

Prepared on behalf of: Telstra Corporation Ltd

Australian Competition & Consumer Commission  
Domestic mobile roaming declaration inquiry 2016

## Statement of Maximilian Edward Downey

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Address: Level 20, 35 Collins Street, Melbourne

Occupation: Senior Wireless RAN Specialist, at Telstra Corporation Ltd

Date: 1 December 2016

**[CIC begins]** = information not to be released even with a confidentiality undertaking

I, Maximilian Edward Downey, Senior Wireless RAN Specialist, at Telstra Corporation Ltd, of Level 20, 35 Collins Street, Melbourne, say as follows:

- 1 I am a Senior Wireless RAN Specialist within the Wireless Network Engineering business division at Telstra Corporation Ltd (**Telstra**).
- 2 I make this statement from my own knowledge as a Senior Wireless RAN Specialist, from my experience accrued as an employee of Telstra across 8 years, and from having consulted and made enquiries of relevant staff and the records of Telstra.

### Background

- 3 I have been employed by Telstra since January 2008.
- 4 In my current role as Senior Wireless RAN Specialist, I am responsible for network modelling and capacity management for Telstra's mobile network.
- 5 Prior to my role as Senior Wireless RAN Specialist (March 2015 – present) I was a Technology Specialist in Wireless Network Engineering.

## Overview of Devil and eDevil

- 6 Telstra uses two dimensioning tools to monitor capacity across cells in its radio access network. In particular, it uses:
  - (a) Devil, which is a Wideband Code-Division Multiple Access (WCDMA/3G) dimensioning tool; and
  - (b) eDevil, which is a Long-Term Evolution (LTE/4G) dimensioning tool.
- 7 Devil and eDevil are bespoke tools that have been developed by Telstra in collaboration with mathematicians at the University of Adelaide's Teletraffic Research Centre. In my previous role as Technology Specialist in Wireless Network Engineering, from 2008 to 2015, I was the lead developer responsible for developing Devil and eDevil.
- 8 In my experience, Telstra considers Devil and eDevil to be extremely robust and reliable. These tools have significantly informed Telstra's radio access network capacity programme since 2006 and have been extensively validated both internally and by the University of Adelaide. They have also been commercialised and sold internationally as capacity management tools. Devil is subject to a patent in Australia.
- 9 Devil and eDevil were created to fulfil three core requirements, based on the present and anticipated future state of Telstra's 3G and 4G networks:
  - (a) to model user experience [REDACTED];
  - (b) to model soft capacity. Soft capacity is the amount of traffic a cell can carry and still meet user experience [REDACTED];
  - (c) to ensure capacity is expanded:
    - (i) only for sites that require it; and
    - (ii) by the time those sites require it, using forecasting to be proactive rather than reactive and taking account of necessary lead times.

- 10 Each cell in Telstra's 3G and 4G network generates performance monitoring and configuration data, which is collected by Devil and eDevil and used to drive detailed teletraffic models.

### Significant KPIs monitored by Devil

- 11 Devil and eDevil have the ability to monitor whether Telstra's network is meeting KPIs with respect to headroom, blocking and throughput. They can model anticipated headroom and blocking for points in time in the future, using arbitrary traffic loads. eDevil also has the ability to model anticipated throughput. The modelling can be run on the entire network, or on specified cells. [REDACTED]  
[REDACTED]  
[REDACTED].
- 12 Throughput refers to the amount of data acknowledged in a particular time period. Devil and eDevil calculate throughput in a number of ways, including by reference to "user throughput". User throughput is a measure of user experience. Higher user throughputs mean that users are able to transfer data more effectively.
- 13 User throughput can be measured based on 'downlink' or 'uplink'. Downlink refers to the link from the cell site down to the mobile phones. Uplink refers to the link from the mobile phones or receivers to the cell site.
- 14 Headroom is a measure of the estimated amount of capacity remaining in a cell [REDACTED]  
[REDACTED]  
[REDACTED]. A cell that carries no traffic will have a headroom of 100% [REDACTED]  
[REDACTED].
- 15 Blocking, or rejected call setup requests, occur when available network resources are exhausted. This might not correspond to precisely 100% resource utilisation as typically a small amount of network resources are reserved to facilitate mobility (handover between cells) and to ensure that emergency (E000) calls do not get blocked.



**Data extracted for Aetha Consulting Limited**

- 19 On 14 November 2016, I caused Devil and eDevil to each model anticipated downlink user throughput (see paragraphs 13 and 14 above) and headroom (see paragraph 14 above) using estimated traffic levels for the five year period between October 2016 and October 2021 based on:
- (a) cells specified by Aetha;
  - (b) various assumptions regarding network traffic provided by Aetha; and
  - (c) the assumption that the network remains static, that is, the number of cell-carriers remains fixed and no network optimisation occurs.

20 Using the output from each tool, I exported the results to a Microsoft Excel spreadsheet and mapped each set of results on a graph.



Signature

Maximilian Edward Downey, Senior Wireless RAN Specialist, Telstra Corporation Ltd

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