NORTON ROSE FULBRIGHT

Dated 16 June 2017

ATTACHMENT G

Re:

Vodafone Hutchison Australia Pty Ltd submission to the Australian Competition and Consumer Commission

Second Statement of Easwaren Siva

I, Easwaren Siva, of 177 Pacific Highway, North Sydney, New South Wales, make the following statement:

1 I am the General Manager – Technology Strategy & Governance at Vodafone Hutchison Australia Pty Ltd (**Vodafone**). I have held this role since mid-2014.

2 Except where I state otherwise, I make this statement based on the knowledge that I have obtained, as General Manager – Technology Strategy & Governance at Vodafone, from approximately 25 years in the telecommunications industry and from having consulted and made inquiries of relevant staff and the records of Vodafone.

3 I believe the information in this statement to be true.

A STATEMENT DATED 10 MARCH 2017

4 I have previously made a statement dated 10 March 2017 (**March Statement**) which contains an overview of my relevant experiences.

5 In my March Statement, I also explained of a number of concepts, for example Network Selection. These concepts are also relevant for the purposes of this statement, however I have not sought to explain them again in the interest of brevity.

B THE ACCC DRAFT DECISION

6 I understand the Australian Competition and Consumer Commission (**ACCC**) published a draft decision dated May 2017 to not declare a domestic mobile roaming service (**Draft Decision**).

7 I understand the ACCC's Draft Decision states:

> *"The ACCC is required to consider whether declaration will achieve any-to-any connectivity. In the ACCC's view the any-to-any objective in the LTIE test is designed to promote interconnection between networks. As declaration of a mobile roaming service will not affect interconnection arrangements between mobile networks, we do not consider declaration will promote any-to-any connectivity."*

8 In my view, domestic mobile roaming does promote and affect interconnection arrangements between networks, specifically, interconnection between the home network and the roaming network. I set out the reasons in this statement.

C NETWORK SIGNALLING AND ROUTING MOBILE TRAFFIC

9 I briefly explain, in layperson terms, the distinction between signalling and traffic to ensure my use of those terms in this statement is understood.

10 A mobile device communicates with a mobile network by sending and receiving signals for the purposes of, among other matters, device management, call management and call detail records (**CDR**). Components of a mobile network communicate with other components of a mobile network, or another communications network by sending and receiving signals. I refer to this as "signalling" or "signal".

11 A mobile device will signal a mobile network when it connects to a mobile network via Network Selection, or when it enters active mode. Signalling is different to mobile traffic, by which I mean voice traffic or data traffic that is sent from or sent to a mobile device via a mobile network.

12 When a mobile device enters active mode in an outbound scenario, for example initiating a voice call, it will signal to the mobile network what type of traffic it wishes to send and where it wishes to send that traffic. The mobile network then attempts to route the traffic to its destination. Once a connection is established between the mobile device and the destination, mobile traffic can flow.

13 When a mobile device enters active mode in an inbound scenario, for example receiving a voice call, the mobile network the mobile device is connected to will signal the mobile device and attempt to route the traffic to the mobile device. Once a connection is established between the mobile device and the destination, mobile traffic can flow.

D GSMA GUIDELINES (3G Data, 4G Data and Voice over LTE (VoLTE))

14 In this section, I briefly explain in layperson terms the standard set out in the GSMA's IMS Roaming, Interconnection and Interworking Guidelines[1] (**Guidelines**).

15 The GSMA is the GSM Association. The GSMA is a trade association that represents the interests of mobile operators worldwide. The GSMA develops global standards and protocols for the industry.

16 The Guidelines sets out the protocol for 4G mobile roaming and interconnection between networks in the IP Multimedia Subsystem (**IMS**) architecture. The IMS supports new, IP-based multimedia services as well as interoperability with traditional telephony services.

[1] GSM Association, *IR 65 – IMS Roaming, Interconnection and Interworking Guidelines*, Version 24.0, 10 March 2017.

17 In other words, the Guidelines set out the global standard for roaming and interconnection between mobile networks in an IP centric environment including 3G Data and 4G networks (Data and VoLTE).

18 The Guidelines sets out three roaming architectures being: (i) Local Breakout VPLMN routing (**LBO-VR**), (ii) Local Breakout HPLMN routing (**LBO-HR**), and (ii) S8 Home routed (**S8HR**).

19 [c-i-c]

20 [c-i-c]

21 In all three roaming architectures, there must be an interconnection between the home network IMS and the roaming network IMS. The two IMS are interconnected by the Inter-IMS-Network-to-Network Interface (**IMS-NNI**). I do not intend to explain the IMS-NNI further other than to note that there is a protocol for inter-IMS connection.

22 I briefly outline in layperson terms the three different roaming network architectures.

23 LBO-VR architecture is illustrated by the figure in Annexure B. In this illustration, the signalling link between a roaming mobile device to another user device is represented by the red line and mobile traffic is represented by the blue line. The key feature of LBO-VR is that the roaming network retains a greater control over the signalling and routing functions, hence the appropriately named "visited" public mobile network routing.

24 LBO-HR architecture is illustrated by the figure in Annexure C. In this illustration, the signalling link between a roaming mobile device to another user device is represented by the red line and mobile traffic is represented by the blue line. Compared to LBO-VR, the signalling and routing functions are more evenly distributed between the home network and the roaming network.

25 S8HR architecture is illustrated by the figure in Annexure D. In this illustration, the signalling link between a roaming mobile device to another user device is represented by the red line and mobile traffic is represented by the blue line. The signalling and routing functions in an S8HR architecture are home routed using IMS well-known "Access Point

Name via S8" interface. In short, the home network is provided direct access to the user equipment for routing purposes.

26 In this section, I have briefly explained the different ways a roaming architecture can be designed. In the sections below, I briefly explain in layperson terms how roaming would work in outbound and inbound call cases, and during data sessions.

E ROAMING IN OUTBOUND CALL CASES (3G Circuit Switched Voice Call)

27 In this section, I briefly explain in layperson terms how mobile roaming works in an outbound scenario. By an outbound scenario I mean when a customer initiates a call while roaming on a roaming network.

28 While roaming on a roaming network, a mobile device will signal the roaming network when it wants to make a call, the roaming network may then signal the home network so that the home network could route the traffic.

29 In other words, the roaming network is responsible for signalling and routing the mobile traffic between the mobile device and the point of interconnect between the home network and the roaming network. The home network is responsible for signalling and routing the mobile traffic between the point of interconnect between the home network and the roaming network to another end-user device.

30 In such cases, the roaming network provides an "originating" service to the home network. The "originating" service involves the originating of a call on the mobile handset of a roaming customer on the roaming network, then the carriage of the call to the point of interconnection between the roaming network and the home network. Such a service is analogous to the mobile originating access service provided in a standard mobile interconnection arrangement. A commercial charge for "mobile roaming voice originating access" would typically apply that is payable from the home network to the roaming network and that covers the origination of a call on the roaming network.

31 In some cases, the mobile networks may agree that the call that originates on the roaming network from the handset of a roaming customer will be terminated by the roaming network, rather than handed over at the point of interconnection to the home network. If this occurs, the roaming network will be responsible for the carriage and termination (including on third parties) of the full end-to-end call. If this arrangement is negotiated, the roaming network would resell the call to the home network and apply a full end-to-end call charge. However, even though the roaming network may resell an

originating call for the outbound call cases, it would still provide an interconnection service in relation to call termination for the inbound call cases.

F ROAMING IN INBOUND CALL CASES (3G Circuit Switched Voice Call)

32 In this section, I briefly explain in layperson terms how mobile roaming works in an inbound scenario. By an inbound scenario I mean when a customer receives a call while roaming on a roaming network.

33 For a roaming mobile device to receive a call, the signalling works in the opposite direction to an outbound scenario.

34 The signal starts by a person calling the relevant mobile number associated with the roaming mobile device from a communications network (**Originating Network**). The home network receives the signal from the Originating Network and the home network checks where the mobile device is located.

35 Because the mobile device is roaming and hence registered with the roaming network, the home network then signals the roaming network that it needs to route a voice call to the mobile device.

36 The roaming network then signals the mobile device that is roaming on its network and attempts to connect the call.

37 In other words, the home network is responsible for signalling and routing the mobile traffic between the caller and the point of interconnect between the home network and the roaming network. The roaming network is responsible for signalling and routing the mobile traffic between the mobile device and the point of interconnect between the home network and the roaming network.

38 In such cases, the roaming network provides an "terminating" service to the home network. The "terminating" service involves the receipt of the call by the roaming at the point of interconnection between the roaming network and the home network, then the carriage of the call over the roaming network to terminate on the handset of the roaming customer. Such a service is analogous to the mobile terminating access service provided in a standard mobile interconnection arrangement. A commercial charge for "mobile roaming voice terminating access" would typically apply that is payable from the home network to the roaming network and that covers the termination of a call on the roaming network.

39 In the inbound scenario, there is not a comparable situation where the roaming network retains the entirety of the voice call. The reason is the Originating Network will always first signal the home network as the mobile number belongs to the home network, so the call is always routed to the roaming network from the Originating Network via the home network.

G ROAMING IN DATA SESSIONS (3G Data and 4G Data using S8HR)

40 In this section, I briefly explain in layperson terms how mobile roaming works in a data session. By data session I mean, for example, when a customer initiates a data session to connect to the Internet.

41 Similar to how roaming works in an outbound call case scenario, while roaming on a roaming network, a mobile device will signal the roaming network when it wants to commence a data session. The roaming network will then signal the home network so that the home network could route the traffic, for example, to the Internet.

42 In such cases, the roaming network provides a form of "originating/terminating" service to the home network, noting that data flows are bidirectional.

43 Data traffic is carried between the mobile handset of a roaming customer on the roaming network and the point of interconnection between the roaming network and the home network. In such circumstances, the home network would be responsible, for example, for connectivity from the point of interconnection to the global Internet. A commercial charge for "mobile roaming data connectivity" would typically apply that is payable from the home network to the roaming network and that covers the bidirectional flow of data on the roaming network.

G CONCLUSION

44 For all the reasons I have outlined above, domestic mobile roaming services requires interconnection between the home network and the roaming network.

Date: 16/6/2017

Easwaren Siva
General Manager – Technology Strategy & Governance, Vodafone Hutchison Australia

Annexure A

Examples where S8HR roaming architecture has been deployed.

Fast "Time-to-Market" Using S8HR

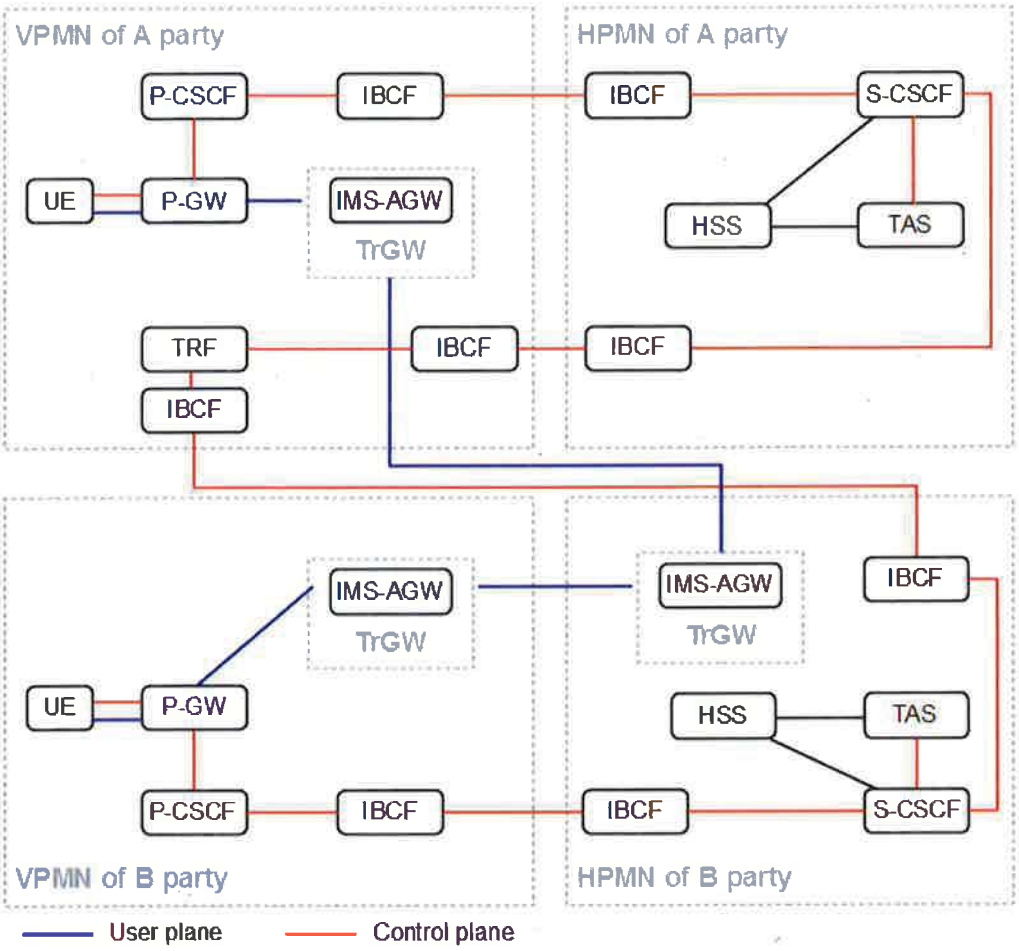
10 operators have launched commercial VoLTE roaming service, with 2 bilateral and 6 unilateral connections.

All are based on S8 Home Routed architecture

Bilateral	[c-i-c]
Unilateral	[c-i-c]

Annexure B

Local Breakout VPMN Routing (LBO-VR) architecture

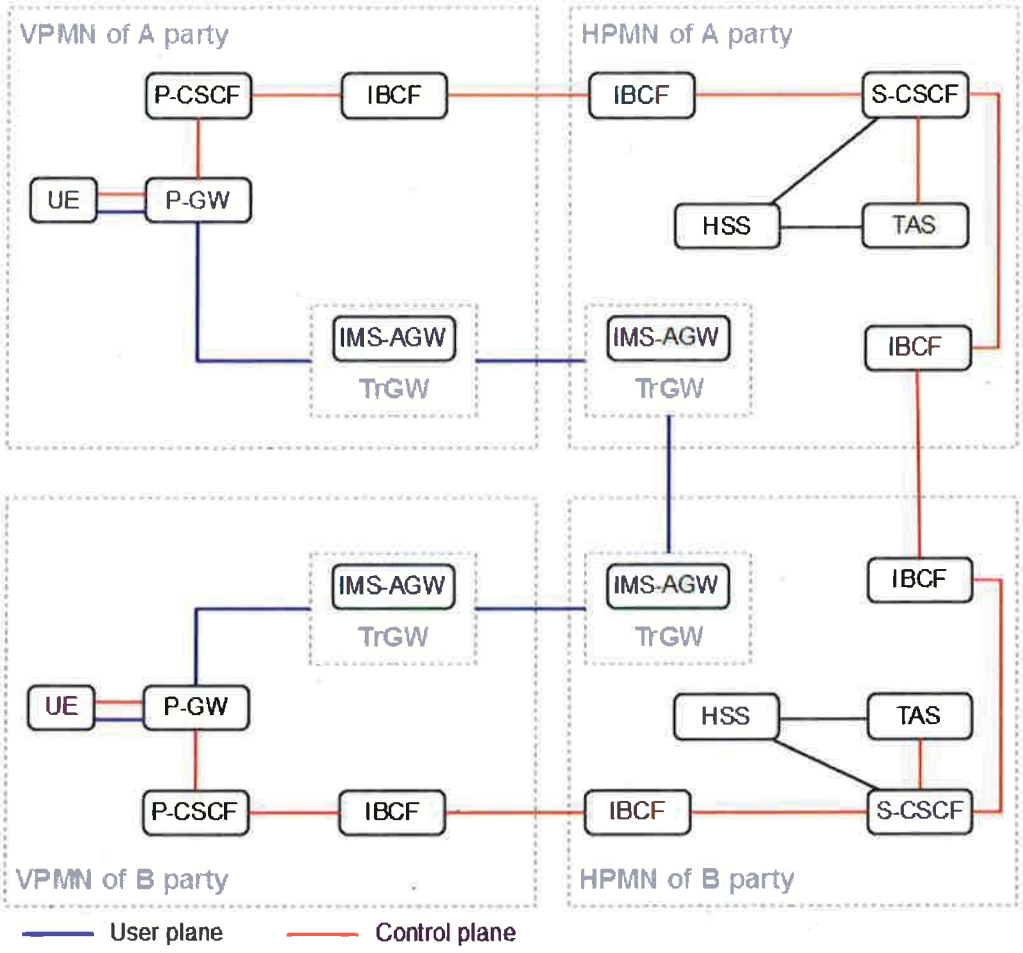


Abbreviations

Term	Description
CSCF	Call / Session Control Function
IBCF	Interconnection Border Control Function
IMS	IP Multimedia Subsystem
IMS-AGW	IMS Access Gateway
HSS	Home Subscriber Server
P-CSCF	Proxy CSCF
P-GW	Packet Gateway
S-CSCF	Serving CSCF
TAS	Telephony Application Server
TrGW	Transition Gateway
TRF	Transit and Roaming Function
UE	User Equipment

Annexure C

Local Breakout HPMN Routing (LBO-HR) architecture



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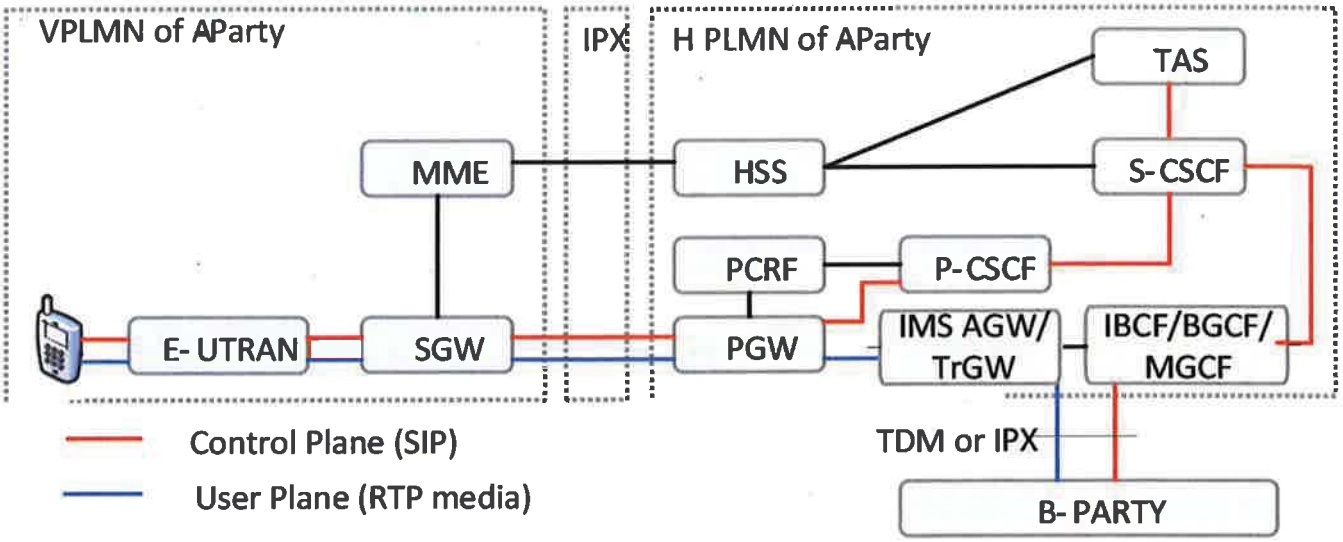
TAS	Telephony Application Server
TrGW	Transition Gateway
TRF	Transit and Roaming Function
UE	User Equipment

Annexure D

S8HR IMS Roaming architecture



Abbreviations

Term	Description
BGCF	Breakout Gateway Control Function
CSCF	Call / Session Control Function
E-UTRAN	Evolved UTRAN (also known as "LTE")
HSS	Home Subscriber Server
IBCF	Interconnection Border Control Function
IMS	IP Multimedia Subsystem
IMS-AGW	IMS Access Gateway
IPX	IP eXchange
MGCF	Media Gateway Control Function
S-CSCF	Serving CSCF
P-CSCF	Proxy CSCF
PCRF	Policy and Charging Rules Function
SGW	Signaling Gateway
MME	Mobile Management Entity
TAS	Telephony Application Server
TDM	Time Division Multiplexing
UE	User Equipment