User guide: quantitative analysis for Public Safety Mobile Broadband

The Commission has undertaken quantitative analysis as part of evaluating the costs of different options for delivering a PSMB capability.

Details of the quantitative analysis are documented in Appendix C of the study report (http://www.pc.gov.au/inquiries/completed/public-safety-mobile-broadband/ report). The Commission is also making publicly available the computer files to run the analysis under the conditions set out in box 1. The Commission will not provide users of these programs with any support.

Box 1 Conditions for using the computer files

1. The Commission will not provide users of these programs with any support.
2. The Commission accepts no liability for any errors in the programs.
3. Users of the programs, including users that derive new variations of the model, should acknowledge the Productivity Commission. The appropriate citation is:

   Productivity Commission 2015, *Public Safety Mobile Broadband*, Research Report, Canberra.

In downloading these files, you accept these conditions.

Program and system requirements

Users of these programs will require access to the program, R, in order to run the quantitative analysis. R is open source and can be downloaded from https://www.r-project.org/.

The analysis also relies on the following packages, which will need to be installed:

- openxlsx
- dplyr
- tidyr
- reshape.

Additionally, sufficient computing power and memory is required to run the core model as well as all the sensitivity analyses.

Download and install

Download the PSMB quantitative analysis files from (http://www.pc.gov.au/inquiries/completed/public-safety-mobile-broadband/report). Unzip the file in a directory.

File structure

The top-level directory contains three folders entitled 'CODE', 'INPUT' and 'OUTPUT'. The contents of these folders are discussed in further detail below.

The top-level directory also contains two files of geographical data (SA2POPULATION.xlsx and SA2_2011_AUST.csv) and one file that specifies the cell radius of mobile network sites (CELLRADIUS.xlsx). These files are called when the model is run. Where applicable, the source of this data can be found in the file DATASOURCES.txt.

It is important to retain this directory structure when running the program.

The 'CODE' directory

This folder contains the R scripts necessary to run the quantitative analysis.

The quantitative analysis can be run using the master file, MASTER.R.

Also included in this folder are nine module files, which each contain the R script for individual modules of the quantitative analysis.

- 00Preliminaries.R
- 01Geotyping.R
- 02AccessNetworkDimensioning.R
- 03UserGrowthProfile.R
- 04CapacityAugmentation.R
- 05Rollout.R
- 06CAPEX.R
- 07OPEX.R
- 08Output.R.

These scripts are called by the master file in sequence and need not be run separately.

The 'INPUT' directory

This folder contains all input sheets used by the Commission as part of its quantitative analysis. This includes inputs used for the central case analysis, as well as all sensitivity analyses.

A catalogue of all input sheets is contained in LISTOFINPUTS.xlsx.

The 'OUTPUT' directory

This directory is initially empty. Outputs will be written to this directory when the R scripts are run.

For each input sheet, three output sheets will be generated.

- The CAPEX output reports the value of capital expenditures for each cost item, broken down by state/territory, geotype and year.
- The OPEX output reports the value of operating expenditures for each cost item, broken down by state, geotype and year.
- The SITES output reports the number of sites generated by the network dimensioning module, broken down by state, geotype and year.

Running the model

1. Open the master file (MASTER.R.) in R.
2. Specify the working directory. The working directory is specified in the first line of the script:

   ```
   setwd("C:/PSMB-Model")
   ```

   The working directory should be set as the location where the folder "PSMB-Model" has been saved. Note that the separator between folders is a forward slash (/).
3. Run the MASTER.R file in R. This can be done by selecting all of the script and pressing the 'Run' button or using the keyboard shortcut Ctrl+Alt+R.
4. Outputs will be written to the 'OUTPUT' directory.