Erlangs and BHCA), the one which is typically dominant should be reported.

▶ Is the equipment also employed for the provision of mobile services?: Answer "Yes" or "No" as applicable.

▶ % of traffic handled by this equipment that relates to mobile services: if the equipment is also employed for the provision of mobile services, please include the percentage of mobile traffic over total traffic handled by this equipment (in terms of capacity units included in the corresponding column).

This information will be used to crosscheck the reasonability of the results with the realities of each national market in terms of network elements.

The values reported should represent 2018 averages (calculated as the average between start and end of the year). As indicated during the Workshop 1, only a pure IMS core network composed of the following core equipment is expected to be modelled: AS, CDF, I-CSCF, S-CSCF, Access SBC (composed of P-CSCF and IMS-AGW functions), IX SBC (composed of IBCF and TrGW functions), ENUM and MRF. However, since we understand that other nomenclatures and even other standards and technologies may be employed by operators, we have included in the list additional equipment. If you still have equipment associated to an all-IP NGN that do not fit in any of the listed equipment, please add them to the list, indicating what are the functions carried out by them.

National Interconnection Points

The purpose of this section is to gather information regarding the national interconnection points of each operator with other operators.

This section should be filled with the following information:

▶ **"Operator"** should be filled in with the name of each fixed national operator whose information has been provided.

▶ **"Number of interconnection points"** is to be filled in with the number of national interconnection points corresponding to each operator.

▶ **"Average interconnected operators per interconnected point"** should correspond to the average number of operators that are interconnected in the particular interconnection point of the operator under consideration.

For instance, if an operator has 3 national interconnection points, interconnecting 2, 3 and 1 operators in each of them, the total number of interconnection points that should be reported in the table is 3 and the average number of operators interconnected should be 2 (which is (2+3+1)/3=6/3=2).

Additionally, during the consultation phase it was reported by a number of stakeholders that there may be obligations to interconnect using TDM technology, even if the core network is all-IP. The EECC is clear that the modelled network should be packet switched. However, EC/Axon would like to understand better this phenomenon and potential implications on operators' networks. Accordingly, a number of questions and information are requested, namely:

▶ **Q1: Is TDM interconnection compulsory in your country (i.e. the operators must provide TDM interconnection even if their networks are all-IP)?:** The options "Yes", "No" and "Other (Please explain in space below)" can be selected. Please provide further detail and explanation on the space provided for comments (e.g. if it applies to all operators, if applies to both national and international traffic, etc.).

▶ **Q2: Is TDM interconnection expected to be compulsory in 2020 and beyond?:** The options "Yes", "No" and "Other (Please explain in space below)" can be selected. Please provide further detail and explanation on the space provided for comments.

▶ **Information about interconnected traffic using TDM:** In order to understand the implications of existing obligations to interconnect using TDM, we require to have information regarding the percentage of voice traffic (minutes) that is interconnected using TDM, and forecasts. The traffic reported here should be aligned with the existing and expected obligations (e.g. if the obligation is only applicable to national interconnection, the traffic reported should refer to national interconnected traffic). Please note that if the question to Q2 above is "NO", you are not requested to provide this information.

▶ **Information regarding equipment used for TDM interconnection:** In order to understand the implications of existing obligations to interconnect using TDM, we require to have information about the equipment used to provide TDM interconnection from all-IP NGN. The information requested is equivalent to the one described above for the rest of the core equipment. Please note that if the question to Q2 above is "NO", you are not requested to provide this information.

The purpose of this section is to gather information regarding the international interconnection points of each operator with other operators.

This section should be filled in with the following information:

▶ **"Operator"** should be filled in with the name of each fixed national operator whose information has been provided.

▶ **"Number of interconnection points"** is to be filled in with the number of international interconnection points corresponding to each operator.

▶ **"Average interconnected operators per interconnected point"** should correspond to the average number of operators that are interconnected in the particular international interconnection point of the operator under consideration.

For instance, if an operator has 3 international interconnection points, interconnecting 2, 3 and 1 operators in each of them, the total number of interconnection points that should be reported in the section is 3 and the average number of operators interconnected should be 2 (which is (2+3+1)/3=6/3=2).

3.3.2 Equipment Unit Costs

The "EQUIPMENT UNIT COSTS" requests aim to gather information about the costs of the network elements to be considered in the cost model. This information is required to calculate the investments and operational expenses of the reference operator.

Stakeholders are welcomed to provide this information in EUR. However, they can also provide it in their own currency. If exchange conversions are used, to ensure consistency with BEREC benchmarking activities, please extract them from the Official Journal of the European Union[9] and indicate the reference date/period you have considered in a comment.

The information requested is split into two worksheets for practical reasons:

▶ Core network elements

▶ Active transmission and switching network elements

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[9] For instance, May 2017 exchange rates are available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1521212307371&uri=CELEX:C2017/138/03.

The contents requested in each of these worksheets are detailed in the subsections below. In the case that the information available on your side is not in the requested format/disaggregation/time period, please use estimates based on internal information or your best knowledge to adapt it to the Form. In these cases, please add notes in the space reserved for comments indicating the considerations you have taken.

Core network elements

Information related to core network elements unitary costs is divided in two different sets: Hardware and Software. Each of these sets is explained below:

Hardware

Information about the Hardware of core network elements is requested in three different tables, as described below:

▶ Purchasing and Installation costs: should include the costs of purchasing and installing new platforms. For the different modularity of each core equipment, the following fields must be filled in:

- Equipment model: Refers to the model of the equipment that corresponds to the price reported.

- CapEx unit Costs 2018 - *Currency*: Should include the latest costs of purchasing and installing new elements. The value provided should correspond to the number to be included in the books applying all discounts granted, removing taxes that are deducted, etc.

  These costs should be representative of the average costs for the latest values of purchasing and installing new elements. If unit costs are provided in a different manner (for instance, average price/year or several years total cost of ownership), please mention it in the space reserved for comments. If reported values do not correspond to the year 2018, please indicate the year of reference in the space reserved for comments.

- Capacity unit of the dominant technical constraint: Units in which the maximum capacity is reported (e.g. Mbps, Erlangs, BHCA, Subscribers, Transactions/sec etc.). Only the most constraining capacity factor/unit should be reported. This means that, in the case that certain equipment has several capacity constraints (e.g. in terms of Erlangs and BHCA), the one which is typically dominant should be reported.

- Maximum capacity: Corresponds to the maximum capacity of the equipment for which the price and the model is provided, measured in the units reported in the "capacity unit of the dominant technical constraint" field.

- Expected CapEx yearly trend - %: Percentage of expected change in unit cost year-over-year.

▶ Operation and maintenance costs: should include the operation (e.g. energy, rent) and maintenance (e.g. labour, material, outsourcing, service fees) costs of the equipment. This information must be reported as a percentage of annual OpEx costs over equipment acquisition prices (% of OpEx over CapEx).

▶ CVR (Cost Volume Relationships). CVRs describe how costs are affected by demand and are commonly implemented in LRIC top-down cost models. If the operator has a LRIC top-down cost model with specific CVRs for the different IMS equipment requested, please report the information of these curves by filling the spaces reserved for it. If the elements are not aligned with the categories used in your LRIC top-down cost model, please provide your best estimates based on the CVRs you have and explain in the space provided for comments the situation and approach used. Please note that we are not suggesting that stakeholders calculate CVRs for the purpose of this project.

Separate tables to be filled in by the different operators have been included.

Software

Information about the Software of core network elements is requested in three different tables, as described below:

▶ Software costs: should include the costs of acquiring and installing the software elements associated to the hardware from above. For the different modularity of each core equipment, following categories must be filled in:

- Equipment model: Refers to the model of the equipment that corresponds to the price reported.

- Is the software paid by means of an initial investment price (CAPEX) or as an annual fee (OPEX), or both?: Given that different schemes of payments are generally available for software elements, please select the corresponding scheme to the equipment model reported. Note that available options are `Initial investment´ (in case that only a full payment is incurred in the moment of acquiring the software), `Annual fee´ (if an annual payment is incurred for the license or maintenance of the software, this option generally includes potential upgrades needed in the

software) and `both´ (if the two previous cases are applicable simultaneously for the equipment reported).

Based on the selection made in the previous category, the following information must be reported.

If you have selected `Initial investment´ or `Both´, please fill in:

- CAPEX unit cost 2018 - *Currency*: It should include the latest costs of purchasing and installing new elements (referred to 2018). The value provided should correspond to the number to be included in the books applying all discounts granted, removing taxes that are deducted, etc.

- Capacity unit of the dominant technical constraint: Units in which the maximum capacity is reported (e.g. Mbps, Erlangs, BHCA, Subscribers, Transactions/sec etc.). Only the most constraining capacity factor/unit should be reported. This means that, in the case that certain equipment has several capacity constraints (e.g. in terms of Erlangs and BHCA), the one which is typically dominant should be reported.

- Maximum capacity: Corresponds to the maximum capacity of the equipment for which the price and the model is provided, measured in the units reported in the "capacity unit of the dominant technical constraint" field.

- Expected CAPEX yearly trend - %: Percentage of expected change in CAPEX unit cost year-over-year.

If you have selected `Annual fee´ or `Both´, please fill in:

- OPEX unit cost 2018 - *Currency*: It should include the annual payments incurred for the license fee which are paid to the supplier of the software.

- Capacity unit of the dominant technical constraint: Units in which the maximum capacity is reported (e.g. Mbps, Erlangs, BHCA, Subscribers, Transactions/sec etc.). Only the most constraining capacity factor/unit should be reported. This means that, in the case that certain equipment has several capacity constraints (e.g. in terms of Erlangs and BHCA), the one which is typically dominant should be reported.

- Maximum capacity: Corresponds to the maximum capacity of the equipment for which the price and the model is provided, measured in the units reported in the "capacity unit of the dominant technical constraint" field.

- Expected OPEX yearly trend - %: Percentage of expected change in OPEX unit cost year-over-year.

Reported costs should be representative of the average costs for the latest values of purchasing and installing new elements. If unit costs are provided in a different manner

(for instance, average price/year or several years total cost of ownership), please mention it in the space reserved for comments. If reported values do not correspond to the year 2018, please indicate the year of reference in the space reserved for comments.

▶ Costs related to the staff managing the software. They should include the cost of the technical staff (salaries) in charge of controlling the software. Based on the selection made in the previous point (Software costs), please fill in the following information when applicable:

- If you have selected `Initial investment´ or `Both´, please fill in the percentage of staff costs over initial investment price, estimated as the annual cost of staff dedicated to control the software over the equipment acquisition prices.

- If you have selected `Annual license fee´, please fill in the percentage of staff costs over annual license fee, estimated as the annual cost of staff dedicated to control the software over the annual license fees.

▶ CVR (Cost Volume Relationships). CVRs describe how costs are affected by demand and are commonly implemented in LRIC top-down cost models. If the operator has a LRIC top-down cost model with specific CVRs for the different IMS equipment requested, please report the information of these curves by filling the spaces reserved for it. If the elements are not aligned with the categories used in your LRIC top-down cost model, please provide your best estimates based on the CVRs you have and explain in the space provided for comments the situation and approach used. Please note that we are not suggesting that stakeholders calculate CVRs for the purpose of this project.

Separate tables to be filled in by the different operators have been included.

Active transmission and switching network elements

The contents of this section are going to be used to determine the costs of the transmission network elements of the reference operator.

In case that the NRA has developed a Bottom-Up model for the definition of the FTR (Fixed Termination Rate) under a Pure LRIC approach and/or there is an accounting separation or regulatory accounting system producing Pure LRIC results, the NRA should report the break down of voice termination unit costs. **Please note that the figures reported must be based on Pure LRIC approach.**

Stakeholders are welcomed to provide this information in EUR. However, they can also provide it in their own currency. If exchange conversions are used, to ensure consistency

with BEREC benchmarking activities, please extract them from the Official Journal of the European Union[10] and indicate the reference date/period you have considered in a comment.

Additionally, in order to understand the reference used, there are a number of questions we require the NRA to answer.

3.4. Finance

The Finance module in the 2nd Request is composed by only one worksheet: "WHOLESALE SPECIFIC COSTS". This worksheet requests information regarding specific costs associated to the provision of fixed wholesale services. The information collected in this worksheet is going to be used to calculate the specific costs associated to the fixed termination service.

Stakeholders are welcomed to provide this information in EUR for the year 2017. However, they can also provide it in their own currency. If exchange conversions are used, to ensure consistency with BEREC benchmarking activities, please extract them from the Official Journal of the European Union[11] and indicate the reference date/period you have considered in a comment.

Specific costs related with the provision of fixed wholesale services are to be provided in this worksheet disaggregated according to their main activity/purpose, namely:

▶ **Route testing/monitoring costs**: Refers to cost of all processes incurred when communication links and billability of the services are tested/monitored.

▶ **Operation and maintenance (O&M) costs**: This cost component includes dedicated staff costs, software and systems for wholesale operations, fraud prevention, accounting, and payments that are incurred.

▶ **Data clearing costs**: Costs incurred for data clearing functions. For termination, this function includes TAP record generation and clearing.

▶ **Financial clearing costs**: Costs incurred for financial clearing activities such as processing of invoices received and sent, billing, collection, bad debt, etc.

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[10] For instance, May 2017 exchange rates are available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1521212307371&uri=CELEX:C2017/138/03.
[11] For instance, May 2017 exchange rates are available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1521212307371&uri=CELEX:C2017/138/03.

▶ **Negotiation and contract management/regulation costs:** fees and expenses incurred in the negotiation of agreements between operators, including external fees, such as consulting services, and internal expenses, such as agreement settlement and contract monitoring.

However, stakeholders are invited to provide this information with a higher level of detail if available. In this case, please split the cost among the different subcategories applicable, providing a short description of each of them. Please note that additional rows have been reserved for reflecting these subcategories in the tables.

These service specific costs must be split between OpEx and CapEx.

Additionally, information about wholesale payments are also requested in this worksheet.

For this purpose, we have included three tables as listed below:

▶ Service Specific Costs – OpEx

▶ Service Specific Costs – CapEx

▶ Revenues and Outpayments for Interconnection

Service Specific Costs – OpEx

This table is designed to capture service specific operational costs, which mainly include maintenance, labour and outsourcing costs for fixed wholesale services.

This data should be referred to FY 2017, consistently with the profit and loss accounts report of the operator.

As material differences across operators are expected, separate tables have been provided to be filled in with the information from each fixed national operator.

The table in this worksheet is to be filled in with the following information:

▶ **"Cost Category"** provides the list of service specific costs that are relevant for fixed wholesale services. Additional categories of costs that are considered to be relevant can also be included, explaining them in the cells reserved for comments.

▶ **"Costs related to the different group of services"** should include the costs associated to the following groups:

- **"Fixed National Interconnection",** which refers to costs related to the activities associated to the interconnection of voice services among national operators. This mean those activities associated to voice termination from national fixed and

mobile, as well as the management of interconnection associated to off-net calls to fixed and mobile national destinations.

- • **"Fixed International Interconnection (EU/EEA)",** which refers to costs related to the activities associated to interconnection of voice services among international operators in the EU/EEA area. This mean those activities associated to voice termination from international locations, as well as the management of interconnection associated to off-net calls to international destinations.

- • **"Fixed International Interconnection (Non-EU/EAA)",** which refers to costs related to the activities associated to interconnection of voice services among international operators outside the EU/EEA area. This mean those activities associated to voice termination from international locations, as well as the management of interconnection associated to off-net calls to international destinations.

- • **"Other wholesale services",** which refers to costs related to any other wholesale services such as ULL, WLR, VULA, bitstream, leased lines, etc. Please note that this category should also consider the costs associated to activities to manage wholesale services used from third operators.

- • **"Total costs"**, which refers to the sum of the three above categories.

▶ **Description of the costs that have been included in each of the categories and subcategories of wholesale costs**, requesting a description of the type of costs, activities, elements, etc. included.

▶ **"Expected yearly trend - %"** should be filled with the expected cost trend, measured as a percentage of year-over-year variation. This item is of medium priority.

▶ **"For `Fixed national interconnection´, please indicate the percentage of the wholesale commercial costs that are fixed (not variable with demand)",** should be filled with the indicated percentage based on the operator's estimates.

▶ **"Please provide details on the approach followed to derive this percentage and explanations that justify its reasonability",** including the requested indications.

In the event that some costs are shared between one or more of the categories listed above, please provide your best estimates and indicate the approach followed to split the costs among the relevant categories in the space reserved for comments (for instance, based on the specific information from the operator's top-down system. In the case that you are using top-down system information, please explain the main allocation criteria used in the system). However, in case that you consider that you do not count on sufficient

or conclusive information to perform such split of costs among categories, please include only the total amount in the space reserved for it.

Additionally, if the information requested is not available, please provide any information that is available and provide indications about the missing data in comments.

Service Specific Costs – CapEx

This table is designed to capture service specific acquisition and installation costs (not annualised costs) for fixed wholesale services.

This data should be referred to FY 2017, consistently with the profit and loss accounts report of the operator.

As material differences across operators are expected, separate tables have been provided to be filled in with the information from each fixed national operator.

The structure of this table is virtually equivalent to that presented for OpEx, with only one additional column:

▶ **"Average asset useful life"** should be filled with the useful life of the assets that are involved in the respective cost category to provide fixed wholesale services. This item is of medium priority.

Please refer to the previous section for further details with regards to the remaining information requested in this table.

In the event that some costs are shared between one or more of the relevant categories, please provide your best estimates and indicate the approach followed to split the costs among the relevant categories in the space reserved for comments (for instance, based on the specific information from the operator's top-down system. In the case that you are using top-down system information, please explain the main allocation criteria used in the system). However, in case that you consider that you do not count on sufficient or conclusive information to perform such split of costs among categories, please include only the total amount in the space reserved for it.

Additionally, if the information requested is not available, please provide any information that is available and provide indications about the missing data in comments.

Revenues and Outpayments for Interconnection

Even if we generally prefer to rely on operators' disaggregation of wholesale costs based on their internal allocations or activity base costing approach, we may require to implement an alternative method based on wholesale payments[12], which refer to revenues received by the operator providing a wholesale service (payment coming from the seeker operator) or costs of wholesale services paid by the operator seeking a wholesale service (paid to the provider operator). With this objective in mind, we are requesting information about payments related to wholesale services (revenues and/or outpayments for interconnection) for the following services:

▶ Fixed voice off-net to national numbers (to both fixed and mobile numbers)

▶ Fixed voice incoming from national (from both fixed and mobile numbers)

▶ Fixed voice off-net to EU/EEA international numbers (to both fixed and mobile numbers)

▶ Fixed voice off-net to non-EU/EEA international numbers (to both fixed and mobile numbers)

▶ Fixed voice incoming from EU/EEA international (from both fixed and mobile numbers)

▶ Fixed voice incoming from non-EU/EEA international (from both fixed and mobile numbers)

▶ Other wholesale services

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[12] Please note that, in the case of costs only shared among voice services, we could use traffic as allocation driver, as suggested by a number of stakeholders during the consultation. The information required for such task is already requested in the 1st Request (Historic Demand).

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