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Operating manual for the ACCC

Bottom-up cost model for voice interconnection services

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1 Introduction

1.1 Background

In June 2024, the Australian Competition and Consumer Commission (ACCC) commenced a public inquiry into access determinations for voice interconnection services.[1] These are wholesale services provided by mobile network operators (MNOs) or fixed network operators (FNOs) to enable subscribers from different networks to originate and terminate voice calls to each other. The three voice interconnection services of interest are:

- mobile terminating access service (MTAS)
- fixed terminating access service (FTAS)
- fixed originating access service (FOAS).

The ACCC has commissioned Analysys Mason Limited (Analysys Mason) to construct a cost model to derive network costs for these voice interconnection services. The model will serve as a basis for setting the regulated prices of these services. Analysys Mason has planned a three-phase approach to achieve the project objectives:

- Phase 1 – Model specification
- Phase 2 – Model development
- Phase 3 – Model consultation.

As one output for Phase 2, Analysys Mason has drafted this operating manual to outline how to use the cost model that has been developed according to the model specification finalised in Phase 1.

1.2 Overview of modelling approach

The objective is to construct a cost model for voice interconnection services for the ACCC, to provide cost-based information for price regulation of the MTAS, the FTAS and the FOAS. This model has been developed using demand and network parameter information submitted by stakeholders in Australia, combined with estimates and calculations performed by Analysys Mason.

The three broad types of input that will feed into the model relate to demand volumes, network design parameters and cost assumptions, as shown in Figure 1.1 below.

[1] See the ACCC's website here.

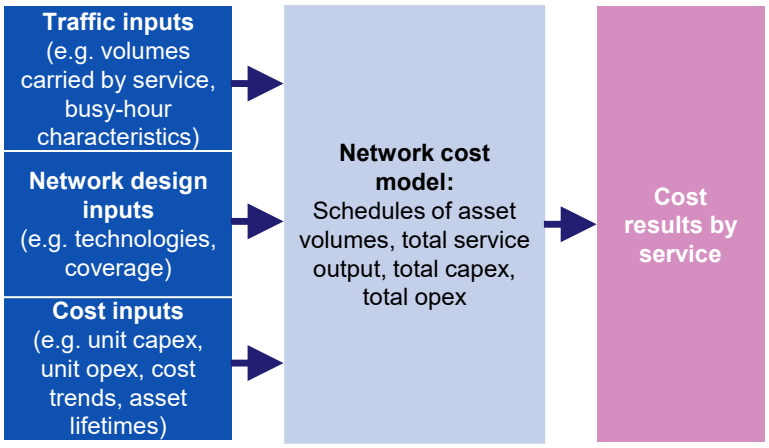


Figure 1.1: Roadmap of the cost model [Source: Analysys Mason, 2025]

A national MNO has been modelled to calculate the relevant costs of MTAS.

FTAS and FOAS are provided over fixed networks. However, the convention in cost recovery of fixed networks is that the costs of the access network infrastructure are recoverable from access line charges and the costs of core network infrastructure are recoverable from traffic-related charges (such as the FTAS and the FOAS). Therefore, only a fixed core network is considered in our model.

It is anticipated that a variety of network configurations can be considered by choosing appropriate input parameters in the model, including (but not limited to) market share, spectrum and coverage. For a configuration defined by a given set of inputs, the model derives the assets in a forward-looking manner and then determines the costs of these assets over a specified timeframe. These costs are then recovered by the services assumed to be conveyed over this network during its lifetime. Capital costs are calculated using a weighted average cost of capital (WACC), which is determined separately by the ACCC. No remaining terminal value is applied within the model at the end of the cost recovery period.

1.3 Structure of this document

The remainder of this document is laid out as follows:

- Section 2 outlines how to use the model to produce cost results
- Annex A provides guidelines on how to update input assumptions in the model.

2 Running the model

This chapter outlines how to use the model to produce cost results based on the input assumptions:

- Section 2.1 describes the worksheets within the model
- Section 2.2 sets out the calculation formatting styles used within the model.

2.1 Calculation flow

The model consists of the following worksheets, each of which undertakes a particular step in the model calculation.

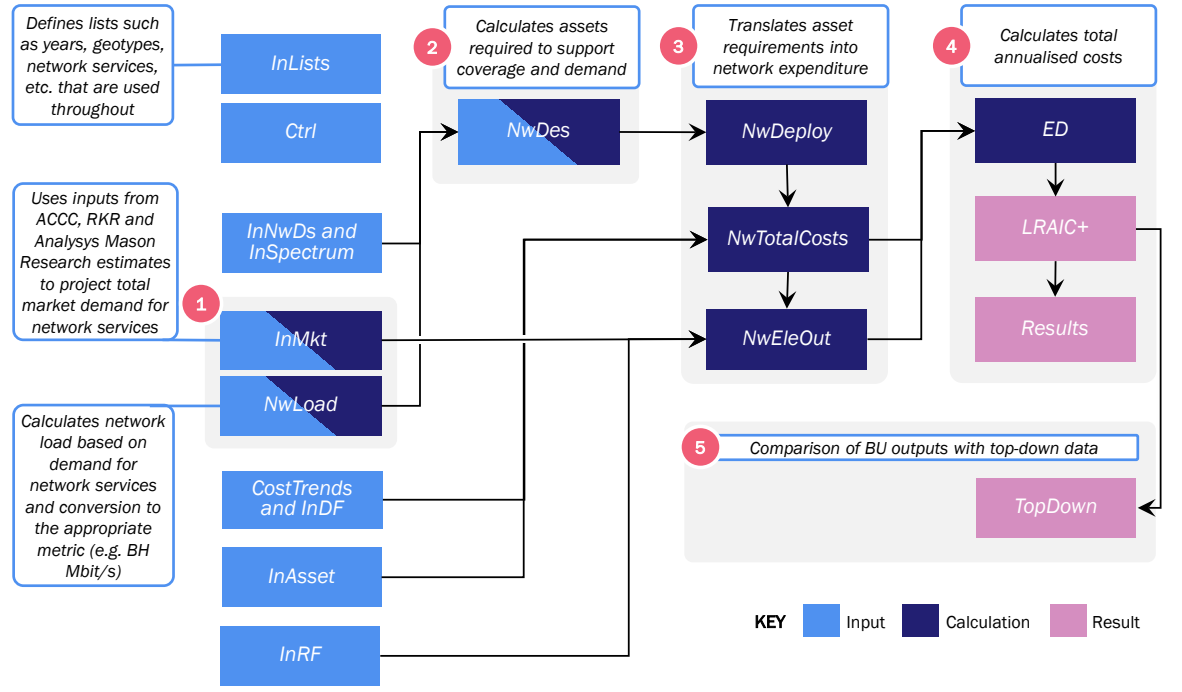
Figure 2.1: Worksheets in the bottom-up cost model for the ACCC [Source: Analysys Mason, 2025]

Sheet name	Description
C	The contents sheet
V	A history of the versions of this workbook
S	A guide to the styles used in this workbook
Ctrl	Dashboard for the model
InLists	Stores key lists for the model
InMkt	Calculates market volumes
InAsset	Specifies cost categories, retirement period, lifetime and unit costs of each asset
InSpectrum	Specifies the spectrum-related inputs for the model (allocations and payments)
InNwDes	Specifies a wide range of inputs used in the design of the network
InRF	Specifies the routeing factors
InCostTrend	Specifies the capex and opex cost trends for the model
InDF	Specifies the assumed inflation rate
NwLoad	Calculates the total and peak traffic load of the modelled operator's network
NwDes	Calculates asset requirements over time for the modelled operator's network
NwDeploy	Calculates the number of assets, reflecting retirement, activation and purchase
NwEleOut	Calculates the routeing factor-weighted output of each asset
NwTotalCost	Calculates the total annual investment and total annual operating costs
ED	Calculates annualised cost according to economic depreciation
LRAIC+	Calculates average incremental costs for all services
Results	Output worksheet of key results
TopDown	Compares key outputs with top-down data

Figure 2.2 indicates how these worksheets interact to undertake the five steps in the model calculation:

1. Market demand forecasting
2. Network design
3. Expenditure derivation
4. Depreciation and service costing
5. Calibration.

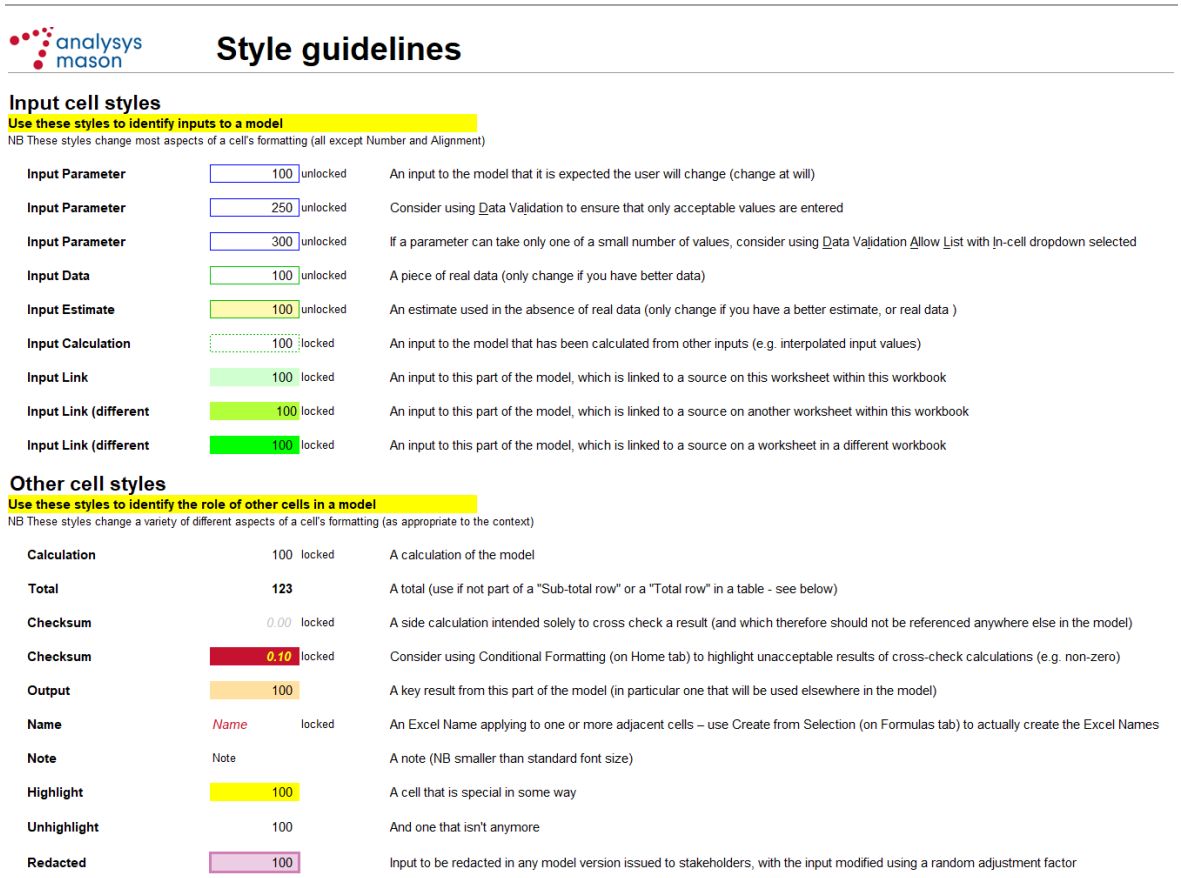
Figure 2.2: Overview of model structure [Source: Analysys Mason, 2025]



2.2 Cell formatting

Figure 2.3 illustrates the cell formatting used within the model, so that the broad functionality of any given cell can be deduced from its formatting. These formats are also set out on the *S* worksheet in the model.

Figure 2.3: Cell formatting used in the model [Source: Analysys Mason, 2025]



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Style guidelines

Input cell styles

Use these styles to identify inputs to a model

NB These styles change most aspects of a cell's formatting (all except Number and Alignment)

Input Parameter	100	unlocked	An input to the model that it is expected the user will change (change at will)
Input Parameter	250	unlocked	Consider using Data Validation to ensure that only acceptable values are entered
Input Parameter	300	unlocked	If a parameter can take only one of a small number of values, consider using Data Validation Allow List with In-cell dropdown selected
Input Data	100	unlocked	A piece of real data (only change if you have better data)
Input Estimate	100	unlocked	An estimate used in the absence of real data (only change if you have a better estimate, or real data)
Input Calculation	100	locked	An input to the model that has been calculated from other inputs (e.g. interpolated input values)
Input Link	100	locked	An input to this part of the model, which is linked to a source on this worksheet within this workbook
Input Link (different	100	locked	An input to this part of the model, which is linked to a source on another worksheet within this workbook
Input Link (different	100	locked	An input to this part of the model, which is linked to a source on a worksheet in a different workbook

Other cell styles

Use these styles to identify the role of other cells in a model

NB These styles change a variety of different aspects of a cell's formatting (as appropriate to the context)

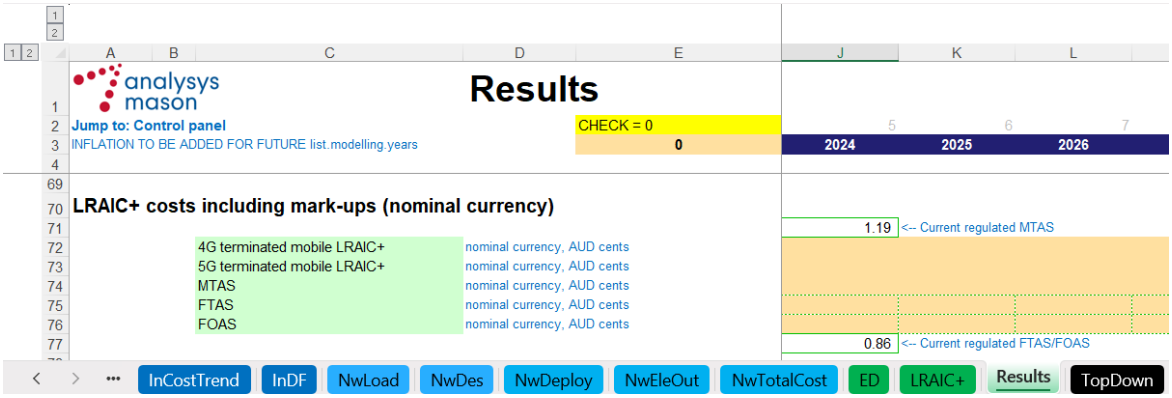
Calculation	100	locked	A calculation of the model
Total	**123**		A total (use if not part of a "Sub-total row" or a "Total row" in a table - see below)
Checksum	0.00	locked	A side calculation intended solely to cross check a result (and which therefore should not be referenced anywhere else in the model)
Checksum	0.10	locked	Consider using Conditional Formatting (on Home tab) to highlight unacceptable results of cross-check calculations (e.g. non-zero)
Output	100		A key result from this part of the model (in particular one that will be used elsewhere in the model)
Name	*Name*	locked	An Excel Name applying to one or more adjacent cells – use Create from Selection (on Formulas tab) to actually create the Excel Names
Note	Note		A note (NB smaller than standard font size)
Highlight	100		A cell that is special in some way
Unhighlight	100		And one that isn't anymore
Redacted	100		Input to be redacted in any model version issued to stakeholders, with the input modified using a random adjustment factor

2.3 Producing cost results

The model is a single workbook. It can be run using the following steps:

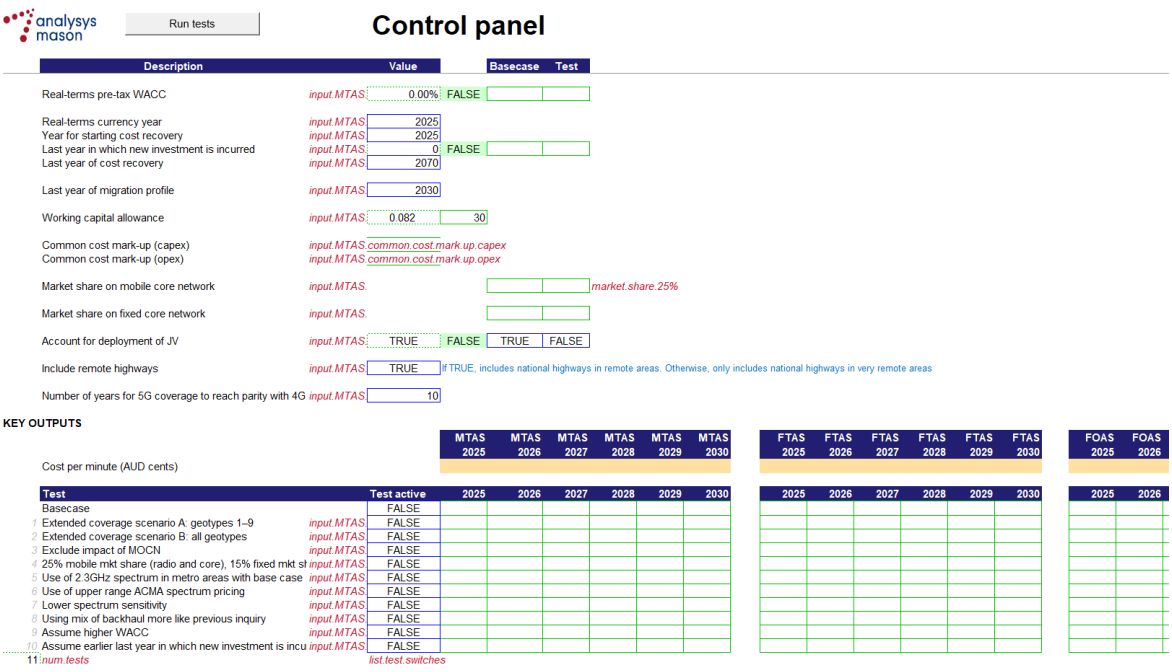
- Microsoft Excel should be used in 'manual' calculation mode (Formulas → Calculation Options → Manual)
- To run the model, press Ctrl+Alt+F9 to instruct Microsoft Excel to perform a full recalculation of the workbook incorporating any changed parameters
- The full numerical results for the MTAS/FTAS/FOAS services can be viewed in the *Results* worksheet. Results are available for all modelled years, as shown in Figure 2.4 below.

Figure 2.4: Outputs on the Results worksheet [Source: Analysys Mason, 2025]



The model can also be run for multiple sensitivity tests, using the table at the bottom of the *Ctrl* worksheet, shown below in Figure 2.5. Each test is configured using a TRUE/FALSE switch (FALSE means the given test is not active, TRUE means the given test is active). All the sensitivity tests defined can be calculated (including the base case) using the "Run tests" button at the top of the worksheet. This button runs a macro that runs each sensitivity test in turn (calculating the model outputs), and pastes the costs results for the MTAS/FTAS/FOAS services (in nominal-terms currency) into the results table for five selected years. The output table is shown below in Figure 2.5.

Figure 2.5: Outputs of sensitivity tests on the Ctrl worksheet [Source: Analysys Mason, 2025]



Annex A Guide for sensitivity testing and updating inputs

To further aid a model user, the following quick-start guide or 'crib sheet' has been developed for the bottom-up cost model. This annex identifies the common tasks and considerations that users may wish to undertake or review when using the model.

Figure A.1 below specifically outlines, for each of the identified tasks, the location within the model of the appropriate parameter to be adjusted, the description of how to change this parameter, and the impact of changing this parameter.

Figure A.1: Crib sheet [Source: Analysys Mason, 2025]

Objective	Cell reference	Description	Impact
Adjust the weighted-average cost of capital (WACC)	Ctrl!F5	The WACC used is currently calculated by the ACCC	Increasing the WACC will result in a higher economic depreciation calculation on the ED/LRAIC+ worksheets
Adjust the working capital uplift (in terms of days)	Ctrl!E14	30 days of working capital is currently assumed best on common modelling practices	Increasing the working capital uplift increases the modelled opex
Adjust the common cost uplifts for capex and opex	Ctrl!D16 (capex) Ctrl!D17 (opex)	Separate mark-ups are applied to the modelled capex and opex	Increasing the mark-ups increases the modelled cost base
Adjust market shares on core networks	Ctrl!F19 (mobile) Ctrl!F21 (fixed)	Single market share values of the total market share for the mobile core network and fixed core network	Increasing the mobile (respectively fixed) market share should reduce the cost of the MTAS (respectively FTAS/FOAS)
Adjust spectrum holdings	InLists!G323:G342	Total MHz assumed by band	Changing assumed MHz will change the modelled radio network and therefore adjust the costs of MTAS
Adjust voice migration profile	InMkt!AD136:CB139	Proportion of voice traffic carried by radio technology	Changing the mix of traffic between technologies can change the dimensioned network by radio technology
Adjust data migration profile	InMkt!AD148:CB151	Proportion of data traffic carried by radio technology	
Adjust forecast usage per subscriber	InMkt worksheet, rows 88/91/95/ 99/102/105/108/111	Year-on-year change in usage per subscriber by traffic type	Changing the forecast traffic can change the future network deployment

Objective	Cell reference	Description	Impact
Adjust unit capex/opex	InAsset!R27:R276 InAsset!V27:V276	Assumed asset costs per unit	Increasing assumed unit costs will increase the costs of services
Adjust lifetimes	InAsset!M4:M23	Assumed lifetimes for asset replacement	Increasing lifetimes reduces asset replacement and therefore the modelled cost base
Adjust mobile population/area coverage by geotype and technology	InNwDes!H1239:J1253 and InNwDes!N1239:R1253 (population) InNwDes!H1257:J1271, InNwDes!N1257:R1271 (4G area) InNwDes!H1275:J1289 and InNwDes!N1275:R1289 (5G area)	Adjusts the assumed coverage of the 4G and 5G networks	Increasing the modelled coverage can increase the modelled cost base
Adjust radio network market share	InNwDes!L1239:L1253 and InNwDes!R1239:R1253	Adjusts the assumed share of market traffic on the modelled radio network	Increasing the mobile market share should reduce the cost of the MTAS
Adjust assumed cell radii	InNwDes!H1363:AA1363 (by frequency) InNwDes!H1365:H1379 (by geotype)	Adjusts the assumed coverage per base station	Increasing the cell radii will reduce the network deployment
Adjust assumed spectral efficiency	InNwDes!H1440:H1459 (4G) InNwDes!H4682:H4701 (5G)	Adjusts assumed capacity of a carrier for a particular spectrum band	Increasing the assumed spectral efficiency will reduce the network deployment
Adjust cost trends	InCostTrend!F5:F19 (capex) InCostTrend!F783:F797 (opex)	Assumed year-on-year change in asset costs in real-terms currency	Revising assumed cost trends changes the economic depreciation calculation and thus the cost results
Adjust inflation	InDF!E13:BC13	Assumed conversion for real-terms currency results to nominal-terms currency results	Increasing assumed inflation increases nominal terms currency results