



Excellence in Business



Cost of Providing Roaming Wholesale Services – CNECT/2022/OP/0065

Manual of the 'Presentation of results' file

Axon Partners Group

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1. Introduction

The European Commission (hereinafter “EC”) commissioned Axon Partners Group Consulting S.L.U. (hereinafter “Axon Consulting” or “Axon”) for the realization of the study “*Cost of Providing Roaming Wholesale Services – CNECT/2022/OP/0065*” (‘the Project’).

As described during the Workshop 1, held on 21 June 2023, the EC deemed relevant to develop a new cost study to understand the costs of providing mobile services in EU/EEA countries. This initiative was necessitated by the new roaming regulation (‘the Regulation’)¹, which requires comprehensive review reports in the years 2025 and 2029. As part of this cost study, the Axon/EC team has updated the Bottom-Up cost model previously elaborated by the EC/Axon during the project SMART 2017/0091², which calculates the costs of providing mobile services in the EU/EEA countries. The updated model aligns with the current market conditions and adheres to the regulatory framework established by the Regulation, ensuring that the EC's approach is both current and compliant for the forthcoming review periods.

This report describes the contents of the “Presentation of results” Excel, which includes the outcomes produced by the model for each of the different combinations of scenarios defined. In particular the following sections explain:

- ▶ The contents of the file and its structure (section 2)
- ▶ A manual on how to assess the results included in this file (section 3)

¹ Regulation (EU) 2022/612 of the European Parliament and of the Council of 6 April 2022 on roaming on public mobile communications networks within the Union.

² The complete list of public materials developed as part of such project is available in the following link: <https://digital-strategy.ec.europa.eu/en/library/finalisation-mobile-cost-model-roaming-and-delegated-act-single-eu-wide-mobile-voice-call>



2. Contents of the 'Presentation of results' file

The 'Presentation of results' file is comprised of the following worksheets:

- ▶ **OVERVIEW OF THE RESULTS.** This worksheet shows, for any selected combination of scenarios, the results obtained for each country, year and service (including data roaming, voice roaming, SMS roaming and voice termination) in a graphical and tabular manner.

The exhibit below provides an overview of the contents included in this worksheet:



Cost of Providing Roaming Wholesale Services

CNCT/2022/07/0065

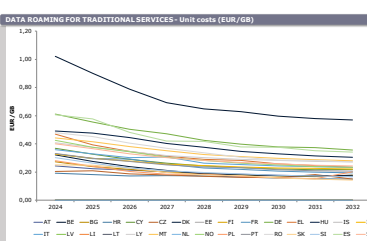
Select below the combination of scenarios to be plotted. Please also note that results shown have been produced in all cases making use of the scenario "Specific cost allocation" of the COVER model with the option "Allocation based on driver", as the other option "Allocation based on GB" was not supported by the stakeholders during the project SMART 2017/0091.

Annualisation criteria	Roaming increment	Threshold to identify seasonality	Demand Forecast	Common costs allocation
Economic depreciation based on demand	Specific roaming increment	50%	Base Case	Common costs allocated according to traffic

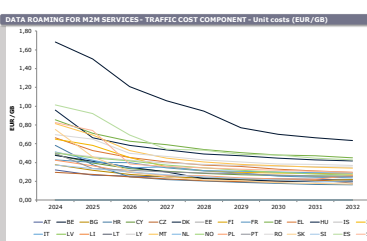
Be in mind that the results produced by the model do not include the transit or termination prices that need to be taken into consideration when setting the wholesale roaming caps. Nevertheless, for the sake of illustration, you can select below to include the transit and termination prices specified in worksheet "WHOLESALE INPUTS".

- ☐ Show transit prices for data roaming
☐ Show transit prices for voice roaming
☐ Show termination prices for voice roaming

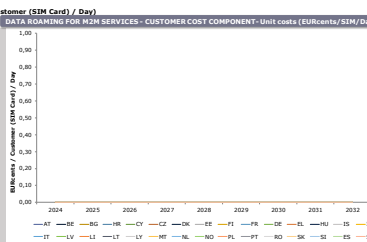
Country	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Austria	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Belgium	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Bulgaria	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Croatia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Czechia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Denmark	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Estonia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Finland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
France	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Germany	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Greece	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Hungary	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Ireland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Italy	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Lithuania	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Latvia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Malta	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Netherlands	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Poland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Portugal	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Romania	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Slovakia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Slovenia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Spain	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Sweden	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Switzerland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
United Kingdom	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Ukraine	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Average	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19



Country	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Austria	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Belgium	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Bulgaria	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Croatia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Czechia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Denmark	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Estonia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Finland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
France	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Germany	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Greece	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Hungary	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Ireland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Italy	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Lithuania	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Latvia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Malta	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Netherlands	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Poland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Portugal	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Romania	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Slovakia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Slovenia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Spain	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Sweden	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Switzerland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
United Kingdom	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Ukraine	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Average	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19



Country	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Austria	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Belgium	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Bulgaria	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Croatia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Czechia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Denmark	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Estonia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Finland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
France	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Germany	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Greece	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Hungary	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Ireland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Italy	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Lithuania	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Latvia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Malta	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Netherlands	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Poland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Portugal	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Romania	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Slovakia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Slovenia	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Spain	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Sweden	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Switzerland	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
United Kingdom	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Ukraine	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19
Average	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19



Voice Reaming Results (selected scenario, in EURcents/minute)										
COUNTRY	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Austria	0.71	0.60	0.47	0.39	0.34	0.30	0.24	0.20	0.16	0.21
Belgium	0.71	0.60	0.47	0.39	0.34	0.30	0.24	0.20	0.16	0.21
Bulgaria	0.71	0.60	0.47	0.39	0.34	0.30	0.24	0.20	0.16	0.21
Croatia	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Czechia	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Denmark	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Estonia	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Finland	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
France	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Germany	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Greece	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Hungary	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Ireland	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Italy	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Lithuania	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Latvia	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Malta	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Netherlands	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Poland	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Portugal	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Romania	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Slovakia	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20
Slovenia	0.69	0.49	0.43	0.35	0.31	0.28	0.22	0.20	0.17	0.20



The user may find the results produced for the following scenarios in this worksheet³:

- Annualisation criteria:
 - Economic depreciation based on ARPU
 - Economic depreciation based on demand.
- Roaming increment
 - Joint roaming and domestic increment
 - Specific roaming increment.
- Threshold to identify seasonality:
 - 10%
 - 30%
 - 50%.
- Demand Forecast:
 - Conservative
 - Base Case
 - Aggressive.
- Common costs allocation:
 - Common costs allocated based on traffic
 - Common costs allocated based on customers

This means that results for a total of 72 (2x2x3x3x2) different combinations of scenarios can be presented in this worksheet.

Finally, it is worth noting that, the results produced by the model do not include the transit or termination prices that need to be taken into consideration when setting the wholesale roaming caps. Nevertheless, for the sake of illustration, the user can select below to include the transit and termination prices specified in worksheet "WHOLESALE INPUTS" through the check boxes illustrated below:

- ☐ Show transit prices for data roaming
- ☐ Show transit prices for voice roaming
- ☐ Show termination prices for voice roaming

Exhibit 2.2: Check boxes to include transit/termination prices [Source: Axon Consulting]

³ Further detail on the scenarios is presented in the methodological approach document.



► **RESULTS DATABASE.** This worksheet includes the full set of results obtained under any scenario from 2022 to 2032 for each service and country. These results have been extracted from the CONFIDENTIAL version of the cost model for each country and they do not include any transit prices (for data and voice roaming) or mobile termination charges (for voice roaming). This worksheet includes the following columns:

- Scenario #. Code that identifies each unique combination of scenarios.
- Annualisation criteria to Common costs allocation. It refers to the different combinations of scenarios considered under a given Scenario #.
- Service. It refers to the service for which costs are presented within the same row.
- Units. It refers to the measurement units in which the costs for the service indicated above are presented.
- Country. It refers to the country for which costs are presented within the same row.
- 2022 – 2032. It refers to the year for which unit costs are presented.

► **WHOLESALE INPUTS.** In case the user wants to see transit/termination prices in the charts presented in the 'OVERVIEW OF THE RESULTS' sheet, he should first introduce the relevant prices he wants to consider in this worksheet. The EC, based on input from the operators, calculated these estimates for 2022-2023. The user can change the relevant prices to any preferred illustrative scenario in the table below:

Concept	Units	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Transit prices for data roaming	EUR/GB	0,095	0,095	0,095	0,095	0,095	0,095	0,095	0,095	0,095	0,095	0,095
Transit prices for voice roaming	EURcents/min	0,400	0,400	0,400	0,400	0,400	0,400	0,400	0,400	0,400	0,400	0,400
Termination prices for voice roaming	EURcents/min	0,200	0,200	0,200	0,200	0,200	0,200	0,200	0,200	0,200	0,200	0,200

Exhibit 2.3: Table to introduce the desired transit/termination [Source: Axon Consulting, estimates from the European Commission]



3. How to assess the results included in this file

The 'OVERVIEW OF THE RESULTS' worksheet has been designed so as to provide a friendly interface to the user.

Drop-down lists are included at the top of this sheet so that the user can select the specific combination of scenarios it would like to assess, as shown below:

Annualisation criteria	Roaming increment	Threshold to identify seasonality	Demand Forecast	Common costs allocation
Economic depreciation based on demand	Specific roaming increment	50%	Base Case	Common costs allocated based on traffic

Exhibit 3.1: Drop-down lists available at the top of the 'OVERVIEW OF THE RESULTS' worksheet
[Source: Axon Consulting]

When a selection is made, the tables and charts below are automatically updated⁴ to show the results produced by the model for that specific combination of scenarios:

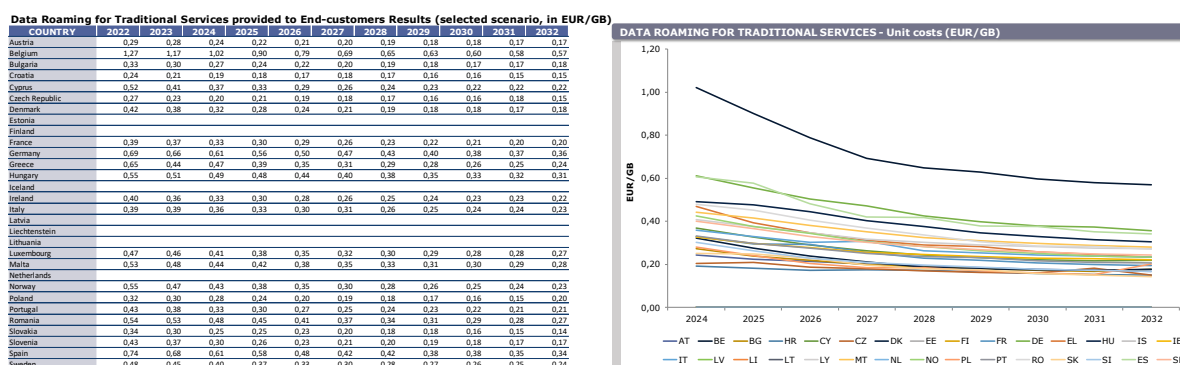


Exhibit 3.2: Illustrative overview of the results obtained for a given service under a given scenario
[Source: Axon Consulting]

On the other hand, the 'RESULTS DATABASE' includes all the raw data generated by the model. While this information may be further explored by the users of the 'Presentation of results' file, its treatment may require a more advanced knowledge of Excel due to the vast amount of information included in it.

⁴ The update of these contents is based on Excel Macros and therefore, these need to be enabled in order for the document to work properly. Please refer to section 3 of the User Manual of the model to learn how to enable Macros in MS Excel.