



# Adaptive Collaboration: Telstra Cloud Calling Integration Guide

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# 1. Document Purpose

This document is designed to assist you with your Adaptive Collaboration: Telstra Cloud Calling integration and deployment activities.

**Note:** This document does not constitute the Telstra Cloud Calling solution design but serves as a generic reference guide for adopting Telstra Cloud Calling and applications within your environment.

## 2. Intended Audience

There are two specific targets for this document. The primary audience is those who will need to read, acknowledge acceptance and compliance for the sections noted in this document.

- Customer Network Administrators
- Customer Authorised Representative
- Customer ICT Managers
- Customer Project Managers
- Telstra Project Managers

The Secondary audience is those who will assist you, representative, throughout this process.

- Solution Consultants/Communication Consultant
- UC Sales Specialists/Architects

## 3. Product Description

Adaptive Collaboration: Telstra Cloud Calling is a hosted telephony and UC application that requires access to users and devices on your network to work.

Handsets and other Unified Communications equipment require connectivity to your network or the internet using suitable internet access. Your Telstra NEXT IP MPLS or Internet access should already be in place before you attempt to set up your equipment.

Your network needs to be configured to be able to support Telstra Cloud Calling. Your network may be provided by Telstra or a third-party Internet provider. This guide provides high-level configuration requirements for networks to support Telstra Cloud Calling.

Given that there are many possible network service and equipment providers, this guide does not provide lower-level network equipment configuration details.

The Telstra Cloud Calling solution aims to deliver a full set of unified communication and collaboration services, including:

- Voice
- Video
- Voicemail (VM)
- Presence & Instant Messaging & Rich Desktop Clients (Webex)
- Compatible Mobility Services (Webex App on Mobile and Tablet)

## 4. Product Variance

### Adaptive Collaboration: Telstra Cloud Calling over Telstra NEXT IP MPLS & Adaptive Collaboration: Telstra Cloud Calling over Internet

Your equipment will need to be configured to support your ordered solution, either for Telstra NEXT IP MPLS or Adaptive Collaboration over the Internet. There are some differences in the way your network needs to be configured depending on whether you have a Telstra NEXT IP MPLS or an internet service.

## 5. Architectural & Infrastructure Overview

The following section will describe the high-level technology, common infrastructure, and architectural touchpoints for Telstra Cloud Calling – it is not designed to provide a complete detailed view of the Telstra Cloud Calling components.

At a high level, the End-to-End Network “Ecosystem” is comprised of 4 key areas, listed in order of their logical flow:

- Customer Premises (including Onsite switches, routers, voice gateway, handsets, soft clients, and analogue devices)
- Network Access
- Hosted Infrastructure – Application Servers, Provisioning servers, Firewalls etc.
- Call Routing/Flow - SBC and Broadworks soft switch, IMS etc

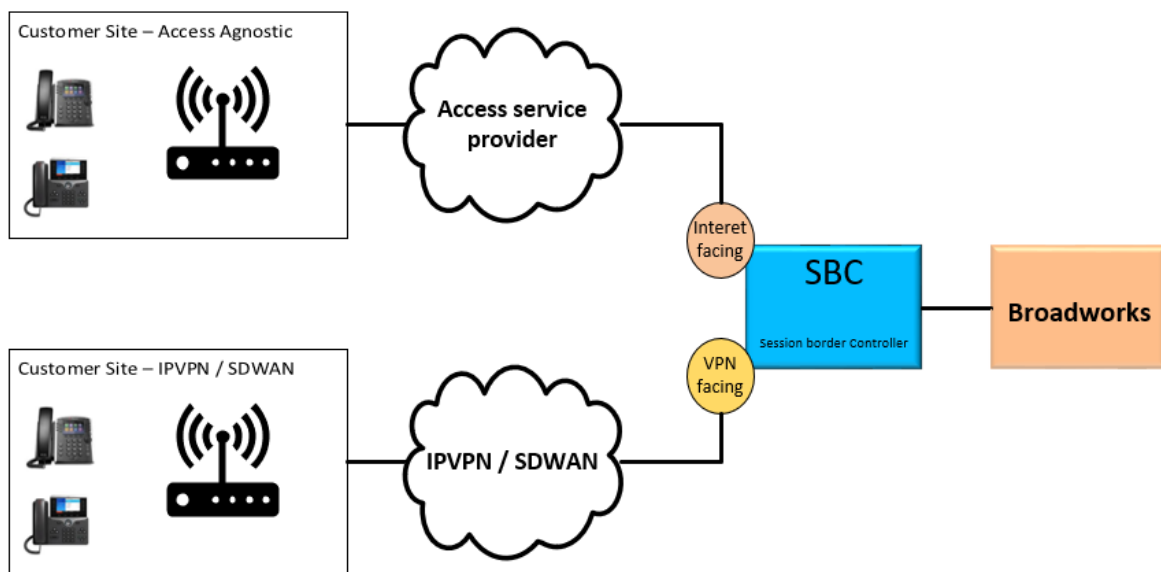


Figure 1: High-Level Network Architecture



## 6. IP Routing

**Adaptive Collaboration: Telstra Cloud Calling over NEXT IP MPLS** and **Adaptive Collaboration: Telstra Cloud Calling over the Internet** is enabled by various applications and network structures.

For your Telstra Cloud Calling service to work, your devices (including softphones) need to be able to access those structures. Your network must be modified to be able to send information to, and receive information from, these subnets.

You must be able to route to these networks to reach the Telstra Cloud Calling platform. IP routing can be configured via static or dynamic routing protocols at your edge device (BGP is preferred).

A **traceroute** to these hosts should be performed before deployment. The traceroute will only show the first few hops as **ICMP** is blocked inside the Telstra core.

The following table shows the subnet accesses that are required for Telstra Cloud Calling.

Interconnects	Configuration	Description
<b>Telstra Cloud Calling over Telstra IP MPLS and Internet customers</b>		
<b>Data interconnects (Mandatory)</b>	203.52.0.0/23	DNS (for Telstra IP MPLS only)
	129.250.35.251	Network Time Protocol (NTP)
	139.99.194.24	Network Time Protocol (NTP)
	144.140.208.16/28	Device Management (DMS)
	144.140.208.32/28	Device Management (DMS)
	144.140.162.40/28	Device Management (DMS)
	144.140.162.48/29	Device Management (DMS)
	144.140.218.96/28	NSW – XSP Servers
	144.140.224.32/28	VIC – XSP Servers
<b>Telstra Cloud Calling Over Telstra NEXT IP MPLS Customers</b>		
<b>Media interconnects (As required)</b>	203.52.0.160/28	VIC – SBC 1
	203.44.42.96/28	VIC – SBC 2
	203.52.1.160/28	NSW – SBC 1
	203.44.42.112/28	NSW – SBC 2
	203.52.3.160/28	QLD – SBC 1
	203.44.42.144/28	QLD – SBC 2
	203.44.43.160/28	SA – SBC 1
	203.44.42.160/28	SA – SBC 2
	203.52.2.160/28	WA – SBC 1
	203.44.42.128/28	WA – SBC 2
<b>Telstra Cloud Calling Over Internet Customers</b>		
	192.148.131.64/28	VIC - SBC1



<b>Media interconnects – Telstra Internet Access</b> <b>(As required)</b>	192.148.130.0/27 203.41.24.0/27	
	192.148.131.80/28 192.148.130.32/27 203.41.24.32/27	VIC - SBC2
	192.148.131.96/28 192.148.130.64/27 203.41.24.64/27	NSW - SBC1
	192.148.131.112/28 192.148.130.96/27 203.41.24.96/27	NSW - SBC2
	192.148.131.128/28 192.148.130.128/27 203.41.24.128/27	QLD - SBC1
	192.148.131.144/28 192.148.130.160/27 203.41.24.160/27	QLD - SBC2
	192.148.131.160/28 192.148.130.192/27 203.41.24.192/27	WA - SBC1
	192.148.131.192/28 192.148.131.0/27 203.41.29.0/27	WA - SBC2
	<b>Media interconnects – 3<sup>rd</sup> Party Internet Access</b> <b>(As required)</b>	192.148.164.20 /32
192.148.164.24/32		SA - SBC2
192.148.164.4/32		VIC - SBC1
192.148.164.8/32		VIC - SBC2

## 7. LAN Environment

### LAN & Internal Cabling

As a rule, your LAN environment (routers/desktops and endpoints) must have structured cabling of CAT5e or better. However (CAT 6) is recommended to support Telstra Cloud Calling for voice, data, and video transmission. All cabling, including network patching, is your responsibility and must be completed before deploying Telstra Cloud Calling.

### WAN Router

WAN router must be designed and configured with a suitable QoS policy to categorise and prioritise VoIP traffic to maintain Grade of Service. A LAN design must be undertaken so that the converged solution meets



Adaptive Collaboration: Telstra Cloud Calling requirements. Site documentation (e.g. network diagrams) should be updated to support the IP Telephony solution.

For Telstra Cloud Calling customers connecting over the internet, QoS is not mandatory. However, a separate prioritised voice VLAN should be implemented where possible.

## SD-WAN

If using SD-WAN, make sure the SD-WAN design routes natively into underlay, i.e. allows MPLS native access for Telstra Cloud Calling.

Using a mix of SD-WAN and MPLS, make sure the routing is in place from SD-WAN sites to the remaining MPLS sites. This needs to be confirmed with the Telstra Project delivery team.

## LAN Switch

IP Telephony enabled LAN switches supporting VLANs, IEEE8021.Q (VLAN Tagging), IEEE 802.3af (Power over Ethernet), Quality of Service (QoS) must be used. VLAN segmentation is required to allow prioritisation of voice traffic. VLAN ID 100 is recommended as the Voice VLAN to achieve configuration consistency across all sites.

The key benefits of having separate data and voice VLAN's are:

- Logical separation of the network
- Broadcast packets from the data network are not sent to the voice network
- Easier to implement Access Control Lists
- Provides a control point for management traffic

In a Cisco LAN switch environment, with CDP enabled, the VLAN assignment is automatic.

In a non-Cisco LAN switch environment, the voice VLAN ID will need to be manually configured unless the IP device supports LLDP.

**Note: All our Telstra devices support LLDP, so LLDP will need to be configured on the switch.**

## Power over Ethernet

Using PoE allows flexibility in the deployment of IP Telephony devices within your site. Importantly, the LAN design must also factor in PoE budgeting (especially in high-density environments), so the LAN can support the necessary PoE requirements of the site.

## Network Time Protocol

Defining an NTP source is critical for displaying the correct time and date on the devices, for certificate validation, obtaining device configurations, and delivering firmware updates.

The NTP source can be specified using DHCP Option 42 and sourced from the following location:

- <https://www.pool.ntp.org/zone/au>.

## DHCP Server

### Adaptive Collaboration: Telstra Cloud Calling over Telstra NEXT IP MPLS

All Telstra Cloud Calling customers are required to provide their own DHCP server to facilitate the assignment of IP addresses to the endpoints for connectivity to UC applications.

The DHCP server used for the Telstra Cloud Calling Voice VLANs (local or centralised) at each site must be configured to provide the following DHCP Options.



DHCP Option	Purpose	Field format	Value
Option 42 (optional)	Time server	IP Address	IP Address of NTP Server
Option 66 (optional)  Used to support Polycom Sound point Phones (capped at firmware version 3.1.3 rev C) and for Linksys IADs transitioning from TIPT, DOT etc.	TFTP Server Name	ASCII	dms.digitalbusiness.telstra.com
Option 160	Device Config servers	ASCII	http://polydms.digitalbusiness.telstra.com/dms/bootsrap

#### Adaptive Collaboration: Telstra Cloud Calling over Telstra Internet

DHCP option	Purpose	Field format	Value
Option 42 (optional)	Time server	IP Address	IP Address of NTP Server
Option 66/160 <b>Must be set to NULL for the device to lookup the provisioning server details from the vendors redirect server.</b>	TFTP Server Name	ASCII	<NULL>

#### Adaptive Collaboration: Telstra Cloud Calling over Public Internet

DHCP option	Purpose	Field format	Value
Option 6 (Optional)	DNS Servers	IP Address	IP Address of DNS Server
Option 42 (Optional)	Time Server	IP Address	IP Address of NTP Server
Option 66/160 <b>Must be set to NULL for the device to lookup the provisioning server details from the vendors redirect.</b>	TFTP Server Name	ASCII	<NULL>





## DNS Server – MPLS

**Note: DNS Conditional Forwarding – Adaptive Collaboration: Telstra Cloud Calling over Telstra NEXT IP MPLS only**

Adaptive Collaboration: Telstra Cloud Calling over NEXT IP MPLS sites, DNS server(s) must be configured for DNS conditional forwarding for “nipt.telstra.com” and “tipt.telstra.com” domains as per the table below.

Parameter	Configuration
Forwarder – DNS Domain Name	nipt.telstra.com tipt.telstra.com
Primary Domain Forwarder	203.52.0.221
Secondary Domain Forwarder	203.52.1.222

## DNS Server – TBB / TID (Telstra internet)

Parameter	Configuration
Primary Domain Forwarder	Google 8.8.8.8 or Cloudflare 1.1.1.1
Secondary Domain Forwarder	Google 8.8.4.4 or Cloudflare 1.0.0.1

## DNS Server – Other ISP (3<sup>RD</sup> Party Internet)

Parameter	Configuration
Primary Domain Forwarder	DNS info provided by your service provider or Google 8.8.8.8 or Cloudflare 1.1.1.1
Secondary Domain Forwarder	DNS info provided by your service provider or Google 8.8.4.4 or Cloudflare 1.0.0.1

## Web Proxy (Caching) Server

Your Web Proxy Server should be configured for http(s) cache bypass for “\*.telstra.com”.

If a cache bypass is not configured, Administrator’s may find that stale web pages are presented whilst trying to manage Telstra Cloud Calling via the Online Management Portal. This is especially critical when using an internal web proxy server to gain access to the Internet.

Alternatively, for a Windows PC, a User can press **<Ctrl F5>** to reload the page.



## Firewall and Ports

The use of customer firewalls (or NAT devices) to limit Voice Traffic - SIP (signalling) and dynamic RTP (Media) is not recommended and should be avoided. VoIP firewall traversal can impact performance (voice quality due to additional network delay) and service quality.

Service	Protocol	Port	Description	IP ranges	Comments	Inbound	Outbound
<b>Adaptive Collaboration: Telstra Cloud Calling over IP MPLS</b>							
SIP	UDP/TCP	5060	Signalling protocol used by IP Handsets and IADs.	203.52.0.160/28	Victoria – SBC 1	Yes	Yes
				203.44.42.96/28	Victoria – SBC 2		
				203.52.1.160/28	NSW – SBC 1		
				203.44.42.112/28	NSW – SBC 2		
				203.52.3.160/28	Queensland – SBC 1		
RTP	UDP	Dynamic (16384-32767) & (8600-8698)	Real-time Transport Protocol (Media) used to deliver audio and video between VoIP endpoints	203.44.42.144/28	Queensland – SBC 2		
				203.44.43.160/28	South Australia – SBC 1		
				203.44.42.160/28	South Australia – SBC 2		
				203.52.2.160/28	Western Australia – SBC 1		
				203.44.42.128/28	Western Australia – SBC 2		
<b>Adaptive Collaboration: Telstra Cloud Calling over the Internet</b>							
SIP	UDP/TCP	5060	Signalling protocol used by IP Handsets and IADs.	192.148.131.64/28 192.148.130.0/27 203.41.24.0/27	VIC - SBC1	Yes	Yes
				192.148.131.80/28 192.148.130.32/27 203.41.24.32/2	VIC - SBC2		
				RTP	UDP		
192.148.131.112/28 192.148.130.96/27 203.41.24.96/27	NSW - SBC2						
SIP	TLS	5061	Secure encrypted Signalling protocol used by IP Handsets			192.148.131.128/28 192.148.130.128/27 203.41.24.128/27	QLD - SBC1
				192.148.131.144/28 192.148.130.160/27 203.41.24.160/27	QLD - SBC2		
				RTP	UDP/TCP	192.148.131.160/28 192.148.130.192/27 203.41.24.192/27	WA - SBC1
92.148.131.192/28 192.148.131.0/27 203.41.29.0/27	WA - SBC2						
<b>Required for both Telstra Cloud Calling over NEXT IP MPLS and over 3<sup>rd</sup> Party Internet</b>							
				192.148.164.24 /32	SA - SBC2		
				192.148.164.4 /32	VIC- SBC1		



				192.148.164.8 /32	VIC- SBC2		
DNS	UDP	53	Used for Name Resolution DNS servers (For Telstra Cloud Calling over IP MPLS Only)	203.52.0.221 203.52.1.222	DNS SERVER	Yes	Yes
HTTPS	TCP	80, 443	Phone configuration files for the Device Management Solution	144.140.208.32/28	Device Management Platform	Yes	Yes
			HTTP and SSL for Adaptive Collaboration Portal administration, Call Centre and Mi Reception and Business Connect client	144.140.208.80/28	Exhibition St – Adaptive Collaboration Web Servers		
			Phone configuration files for the Device Management	144.140.162.48/28	Device Management platform		
			HTTP and SSL for Adaptive Collaboration Portal administration, Call Centre and Mi Reception	144.140.162.80/28 144.140.181.80/28	Web Servers Web Servers		
NTP	UDP	123	Handsets will obtain their NTP time source via a specified synchronised time source	Customer configured.	Time server	Yes	Yes
*Webex for Broadworks	UDP/ TCP  SRTP over UDP/TCP/TLS	5004, 9000, 443	Ports for Webex	3.22.157.0/26 18.181.204.0/25 69.26.160.0/19 3.25.56.0/25 18.230.160.0/25 114.29.192.0/19 3.101.70.0/25 20.50.235.0/24 150.253.128.0/17 3.101.71.0/24 20.53.87.0/24 170.72.0.0/16 3.101.77.128/28 20.68.154.0/24 170.133.128.0/18 3.235.73.128/25 23.89.0.0/16 173.39.224.0/19 3.235.80.0/23 40.119.234.0/24 173.243.0.0/20 3.235.122.0/24	Webex Collaboration servers	Yes	Yes



				44.234.52.192/26 207.182.160.0/19 3.235.123.0/25 52.232.210.0/24 209.197.192.0/19 18.132.77.0/25 62.109.192.0/18 210.4.192.0/20 18.141.157.0/25 64.68.96.0/19 216.151.128.0/19 18.181.18.0/25 66.114.160.0/20 18.181.178.128/25 66.163.32.0/19 18.141.157.0/25 64.68.96.0/19 216.151.128.0/19 18.181.18.0/25 66.114.160.0/20 18.181.178.128/25 66.163.32.0/19			
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\*Further IP/Port information for Webex for Broadworks can be found [here](#)

## SIP ALG

### What is SIP ALG?

SIP (Session Initiation Protocol) ALG (Application Layer Gateway) is an application within many routers. It inspects any VoIP traffic to prevent problems caused by firewalls and if necessary, modifies the VoIP packets. Routers will often have SIP ALG activated by default.

### What problems can SIP ALG cause?

- This can stop your Telstra Cloud Calling Voice devices from:
- Registering on the service.
- Making internal calls.
- Receiving incoming calls.
- Voice quality issues.

**Note: For Telstra Cloud Calling over 3<sup>rd</sup> party Internet, make sure to turn off SIP ALG on the 3<sup>rd</sup> party router.**

## Quality of Service

Quality of Service (QoS) is the ability to provide differential levels of treatment to specific classes of traffic. This traffic, being voice, video or data, must be identified and sorted into different classes to which differential treatment is applied.

Implementation of a network-wide QoS design for on-site switches and routers, is recommended so that voice receives prioritisation within the Local Area Network and that network congestion is avoided by implementing techniques such as “Modular QoS”.

Implementation of Telstra’s NEXT IP MPLS Dynamic CoS means that voice receives prioritisation within the Wide Area Network and that network congestion is avoided through the implementation of techniques such as “Egress Queuing”.



A Quality of Service Policy will address the key issues of:

- Classification and Marking
- Congestion Management
- Congestion Avoidance
- Traffic Policing and Shaping, and
- Link Efficiency.

To provide an enterprise grade of service for Telstra Cloud Calling, your network must support end-to-end QoS. The WAN edge router must be configured to categorise and prioritise SIP Connect traffic accordingly.

Differentiated Service (DSCP)	Class of Service (COS)	Value	Queuing Method
EF	5	RTP Audio	Bandwidth allocation Strict Priority Queuing (LLQ)
AF (31) Video Endpoints	3	RTP Video H.264	Bandwidth %
CS3	3	SIP (Signalling), RTCP	Bandwidth %
BE (0)	0	Other (that is: DNS, HTTP(s), FTP, TFTP)	

**Note:** For **Adaptive Collaboration: Telstra Cloud Calling over the Internet sites**, it's **Best Effort** as the traffic is coming through 3<sup>rd</sup> Party Internet.

#### Bandwidth:

Although there is no set bandwidth that is mandated you will still need to ensure there is enough WAN link bandwidth available for Telstra Cloud Calling traffic, as a guide you should nominally base your total voice bandwidth requirement around the 30% mark.

The voice bandwidth of the access product must be dimensioned using at least 100Kbit/s in each direction for each concurrent phone call provisioned on the service. See the table below for examples.

Voice Services		
Number of concurrent calls	Minimum Downstream Voice Bandwidth	Minimum Upstream Voice Bandwidth
2	200 Kbit/s	200 Kbit/s
4	400 Kbit/s	400 Kbit/s
6	600 Kbit/s	600 Kbit/s
8	800 Kbit/s	800 Kbit/s
10	1 Mbit/s	1 Mbit/s
30	3 Mbit/s	3 Mbit/s
50	5 Mbit/s	5 Mbit/s
60	6 Mbit/s	6 Mbit/s
100	10 Mbit/s	10 Mbit/s



150	15 Mbit/s	15 Mbit/s
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## CPE Guide

Please refer to the Adaptive Collaboration: Telstra Cloud Calling Device Guide found [here](#).

# 8. Supplementary Information

## Supported Codecs for Adaptive Collaboration: Telstra Cloud Calling

To simplify the choice for our customers, Adaptive Collaboration: Telstra Cloud Calling recommends the use of G.722 codec where possible and G.711a as second option followed by G729a. Below table contains sample calculations for the default voice payload sizes.

Codec Information				Bandwidth Calculations					
Codec & Bit Rate (Kbps)	Codec Sample Size (Bytes)	Codec Sample Interval (ms)	Mean Opinion Score (MOS)	Voice Payload Size (Bytes)	Voice Payload Size (ms)	Packets Per Second (PPS)	Bandwidth MP or FRF.12 (Kbps)	Bandwidth w/cRTP MP or FRF.12 (Kbps)	Bandwidth Ethernet (Kbps)
G722_64k (64 Kbps)	80 Bytes	10ms	4.13	160 Bytes	20ms	50	82.8 Kbps	67.6 Kbps	87.2 Kbps
G.711a (64 Kbps)	80 Bytes	10ms	4.1	160 Bytes	20ms	50	82.8 Kbps	67.6 Kbps	87.2 Kbps
G.729 (8 Kbps)	10 Bytes	10ms	3.92	20 Bytes	20ms	50	26.8 Kbps	11.6 Kbps	31.2 Kbps
G.711u (64 Kbps)	80 Bytes	10ms	4.1	160 Bytes	20ms	50	82.8 Kbps	67.6 Kbps	87.2 Kbps

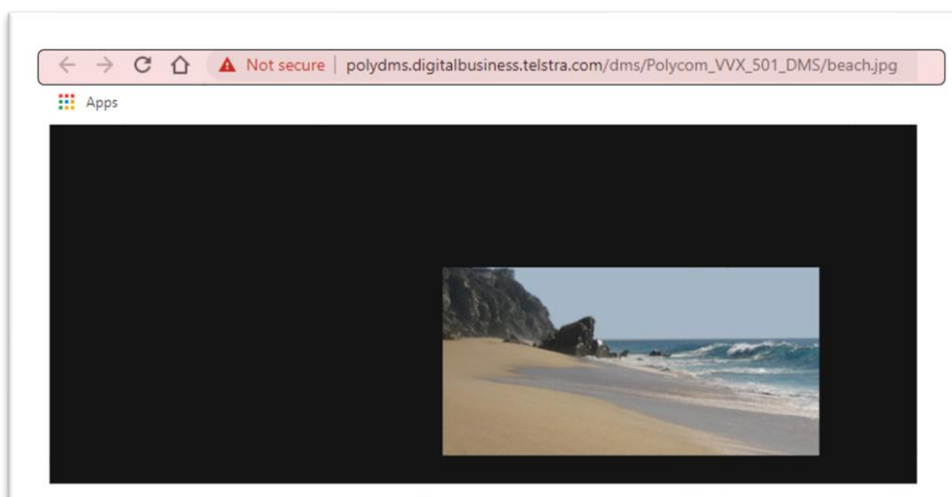
# 9. Troubleshooting & Quick tips

## Device Management Platform (Provisioning server) Connectivity test

To check the routing has been established to Telstra's Device Management Platform, open a browser window via your PC using the following address:

- [https://polydms.digitalbusiness.telstra.com/dms/Polycom\\_VVX\\_501\\_DMS/beach.jpg](https://polydms.digitalbusiness.telstra.com/dms/Polycom_VVX_501_DMS/beach.jpg)

A successful test should display the following picture:



## 10. Glossary

The following words, acronyms and abbreviations are referred to in this document:

Term	Definition
CDP	Cisco Discovery Protocol
CoS	Class of Service
DHCP	Dynamic Host Configuration Protocol
DMS	Device Management Solution
DNS	Domain Name Services
FTP	File Transfer Protocol
HTTP	Hyper Text Transfer Protocol
HTTPS	Hyper Text Transfer Protocol Secure
IAD	Integrated Access Device
IP	Internet Protocol
IP WAN	Internet Protocol Wide Area Network
LAN	Local Area Network
LLDP	Link Layer Discovery Protocol
NTP	Network Time Protocol

## 11. Customer Support

For any questions about your offer, technical support, service, or connection, you can visit [Telstra Connect](#), or call us on 1800 370 430. Assurance and fault calls are answered 24 hours / 7 days, all other calls are answered Monday to Friday, 9am to 5pm Eastern Standard Time (except national public holidays).

For escalations, contact your **Telstra Account Representative**.