



**SATELLITE**

# **VAST™ Set Top Box Certification Plan**

**Version 6.1**

**15 July 2011**

# 1 DISCLAIMER

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Optus does not provide any warranties and will not otherwise be responsible for any losses concerning any VAST™ STB supplied to the VAST™ STB market, any certification it issues or fails to issue or in its capacity as VAST Platform Operator.

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### 3 INTRODUCTION

Optus operates a satellite based Direct To Home (DTH) digital broadcast platform called VAST™. This platform currently provides services under contract to and on behalf of the regional broadcasters' industry group – Regional Broadcasting Australia (RBA) – and the two national government broadcasters. Broadcast on Optus C1 satellite, the DTH services can be received by a small satellite dish and set top box (STB). The platform has been in operation since June 2010.

Although the broadcast services are Free-to-Air (in the sense that there is no subscription charge made for receiving them) the satellite signal covers many commercial licence areas and state boundaries and for commercial, copyright and legal reasons individual viewer access must be restricted to services intended for that viewer's location.

This requirement is met by means of grouping the services to each geographically restricted area to a specific bouquet, which restricts the Electronic Program Guide display to only the relevant services in that area. This is managed by the use of an Irdeto Conditional Access System which mandates that a STB be equipped with a smart card in order to decode the channels to which a viewer is entitled. The Conditional Access system is jointly operated by Optus and the RBA.

VAST™ viewer entitlement to commercial services is solely controlled by the RBA. Entitlement to ABC and SBS services is jointly controlled by Optus (on behalf of the ABC and SBS) and the RBA.

VAST™ is intended to operate in an environment where there are multiple types of STB deployed across the consumer population. These would be made available from a variety of suppliers through their distribution chains. Thus it is a so called "horizontal market" and places demands on Optus as the platform operator, to maintain integrity of the system by allowing only STBs which have been "VAST™ Certified" and which continue to satisfy ongoing certification requirements, to operate with VAST™.

Note that the role of Optus will be limited to administering this STB certification process.

Optus will not purchase or supply any VAST™ STB.

Optus will not provide any warranties or otherwise be responsible for any losses concerning any VAST™ STB supplied to the VAST™ STB market, any certification it issues or fails to issue or in its capacity as VAST™ Platform Operator.

Suppliers submitting STBs for certification do so at their own risk and on the basis that:

- Optus is not liable for any loss or damage arising from any certification it issues or fails to issue or information it provides; and
- the Supplier indemnifies Optus against any loss or damage arising from third party claims concerning Optus activities contemplated by this document.

Optus estimates that the market demand for the VAST™ consumer STBs over the next several years may be as high as several hundred thousand. Government policy decisions could influence these numbers.

This figure should be considered as indicative only and suppliers are advised to make their own assessments of market size and demand. The Supplier may wish to contact the RBA for further information on this assessment.

Key features of the VAST™ platform include:

1. The STB must be compliant with the minimum set top box specifications set by the Department of Broadband, Communications and the Digital Economy.

These specifications can be found at:

[http://www.digitalready.gov.au/Content/Documents/PDF/VAST\\_tech\\_spec.aspx](http://www.digitalready.gov.au/Content/Documents/PDF/VAST_tech_spec.aspx)

Note: The above specification provides the minimum requirements for interoperability with the Eastern VAST™ Service. Compliance with this specification does not imply full compliance with or certification on the VAST™ Platform.

2. A controlled STB environment which enhances platform security, facilitates piracy management and enhances STB functionality and ongoing operability. In addition, a controlled STB environment minimises operational issues inherent with an uncontrolled STB model.
3. There will be only one VAST™ operator ID and it will be held by Optus.
4. A feature set that emulates the viewer experience of a terrestrial broadcast in accordance with AS4599.1 as received on a receiver that is compliant with AS4933.1: 2010.

5. The STB must have parental lock functionality in the same way as if it were a receiver subject to the requirements of the Broadcasting and Datacasting Services (Parental Lock) Technical Standard 2010 available at [www.comlaw.gov.au/details/F2010L02220](http://www.comlaw.gov.au/details/F2010L02220) and Parental Guidance features as defined in AS4933.1.
6. STBs will use Irdeto Conditional Access. The STB software and loader will be approved by Optus and Irdeto and will support Optus requirements for Home Channel, DR home channel, a variety of STB commands and SI / PSI tracking to facilitate any future transponder or transport stream changes.
7. The middleware will be MHEG-5 and conform to the “VAST™ MHEG-5 Profile”. The “VAST™ MHEG-5 Profile” is similar to the Freeview MHEG-5 Profile but with one smart card related extension.
8. The output interfaces will conform to Australian Standard AS4933.1: 2010 / Freeview Phase 2 Specification as well as support for data output which will be part of the VAST™ Transport Streams.
9. Any STB supplied to the VAST™ market must be equipped with a specified Irdeto smart card. Smart cards will only be available from Optus who will only supply to “VAST™ Certified” Suppliers. (There may be small exceptions for testing purposes.). VAST™ smart cards will not be, made available by Optus to the consumer market separately from STBs.
10. The STB must be capable of decoding MPEG 2 or MPEG 4 (H.264) encoded channels, either mixed in one transport stream or available as a dedicated transport stream of either type.
11. VAST™ will utilise transmissions from the Optus satellites (C1 or any other satellite of equivalent performance, for example D3) located at 156 deg east.
12. A VAST™ STB shall not be capable of tuning any other non VAST™ platform services i.e. those services provided by a platform operator other than Optus. The Method to achieve this security feature is subject to agreement and, in the first instance, it will be necessary to complete a non-disclosure agreement between Optus and the proposed Supplier of VAST™ STBs.

## 4 ACRONYMS / DEFINITIONS

Parameter	Definition
AAC	Advanced Audio Coding
AC3	The coding of audio using the Dolby AC-3 method. Recommendation ITU-R BS.1196-E (1995) – ANNEX 2
Application	A functional implementation realised as software running in one or spread over several interplaying hardware entities
API	Application Program Interface: An interface between an application and another particular feature, function or source
AVC / H.264 / MPEG-4	Advanced Video Coding
Bouquet	A collection of services marketed as a single entity
BAT	Bouquet Association Table: The BAT provides information regarding bouquets. As well as giving the name of the bouquet, it provides a list of services and the channel number it is to be displayed on for each bouquet
BER	Bit Error Ratio
Broadcaster	An entity that provides a broadcasting service that delivers television programs or radio programs to persons having equipment appropriate for receiving that service and who is licence in accordance with the Broadcast Services Act.
CAT	Conditional Access Table: Provides information on the CA systems used in the multiplex. The information is private and dependent on the CA system, but includes the location of the EMM stream, when applicable
Conditional Access (CA)	A system to control viewer access to services e.g. Irdeto Access
CLMD	Channel List Mapping Descriptor a descriptor defined within the private Irdeto extensions to DVB refer to Irdeto document number 706440. This lists the mapping between the DVB Triple and the desired Channel Number

	in a bouquet.
CLUT	Colour Look Up Table: A look up table applied in each region of the screen for translating the objects' pseudo-colours into the correct colours to be displayed
CPU	Central Processing Unit
Delivery System	The physical medium by which Transport streams are transmitted e.g. Satellite
DiSEqC	Digital Satellite Equipment Control
DTH	Direct To Home
DVB	Digital Video Broadcasting
DVB Network	A collection of MPEG Transport Stream multiplexes transmitted on a single delivery system using a single and geographically unique Network ID
DVB-SSU	DVB System Software Update
EPG	Electronic Program Guide: A means of presenting available content to the consumer, allowing selection of desired content. Broadcasters transmit schedules in EIT tables. The STB uses this information to produce EPGs
ETSI	European Telecommunications Standards Institute
Event	A grouping of elementary broadcast data streams with a defined start and end time belonging to a common service.
EIT	Event Information Table (See EN 300 468). Contains data concerning events or programmes such as event name, start time, duration etc.
FEC	Forward Error Correction. Type of error correction not requiring a return path.
HD	High Definition
Freeview Phase 2 Specification	Refers to the "FREEVIEW™ Australia Digital Television Receiver Technical Specification Phase 2"
Freeview MHEG-5 Profile	FREEVIEW™ Australia MHEG-5 Profile for Australia
HDCP	High Definition Content Protection
HDMI	High Definition Multimedia Interface (See HDMI 1.3a specification.)

HDTV	High Definition TV
HE-AAC	Highly Efficient Advanced Audio Coding ( See ISO/IEC 14496-3 )
ID	Identifier
LCN	Logical Channel Number
LNB	Low Noise Block
LO	Local Oscillator
MHEG	Multimedia and Hypermedia Experts Group
MHEG-5	A standard devised for the middleware for interactive services
MIPS	Millions of Instructions Per Second
MPEG	Moving Picture Experts Group
MPEG-2	See ISO/IEC 13818 1,2,3
MPEG-4	See AVC
Multiplex	A multiplex or mux - A group of services mixed together (multiplexed) for broadcast over a digital transmission medium for later separation (de-multiplexing) by a receiver.
NIT	Network Information Table. The Network Information Table (NIT) conveys information relating to the physical organisation of a given network and the characteristics of the network itself. The Network Information Table (NIT) provides the relevant tuning information for digital television receivers (DTV).
OSC	Operator Secure Chipset - File defined by Irdeto as part of Irdeto's Secure Silicon Chipset policy
OSD	On Screen Display. Graphical information, locally generated by a piece of equipment, providing information to the user of that equipment.
OTA	Over The Air - usually in the context of over the air download of a STB software update.
PAT	Program Association Table. For each service in the multiplex, the PAT indicates the location (PID) of the corresponding PMT. It also gives the location of the NIT
PCR	Program Clock Reference
Persistent Memory	Memory available in the STB which can be read / written to by an application and which may outlive the application's own life

PID	<p>Packet Identifier. A unique integer value used to associate elementary streams of a program within a MPEG transport stream.</p> <p>Each table or elementary stream in a MPEG transport stream is identified by a 13-bit packet ID (PID). A demultiplexer extracts elementary streams from the transport stream in part by looking for packets identified by the same PID.</p>
Piracy	Reception and display of a broadcast service at a location where such reception is not authorised by the broadcaster concerned.
PMT	Program Map Table. It identifies and indicates the locations of the streams that make up each service, and the location of the PCR fields for a service
Profile	A description of a series of minimum configurations, defined as part of the specification, providing different capabilities. It maps a set of functions which characterize the scope of service options.
Program	MPEG transport streams use the concept of programs. Each single program is described by a Program Map Table (PMT) which has a unique PID, and the elementary streams associated with that program have PIDs listed in the PMT. Elementary streams within the Program, may contain video, audio, teletext or other metadata associated with the Program.
PSI	Program Specific Information
QEF	Quasi-Error Free. Defined as a Transport Stream bit error ratio (BER) of less than 10 raised to the power of minus 11, equivalent to about one error per hour
RAM	Random Access Memory
RBA	Regional Broadcasting Australia – represents the interests of Australia’s regional and remote commercial broadcast licence holders.
RCU	Remote Control Unit
SDT	Service Description Table
SD	Standard Definition

SI	Service Information. See EN 300 468
SLD	Service List Descriptor a DVB descriptor listing the unique ID of each service within a transport stream
Softcell	Embedded Software interface between an Irdeto smart card and the STB
STB	Set Top Box
Supplier	The STB manufacturer
TSC	Tested Secure Chipset – File defined by Irdeto as part of Irdeto's Secure Silicon Chipset policy
TDT	Time and Date Table
TOT	Time Offset Table
Transport Stream (TS)	A data structure defined in ISO/IEC 13818-1
VAST™ MHEG-5 Profile	The Optus VAST™ satellite platform specific STB MHEG-5 profile. This is used in replacement of the FREEVIEW™ Australia MHEG-5 Profile for Australia. It is similar to Freeview with one smart card related extension required for satellite operation. Optus can provide a copy of the profile subject to a NDA.
Zapper	A standard STB with a single tuner and no PVR support. The simplest form of STB that can be used on VAST™

## 5 PURPOSE & SCOPE

This VAST™ Set Top Box Certification Plan defines the process for a Supplier to submit a STB to undergo VAST™ compliance testing and verification and specifies how a Supplier shall certify a product for conformance to the VAST™ STB specifications as outlined in Appendix 1.

The VAST™ Set Top Box Certification Plan is limited to evaluation of the compliance of the product with the minimum specifications as defined in this document and is not designed to test or confirm the overall performance of the product.

Each Supplier remains solely responsible for ensuring that its products function correctly, fully comply with the claimed specifications, and interoperate with other products.

Completing and passing the VAST™ Set Top Box Certification, will entitle a Supplier to display the words “VAST™ Certified” on the Suppliers certified STB.

This document covers traditional / zapper set top boxes only. Other STB types such as Personal Video Recorders (PVRs) and integrated Digital TVs are outside the scope of this document. Any additional requirements for PVR STB will be published as an update to this document.

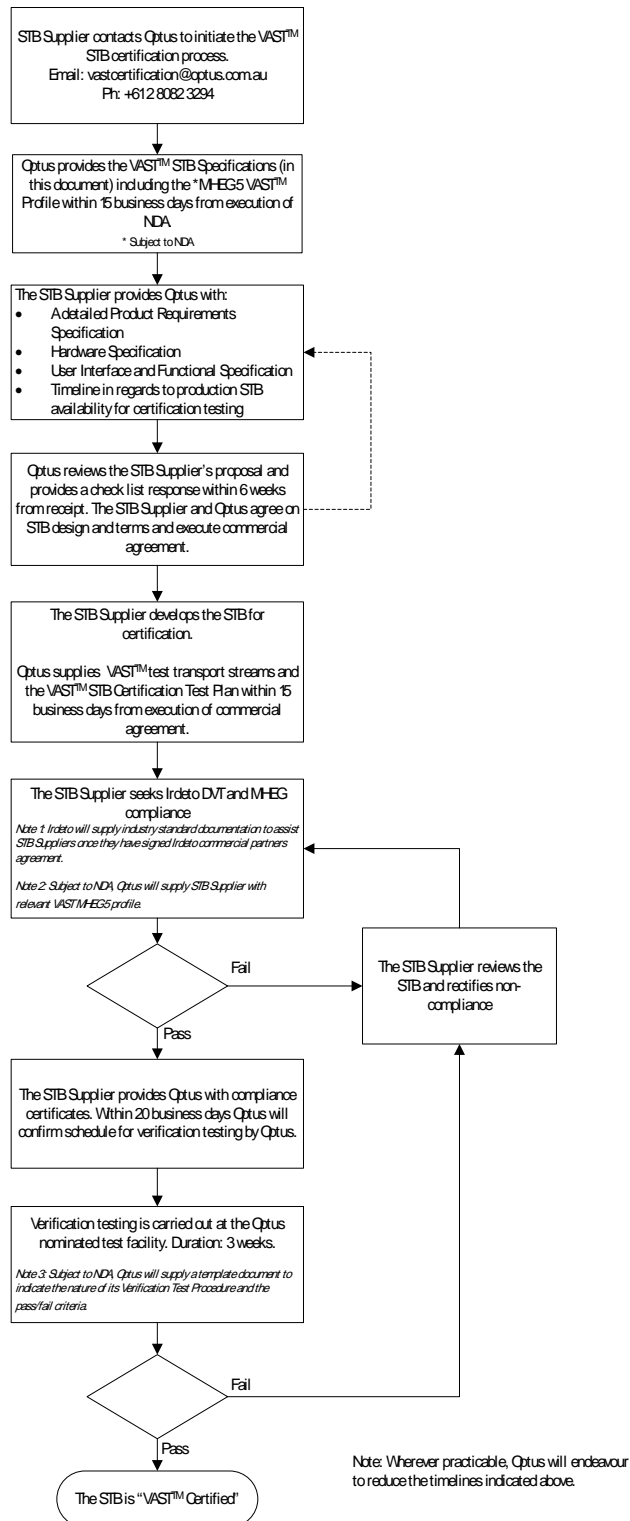
All Potential VAST™ STB suppliers shall submit to Optus for discussion and approval, prior to the commencement of any conformance testing, the following:

- A detailed Product Requirements Specification
- Hardware Specification
- User Interface and Functional Specification
- Timeline in regards to production STB availability for certification testing

Subject to completion of a non disclosure agreement, Optus will supply the Supplier the “VAST™ MHEG-5 Profile” specification and the VAST™ STB Verification Test Procedure. The Supplier should use this to verify the information within this document and develop their STB.

# 6 CERTIFICATION PROCESS OVERVIEW

The certification process detailed below is a high level example only and may vary for each Supplier. It is shown here as a guide for the Supplier to plan their STB certification.



## 7 COMPLIANCE TESTING

To gain VAST™ certification of a STB on the VAST™ platform, a Supplier must submit test results and pass certification for the following areas of the STB:

1. Australia Safety Standards.

Note that responsibility is with the STB supplier to comply with relevant safety standards. However, the supplier should provide documentation to Optus on any relevant certification.

2. Irdeto DVT for the secure loader and Customer Code, from Irdeto.
3. MHEG-5 compliance to the full “VAST MHEG-5 Profile”, from ADT or other test house approved by Optus.
4. SI and PSI Handling, to be certified by Optus.
5. The STB must meet the H/W, S/W, EPG and other requirements as specified in this document. This will be verified by the compliance facility.
6. Set top box stability, to be tested by Optus against a simulated VAST™ transport stream, and also with sample in-field installations. No environmental stress testing.
7. Full support for Softcell 3.11 including IFE.
8. Written approval from Optus and Irdeto that the Suppliers VAST™ security model has been implemented and can be maintained by the Supplier.
9. Acceptance of the support conditions required by Optus to ensure the STB variant is supported in the VAST™ market for a minimum of 7 years.

The VAST™ Certification will only apply to a clearly identified STB model / part number and software version. These shall match the STBs supplied by the Supplier and held by Optus for VAST™ system testing.

If the Supplier subsequently changes the STB hardware in any way, the STB part number shall also be changed and the STB resubmitted for certification. Similarly, for any STB software change, the STB will be required to be resubmitted for certification. In practice, Optus in dialog with the Supplier would assess the level of re-certification required on a case by case basis. While Optus will be reasonable, if agreement cannot be reached with a Supplier then full re-certification may be required.

If the Supplier does not comply with these requirements then supply of VAST™ smart cards for operation with the STB may be refused.

It is expected that the Optus VAST™ STB Verification testing will take between 2–3 weeks.

The Supplier should also allow for the Irdeto DVT and ADT MHEG compliance testing in their overall certification schedule. The Supplier should contact Irdeto and ADT to confirm testing availability.

## 8 COMPLIANCE CHARGES

The charges for verifying compliance with Optus certification requirements shall be met by the Supplier.

No STBs will be certified for the VAST™ platform until the cost of such testing has been paid in full to Optus by the Supplier.

Optus may choose to outsource some of its own compliance testing.

Pre-requisite certification for Australian Safety Standards, Irdeto certification and MHEG-5 certification remain the responsibility of the Supplier.

Indicative charges stated below are in AUD, exclude GST and are subject to CPI. Charges may be changed by Optus without notice.

### 8.1 Optus Certification Charges

- a) Charges for VAST™ lab time offered by Optus to a Supplier to test their developed STB. These charges will be determined at time of request.
- b) Initial certification verification testing at the Optus nominated VAST™ test facility:

	Item	Charge
i	VAST™ STB Verification Test Charge	\$20,388 (ex GST) payable in advance

- c) Subsequent certification verification testing by Optus due to a hardware or software change of a previously certified STB:

	Item	Charge
i	Full VAST™ STB Verification Test Charge <i>Note:</i> Full testing may not be required and reduced costs would be assessed by Optus on a case-by-case basis.	\$20,388 (ex GST) payable in advance

- d) An annual maintenance charge is payable to Optus to cover Optus' costs of maintaining the STB variant on the VAST™ platform:

	Item	Charge
i	VAST™ STB first year Annual Maintenance Charge <u>Note:</u> Subsequent year Annual Maintenance Charge will be assessed by Optus based on the previous year's cost impact on Optus.	\$28,000 (ex GST) per STB variant per annum payable in advance
ii	VAST™ STB Annual Maintenance Charge – 2-3 Set Top Box variants	\$25,200 (ex GST) per STB variant per annum payable in advance
iii	VAST™ STB Annual Maintenance Charge – 4-5 Set Top Box variants	\$23,800 (ex GST) per STB variant per annum payable in advance
iv	VAST™ STB Annual Maintenance Charge – Above 5 Set Top Box variants	\$22,400 (ex GST) per STB variant per annum payable in advance

e) Charges associated with items a), b) and c) above, will not be refunded to the Supplier if the Supplier:

1. Cancels a scheduled VAST™ STB Verification Test or VAST™ Lab time booking providing less than 2 weeks notice.
2. Changes a scheduled VAST™ STB Verification test or VAST™ Lab time booking providing less than 2 weeks notice, and Optus cannot accommodate the requested change.

f) Optus will provide the Supplier reasonable notice if a VAST™ STB Verification Test or a VAST™ Lab time booking requires rescheduling due to unforeseen circumstances outside Optus' control. In this case, Optus will fully refund any payments made by a Supplier if the Supplier wishes to cancel the VAST™ STB Verification Test or a VAST™ Lab time booking.

## 8.2 Other Certification Charges

The Supplier is responsible for any costs associated with third party STB compliance testing with other third party testing facilities.

This will apply to, but is not limited to, the following compliance testing:

	Item	Compliance Test Provider
i	Decoder Validation Testing (DVT) for the Secure Loader and Customer Code	Irdeto
ii	MHEG-5 compliance to the full "VAST MHEG-5 Profile"	ADT or other test provider approved by Optus.

The Supplier should contact Irdeto and ADT to confirm compliance testing charges.

### 8.3 VAST Smart Card Charges

Optus is the sole supplier of VAST™ smart cards. The Supplier will be required to purchase smart cards from Optus. Current smart card pricing is as follows:

Cumulative VAST™ Platform Premium Smart Cards Purchased	Charge
1,000–50,000	\$30 per smart card (ex GST)
50,001 – 100,000	\$29.50 per smart card (ex GST)
100,001 – 250,000	\$29 per smart card (ex GST)
250,001 – 500,000	\$28 per smart card (ex GST)
500,001 – 1,000,000	\$27.25 per smart card (ex GST)

Notes:

- a) This applies to the VAST™ Premium smart card only
- b) Optus will calculate the cumulative total smart cards purchased by the STB Supplier at the time of quotation.

## 9 SUPPLIER OBLIGATIONS

Optus' acceptance of any or all compliance testing results and certification of the STB on the VAST™ platform shall not release the Supplier from the obligation to meet all the requirements of the specification detailed in Appendix 1.

The Supplier is expected to enter into an agreement with Optus which will define and govern the Supplier's obligations and Optus' obligations in respect to VAST™ STB certification compliance.

The Supplier is expected to indemnify Optus in regards to any and all losses which Optus may suffer arising from or in connection with any Supplier conduct concerning or third party claims arising from the supply and sale of VAST™ STBs.

### 9.1 Supply Of STBs To Optus

To assist in the certification process and future STB maintenance, the Supplier must provide at no charge to Optus:

- a) Up to 10 development key STB as requested by Optus; and
- b) 20 Customer key STB for testing and platform monitoring.

### 9.2 Third Party Royalties

All Royalties payments for STB functionality or features shall be paid by the Supplier and the Supplier shall provide Optus with an indemnity against any and all claims concerning royalties.

### 9.3 Local Presence

- a) A Supplier of "VAST™ Certified" STB must have a local Australian presence capable of holding detailed commercial and technical discussions with Optus and have the authority to commit to and meet the agreements, both commercial and technical, made with Optus.
- b) The requirements of the Supplier's distributor and distribution network will include but not be limited to:
  - i. Must support all VAST™ Certified STB variants for a minimum of seven (7) years from date of original certification

- ii. Must have the necessary staff, equipment, facilities and resources, for representing the Supplier, preferably with an Australia wide capability
- iii. A demonstrated ability to co-ordinate and manage the required scale and complexity of the distribution network including the provision of related support and maintenance services

## 9.4 STB Discontinuance

The Supplier may from time to time discontinue the supply of a STB variant provided that:

- a) The Supplier provides the market and Optus with at least two years' prior notice of such discontinuance ('End Of Life Notification'). This notification period would apply to Supplier-manufactured Goods as well as third-party-manufactured Goods, and
- b) a period of at least 5 years has passed between the date of original VAST™ Certification of the STB variant and the advised discontinuance date; and
- c) the Supplier will continue to support the STB variant for further 2 years after the discontinuance date and maintain sufficient spares (or suitable VAST™ certified STB replacement).

## 9.5 STB Support

The Supplier must also agree to the following software support principles:

- a) The Supplier must have an ongoing software testing and approval process in place with the Conditional Access (CA) vendor IRDETO that guarantees ongoing CA interoperability for a minimum of seven (7) years from date of certification. This must apply to all hardware and software models on offer for service on VAST™.
- b) The Supplier must provide software support as reasonably negotiated in the support section of the commercial agreement in place between the Supplier and Optus. The Supplier will provide updated STB software to resolve the non-compliance for OTA download to the non compliant STBs. The download process, end user acceptance and notification and the performance of the downloaded software is the responsibility of the Supplier.
- c) STB support must be for a minimum of seven (7) years from date of STB certification and this term must be clearly stated by the Supplier and its distributor to end users

- d) The Supplier must have a distribution network that will supply support to end users. The software and hardware performance of this STB always remains the responsibility of the Supplier. STB performance, ongoing CA compliance and the range of functionality that the STB is capable of, is the responsibility of its Supplier and added functionality (beyond what is specified by the VAST™ compliance process) must be clearly communicated to end users.
- e) The Supplier has a process in place with Optus to identify any software faults.
- f) The Supplier shall provide Optus all versions of STBs in the VAST™ marketplace so that they can be monitored by Optus.
- g) A software bug resolution process that is acceptable to Optus

## 9.6 Other Obligations

The STB certification compliance process will require a Supplier to meet the following conditions for each STB variant before their STB can be certified as suitable for use on the VAST™ platform:

- a) The STB must meet the Irdeto CA integration compliance requirements specified in this document
- b) The Supplier prior to certification must establish and demonstrate to Optus' satisfaction a process to accurately capture the pairing of the STB and smart card at the production facility and produce the security files required by Irdeto and Optus.
- c) Provide Optus, in an agreed file format the list of STB S/N, CSSN No. and smart card numbers. Provide an OSC file to Irdeto so Irdeto can provide to Optus the required TSC file in an agreed time frame.
- d) A minimum of 1 months notice to Optus is required if the Supplier wishes to schedule a VAST™ STB Verification Test or request use of the Optus VAST™ Lab.
- e) The STB Supplier will provide to Optus a detailed test plan when requesting VAST™ Lab time.
- f) The smart card and STB are paired together therefore a faulty STB will also mean the return of the smart card and vice versa. A service based recovery process for smart card from a failed STB will be agreed with the Supplier.

## 10 OPTUS OBLIGATIONS

### 10.1 Technical Information & Support

- a) Optus will provide technical information about the VAST™ platform that the Supplier reasonably requires to develop a STB.
- b) Optus will provide the VAST™ MHEG-5 Profile and the VAST™ STB Verification Test Procedure to the Supplier subject to completion of a non disclosure agreement with Optus.
- c) Optus will provide reasonable access to the Optus VAST™ LAB on Supplier request. Lab time will be charged as per 8.1 a).
- d) Optus will use its reasonable endeavours to meet the Supplier's requested VAST™ STB Verification test date but is not liable for any failure to do so or for any failure of the STB to meet verification or obtain certification.
- e) Optus will provide the Supplier with a copy of the VAST™ Test Transport Streams on request during the Suppliers development of the STB.

### 10.2 VAST Certification Label & Certificate

- a) Optus will provide the Supplier with artwork for the VAST™ Certification label on STB certification.
- b) Optus will issue the Supplier a certificate of VAST™ Certification for each STB variant that is certified for the VAST™ platform.

### 10.3 Supply Of Smart Cards

- a) Optus will provide the Supplier up to 200 VAST™ smart cards to support the Supplier's STB development. Pricing for these smart cards will be as per 8.3.
- b) Optus will continue to provide VAST™ smart cards to the Supplier while the Supplier continues to meet all their obligations under agreement with Optus and has at least one (1) VAST™ Certified STB in active production
- c) Smart cards will be ordered by Optus from Irdeto on receipt of a purchase order from the Supplier. (Standard lead time on smart cards is 12 weeks from order. This lead time can be reduced if the Supplier provides accurate forecasting of their smart card requirements to Optus.)
- d) Optus will deliver the smart cards to the nominated Supplier's delivery address (DDU terms)

- e) Optus will supply a list of smart card serial numbers to the Supplier on delivery. Format of this list to be agreed between Optus and the Supplier.

## 11 FURTHER INFORMATION

If you require further information about the VAST™ STB Certification Plan or specifications within, contact Optus at: [vastcertification@optus.com.au](mailto:vastcertification@optus.com.au) or alternatively call +61 2 8082 3294 during business hours (9am to 5pm EDST Monday to Friday excluding public holidays).

The Supplier should contact Irdeto and ADT in regards to information and requirements for the Irdeto DVT and VAST™ MHEG-5 Profile compliance testing and associated charges.

Contact information:

<b>Company</b>	Irdeto
<b>Contact</b>	Steve McInerney
<b>Address</b>	Suite 2, Level 16 275 Alfred Street North Sydney NSW 2060
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# APPENDIX 1 - VAST™ SET TOP BOX (STB) SPECIFICATIONS

## 1.1 The VAST™ Set Top Box Architecture

DVB S/S2 FRONTEND	MPEG 2 / 4	HD /SD	OUTPUT INTERFACE AND RELEVANT REQUIREMENTS AS PER THE AUSTRALIAN DTTB STB STANDARD AS4933.1
VAST™ MHEG-5 PROFILE MIDDLEWARE			
IRDETO C.A O/S SOFTCELL VER 3.11	OPTUS / BROADCASTER O/S <ul style="list-style-type: none"> <li>• CONTROLLED STB</li> <li>• STB COMMANDS</li> <li>• DVB SI ACQUISITION RULES</li> <li>• SATELLITE "D-BOOK" STANDARDS COMPLIANCE</li> </ul>		
IRDETO SECURE SILICON CHIPSET			
IRDETO SECURE LOADER	IRDETO SMARTCARD		
DISTRIBUTION AND REPAIR REQUIREMENTS			
<p>COMPLIANCE REQUIREMENTS</p> <ul style="list-style-type: none"> <li>• Irderto DVT</li> <li>• VAST™ MHEG-5 Profile</li> <li>• SI/PSI handling</li> <li>• Stability Testing</li> <li>• Optus VAST™ Certification</li> </ul>			

**Figure 1 VAST™ Set Top Box Architecture**

## 1.2 Detailed Technical Requirements for the STB

The document addresses necessary requirements for satellite reception, demodulation and decoding of services, including television and radio, supplied by the Optus VAST™ platform and outputting the decoded information in a time synchronised manner suitable for a display device and sound reproduction system.

The core functionality of a VAST™ STB is set out by the Department of Broadband, Communications and the Digital Economy. This document is not a full STB specification but failure to meet any of the requirements will automatically prevent qualification.

These specifications can be found at:

[http://www.digitalready.gov.au/Content/Documents/PDF/VAST\\_tech\\_spec.asp](http://www.digitalready.gov.au/Content/Documents/PDF/VAST_tech_spec.asp)

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### 1.2.1 Input Signal

a)	Input Connector	F type: IEC 60169-24 female
b)	Impedance	75 ohm
c)	Signal Level	-25 to -65 dBm
d)	Frequency Range	950 to 2150 MHz
e)	Default LNB Local Oscillator Frequency	10.700 GHz (mandatory) with 11.300 GHz selectable as an alternate followed by a full user programmable option.
f)	LNB Local Oscillator Frequency tuning range	10.000 to 12.000 GHz
g)	Signal acquisition Frequency Range	+/- 5MHz
	Signal Tracking Frequency Range	+/- 2MHz
h)	Carrier Centre Frequencies	Multiples of 1 MHz
i)	Polarity Switching	Horizontal 17<V<19 (IEC 1319-1) Vertical 12.5<V<14 (IEC

		1319-1) Provision for turning off DC supply to be provided
j)	LNB DC output current	250 mA continuous minimum
k)	LNB DC short circuit protection	No damage should result to the receiver from the DC supply being short circuited and after release of the short circuit the receiver shall operate as normal
l)	DiseqC	22 KHz tone $\pm 2$ kHz 400 < mV p-p < 900 (IEC 1319-1) DiSEqC 1 and 1.2 compliant

**Table 1 Input Signal Parameters**

## 1.2.2 Demodulator System

Transport Streams on the VAST™ Platform will either be modulated using the DVB-S2 or the DVB-S Standard.

The STB shall be capable of demodulating a transmission system as defined by:

- a) EN 300 421 V1.1.2 (Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for 11/12 GHz Satellite Services). DVB-S
- b) and EN 302 307 V1.1.2 (Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications). DVB-S2.
  - i. The system configuration meets the specifications of Table 1 of the above Standard for System configurations classified as Broadcast services
- c) There shall be no impairments when tuning between transmission systems supporting either of the Standards above.

### 1.2.2.1 Error Performance

- a) DVB-S: The error performance requirements must meet the values specified in Table 3 of EN 300 421 V1.1.2.
- b) DVB-S2: The error performance of the STB shall meet the specifications of Table 13 of EN 302 307 V1.1.2 that are relevant to a Broadcast service.
- c) INPUT SYMBOL RATE

i	DVB-S	2 to 45 MS/s
ii	DVB-S2	2 to 30 MS/s. 45 MS/s is desirable.

**Table 2 Input Symbol Rates**

- d) DVB-S2 AND NEED FOR PILOTS

Pilots are currently used on the VAST™ platform. Operation of the STB in regards to pilots shall be supported as per the ETSI standard EN 302 307.

### 1.2.3 Demultiplexing

A Transport Stream may carry multiple programs as well as private data. Conditional Access will be applied in accordance with ETSI ETR 289. The STB shall be able to meet the minimum demultiplexing requirements set out in TS 101 154.

a)	Data Rates	A STB shall be able to demultiplex ISO/IEC 13818-1 transport streams with data rates up to 72 Mbit/s
b)	Errors	A STB shall implement a suitable error correction mechanism on receipt of transport packet errors
c)	PID Filters	A STB shall be able to demultiplex at least 32 different PIDs simultaneously in order to receive any single service. As a minimum the STB shall be capable of simultaneously processing and outputting 1 video channel, 1 audio channel , 1 teletext channel, an EPG and a data channel
d)	Section Filters	A STB shall be able to implement at least 32 simultaneous section filters, each applying a filter specification to bytes 1 and 4 to 10 of the section, where each bit in the filter is individually maskable. It shall be possible to apply all 32 section filters to each section.
e)	Burst rate	The throughput shall be at least 5 Mbps for section filters, and at least 15 Mbps and 20 Mbps for PID filters for streams associated with SD and HD services respectively (peak burst rate measured over 1 ms)
f)	Scrambling Control Bits	The STB shall respond appropriately to the DVB use of the transport scrambling control bits defined in ETR 289
g)	Channel surfing access time	Less than 1 second for any program with a video data rate exceeding 2.5 Mbit/s

**Table 3 Demultiplexing Specifications**

### 1.2.4 Video and Audio Requirements

Services within a VAST™ Transport Stream could be encoded under any of the coding standards mentioned below. The STB shall support the

requirements as well as the decoding and display / reproduction of MPEG video and audio as specified below

a)	MPEG-2 Video	<p>i. The STB shall decode MPEG-2 MP @ ML Standard Definition (SD) and MP @ HL High Definition (HD) video that is encoded according to ISO/IEC 13818-2 constrained according to the TS 101 154 Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream. As a minimum, the resolutions and Video requirements as stated in the latest version of the Australian Standard AS4933.1 and the Freeview Phase 2 Specification shall be supported.</p>
b)	MPEG-4 Video	<p>i. The STB shall decode MPEG-4 AVC Standard Definition (SD) and High Definition (HD) video that is encoded according to ISO/IEC 14496-10 constrained according to the TS 101 154 Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream. As a minimum the following resolutions shall be supported: 720 x 576, 544 x 576, 480 x 576, 352 x 288, 1920 x 1080, 1440 x 1080, 1280 x 1080 at interlaced 25 frames/s; 1280 x 720, 960 x 720 at progressive 50 frames/s; 1280 x 720, 960 x 720, 1920 x 1080, 1440 x 1080, 1280 x 1080 at progressive 25 frames/s.</p> <p>ii. Any variations and requirements that are stated in the latest version of the Australian Standard AS4933.1 and the Freeview Phase 2 Specification take precedence.</p>
c)	Audio	<p>i. The STB shall include MPEG-1 Layer II audio (ISO/IEC 13818-3) decoding as constrained by TS 101 154</p> <p>ii. The STB shall include Dolby AC3 audio (TS 102 366) decoding and MPEG-4 HE-AAC</p>

		<p>v2 (ISO/IEC 14496-3) decoding, as constrained by TS 101 154</p> <p>iii. Any variations and requirements that are stated in the latest version of the Australian Standard AS4933.1 and the Freeview Phase 2 Specification take precedence.</p> <p>iv. The implementation of Dolby AC3 particularly in respect to compatibility of audio levels with MPEG audio will be compliant with Dolby Tech Bulletin 11</p> <p>v. The audio output level must be <math>-20\text{dBfs} = -10\text{dBv} \pm 6\text{dB}</math>. Controllable via RCU.</p>
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**Table 4 Video & Audio Specifications**

### 1.2.5 Picture Colorimetry

At a minimum, the STB shall meet the requirements of the latest version of the Australian Standard AS4933.1 and the Freeview Phase 2 Specification.

### 1.2.6 Services

The STB shall be capable of decoding all VAST™ broadcasts of television (Standard Definition (SD) and High Definition (HD) This shall include the capability to

- a) Present SD and HD MPEG services
- b) Present SD and HD Teletext and subtitles (where broadcast) if selected by the viewer
- c) Re-insert teletext data onto line 21 of the (SD) analogue video output in accordance with OP42.
- d) Utilise DVB Bouquet Association Tables and that may be broadcast within the VAST™ DVB-SI transport streams in order to support VAST's regional services requirement.
- e) Support for data services. (See 1.2.7)
- f) Support up to 500 services

## 1.2.7 Data Support

STB data support is not a mandatory requirement to meet the minimum VAST™ STB technical requirements as set out by the Department of Broadband, Communications and the Digital Economy. Optus strongly recommends data support and considers data support as a mandatory feature of the STB and that the STB Supplier should implement data support to ensure the STB can support future VAST™ services. (Example: Future service transitions from Aurora to VAST™)

### 1.2.7.1 Low Speed Data

Support for low speed data shall be implemented as follows:

#### a) Scrambling

Low Speed Data is treated as an associated service for any DVB service, e.g., Digital Video, Digital Radio services. In this mode the data channel would only be scrambled if the associated service was scrambled or would be un-scrambled if the associated service was transmitted in the clear.

#### b) Private Stream Type

Private Stream Type II is the MPEG-2 data broadcast mode. In this mode the broadcast data is included in the payload of PES packets. For the PES\_header, the packet\_start\_code\_prefix would be '0x000001', stream\_id would be '0xbf', and the PES\_packet\_length would be set to the size of the data payload. It shall be possible for adaption field stuffing to occur on any TS\_packet during the transfer of a PES\_packet such that the PES\_packet will then occupy an integer multiple of TS\_packets.

#### c) Auto Sensing Baud Rates

STBs shall use the stream\_type definition within the Program Map Table to determine the speed, parity and data port of the asynchronous data stream as defined in Table below:

<b>Stream Type</b>	<b>Definition - Low Speed Data Port</b>
0xd0	1200 bit/s ( 8 bits, no parity, 1 stop bit )
0xd1	2400 bit/s ( 8 bits, no parity, 1 stop bit )
0xd2	4800 bit/s ( 8 bits, no parity, 1 stop bit )

	bit )
Oxd3	9600 bit/s ( 8 bits, no parity, 1 stop bit )
Oxd4	19200 bit/s ( 8 bits, no parity, 1 stop bit )
Oxd5	38400 bit/s ( 8 bits, no parity, 1 stop bit )
Oxdc	57600 bits/s ( 8 bits, no parity, 1 stop bit )
Oxdd	115200 bits/s ( 8 bits, no parity, 1 stop bit )
Oxd6	1200 bit/s ( 8 bits, even parity, 1 stop bit )
Oxd7	2400 bit/s ( 8 bits, even parity, 1 stop bit )
Oxd8	4800 bit/s ( 8 bits, even parity, 1 stop bit )
Oxd9	9600 bit/s ( 8 bits, even parity, 1 stop bit )
Oxda	19200 bit/s ( 8 bits, even parity, 1 stop bit )
Oxdb	38400 bit/s ( 8 bits, even parity, 1 stop bit )

**Table 5 Low Speed Data Formats**

d) Default Setting

The default setting of the stream type shall be 'Oxd4'.

e) Buffer Timeout

STBs shall transmit the data to the low speed data port as soon as it is received. Headend equipment shall ensure that data receivers shall transmit data after a suitable timeout.

f) Data Services

When an STB switched to a service containing an associated low speed data service the data output shall automatically be routed to the low speed data port and transmitted.

g) Character Set

There shall be no restriction on the available character set used in the Low Speed Data protocol, that is, all 8 bit data characters from '0x00' to '0xff' shall be transparently transmitted through the system.

h) Low Speed Data Port

The low speed data port shall be RS232C with a DB9 female connector.

### 1.2.7.2 IP Data

Hardware capability of the STB shall be provided to support DVB Multiprotocol encapsulation as per EN 301 192 section 7.

This is envisaged as a potential future function via the STB Ethernet port.

### 1.2.8 Display Conditions

- a) Receivers shall be able to continue outputting decoded video pictures undisturbed by changes in the video format parameters or when switching from SD to HD or vice versa.
- b) To allow interactive applications to navigate smoothly between video streams of different resolutions, the resolution of the MHEG plane shall be independent of the format of the decoded video stream. The minimum resolution of the MHEG plane shall be 1280 x 720 consistent with the requirements for receivers to support MHEG HD Graphics Plane Extensions, but a resolution matching that of the Decoders video output is recommended.
- c) Colorimetry Management in a MHEG environment when switching from SD and HD video sources. Problems with colour distortions are expected if not properly managed. Supplier to address.

### 1.2.9 On Screen Display

The STB must support a three graphics layer model :

- a) Image Layer i.e. a full colour layer to display I-Frame stills captured from the video decoder. The layer to support:
  - i. Y=8 bit, Cb=8 bit, Cr = 8bit

- ii. Chroma to be sub sampled at either 4:2:0 or 4:2:2
- b) Video Layer i.e. a full colour layer displaying the output of the MPEG video decoder. The layer to support
  - i. Y=8 bit, Cb=8 bit, Cr = 8bit
  - ii. Chroma to be sub sampled at either 4:2:0 or 4:2:2
- c) OSD/Graphics Layer i.e. an 8-bit palletized layer which can display region based graphics
  - i. Each CLUT palette entry to support Y = 6 bit, Cb = 4 bit, Cr = 4 bit
  - ii. Chroma to be sub sampled at either 4:2:0 or 4:2:2
  - iii. Alpha blending to be either 6 bit across the entire layer, or 2 bit per pixel

### 1.2.10 Conditional Access Integration

- a) Irdeto is the Conditional Access Provider for the VAST™ Platform. The Conditional Access System (CAS) chosen is the Irdeto Ver. 3 Key Management System (KMS). Where scrambling is employed then the DVB Common Scrambling Algorithm is used. It will be implemented in compliance with ETR 289. The STB must be fully integrated with the Irdeto Ver 3 CAS
- b) The STB must be integrated with Irdeto's latest Softcell Software release. (Currently Ver 3.11). The STB must have an embedded Irdeto ver 3 CAS.
- c) The STB must be fully compliant with Irdeto's Secure Silicon Chipset requirements. Simple identification of the STB unique identifier by the end user is mandatory
- d) The STB must be integrated with Irdeto's Secure Loader and meet Irdeto's Over The Air (OTA) secure software download requirements
- e) The STB must pass Irdeto's CA Decoder Verification Testing (DVT) process
- f) The STB must support the following Irdeto CAS STB relevant commands. The reference document is Irdeto's Command Interface guide 18<sup>th</sup> May 2009, Section 3.2 Command Overview and the Service headings are:
  - i. Secure Client
  - ii. Smart card

- iii. Messaging
  - iv. Targeted Messaging
  - v. Parental Control
  - vi. Secure Chip set
  - vii. Smart card pairing and “fingerprinting”
  - viii. Homing Channel
  - ix. Tuning
  - x. Recovery
  - xi. Download
  - xii. Smart card Interface Encryption
- g) The Supplier must participate in Irdeto’s controlled STB environment requirements
- h) The STB must support future Irdeto smart card releases, from the current V6.x to the version existing at the end of life for the STB. The smart card reader must be compliant with ISO7816.

### 1.2.11 STB Security Model

- a) The STB would ship from the Supplier’s factory with the secure chip set pairing fuse blown, the result of this is that the STB will not operate unless it has a paired Irdeto smart card. The smart card has the pairing flag set at personalisation. The result of this is that the smart cards will not operate unless it is paired to a STB.
- b) On arrival in Australia the STB/smart card will not operate until the STB and smart card are paired together via OTA command from the VAST™ head end. Automated systems are in place to enable viewers to self activate their VAST™ services provided they are in a qualified reception area.
- c) To aid installers and or viewers Optus has set up an unencrypted info channel on the VAST™ platform (Channel 800) such that the STB will receive this channel only, prior to activating the smart card. This channel is signalled as the landing channel for the STB. This will verify the RF signal path to the STB is setup correctly.

### 1.2.12 API Requirements

- a) At a minimum, the STB shall meet the relevant requirements of the latest version of the Australian Standard AS4933.1

- b) The STB must be fully compliant with the Australian Freeview Phase 2 Specification and have sufficient memory resources to support its current and future functionality.
  - i. MHEG-5 Middleware.
  - ii. EPG of the Suppliers own choice, (subject to Optus approval) but implemented via the single transponder 8 day EIT stream detailed in this document.
  - iii. DVB-SI.
  - iv. Menu/ Graphic User Interface. MHEG-5 with GUI and Template to be discussed with the Supplier
- c) The STB shall support interactive TV implemented as MHEG-5 services.

### 1.2.13 Over The Air (OTA) Requirements

- a) Ensure OTA downloads need not be sequential i.e. a STB that misses several downloads can be downloaded with the latest version.
- b) Ensure that should a situation occur where the latest download causes unforeseen problems, that a download is immediately available to restore the STB to its previous configuration.
- c) Ensure a STB cannot be left in a “hung” state by an OTA download.
- d) For long term STB disconnects, discuss how the STB can occasionally check the STB’s operating software version number and inform the end user that a version upgrade is required. This assumes that the latest version for that STB is not present on the satellite.
- e) STB downloads shall be possible using the following method:
  - i. Forced downloads using either the GOCODE or SOCODE command from the headend.
  - ii. Viewer initiated from a STB menu command assuming the code on the headend stack is a higher version than is currently in the STB
  - iii. Via USB load and a front panel command. This USB based upgrade shall not circumvent the Irdeto secure loader process.
- f) The Supplier shall ensure that the receiver offered shall only respond to its unique identifier. The STB shall not react to any other ID from any other manufacturer nor react to any other ID from the same company which relates to a different model STB.

## 1.2.14 STB PSI/SI Handling Requirements

- a) The STB shall interpret MPEG-2, DVB Mandatory and DVB optional tables correctly and shall be able to skip over data structures which are currently reserved or which correspond to functions not implemented by the STB.

Platform changes are inevitable. Unless appropriate measures are incorporated in the STB handling of SI information, loss of service(s) could eventuate.

- b) The STB will have PID and section filtering active at all times and targeted at:

- i. Any changes in PAT and PMT version\_number
- ii. Any changes in NIT(actual) version\_number
- iii. Any Changes in SDT(actual) and all SDT(other) version\_numbers
- iv. Any changes in EIT (actual) and all EIT (other) version\_numbers
- v. Any changes in BAT version numbers
- vi. Any changes in TDT/TOT version numbers

- c) The STB shall respond dynamically in real time to PSI/SI changes indicated by updates in table version numbers. When STB channel tuning causes it to change to a different Transport Stream, all PSI/SI shall be re-freshed.

- d) Should issues arise between SI\_actual and SI\_other, all SI shall be re-verified. This operation should be invisible to the viewer.

### 1.2.14.1 Addition or removal of Transport Streams from the Platform

A fact of satellite carriage is the addition of a new Transport Stream (TS) or the need to move Transport Streams to other transponder locations. Hence the STB must provide seamless acquisition of any TS changes.

In order to assist with testing STB behaviour, Optus can provide test Transport Streams.

- a) A STB shall deem there to have been a change in the number of Transport Streams on the Platform when:
  - i. An update occurs in the NIT (actual) bringing with it a different listing inside its transport\_stream\_loop and, after a re-acquisition of SI has been made, a new SDT (other) is found or an existing SDT (other) is lost. Note that inability to acquire a Transport Stream does not constitute that Transport Stream having been removed from a DVB Network as it could be due to transmission problems. The STB should recover from temporary loss of a service/transport stream due to transmission/reception problems.
- b) When a Transport Stream is added to the Platform:
  - i. The STB should indicate the presence of a new Transport stream only if new services are then available to the user.
- c) When a Transport Stream is removed from the Platform:
  - i. The legacy set of services are removed assuming they have not been moved to another multiplexed stream.
- d) When a Transport Stream is moved:
  - i. The STB should seamlessly acquire the new Transport Stream and there will be no changes to the viewer set up of the STB

#### **1.2.14.2 Addition to/or removal of services from a Transport Stream**

A STB shall deem a service to have been added to a Transport Stream if there is an update to the SDT (actual or other) and it's correlating Service List Descriptor in the appropriate Transport Stream loop of the NIT, and it references a new service. The STB shall consider a service to have been removed if there has been no explicit reference to it in any table in any Transport Stream in which that reference was expected for a time out period.

#### **1.2.14.3 Temporary removal of services from a Transport Stream**

- a) This occurs when the service moves to a non-running state. The receiver shall deem that a service is not running if an update is found in the SDT, actual or other, indicating a running status for service of not running.

- b) To prevent faults in SI blocking access to services, the receiver shall use the state of running status in the SDT for information purposes only, and shall attempt to select the service if the viewer requests it.
- c) The chain of events during the change of state of a service from running to not\_running to which the receiver is expected to respond are:
  - i. Removal of the service's entry in the PAT
  - ii. Removal of the services PMT and components from the Transport Stream
- d) The receiver should respond to either event, whichever occurs first. If this happens the receiver should inform the viewer that the service is not running by displaying an appropriate error message.

### 1.2.15 Bouquets/Channel Numbering Support

- a) The VAST™ platform uses bouquets to emulate the geographic limitations on coverage that occurs terrestrially while the terrestrial LCN channel numbering scheme is emulated using bouquet channel numbers. The STB shall support a minimum of 30 bouquets and the STB vendor shall identify to Optus the maximum number of bouquets that could be implemented on their STB.
- b) The Bouquet support mechanism is as per the Irdeto document number 706440 – “Irdeto Defines Private Descriptors Used in DVB Extensions”. This document is a confidential Irdeto document and can be obtained by the Supplier from Irdeto under the commercial terms between the Supplier and Irdeto. Optus can provide details on use of these descriptors on the VAST™ platform.
- c) To enable the VAST™ to support the maximum possible number of channels per bouquet it is required that the STB support up to two instances of the CLMD in the second loop of each BAT. This is required as the maximum number of channels supported by the DVB SLD is 85 services, however each CLMD has a limit of 63 services. Therefore two instances of the CLMD are required to support the full number of 85 services.

Note: The second CLMD shall only be present when the number of channel numbers in a specific BAT is greater than 63. In addition the maximum number of entries for Channel Numbers shall be limited to 85 by the headend.
- d) Bouquet blocking shall also be implemented to enable Optus to restrict the reception of each STB to only those bouquets it is allowed to view as defined by the country code specified on its smart card. The STB

should only display as available for selection the bouquets for which it has the ability to view based upon the country code specified on the smart card.

- e) Once a bouquet has been selected, the STB will only display on the EPG and allow the viewer to select services available in that bouquet. The STB shall also support the use of multiple occurrences of the same DVB triplet on different channel numbers within a bouquet as specified by the Irdeto private descriptor.

### 1.2.16 Landing Channel Support

- a) The VAST™ platform uses a linkage descriptor in the first loop of selected bouquets in the BAT to define a landing channel within selected bouquets. This enables the landing channel to be signalled under head end control. The linkage descriptor is as per 6.2.19 of EN\_300468 and the linkage type is 0x01. The landing channel, when signalled, shall be used when a STB is tuning a bouquet for the first time to specify which channel within a bouquet that is to be displayed. Once the STB has tuned to a channel in a bouquet the last channel viewed shall be held in persistent memory and be used to select the channel displayed after a reset. If no landing channel is signalled for a bouquet the landing channel shall be the lowest numbered channel in that bouquet.
- b) The use of the factory reset function shall clear the channel persistent memory.

### 1.2.17 Single Transponder 8 day EPG

- a) The VAST™ STB shall support the use of a single transponder 8 day EPG, the STB shall tune to that transponder when the EPG is selected and present the EPG. To aid the viewer experience Optus may publish a one or more day EPG in each VAST™ transponder. In this event the STB shall load the available data into the EPG such that when the EPG is selected one or more days data is already displayed and subsequent data is populated as it is received from the full EPG data feed from the single transponder. The channel being watched when entering the EPG should be the first channel selectable from within the EPG.
- b) The head end signals the location (transponder) of the 8 day EPG via a linkage descriptor in the first loop of selected bouquets in the BAT to define an EPG service within each bouquet. This enables the EPG to be signalled under head end control. The linkage descriptor is

as per 6.2.19 of EN\_300468 and the linkage type is 0x02, the BAT declares a radio service with this linkage type, it may or may not include an audio service to be played as background music while viewing the EPG.

- c) Suppliers are to display EPG information correctly when it adheres to the field lengths and modes of operation for the Event Name, Short Event descriptor and Extended Event descriptor that are detailed in OP-44. The STB must pass through event descriptor text without modification i.e. no capitalisation.

### **1.2.18 Disaster Recovery Mechanisms and Alternate Homing Transponder**

- a) The VAST™ STB shall support a mechanism that will recover the STB to a known transponder in the event of the loss of the VAST™ home transponder.
- b) During the scan phase, if the STB could not successfully lock to the Home Transponder for a period of 5 minutes, the STB will attempt tuning to the parameters in the dynamic list obtained previously from the NIT. Each tune attempt should take less than 20 seconds. If the STB cannot lock to any of these transponders, it will proceed to the static (hardcoded) tuning parameters. Once the tuning parameters from both lists have been attempted, it will start the loop again with the Home Transponder first. In the case of the STB having never acquired a NIT, it proceeds directly to the static hardcoded tuning parameters after the 5 minute period.
- c) The dynamic transponder list will be built up in the order contained in the NIT, which Optus can change at will. Apart from the normal VAST™ transponders, any number of other alternate transponders can be added to the NIT in whichever order. Particularly important is to have at least one “emergency” transponder that can be lit up for a worst-case recovery. The static list can consist of these same transponders, since duplicates (appearing both in dynamic and static lists) will be catered for by the software.
- d) This mechanism should provide an effective way to guarantee the VAST™ STB will be able to scan an Optus signal in the event of Home Transponder failure.
- e) A similar algorithm shall be applied for the normal viewing mode. If signal for the current transponder is lost for a period of more than 5 minutes the STB will attempt to tune to the parameters in the dynamic list only. The static list should not be needed here since the STB has already has performed a successful scan and is guaranteed to have the

current dynamic list. Upon receiving a signal on one of the transponders in this dynamic list the STB will remain on the signal long enough to update the SI and then attempt to return to the previously viewed service.

- f) To cater for a Satellite failure and for the STB population to auto acquire a D3 transponder that had not been previously signalled in the NIT the STB should time out after a longer period of time (Optus suggests 1 Hour) from the normal viewing mode above, such that the hard coded transponder parameters are included in the scan routine until a VAST™ service is acquired. In this mode, if a complete C1 failure occurred, and a D3 transponder was not being signalled in the NIT, after 1 Hour the D3 VAST™ DR transponder would be scanned automatically and continue to be scanned until a VAST™ service was acquired.
- g) The hard coded transponders are to be:-

	<b>Transponder</b>	<b>Downlink Frequency (MHz)</b>
i	C1 T2	12367.00
ii	C1 T4	12447.00
iii	C1 T5	12487.00
iv	C1 T7 (Home transponder)	12567.00
v	C1 T8	12607.00
vi	C1 T9	12647.00
vii	D3 T1	11720.50

**Table 6 VAST™ Transponder Frequencies**

### 1.2.19 Mandatory STB Features

To provide a baseline set of features to all VAST™ viewers the following features are mandatory for a STB to gain VAST™ certification:-

- a) The Power cord of the STB shall not be captive in the STB, rather a suitable socket and plug type power cord shall be used.
- b) A front panel hardware based reset button shall be provided, this may be a power on off switch.
- c) The STB shall be upgradeable via a USB port in the STB, this is to provide an upgrade path in the event of a catastrophic event on the

platform that prevents recovery of STB via OTA download. This USB based upgraded shall not circumvent the Irdeto secure loader process.

- d) The Supplier will include at no cost to Optus two paper full colour pamphlets with each STB produced. The format shall be provided by Optus to the Supplier. Changes and or updated to these pamphlets shall be implemented in future STB deliveries with a lag of no more than 10,000 STB.
- e) The STB will indicate a loss of RF on the front panel of the STB.,

### 1.2.20 System Resources

- a) The processing power and memory footprint of the STB must be suitable to meet the performance specifications of this document, the embedded operation of the VAST™ MHEG-5 Profile version, Irdeto's long term CA requirements and the provision for replacement of all software via an OTA download. Typical values are:

i	Flash Memory	128 Mbyte minimum
ii	RAM	256 Mbyte minimum
iii	EEPROM / NVRAM	32 kbyte minimum
iv	CPU Power	120 MIPS minimum

**Table 7 VAST™ STB System Resources**

- b) The Supplier is to ensure memory footprint will meet Irdeto CA OS and Middleware OS requirements for a minimum 7 year term.

### 1.2.21 Menu Settings

- a) Menu access, display information and viewer input will be limited in accordance with a controlled STB environment.
- b) Viewer input parameters / display information and the need for an "Installation Pin number" will be discussed with each the Supplier, to ensure basic common features are included without unduly limiting the features of a Suppliers STB, and will include:

i.	Installation Pin Number	To be specified by Optus
ii.	LNB power	ON / OFF
iii.	Program Parental Blocking Pin	In accord with ACMA Broadcasting and Datacasting Services (Parental Lock) Technical Standard 2010 and Parental Guidance features as defined

		in AS4933.1
iv.	Signal detection	Preference is for an on screen bar graph. Indicators for “Coarse tuning” (Maximum signal strength) and “Fine tuning” (minimum Bit Error Rate) should be provided.
v	View LNB LO frequency	Does not require PIN to view
vi.	Change LNB LO frequency	Requires PIN to change.

### 1.2.22 Interfaces and Connectors

a) At a minimum, the STB shall meet the requirements of the latest version of the Australian Standard AS4933.1 and the Freeview Phase 2 Specification.

b) Front Panel Layout

i.	Display	Supplier to detail
ii.	Status Indicators	Supplier to detail
iii.	Switches	Supplier to detail (Reset or Power switch is mandatory)
iv.	Infra-Red	Supplier to detail
v.	Low power mode	Australian MEPS
vi.	Smart card slot	The smart card slot should be located at the front right of the STB with the smart card chip side facing down when inserted
vii.	Display	Supplier to detail

**Table 8 STB Front Panel Layout**

c) Rear Panel Layout

i.	LNB Input	F-type –Female
ii.	Baseband Video	1 x RCA (CVBS)
iii.	Stereo Audio	2 x RCA (Mono software switchable)
iv.	Component Video	3 x RCA (YPrPb)
v.	Digital Audio	Co-axial or Toslink SPDIF output (both desirable)
vi.	HDMI	HDMI output version 1.3 or later
vii.	USB 2.0	USB Host Type A

viii.	Ethernet	1 x RJ-45
ix.	RS232C	1 x DB9 (female)
x.	Power Jack	Australian Approved, Supplier to detail

**Table 9 STB Rear Panel Layout**

d) Accessories

i.	AV Cable	3 RCA to 3 RCA Video and Audio
ii.	HDMI	HDMI Cable Optional Supplier to detail
iii.	Power Cord	Moulded Australian plug
iv.	User Manual	Supplier to detail
v.	RCU	Supplier to detail
vi.	Batteries	Batteries included, 2 x AA preferred
vii.	Packing carton	2 colour gift box Supplier to detail

**Table 10 STB Accessories**

- e) The STB shall have hardware and connectors implemented for IP, USB and RS232C connectivity. Future software and driver implementation shall be supported by the Supplier for platform features that are introduced within 7 years of the launch of a STB variant at no cost to Optus.

### 1.2.23 TV Display Format Support

The VAST™ network will only carry 16:9 signals. To facilitate display on ‘legacy’ 4:3 displays the STB shall have a simple RCU function to switch display formats between 16:9 full screen 4:3 letterbox and 4:3 centre cut outputs.

### 1.2.24 Australian Regulatory and Safety Requirements

At a minimum, the STB shall meet the requirements of the latest version of:

- a) AS 3000 (note more specific detail to follow)
- b) AS/NZS 62087
- c) Minimum Energy Performance Standards (MEPS) Regulations in Australia
- d) the Australian Standard AS4933.1
- e) The Freeview Phase 2 Specification.

### 1.2.25 Controlled STB Environment

- a) Because of the mandatory adherence to Irdeto's Secure Silicon Chipset policy, only STB's that have been through the certification process will be able to communicate with Irdeto VAST™ smart cards and hence receive scrambled VAST™ services. Pairing of VAST™ smart cards as well as headend knowledge pertaining to VAST™ STBs will ensure this process.
- b) The Secure Loader and the VAST™ STB Operating Software will ensure no end user action can alter satellite and VAST™ Transport Stream acquisition. Access to and linkage with, other operator services shall not be allowed.
- c) Initial and ongoing acquisition of Transport Streams by the STB as well as ongoing interaction with planned changes to the VAST™ platform shall be automatic and will be based on a combination of STB commands, SI handling and Signalling.
- d) The Supplier must agree to the following VAST™ STB code download procedure:
  - i. The compliance centre will test the changes brought about by the revised software and inform the Supplier of its findings. This action will not imply that the compliance centre takes responsibility for that software. This responsibility remains with the Supplier.
  - ii. Optus will provide reasonable capacity on a relevant Satellite Transponder to accommodate the broadcast of new STB code.
  - iii. The compliance centre and the Supplier will perform test downloads of the code into STBs. This will be performed at the Compliance Test Lab and into selected test sites via OTA satellite downloads. The procedure and test parameters will be a "work-in-progress" document with necessary contributions from all parties.
  - iv. The Supplier will be responsible for the suitability of the downloaded software
  - v. The Supplier will be responsible for initiating the download process and any subsequent Customer issues
  - vi. If required, Optus will be responsible for generating the correct headend commands using its Irdeto Access CA system to enable software to be downloaded into STB's designated by the smart card information as supplied by the Supplier

- vii. The Supplier must supply two software versions of software for downloading. The first is to replace the software in a STB and the second will only be used in emergency and will restore the STB to its then current configuration.
- viii. Satellite capacity will be reserved for up to 3 months to target universal reach. The frequency and times of the download enable commands will be subject to agreement by all parties.

## 1.3 Standards and Specifications References

TR: ETSI Technical Report – typically a set of guidelines for the implementation of a more normative specification or standard. A TR is approved by the ETSI Technical Committee which proposes the document.

TS: Technical Specification – a document which can contain normative text, i.e. mandatory text such as “shall”. A TS is approved by the ETSI Technical Committee which proposes the document, and as such might lack some of the weight associated with the following publications. A DVB TS is generally a stepping stone to a more stable document(s).

ES: ETSI Specification – a document approved by the entire ETSI membership, not just the Technical Committee proposing it. It is a more stable document, than either a TR or a TS.

EN: European Standard – the highest ranking ETSI publication approved by the national standards organisations of Europe. An EN is a publication which can be and often is included in European and national legislation.

BLUEBOOK: From time to time, DVB publishes documents approved by its Steering Board: the BlueBooks. In practice, these are commercial requirements documents, policy statements, or technical specifications which are being standardised. In the latter case, DVB has decided that there is value in the rapid publication of draft specifications as BlueBooks, pending their formal standardisation.

Freeview: FREEVIEW Australia Limited is a consortium of Australian commercial and national free-to-air television broadcasters, formed to promote free-to-air digital television broadcasting. For further information regarding FREEVIEW Australia, including technical and licensing information, see the FREEVIEW Australia website: <http://www.freeview.com.au> .

FREE TV AUSTRALIA OPERATIONAL PRACTICES: The Free TV Australia Engineering Committee has been a standing committee of the commercial television industry's representative body since 1965. The Free TV Australia Engineering Committee maintains a number of Operational Practices (OPs), Engineering Guidelines and Recommended Purchase Specifications relevant to analogue and digital television broadcasting.

REFERENCE #	TITLE
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AS 4933.1	Australian Standard: Requirements for receivers
DVB BlueBook A003 Rev. 1 (05/95)	DVB-S User Requirements for Cable and Satellite delivery of DVB Services, including Comparison with Technical Specification
DVB A011	DVB Common Scrambling Algorithm (DVB Bluebook)
DVB BlueBook A082 (07/04)	DVB-S2 Commercial Requirements: Advanced coding and modulation schemes for broadband satellite services
Freeview Phase 2 Specification	Digital Television Receiver Technical Specification Phase 2
EN 300 294	Television Systems: 625-line television Wide Screen Signalling (WSS).Equivalent to ITU-R BT.1119
EN 300 421 V1.1.2 (08/97)	DVB-S Framing structure, channel coding and modulation for 11/12 GHz satellite services
EN 300 468 V1.7.1 (05/06)	DVB-SI Specification for Service Information (SI) in DVB systems
EN 300 472 V1.3.1 (05/03)	DVB-SI Specification for conveying ITU-R System B Teletext in DVB bitstreams
EN 301 192 V1.4.1 (11/04)	DVB-DATA Specification for data broadcasting
EN 301 775 V1.2.1 (05/03)	DVB-SI Standard for conveying VBI data in DVB bitstreams
EN 302 307 V1.1.2 (06/06)	DVB-S2 Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications
ETR 289	Digital Video Broadcasting (DVB); Support for use of scrambling and Conditional Access (CA) within digital broadcasting systems
ISO/IEC 11172-2	MPEG-1 Standard for Video
ISO/IEC 11172-3	MPEG-1 Standard for Audio

ISO/IEC 13818-1	Generic Coding of moving pictures and associated audio information: MPEG2 Systems
ISO/IEC 13818-2	Generic Coding of moving pictures and associated audio information: MPEG2 Video
ISO/IEC 13818-3	Generic Coding of moving pictures and associated audio information: MPEG2 Audio
ISO/IEC 14496-3	Advanced Audio Coding. MPEG-4
ISO/IEC 14496-10	Advanced Video Coding. H.264 is a standard for video compression and is equivalent to MPEG-4 Part 10 or MPEG-4 AVC
ITU-R BT.470	Characteristics of Conventional Television Systems
ITU-R BT.709	Parameter values for the HDTV standards for production and international programme exchange.
ITU-R BT.1119-2	Wide-Screen Signalling for broadcasting (Signalling for wide-screen and other enhanced television parameters). Equivalent to EN 300 294
OP-42	Distribution, Transmission and monitoring of closed captions on line 21/334
OP-44	Implementation Guide for DVB EIT present/following Information (EITp/f)
TR 101 202 V1.2.1 (01/03)	DVB-DATA Specification for data broadcasting; Guidelines for the use of EN 301 192
TR 101 211 V1.7.1 (02/06)	DVB-SI Guidelines on implementation and usage of Service Information (SI)
TR 101 290 (V1.2.1)	DVB: Measurement Guidelines for DVB Systems
TR 102 376 V1.1.1 (02/05)	DVB-S2 User guidelines for the second generation system for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications
TS 101 154 V1.7.1 (06/05)	DVB MPEG Implementation guidelines for the use of MPEG-2 Systems, Video and Audio in satellite, cable and terrestrial broadcasting applications
TS 101 197	DVB: Head-End implementation of DVB Simulcrypt
TS 102 006 V1.3.1 (05/04)	DVB-SSU Specification for System Software Update in DVB Systems
TS 102 154 V1.2.1 (05/04)	DVB-MPEG Implementation Guidelines for the use of MPEG-2 Systems, Video and Audio in Contribution Applications

TS 102 323 V1.2.1 (11/05)	DVB-TVA Carriage and signalling of TV-Anytime information in DVB transport streams
TS 102 366	Digital Audio Compression (Enhanced AC-3)
TS 102 823 V1.1.1 (11/05)	DVB-TVA Carriage of synchronised auxiliary data in DVB transport streams

**Table 11 Standards and Specifications**