COMPETITION ECONOMISTS GROUP

Review of Analysys Mason MTAS report

Final

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1 Overview

1. The ACCC has proposed that it will adopt an international benchmarking approach to determine the cost range of a mobile terminating access service (MTAS) in Australia.[1] We have been engaged by Commpete to review a report by Analysys Mason for the ACCC titled "Benchmarking the cost of providing MTAS in Australia", dated May 2020.

2. Analysys Mason has selected nine (9) jurisdictions to include in its benchmarking based on those jurisdictions having published cost models that include local market parameters (i.e., have not been anonymised). Analysys Mason then adjusts a number of inputs to each model to be more reflective of mobile network deployments and services in Australia.

3. We have reviewed the approach adopted by Analysys Mason and draw the following conclusions:

   a. The adjustments to the inputs to the models will improve the use of the international benchmarks to set the price of the MTAS in that it will be more likely that prices reflect the cost of providing the service in Australia. The approach might be viewed as an intermediate step between a typical benchmarking approach and a cost modelling exercise.

      We have been unable to replicate the results of Analysys Mason's adjustments to the models in the East Caribbean and Spain. We also have concerns in relation to the adjustments to the Netherlands model as it produces a very higher number of LTE sites.

      In the absence of further information in relation to the results for the East Caribbean and Spain, we cannot form an opinion on whether the adjusted rates are reliable.

   b. The resulting MTAS benchmark rates do not take into account the significantly different trajectory of modelled costs and MTAS rates set previously. MTAS rates previously set by the ACCC follow a trajectory most similar to the modelled costs in the UK which adopt economic depreciation. The depreciation adopted in the UK model is adjusted so that there is greater depreciation in periods where network utilisation is expected to be higher (with lower depreciation in periods where network utilisation is low).

      In this respect, the price path in the UK is more reflective of the depreciation profile implicit in the MTAS rates previously allowed by the ACCC. For this reason, greater weight should be given to the MTAS rate from the UK.

[1] ACCC, *Public inquiry on the access determination for the Domestic Mobile Terminating Access Service*, Draft report, May 2020.

c. A difficulty with implementing the approach proposed by Analysys Mason is the different geo-demographics of Australia relative to other jurisdictions, particularly in rural areas. Analysys Mason recognise that maintaining the geo-type definitions in each model and substituting Australia's population density will overestimate costs in rural areas. Analysys Mason seeks to address this issue by adjusting the cell radii of the most rural geo-type within each model to reflect a cell radii applicable for rural Australia (around 15 km).

   This approach is problematic as the cut-off for the 'most rural' geo-types are significantly different in each model. Given the difference in the density of the most rural geo-types in each model, a better approach would be to adjust the cell radii in the most rural geo-type so it calibrates to the number of sites observed in Optus' network (which has a market share similar to the hypothetical operator).

   We have been able to implement this approach for each of models we have replicated, except for the East Caribbean, Netherlands and Spain, which we have been unable to adjust in this way.

   In any event, we consider that the geo-type cut-offs in the models for East Caribbean, Mexico and The Netherlands make them unsuitable for the adjustments proposed by Analysys Mason. Similar concerns may be raised in relation to the Portuguese model.

d. In order to capture the cost differences in the non-tradable components of the network cost, Analysys Mason has used a GDP PPP conversion factor to adjust for the relative cost of providing MTAS in Australia. An issue with using a GDP PPP conversion factor is that it includes industries that are not relevant to the telecommunication industry, thus creating bias in the measure.

   Instead of a GDP PPP, using the smallest PPP category that encompasses the cost of providing telecommunication services would more accurately capture the relative cost of these services in each jurisdiction. The PPP for the communication category will more appropriately capture the difference in costs for non-tradable components of the MTAS service.

4. In summary, our assessment based on the information available is that the models from Sweden, Peru, France and the UK appear to be the most robust for the purpose of a benchmarking exercise that includes the adjustments proposed by Analysys Mason. Weight may also reasonably be given to the model from Portugal.

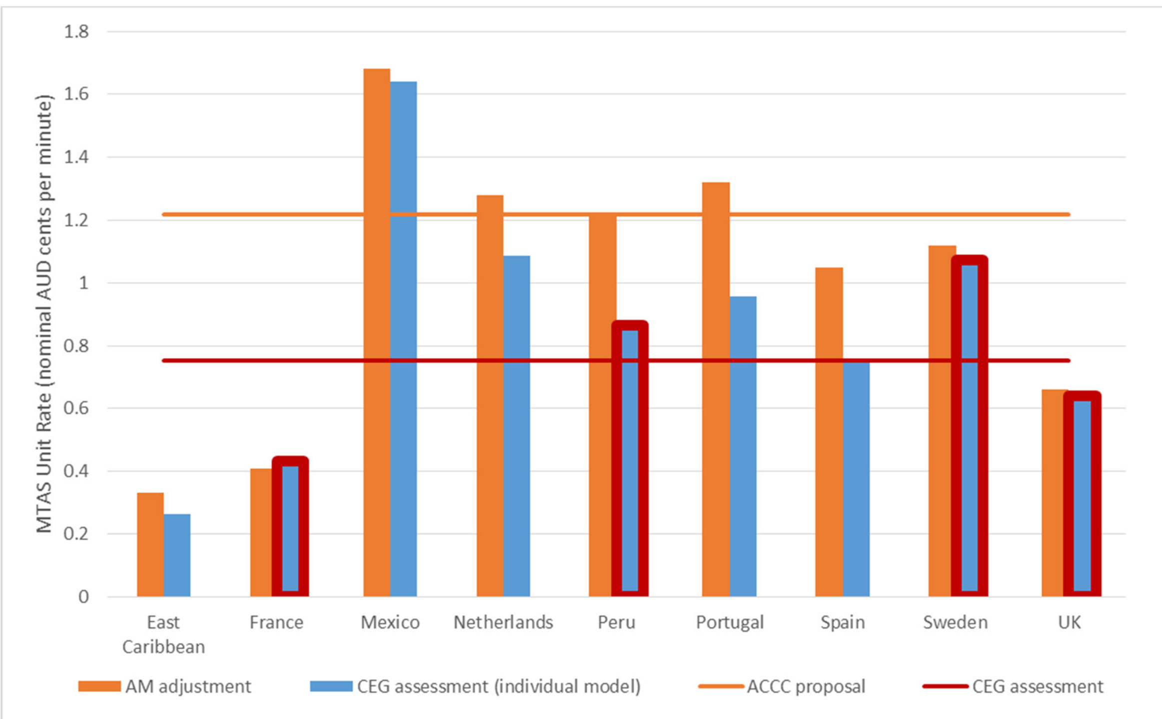
5. We also consider that it would be appropriate to adopt an alternative PPP that more likely reflects the cost differences relevant for benchmarking the MTAS.

6. Based on the conclusions we've drawn, we find a unit price of 0.75 cents per minute to be more reasonable than the 1.22 cents per minute currently proposed. The MTAS unit rate we calculate is based on the unit rates calculated from the British, French, Peruvian and Swedish models which find to be most robust for the purpose of a benchmarking exercise.

7. Figure 1-1 compares the unit rate recommended by Analysys Mason and ACCC against the unit rate that we find to be more reasonable. The orange bars are the unit rate, with PPP adjustment and 0.13 cents added for spectrum cost, calculated by Analysys Mason for each of the benchmark models. The orange line is the 1.22 cents per minute unit rate proposed by ACCC and equals to the average of the recommended benchmark models by Analysys Mason, Peru, Portugal and Sweden for 2022.

8. The blue bars are the priced assessed for each benchmark model by CEG based on the PPP and radii adjustments that we find to be more reasonable.[2] We find the adjustments adopted by Analysys Mason dramatically over-estimates the unit rate based on the Peruvian, Portuguese and Spanish models. The unit rate based on the benchmark models that we find to be more reasonable (with maroon outline), 0.75 cents per minute is shown as the blue line. This implies a 38%, 0.47 cents per minute, reduction in the currently proposed rates.

Figure 1-1: CEG assessment of MTAS unit rate (2022)



Price includes 0.13 cents per minute adjustment for spectrum cost. ACCC proposed price is equal to the average of Peru, Portugal and Sweden for 2022. CEG assessed price is based on the average France, Peru, Sweden and UK (maroon outline). CEG adjustment includes alternative PPP and radii adjustment.

[2] It includes the 0.13 cents per minute for spectrum cost.

2 Review of adjustments to models

9. This section sets out our observations in relation to the adjustments made by Analysys Mason to the mobile cost models, except for observations in relation to geo-types and the PPP adjustments, which we cover in the flowing chapters.

10. This section summaries our attempt to replicate the adjustments made by Analysys Mason and provides some observations on the path of prices adopted in the models.

2.1 Replication of adjustments to models

11. Analysys Mason has made a number of adjustments to each model in an attempt to make the models more reflective of local conditions. These include adjustments to the level of market demand, market share, geography, rural cell radii, radio technology, spectrum holding, spectrum cost, WACC and currency.

12. We have attempted to replicate the adjustments to the models based on the descriptions of the adjustments provided by Analysys Mason in Annex B of its report. We have been able to fairly closely replicate Analysys Mason's results for the majority of jurisdictions. Specifically, we have been able to reproduce the MTAS rates within plus or minus 5% for the French, Mexican, Dutch, Peruvian, Portuguese, Swedish and UK models.

13. The residual discrepancy may be due to our use of reported adjustments in the Analysys Mason report, which we understand report rounded figures rather than the precise adjustments made.

14. We have been unable replicate the MTAS rates reported by Analysys Mason using the East Caribbean and Spanish models. From discussions with Commission staff, we understand that the ACCC has more closely replicated these models. In the interests of transparency, it would assist to publish these models if they are to be used in the benchmark set.

15. We have the same concerns as Analysys Mason in relation to the ability of the model for The Netherlands to handle the adjustments implemented by Analysys Mason. That is, we observe the model predicts a very large number of sites in future years. On this basis the result from The Netherlands may need to be given less weight.

2.2 Price paths in models

16. The models vary to some degree in the approach to determining the path of prices for the MTAS. In general, the models calculate a smoothed price that will equate the NPV of costs and revenues. The smoothed price is calculated over a period before and after

the regulatory period reflecting the cost of serving the actual demand in the past and the expected demand in the future.

17. The models generally tilt the smoothed price so they reflect the trend in prices for the input costs of providing the MTAS. These are referred to as 'price trends'. The path of prices which is modelled, in effect, determines the profile of depreciation of assets in the model. The tilting of the price path at the price trends of the asset creates a tilted annuity form of depreciation, which in the case of declining price trends, creates a more front-loaded path of prices.

18. In other words, the models generally assume a depreciation profile which results in higher prices in the beginning of modelled period and lower prices in the future.

19. The UK model introduces a further element to depreciation that adjusts the smooth price so that it creates a depreciation profile which it considers reflects economic depreciation that would be observed in a competitive market. Ofcom (the UK regulator) tilts the path of prices so that greater depreciation occurs in periods of highest demand. Ofcom states:[3]

> *Economic depreciation matches the cost of equipment to its actual and forecast use over the long-term. Consequently, there is relatively little depreciation in years when utilisation is low and relatively high depreciation in years of full, or almost full, equipment utilisation. As such economic depreciation differs from typical accounting approaches to depreciation when the amount recovered is invariant to usage (and so unit costs are inversely related to utilisation). A9.73 In the 2018 MCT model we have used the form of economic depreciation known as Original Economic Depreciation (Original ED), consistent with our previous MCT models since 2005. A9.74 We have continued with this approach instead of accounting approaches to depreciation, on the basis it would better reflect the forward looking economic value of an asset and hence better mimic the outcome of a competitive market. Furthermore, using economic depreciation would be consistent with the 2009 EC Recommendation which states that "the recommended approach for asset depreciation is economic depreciation wherever feasible." A9.75 Our view is that Original ED is a better depreciation approach to other forms of economic depreciation because it better mimics the outcomes that would be expected in a competitive market.*

20. We note that this approach has been endorsed previously by Analysys Mason. It previously stated:[4]

3 https://www.ofcom.org.uk/__data/assets/pdf_file/0022/112459/MCT-review-statement-annexes-115.pdf

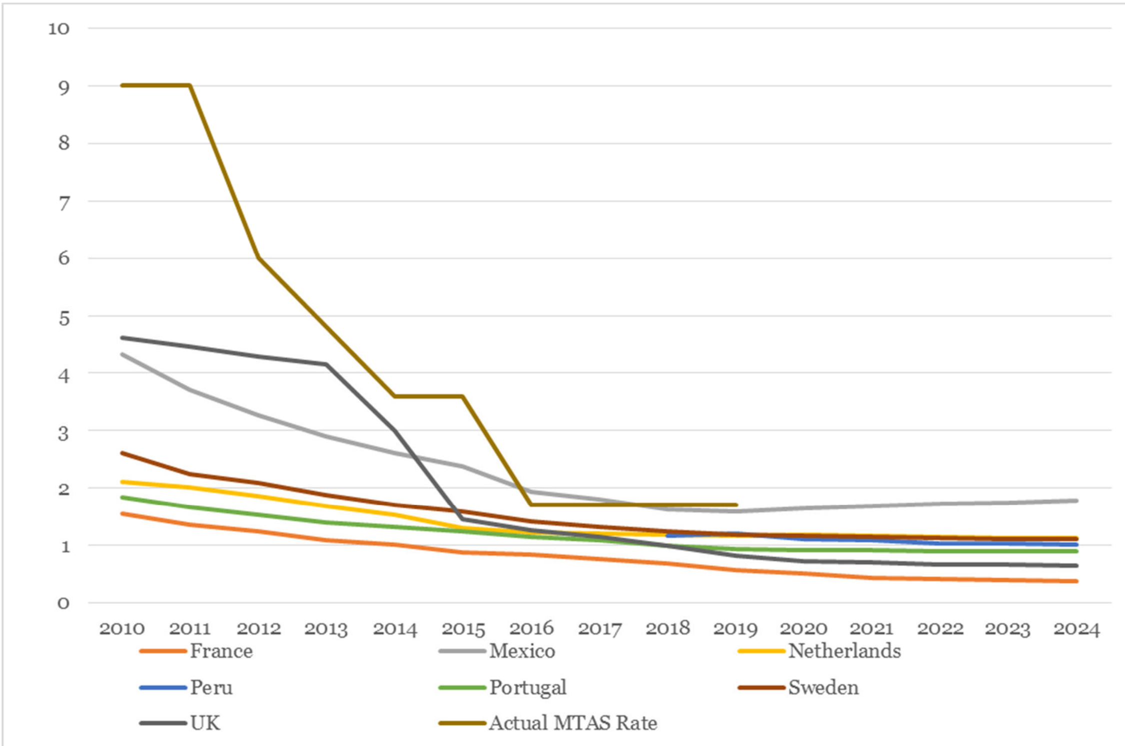
4 https://www.accc.gov.au/system/files/Vodafone%20Submission%20-%20Annex%20A%20Analysys%20Report.pdf

In Analysys's opinion this is not the best methodology to use in a mobile LRIC model. Where the network element output profile does not change significantly over time – i.e. demand levels are relatively stable – it may be possible to adopt the tilted annuity as a good approximation for economic depreciation. In such cases it will be important to check that the difference in unit price derived by each method is immaterial. However where the network element output profile does change significantly over time – for example, a rapidly growing mobile subscriber base – then the tilted annuity result is likely to diverge significantly from economic depreciation in any given year. Tilted annuity will fail to account for the impact that higher asset utilisations and increased economies of scale in future years have on the LRAIC today when calculated using economic depreciation.

21. We observe that the MTAS rates previously set by the ACCC in Australia most closely follow the trajectory of modelled costs in the UK. This is shown in the below figure. This indicates that the price path in the UK is more reflective of the depreciation profile implicit in the MTAS rates previously allowed by the ACCC.

22. On this basis, greater weight should be given to the MTAS rate from the UK.

Figure 2-1: Historic MTAS rates compared to modelled rates in each jurisdiction



Source: ACCC, Analysys Mason. Note that Analysys Mason Model does not have assumption available for Peru before 2018. The modelled MTAS rates are based on PPP adjusted rates. 0.13 cents per minute are added to the modelled rates to account for spectrum costs.

23. In terms of quantifying the historically higher MTAS rates allowed by the ACCC, relative to the costs modelled in each jurisdiction, we can calculate the present value of revenues that would have been earned by the hypothetical operator at the rates set by the ACCC and at the rates indicated by the (adjusted) international cost models. The results of this analysis are shown in the table below. It shows that the hypothetical Australian operator has earned significantly higher revenues (and hence recovered more costs through depreciation) than modelled in the benchmark set.

Table 2-1: NPV of MTAS revenues for the period of 2010-2019 in each jurisdiction relative to historic rates in Australia

Country	NPV (Australian Inflation)
France	2,296,397,971
Mexico	5,995,258,336
Netherlands	3,530,691,528
Peru	672,336,105 (2018 & 2019 only)
Portugal	3,039,827,731
Sweden	3,984,020,895
UK	5,923,230,142
Historic MTAS Rate (ACCC)	9,621,723,756 (866,565,209 for 2018 &2019)

Source: Analysys Mason, World Bank. Note that Analysys Mason Model does not have assumption available for Peru before 2018, the Peru number is the NPV for the period of 2018-2019. Total incoming minutes is used as volume. 0.13 cents per minute are added to the modelled rates to account for spectrum costs.

3 Geo-type and cell radii adjustments

24. A key input into modelling the cost of the MTAS service is the variation in costs across areas with different population densities. In urban areas, with higher population density, the cost of providing mobile services can be lower than the cost of providing mobile services in less-dense rural areas (where costs may be driven by coverage).

25. The models classify areas as being within a particular "geo-type" and model the cost of providing mobile services in each of those geo-type areas. The overall cost of providing mobile services depends on the proportion of the jurisdiction (or population) that fall into each geo-type.

26. The approach adopted by Analysys Mason is to retain the geo-types modelled in each jurisdiction and to substitute the proportion of Australia's area (or population) that fall into each geo-type.

3.1 Different geo-types relevant for Australia

27. The jurisdictions included in the benchmarking exercise have vastly different population distributions to Australia.

28. The following figure shows the cumulative population distribution of each of the benchmarked jurisdictions based on the statistical areas used in the models or the most granular that was publicly available. It compares them with the cumulative population distribution with Australia based on SA2.[5]

5 Four out of the nine models in the Analysys Mason Report provide detailed population, land area and density breakdown by statistical area which allow us to plot the cumulative distribution of population. These countries are Mexico, Netherland, Portugal and Sweden.

Models for the countries below (United Kingdom, France, Spain) do not provide breakdown of statistical area, so we source the information from each countries' statistical offices. For United Kingdom, no information is provided in the Ofcom 2018 model. In the 2011 model, Ofcom stated that "The proportion of the UK within each geotype has been estimated using geographical analysis of the postal sector areas in the UK." However, The UK Office for National Statistics has not published data at postcode level for the United Kingdom (available for England and Wales, but inconsistent with the model setting). Instead, we use the population density by census for wards from UK official labour market statistics.

For France, ARCEP's mobile termination models back in 2011 says "Geotypes are defined at the "commune" level, with each of the 36 000 communes being allocated to a specific geotype." This data is collected from Insee - Statistiques locales.

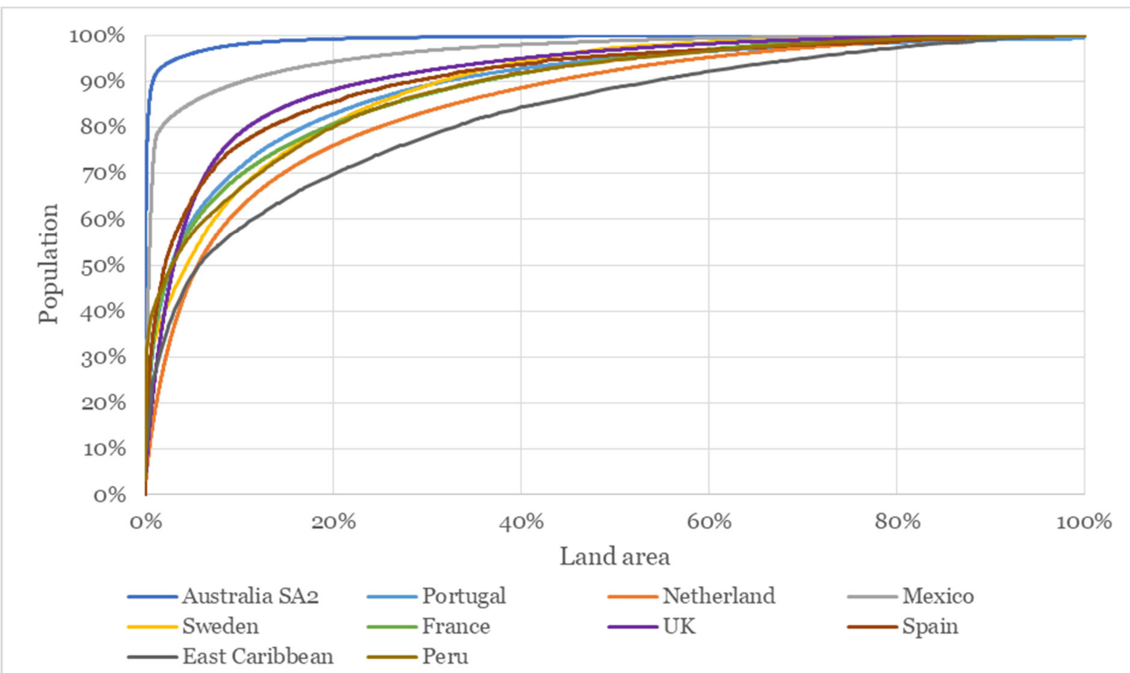
For Spain, according to Axon consulting the data is collected from Registry of local administrations of the Ministry of Public Administrations.

29. Whilst there are difficulties in comparing such distributions with jurisdictions using different sized statistical areas, the analysis is sufficient to show that relative to the benchmarked jurisdictions, Australia has:

a. A higher proportion of population living in more densely populated areas – this is consistent with the understanding that Australia has one of the most urbanised populations in the world.[6] This is illustrated in the figure with the steepness of the initial rise in the distribution of Australia's population when compared to other jurisdictions.

b. Significant land mass which is sparsely populated. This is illustrated in the figure in the flattening of the distribution of Australia's population at close to 100% at around 20% of the land mass.

Figure 3-1: Cumulative population distribution of benchmark jurisdictions



Source: Analysys Mason, UK official labour market statistics, Insee Statistiques locales, Registro de administraciones locales del Ministerio de Administraciones Públicas, Instituto Nacional de Estadística e Informática, Oficina Nacional de Estadística,CEG analysis.

6 https://www.abs.gov.au/websitedbs/D3310114.nsf/home/Interesting+Facts+about+Australia%E2%80%99s+population

30. The approach used by Analysys Mason can in theory accommodate the different distributions of populations across areas of different population density. However, in practice this will only work if the cost models include a range of geo-types that are relevant for modelling costs in Australia. In particular, whether they include a cost category that can fairly model the costs in suburban and rural areas.

31. The following table summarises the population density cut-offs for each geo-type in each model. It shows that for some of the models, the most rural geo-type includes areas of significantly higher population densities than would be viewed as rural (or even suburban) in Australia. These include the models for the East Caribbean, Mexico and The Netherlands.

Table 3-1: Geo-type cut offs in each jurisdiction (population per square km)

Country	Urban	Suburban dense	Suburban	Rural
East Caribbean	900	750	600	375
France	7000	300		50
Mexico		4500		500
Netherland		5825		720
Peru	400	30		3
Portugal	14000	1100		100
Spain	3000	500	200	100
Sweden		260		15.8
UK		7959	3119	782/112/47/25

Source: Analysys Mason. Note: UK has 4 Rural cut-offs, which are Rural 1: 782, Rural 2: 112, Rural 3: 47 and Rural4: 25 people per square km.

32. A similar concern may also be raised with models for Portugal given the significant step between the 100 population/km2 rural cut-off and the 1100 person/km2 suburban cut-off. This geo-type would likely capture both urban and suburban areas of Australia.

3.2 Cell-radii adjustment

33. A difficulty with implementing the approach proposed by Analysys Mason is the different geo-demographics of Australia relative to other jurisdictions, particularly in rural areas. Analysys Mason recognise that maintaining the geo-type definitions in each model and substituting Australia's population density will overestimate costs in rural areas. Analysys Mason seeks to address this issue by adjusting the cell radii of the most rural geo-type within each model to reflect a cell radii applicable for rural Australia (around 15 km).

34. This approach is problematic as the cut-off for the 'most rural' geo-types are significantly different in each model. Given the difference in the density of the most rural geo-types in each model, a better approach would be to adjust the cell radii in the most rural geo-type so it calibrates to the number of sites observed in Optus' network (which has a market share similar to the hypothetical operator).

35. We have been able to implement this approach for each of the models we have replicated, except for the Netherlands, which we have been unable to adjust in this way[7]. The results are shown in the following table.

Table 3-2: Alternative approach to adjusting cell radii in rural areas based on calibration to Optus rural sites

Country	Ratio modelled sites to Optus sites	CEG calibrated AM Unadjusted price (2022)	Cell radii modelled by CEG	Number of sites	CEG Unadjusted price (2022)
East Caribbean	70%				
France	105%	0.24	15.4	2521	0.24
Mexico	80%	0.78	17	2745	0.79
Netherland	140%				
Peru	175%	0.61	20	1333	0.59
Portugal	78%	0.78	16.1	4559	0.78
Spain	138%				
Sweden	103%	0.96	15.2	2162	0.96
UK	202%	0.48	14.5	2067	0.45

Source: Unadjusted price is price prior to PPP adjustment

7 The number of sites in the Dutch model can not be adjusted because the aggregate number of sites is predominantly impacted by the capacity sites rather than coverage sites. This is due to the relatively large number of capacity sites compared to coverage sites.

4 Purchasing Power Parity

36. In calculating the rate for MTAS, Analysys Mason adopted purchasing price parity (PPP) rather than foreign currency exchange rates to convert the non-tradeable component of the costs in various benchmark models.

37. The motive to adopt PPP rather than exchange rate to determine the cost of non-tradeable components is the price of these components may differ across countries, after accounting for exchange rate differences, due to the fact that they are non-tradable. Therefore, Analysys Mason finds PPP to be the more appropriate approach in determining the Australian equivalent costs for these components.

38. In applying the PPP to the non-tradable components, Analysys Mason sourced the PPP Conversion Factor, GDP from the World Bank[8]. To calculate the PPP Conversion Factor, prices are collected based on a common list of precisely defined goods and services across different countries.[9] Then the prices are combined into a single index, PPP, so that prices can be compared across countries for the same set of goods and services.

39. In order to adopt a meaningful PPP that can be used for the GDP, a large basket of goods and services needs to be included in order to encompass the whole economy. They come from a large source of industries such as, but not limited to, agriculture, finance and education[10].

40. However, the purpose of the PPP in the benchmarking is to capture cost differences in non-tradable components of costs in providing telecommunication services across different countries. The cost in the telecommunication industry should be reflected in the price the industry charges to consumers. If the cost of the industry is high, we expect the price to be higher as well. The relative price differences in other industries will not give a good indication to the cost differences in the telecommunications industry. Using the largest basket of goods and services can create distortions.

41. The most appropriate proxy is to use the smallest category that reflects the price of telecommunications services and its associated costs, rather than a broader GDP PPP. The smallest category that represents the price of telephone services is

8 See foonote 27 in Analysys Mason (2020), " Benchmarking the cost of providing MTAS in Australia, May 2020 and Analysys Mason (2020), "Inputs and Outputs of MTAS benchmark.xlsx"

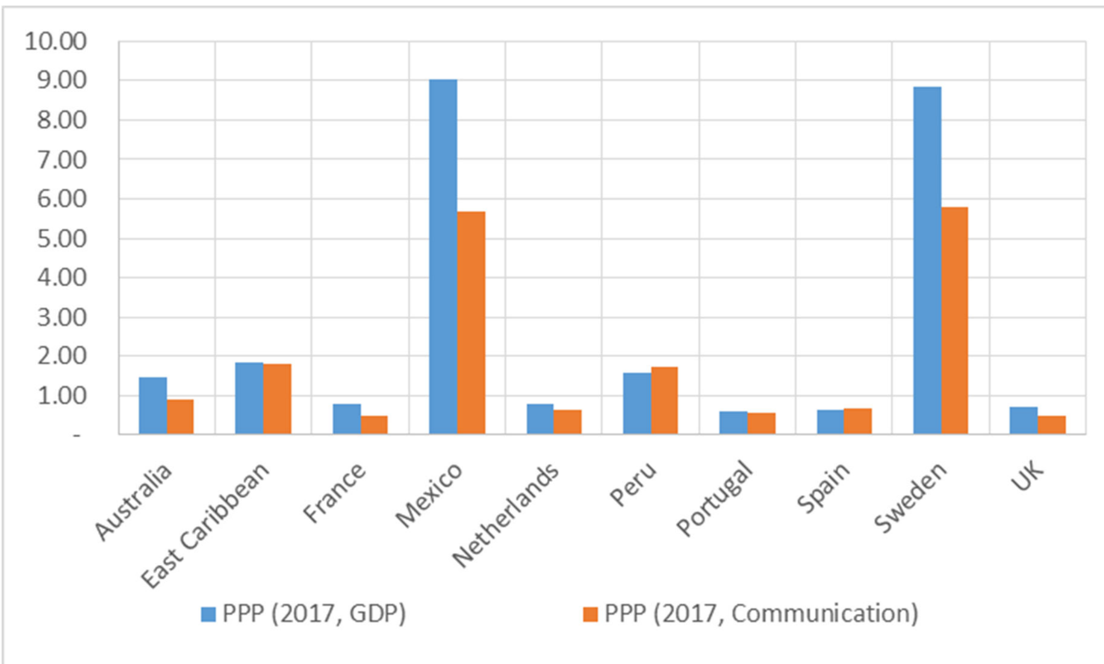
9 https://www.worldbank.org/en/programs/icp/brief/methodology-calculation

10 See Table 1.2 in World Bank, "Measuring the Real Size of the World Economy", http://pubdocs.worldbank.org/en/927971487091799574/ICPBook-eBook-FINAL.pdf

communication. It includes postal services, telephone equipment and telephone services.[11]

42. Therefore, instead of GDP based PPP, we adopt the PPP specific to the communication sector.[12] Figure 4-1 shows the PPP for each country in US dollars. It shows that using a GDP PPP over-estimates the cost of communication in many countries especially Mexico and Sweden.

Figure 4-1: Comparison of GDP PPP and Communications service PPP (Local currency relative to USD)



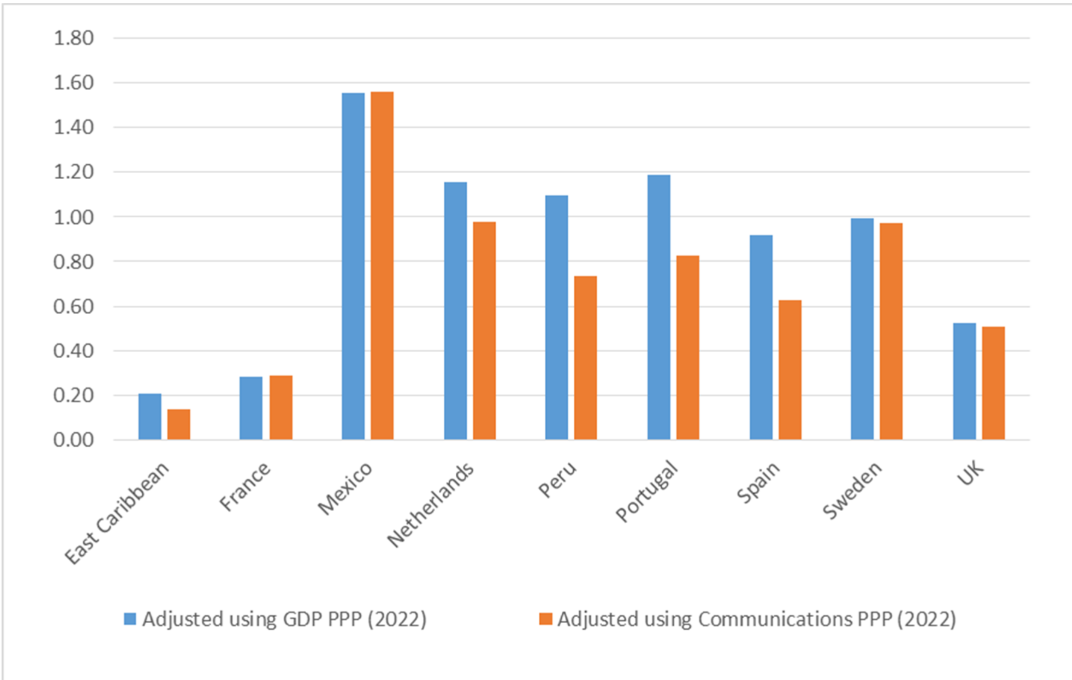
Source: World Bank

43. We then apply the 2017 PPP for the communication sector to the non-tradable cost components to the benchmark models. The results are shown in Figure 4-2. It shows that the rates based on the Netherlands, Peru, Portugal and Spain are over-estimated using a GDP PPP. The rates for the other benchmark models remain similar.

11 See Annex World Bank, “Measuring the Real Size of the World Economy”, http://pubdocs.worldbank.org/en/927971487091799574/ICPBook-eBook-FINAL.pdf

12 See World Bank International Comparison Program 2017

Figure 4-2: Comparison of PPP adjusted per unit price (AUD cents)



Source: World Bank and Analysys Mason. The unadjusted unit price is obtained from Figure D.1 in Analysys Mason report and PPP is adjustment is based on Figure 22. 18% non-tradable assumption is used for Mexico based on calibration of Analysys Mason PPP adjustment formula.

44. Table 4-1 duplicates the calculation shown in Figure 29 of Analysys Mason. It shows the average price for subset of benchmark models. Analysys Mason finds that the subset contain Portugal, Peru and Sweden warrant the most consideration based on the similarity of their result. Using communication PPP, we find that the average rate decreases from 1.10 cents to 0.85 cents for this subset.

Table 4-1: Average costs per minute for MTAS across different subsets of the models, in nominal AUD cents and including communication PPP adjustment

Subset for averaging purposes	2020	2021	2022	2023	2024
All (9)	0.78	0.74	0.74	0.73	0.73
All except East Caribbean and Mexico (7)	0.77	0.72	0.71	0.69	0.69
Also excluding Netherlands and Spain (5)	0.73	0.68	0.67	0.65	0.64
Portugal, Peru, Sweden and UK (4)	0.81	0.77	0.76	0.74	0.74
Portugal, Peru and Sweden only (3)	0.89	0.86	0.84	0.83	0.82
France, Peru, Portugal, Sweden and UK	0.73	0.68	0.67	0.65	0.64
France, Peru, Sweden and UK (**CEG recommended**)	0.70	0.65	0.63	0.61	0.60

Source: World Bank and Analysys Mason. The unadjusted unit price is obtained from Figure D.1 in Analysys Mason report and PPP is adjustment is based on Figure 22. 18% non-tradable assumption is used for Mexico based on calibration of Analysys Mason PPP adjustment formula.

45. The result for each benchmark model using communications PPP adjustment is shown in Table 4-2.

Table 4-2: Cost per minute for MTAS from each of the models, in nominal AUD cents and including the communications PPP adjustment

Country	2020	2021	2022	2023	2024
East Caribbean	0.13	0.13	0.13	0.13	0.12
France	0.40	0.31	0.29	0.28	0.26
Mexico	1.48	1.52	1.56	1.58	1.60
Netherlands	1.01	0.99	0.98	0.96	0.95
Peru	0.82	0.76	0.73	0.70	0.69
Portugal	0.84	0.83	0.83	0.82	0.82
Spain	0.78	0.61	0.63	0.64	0.64
Sweden	1.01	0.98	0.97	0.96	0.95
UK	0.57	0.53	0.51	0.50	0.49

Source: World Bank and Analysys Mason. The unadjusted unit price is obtained from Figure D.1 in Analysys Mason report and PPP is adjustment is based on Figure 22. 18% non-tradable assumption is used for Mexico based on calibration of Analysys Mason PPP adjustment formula.