

STATEMENT OF [c-i-c commences] [c-i-c] [c-i-c ends]

On 5 September 2013 I, [c-i-c commences] [c-i-c] [c-i-c ends] of 255 Elizabeth Street, Sydney in the State of New South Wales, Manager, state as follows:

Confidentiality

- 1 Certain information in this statement is confidential to Telstra Corporation Limited (“**Telstra**”). I have prepared this statement on the basis that the information in it which is identified as confidential will be treated as confidential.

Position and experience

- 2 [c-i-c commences] [c-i-c]

- 3 [c-i-c]

- 4 [c-i-c]

- 5 [c-i-c]

- 6 [c-i-c]

- 7 [c-i-c]

- 8 [c-i-c]

- 9 [c-i-c] [c-i-c ends]

- 10 By reason of my experience described above, I have knowledge of the technologies involved in providing voice and broadband services to customers using both the PSTN and alternative access networks using internet protocol (“**IP**”) technology.

Introduction

- 11 The PSTN Originating Access (“**PSTN OA**”) and PSTN Terminating Access (“**PSTN TA**”) services provide a range of services to acquirers. These include:

- (a) Access services to end users connected to the PSTN for the purposes of providing long distance and fixed to mobile calls via the access seeker’s own network infrastructure (using PSTN pre-select and override OA as an input).
- (b) **Fixed Interconnection** services to end users connected to the PSTN in order to provide *any to any connectivity* via the provision of:

- (i) **PSTN terminating access interconnection** – which is provided by an access provider to enable end users receiving a service from another network operator to connect with end users directly connected to the access provider’s network; and
- (ii) **Special access services interconnection** – which enables retail business customers who acquire 13/1300 and 1800 calling services from a retail service provider (“**RSP**”) to reach end users who are directly connected to carriers other than their Special Services RSP (by means of the RSP acquiring Special Services OA from the carriers of each end user who makes 13/1300 and 1800 calls).

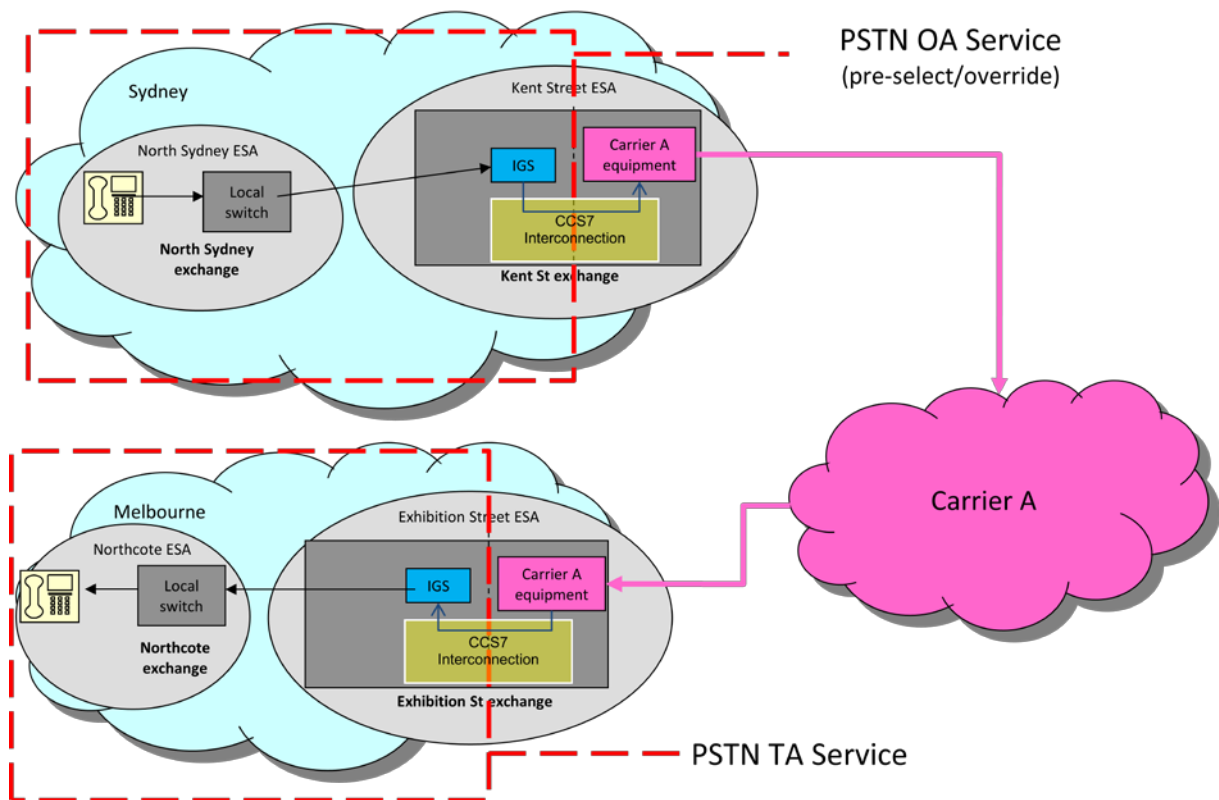
12 Figure 1 below shows a typical call scenario involving PSTN OA and PSTN TA. In this example:

- (a) a calling party (known as the “**A-party**”) located in the North Sydney Exchange Service Area (“**ESA**”) in Sydney places a call to a receiving party (known as the “**B-party**”) located in the Northcote ESA in Melbourne;
- (b) the A-party is a retail customer of Carrier A. Carrier A acquires Wholesale Line Rental (“**WLR**”), Local Carriage Service (“**LCS**”) and PSTN OA (pre-select and override) services from Telstra in order to supply a complete voice calling bundle; and
- (c) the B-party is a Telstra retail end user.

13 As the call is placed, the PSTN identifies that it is a pre-selected long distance call. The call is transmitted to the closest Interconnect Gateway Switch (“**IGS**”) which is in the Kent St exchange. At this point the call is handed over (using PSTN OA) to Carrier A. Carrier A then utilises its own infrastructure to carry the call to Melbourne.

14 As the call needs to terminate on the PSTN in Northcote, Carrier A will carry the call to the nearest IGS to the B party, in this case at the Exhibition St exchange. Here the call is handed over (using PSTN TA) to Telstra, and Telstra will terminate the call at the B party’s premises.

Figure 1 – PSTN OA and TA example

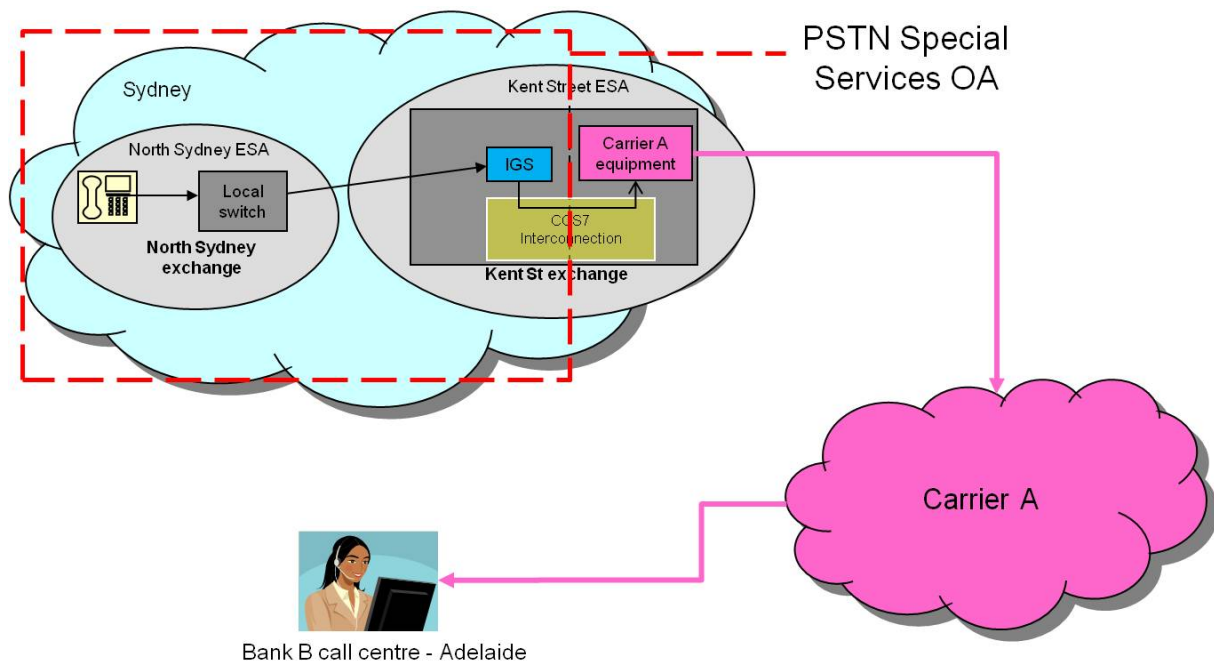


15 Figure 2 below outlines an example of PSTN Special Services OA. In this case the A-party in North Sydney places a call to Bank B's 1800 customer service number, which is connected to a call centre in Adelaide.

(a) Bank B obtains its 1800 service from Carrier A.

16 The PSTN Special Services OA service is used where an A-Party directly connected to Telstra's PSTN network makes a call using a 13/1300/1800 number to a B-Party (Bank B) who is directly connected to Carrier A's network. Unlike a pre-select OA call where the Carrier Access Code is based on the carrier nominated by the A-Party for pre-selection, the Carrier Access Code (for Carrier A) is determined by the carrier that the B party has contracted with to support the 1800 service – in this case Bank B has contracted with Carrier A.

Figure 2 – PSTN Special Service OA example



PSTN OA and TA customers

- 17 PSTN OA and PSTN TA services are currently acquired by [c-i-c commences] [c-i-c] [c-i-c ends] carriers that interconnect to Telstra's PSTN.
- 18 The carriers who currently acquire PSTN OA and PSTN TA services from Telstra are listed in **Figure 3**, below. This includes multiple entries [c-i-c commences] [c-i-c] [c-i-c ends]. I have also set out in **Figure 3** further information about the types of core network technology and whether those carriers host other voice providers from publicly available information.

Figure 3 - PSTN OA and TA customers

[c-i-c commences]
[c-i-c]

[c-i-c ends]

- 19 These carriers interconnect with Telstra's PSTN via TDM only irrespective of the technology used in their core network.
- 20 As is identified in Figure 3 above, a number of these carriers also host other providers who supply services using OTT VoIP. This allows the OTT VoIP provider to virtually interconnect with Telstra's PSTN and other carriers' network infrastructure.

- 21 The majority (approximately [c-i-c commences] [c-i-c] [c-i-c ends]) of PSTN OA traffic is used for the provision of 13/1300 and 1800 OA calls with around [c-i-c commences] [c-i-c] [c-i-c ends] used for pre-selection and override OA services. The current breakdown of PSTN OA volumes by service type is illustrated in Figure 4 below:

Figure 4 - PSTN OA split

[c-i-c commences]
[c-i-c]

[c-i-c ends]

- 22 Telstra's PSTN OA volumes have declined over the past 4 years due to fixed to mobile substitution, the availability of ULLS based services and the growth in OTT VoIP providers. This is shown in Figure 5, below:

Figure 5 - OA minutes

[c-i-c commences]
[c-i-c]

[c-i-c ends]

- 23 PSTN TA minutes have also declined by [c-i-c commences] [c-i-c] [c-i-c ends] over the same period. This is primarily driven by the declining volume of fixed line services in operation. As the total number of services in operation reduces, it follows that fewer minutes are terminated. This is shown in Figure 6, below:

Figure 6 - TA minutes

[c-i-c commences]
[c-i-c]

[c-i-c ends]

- 24 Almost all PSTN pre-select OA traffic is acquired as part of a fixed line voice bundle (i.e. acquired by the same carrier that provides basic access to the end user via WLR with stand-alone pre-select significantly declining. Less than [c-i-c commences] [c-i-c] [c-i-c ends] of Telstra retail end users, and [c-i-c commences] [c-i-c] [c-i-c ends] of

WLR-based end users pre-select a different carrier (than their basic access provider) for long distance services.

Interconnection

- 25 Interconnection is a term used to describe the handover of specified call traffic between network operators in accordance with industry standardised arrangements. Current interconnection arrangements involve:
- (a) **Network technology** used for the carriage and handover of traffic between different networks using TDM;
 - (b) **Technical standards** that govern how signalling between carriers' networks operates; and
 - (c) Specified **interworking arrangements and processes** that govern technical, billing, number portability and other relationships between carriers.
- 26 Further details of these arrangements are set out below.

Network Technologies

- 27 Interconnection capacity is provided by 2.048 Mbit/s switchports which operate in accordance with International Telecommunications Union ("ITU") recommendations G.703, G.704 and G.732. In order to interconnect, access seekers "build" capacity to the nominated handover locations and are responsible for the provisioning, installation, testing, making operational and monitoring of all network infrastructure on their side of the Point Of Interconnection ("POI").
- 28 In Australia, Telstra has defined 65 interconnection calling areas, (known as "Call Collection Areas" or "**CCA**"s) grouped around each of the five mainland capital cities (Sydney, Melbourne, Brisbane, Perth and Adelaide, referred to as "**CCA regions**") Telstra historically had 66 CCA's, however the interconnect functionality of the Warrnambool POI (located in the Warrnambool exchange) has been moved to the Melbourne Call Collection Area (CCA) as a result of the Warrnambool exchange fire in November 2012.
- 29 Alternative infrastructure-based network operators can interconnect with Telstra in each of these CCA's in order to deliver PSTN voice services.

- 30 Any network operator using its own fixed infrastructure rather than Telstra's PSTN to provide any to any connectivity between its own directly connected customers and Telstra's directly connected customers would at a minimum need to interconnect with Telstra's PSTN in at least one point of interconnection in each of the five mainland capital cities.
- 31 As outlined in Figure 3 above, Telstra's PSTN currently interconnects with [c-i-c commences] [c-i-c] [c-i-c ends] network operators. [c-i-c commences] [c-i-c] [c-i-c ends] of these network operators interconnect with Telstra in all 65 CCAs.

Technical Standards

- 32 Interconnect signalling prescribes how carriers signal between networks. Interconnection with Telstra's PSTN uses a modified form of the ITU's Common Channel Signalling 7 standard ("CCS7") which is defined by the Australian Communications Industry Forum specification ACIF G500.

Interworking arrangements

- 33 The most critical and complex aspect of interconnection (and what separates it, for example, from best efforts, internet-based peering arrangements) is the detailed interworking arrangements necessary to make interoperability possible. These interworking arrangements have evolved over time through substantial carrier co-operation and have proven resilient to the changing ways in which voice is treated inside different carriers' core networks (including IP and TDM).
- 34 Current interconnect interworking arrangements are governed by a set of standards which cover technical, billing, number portability and other elements critical for the successful passage of voice calls between interconnected carriers. The current arrangements:
- (a) provide consistent operation across all carriers for an agreed list of services; and
 - (b) allow PSTN and mobile call services to inter-work between **all** domestic carriers.
- 35 Key elements which are set out in interconnect interworking arrangements include:
- (a) **Handover locations**— For PSTN services, Telstra has handover locations for interworking arrangements at approximately 90 Points of Interconnect (POIs) across the 65 CCAs. As is described in more detail below, handover can occur at

either a “near end” or “far end” POI. For PSTN OA and PSTN TA services, the handover point is always located in the CCA in which the relevant end-customer is located;

- (i) Most PSTN OA services are handed over at the “near end” - in other words Telstra makes the call available to the OA acquirer at the closest possible point to the customer making the call (the A-party). Services that originate on the PSTN that are near end handover include pre-select/override PSTN OA services and PSTN Special Services OA (13/1300 and 1800 call origination).
 - (ii) Most call PSTN TA services are handed over at the “far end” handover – in other words Telstra receives call at the closest possible point to the customer receiving the call.
 - (iii) Carriers exchange mobile calls in 5 capital city locations only. Other services such as operator services are generally handed over in capital cities.
- (b) **Interconnect Implementation Plan** – The industry-standard Interconnect Implementation Plan is published by the Australian Communications Industry Forum (“**ACIF G549**”). ACIF G549 provides a mechanism to identify a range of call types carried between interconnecting networks, including:
- (i) A “Dial Plan” provides added information to allow interworking of various services and functions by applying additional digits in front of the dialled number. Services and functions include:
 - A. Pre-selection;
 - B. Networking and Operational processes for local number portability, mobile number portability and inbound number portability;
 - C. Carrier Specific Services;
 - D. Other information such as Mobile Location Indication (MOLI);
and
 - E. Support for E000

- (c) **Billing inter-working arrangements** – These arrangements facilitate the proper operation of inter-carrier billing systems. Telstra has entered into such arrangements with each of the other carriers which interconnect with the PSTN.

Use of alternative infrastructure to provide voice services

- 36 Any network operator wishing to carry and deliver PSTN voice services using existing circuit switched technology and signalling must build (or acquire access to) switching equipment, transmission infrastructure and the capacity to interconnect with other carriers' networks.
- 37 As an alternative, carriers can also use voice over internet protocol ("**VoIP**") which is capable of delivering PSTN equivalent voice services. There are a number of carriers **[c-i-c commences][c-i-c] [c-i-c ends]** which exclusively use VoIP technology in their own core networks to supply voice services.
- 38 This requires the service provider to either:
- (a) set up interconnection arrangements (including media gateways) in order to convert IP based voice information packets to circuit switched format (TDM) for the purpose of interconnecting with other carriers' networks (including Telstra's PSTN network); or
 - (b) enter into an arrangement with another carrier and use that carrier's network and third party interconnection arrangements in order to deliver PSTN equivalent voice services to customers.
- 39 There are a number of carriers which offer the service set out at paragraph (b), above. By way of example, an Optus brochure describing the wholesale VoIP services offered by Optus is annexed and marked Attachment "A". Similar services are offered by other carriers.
- 40 Regardless of whether a particular access provider network uses IP, TDM or a combination of technologies, the current interconnection arrangements which apply between carriers remain reliable, robust and effective.

PSTN OA operation over NBN

- 41 Pre-select and override functionality is built into the local access switch in Telstra's PSTN network and call routing is then facilitated based on the end users selection of long distance provider. This capability is important for a number of reasons. Firstly, it allows Telstra's billing systems to differentiate between local calls (and other non-pre-

selectable calls) on the one hand and long distance calls on the other. Secondly, this functionality facilitates the hand over, routing and billing of pre-select and override calls via PSTN OA when an end user makes a pre-selection choice to receive long distance services from a carrier other than their basic access carrier or, in the case of override, an end user selects a carrier other than their pre-selected carrier on a case by case basis.

- 42 IMS-based voice services (including UNI-D and UNI-V services provided over NBN¹) do not support pre-selection (or override) functionality. The cost of building this type of functionality into an IMS-based platform is substantial.
- 43 For 13/1300/1800 calls over the PSTN, the contracting parties are the carrier providing the special service (13/1300/1800 provider) and the B-party end customer (the entity receiving the 13/1300/1800 calls). The B-party end customer selects their carrier to provide the 13/1300/1800 services, and via an intelligent network platform (which is separate to the switching platform), inbound number portability coordinates call routing from the A-party to the 13/1300/1800 provider. The A-party takes no part in the choice of 13/1300/1800 provider and is charged either a local call equivalent call for a 13/1300 call, or zero charge for a 1800 call, regardless of where the B-party is located.
- 44 This will continue to be the case under the NBN as interconnection and routing via PSTN (Special Service Access) OA can be facilitated using existing platforms. Using Special Service Access OA the B-party can continue to exercise their choice of special service provider for 13/1800 calls regardless of which access technology (copper or NBN) is used.

¹ These services are described more fully in the statement of [c-i-c begins] [c-i-c] [c-i-c ends] at paragraphs 56-66.



Optus Wholesale VoIP Services

ABOUT OPTUS WHOLESALE VOIP SERVICES

Voice over Internet Protocol (VoIP) is having an increasing impact on the telecommunications sector as businesses and consumers realise the communication improvements the technology brings to their IT environments.

This growing awareness represents a huge opportunity for Carriers and Carriage Service Providers, but the challenge is the ability to offer an attractive array of flexible, secure and durable VoIP solutions at the right price.

Optus can help. We've made substantial investments in our Voice and IP network products and services in recent years – meaning our wholesale customers have an exceptional choice of VoIP services to assist you meet your wholesale voice requirements.

Optus' Wholesale VoIP solutions are designed to help you address Australian businesses demands for future network readiness as well as immediate performance enhancements. What's more, our wholesale customers continue to receive around-the-clock dedicated customer support.

Optus Wholesale has a range of VoIP interconnect products designed to meet the needs of Carriers and Carriage Service Providers (C/CSPs). The products available are:

- Optus Wholesale VoIP Carrier Interconnect
- Optus Wholesale VoIP Call Termination
- Optus Wholesale VoIP International Call Termination

The Optus Wholesale VoIP products are provided to C/CSPs over the secure Optus MPLS core based managed IP Next Generation Network. The Optus Wholesale VoIP C/CSP based products are available Australia wide.

Optus Wholesale VoIP products are designed to deliver a solution that enables you to originate and terminate VoIP traffic as well as complement Optus Wholesales existing circuit switched C/CSP services.



OPTUS WHOLESALE VOIP CARRIER INTERCONNECT

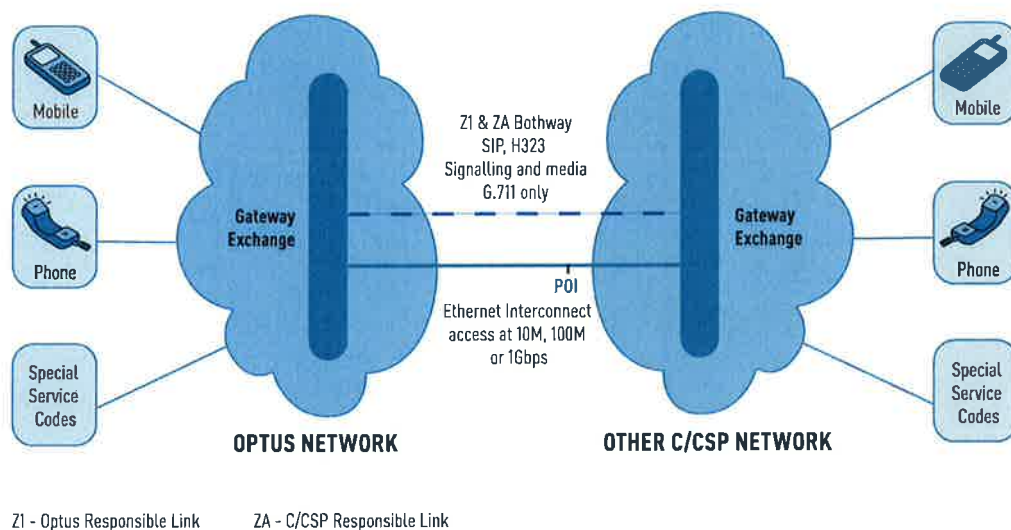
Optus Wholesale VoIP Carrier Interconnect service provides voice interconnection of declared and non declared services between your network and the Optus fixed and mobile network.

Interconnection between the C/CSP network and the Optus network takes place at points of interconnection (POIs).

Each POI may consist of an Optus Z1 bothway trunk for origination and termination of Optus responsible traffic and/or ZA bothway trunks for origination and termination of your responsible voice traffic. The VoIP POI is a single ethernet port on an Optus supplied customer edge (CE) router. This port is for shared use and as well as the POI for Carrier Interconnect the port may also be a service delivery point for non Carrier interconnect voice services such as the Optus Call Termination service. Each Z1 or ZA trunk is delivered in 4bit/s increments that support a maximum of 36 simultaneous bothway voice calls.

The Optus Wholesale VoIP Carrier Interconnect servicesupports both SIPv2 and H.323v4 VoIP signaling protocols and G.711a Codec for Voice carriage between the networks.

The following diagram shows the VoIP CI service.



Call Types

The following Call Types are supported by the OW VoIP CI service:

Declared Services	Non Declared Services
Domestic PSTN Terminating Access	Data Network Access Service
Mobile Terminating Access	Special Services
Domestic PSTN Originating Access	Video Telephony



Features and Benefits

Features and Benefits of the Optus Wholesale VoIP Carrier Interconnect service:

- Voice and Data convergence over a single ethernet access
- Offers carrier grade voice quality interconnection (G.711)
- Offers multiple Optus wholesale voice services over a single customer interface reducing interconnect gateway hardware costs
- Offers multiple VoIP protocols (SIP and H323) to meet your equipment requirement
- No transcoding required from VoIP networks reducing your equipment costs and improving quality

Interconnection with Optus requires the C/CSP to meet responsibilities as set down by the Telecommunication Act 1997.

More details regarding the Optus Wholesale VoIP Carrier Interconnect service to assist with planning your VoIP interconnection with Optus can be found in the VoIP technical specification brochure.

OPTUS WHOLESALE VOIP CALL TERMINATION

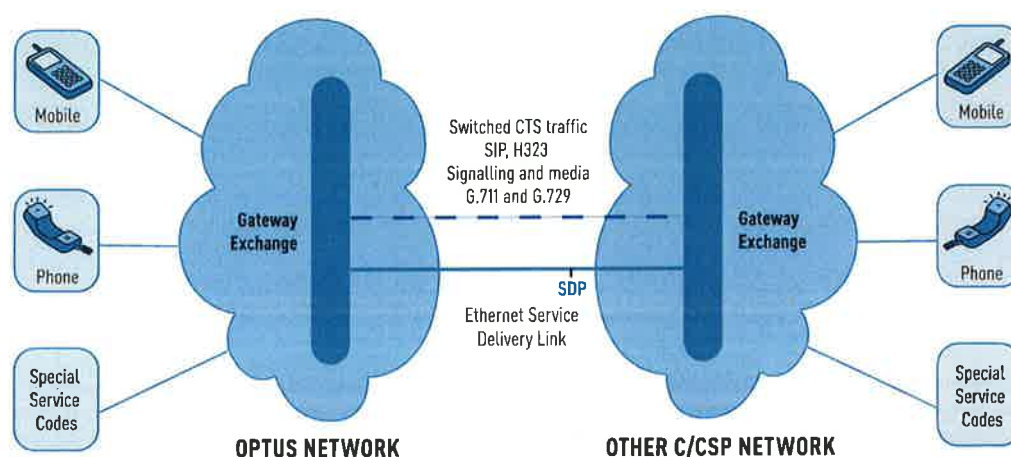
The Optus Wholesale VoIP Call Termination Service (CTS) is a Next Generation Network service enabling C/CSPs to terminate voice traffic to Fixed and Mobile networks of Optus and other C/CSP networks with Optus interconnection arrangements.

The OW VoIP CTS service comprises 2 parts:

1. The physical ethernet access between the C/CSP gateway and the Optus gateway known as the Service Delivery Link, and
2. The virtual connection from the Service Delivery Point at the C/CSP location to the Optus network for the carriage and termination of voice traffic – the Optus Switched Long Distance Service. Refer to the Optus Switched Long Distance Service brochure for details on this service.

The Optus Wholesale VoIP CTS service offers C/CSPs a choice of SIPv2 and H323v4 VoIP signalling protocols and G.711 and G.729 Codecs for transportation of Voice. The Ethernet Service Delivery Link is available as 10M, 100M & 1G.

The following diagram shows the OW VoIP CTS service:



OPTUS WHOLESALE VoIP SERVICES

- National Coverage
- Carrier grade voice quality interconnection
- No transcoding required from VoIP networks resulting in improved quality and reduced equipment costs
- Voice and data convergence over a single Ethernet access
- Multiple VoIP protocols

OPTUS WHOLESALE VOICE SOLUTIONS



Call Types

Calls to the following destinations of Optus and other C/CSPs networks are supported by CTS:

Optus Destination	Destination of other C/CSPs
PSTN - Local	PSTN - Local
PSTN - National	PSTN - National
Mobile	Mobile
Special Service Codes - 18,13 & 1300	Special Service Codes - 18,13 & 1300
International	International
Mobile Satellite - 0145	Emergency Services - 000,112 & 106 #1
Operator - 12	Emergency Services - 1144x (SA & VIC) #1
Fault Reporting - 125125	DNAS - 0198
DNAS - 0198	#1 - Must support MoLI & FoLI (ACIF G557:2006)

Features and Benefits

- A solution assisting C/CSPs to meet many regulatory requirements such as LNP, MNP & FP&LR porting
- Reduces your interconnection requirements by combining with CI
- No need for transcoding from VoIP to circuit switched technologies
- Flexible VoIP protocol options - SIP and H323
- G.711 and G.729 voice Codec options meet VoIP requirements
- Single Voice interface for multiple interconnect services (CTS and CI)
- Data can be delivered using the same ethernet access via a separate port
- Very scalable making capacity planning and management simple
- QoS managed by the C/CSP by ensuring the voice traffic does not exceed available bandwidth i.e. 90 x G.726 or 36 x G.711 speech channels per 4M of bandwidth.

To assist you with planning your VoIP interconnection with Optus more details regarding the Optus Wholesale VoIP Call Termination Service can be found in the VoIP technical Specification brochure.

Further Information

Optus Wholesale VoIP services are part of a range of integrated communications solutions that we provide. To discuss your wholesale needs, please contact your Optus Wholesale Account Manager or visit our website at www.optus.com.au/wholesale.