



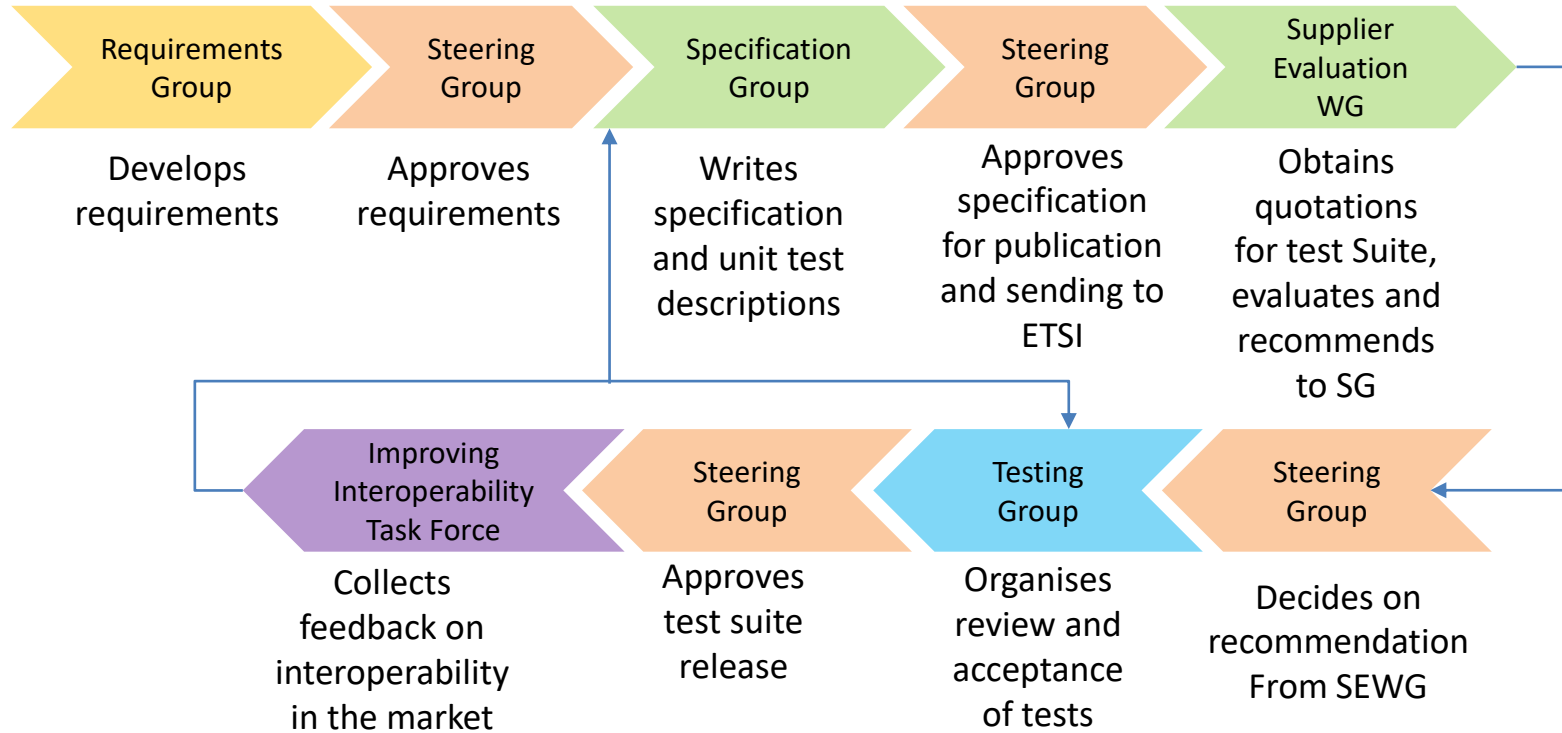
Update on our Specifications and Related Activities

Jon Piesing

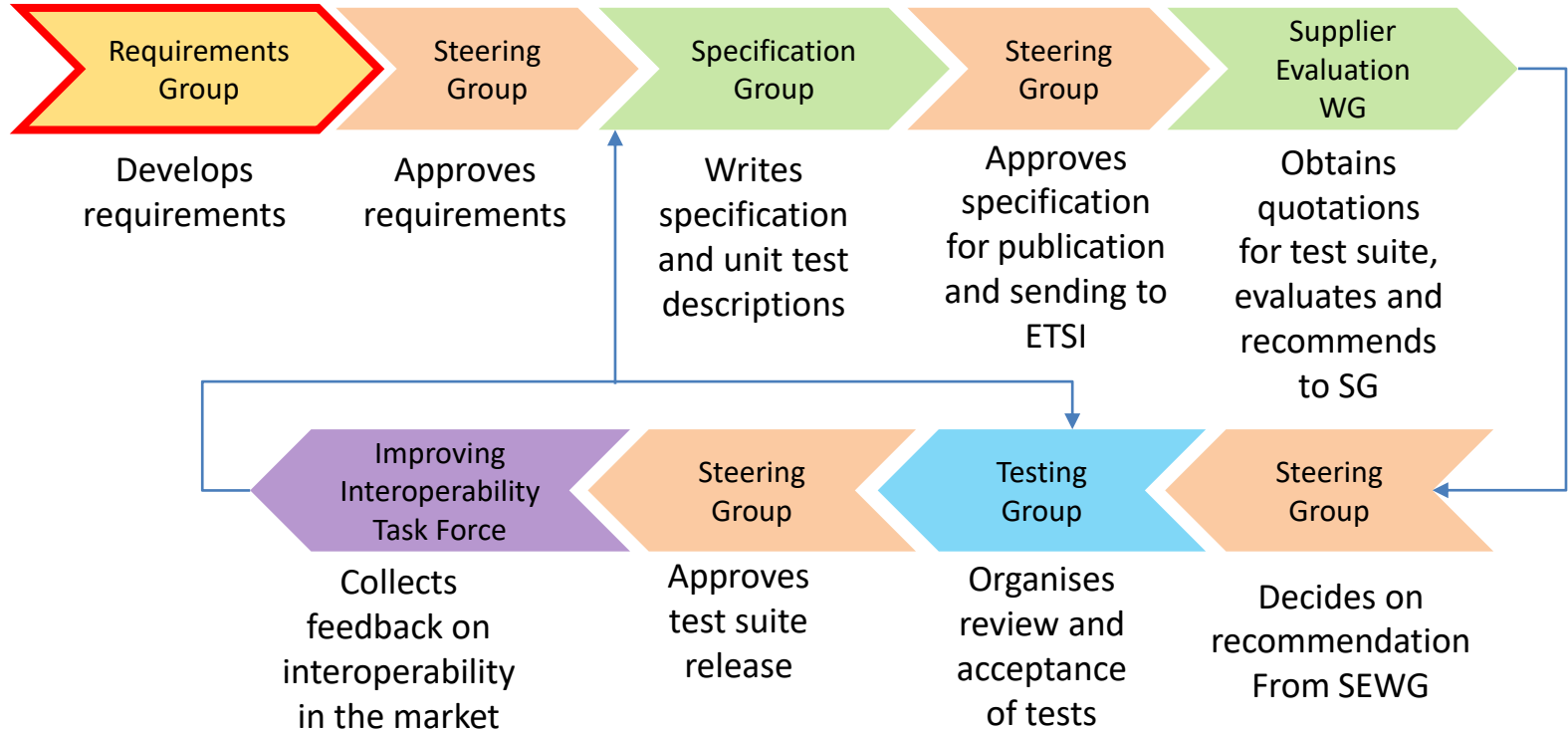
Vice-Chair HbbTV Association & Director Standardisation TP Vision



HbbTV Specification Workflow

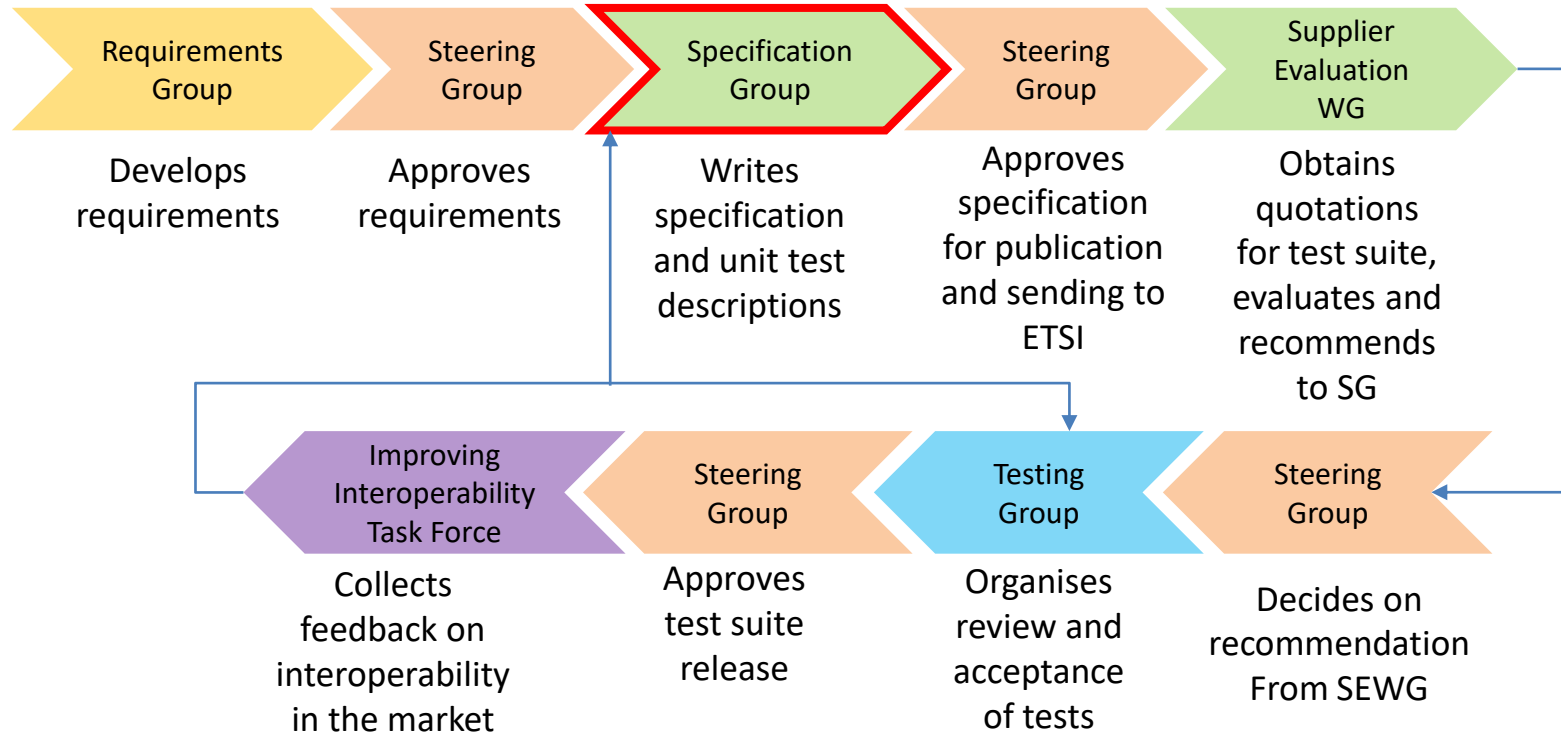


HbbTV Specification Workflow



- Annual process to identify new requirements with support across the value chain
 - Broadcasters, operators / platforms and manufacturers
- 2020 and most 2021 requirements are included in HbbTV 2.0.4/1.7.1
 - Details are in the Specification Group section up next
- Just launched a new call for requirements ...
Have you features that you would like to see in HbbTV and are not included in HbbTV 2.0.4? Do you have feedback from your deployments, clients, customers about improving features already in HbbTV specifications? We'd like to hear from you to shape the future of Hybrid TV using HbbTV.
- Requirements Group co-chairs are Peter Macavock (EBU) and Richard Moreton (Samsung)
 - As they're not here, feel free to discuss with Vincent Grivet or myself

HbbTV Specification Workflow



Core HbbTV Specification



Informal Name	Formal Name	When?
1.0	TS 102 796 V1.1.1	2010
1.5	TS 102 796 V1.2.1	2012
2.0	TS 102 796 V1.3.1	2015
2.0.1	TS 102 796 V1.4.1	2016
2.0.2	TS 102 796 V1.5.1	2018
2.0.3	TS 102 796 V1.6.1	2021
2.0.4	(subject to ETSI approval) TS 102 796 V1.7.1	2023

HbbTV 2.0.4 / 1.7.1 Feature Reminder

Feature	Summary
Accessibility	Allow apps to 1) query TV OS accessibility support & settings and 2) ask TV to disable accessibility support if app can do better.
Voice	Allow app to tell TV what voice inputs the app can handle & allow the TV to provide those to the app.
Usage of HbbTV in DVB-I	Support HbbTV "red button" apps on broadband delivered channels
Audio Mixing Enhancements	Better support for mixing broadcast audio and app originated audio
Media Playback Metrics (MSE)	Provide data to apps on dropped frames
Analytics reporting on exit from HbbTV apps	Enable apps to schedule data to be written on exit (standard web API)
Partial deprecation of A/V control object	Deprecate any unused parts of the A/V control object, particularly ones that are difficult to "polyfill" on HTML5 video element
Web standards update (*)	Update web standards from 2018 to 2021.
IPv6 (*)	Optional
Better graphics > 720p (*)	Optional. Define how an app can indicate it supports graphics > 720p.
Suspend & resume of apps (*)	Define how an app can detect if it has been suspended/resumed (suspend/resume is optional)

(*) = 2021 requirement brought forwards to 2.0.4

- Document is stable
 - Small changes are being made based on feedback received
- HbbTV only publishes specs when unit test descriptions are reviewed & approved
 - The only practical way to get the resources to create them
 - Also a test that a feature proposed 2-3 years ago is still relevant today
 - Features will be removed if nobody finds resources
- Unit test descriptions in review
 - 249 written
 - No more are expected right now but review may find gaps
 - 90 are approved so far
 - Another 56 have passed 1 review and are waiting for the 2nd
- When will it be published?
 - Whenever all the unit test descriptions are reviewed and approved
 - Hopefully before the year end but it depends on volunteers contributing time

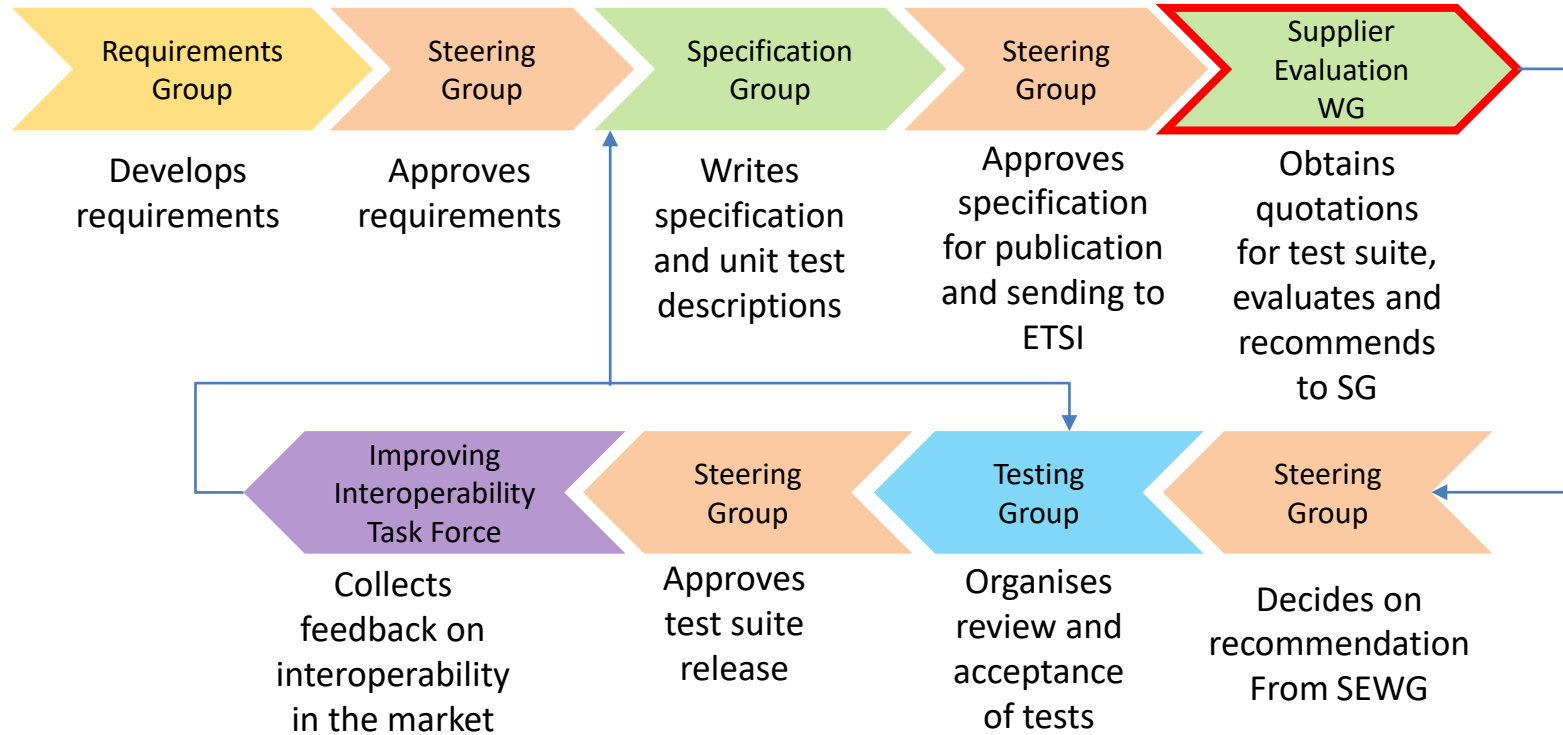
- Learning lessons from HD+, M7, Zattoo & other OpApp deployments
 - Many small but important details needed for the concept to work
 - Like to thank HD+ and their supplier Yotta Media for their input
- New features
 - Link OpApp with CI+ CA module
 - User inserts module into TV, OpApp is installed
 - Better support for OTT services
 - Streaming OTT content using JavaScript media player library in the OpApp
 - Discovery of OTT services done by the OpApp and not the terminal
 - Running regular broadcast-related apps when either or both of these apply
- Work in progress
 - Lots of work done but plenty more still to do

- [Application Discovery over Broadband \("ADB"\)](#)
 - Version 1.2.1 ("ADB phase 2") defined how to add watermarks to broadcast video and audio to run HbbTV apps in TVs getting broadcast via HDMI from a STB
 - Version 1.3.1 adds integration between ADB and TA
 - Now stable - Waiting for more deployment experience
 - See RTL and Verance presentations in the TA panel yesterday
- [IPTV](#)
 - No activity
- [TA](#)
 - Internal update available that fixes bugs, no new features
 - Not yet a plan for publication
 - Now stable - waiting for more deployment experience

- Next generation video codecs
 - Define how new video codecs like VVC, AVS3 and AV1 can be used with HbbTV
 - Timing is uncertain
 - Controversy around AV1
- DRM guidelines
 - Reduce the occurrence of DRM as a problem for HbbTV service deployment
 - Guide platforms through deployment of services using DRM with HbbTV
 - Inform platforms about choices that need to be made
 - Provide platforms with clearer DRM options they can reference
 - The first step in a journey, avoid / defer things likely to be particularly controversial
 - Won't try to be a perfect solution or solve all problems at once
 - Example illustration of possible table of contents on the next slide

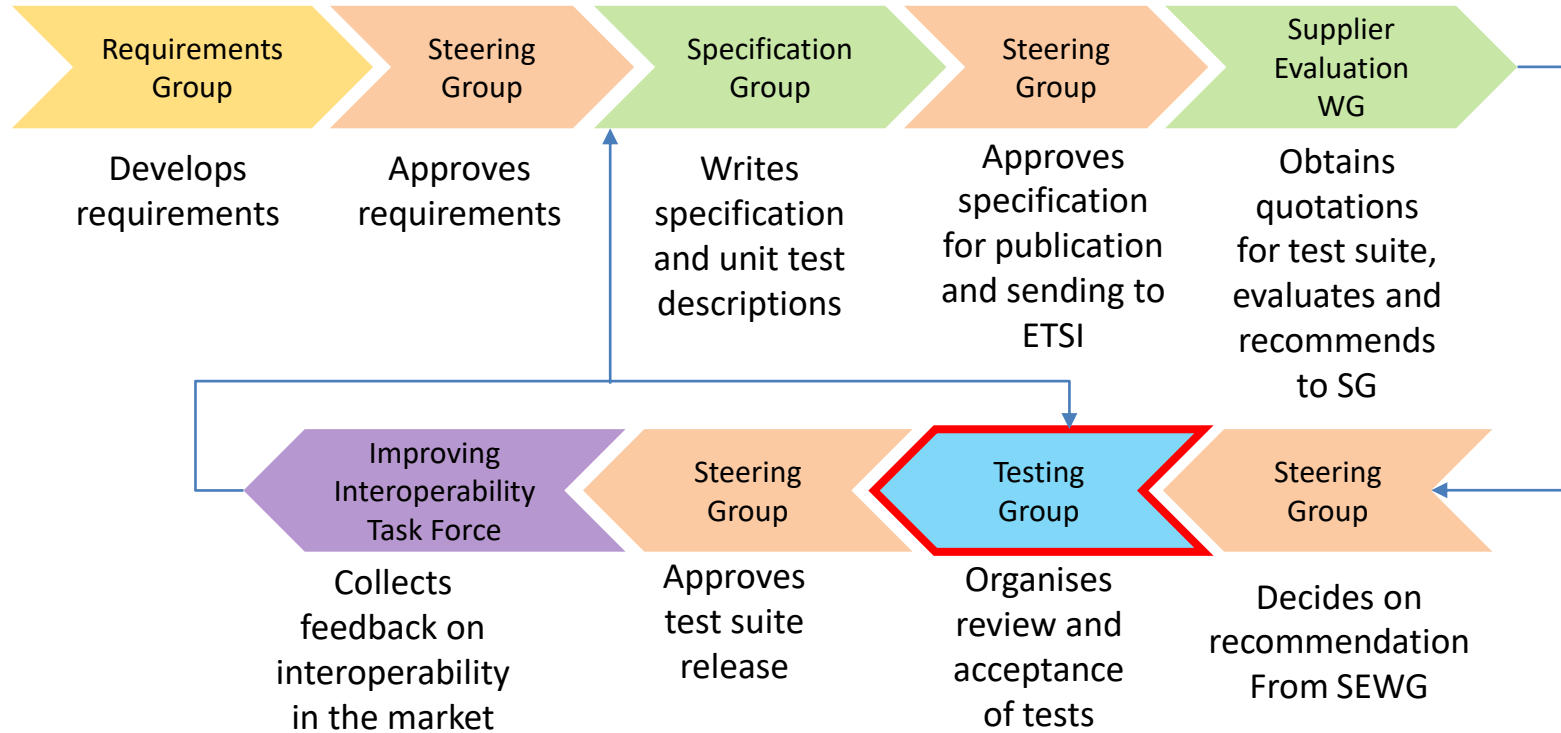
- Introduction
- DRM features
 - Basic features
 - Common encryption & multi-DRM
 - Advanced features
 - Persistent licenses
 - Key rotation
 - Hardware DRM / trusted execution environment / security levels
 - Transitioning encrypted content to unencrypted & back
 - (Native) DASH player integration
- DRM APIs
 - oipfDrmAgent
 - EME
- Guidelines for platforms and operators
 - Identify what content protection obligations apply to which content
 - Deciding what is (really) needed for their services & market
 - Clearly documenting their requirements
 - Communicating with manufacturers
 - Testing
- State of the installed base
 - Overview of results from running the reference app on real TVs
- Criteria for adding DRM systems to the guidelines
 - Existence proof of implementation with HbbTV
 - Unit tests
 - Publicly available documents
 - Inclusion in DASH-DRM reference app
 - Mutually acceptable commercial terms for DRM license server access
- Annex A – PlayReady
 - References to key documents about PlayReady
 - Cross reference DRM features from above with PlayReady documents where possible
 - Versions of PR
 - Optional features
- Annex B – Widevine
 - As per PlayReady
- Annex C – Marlin
 - Subject to contributions from someone motivated
- Annex D
 - Reserved for the next DRM system to be included

HbbTV Specification Workflow

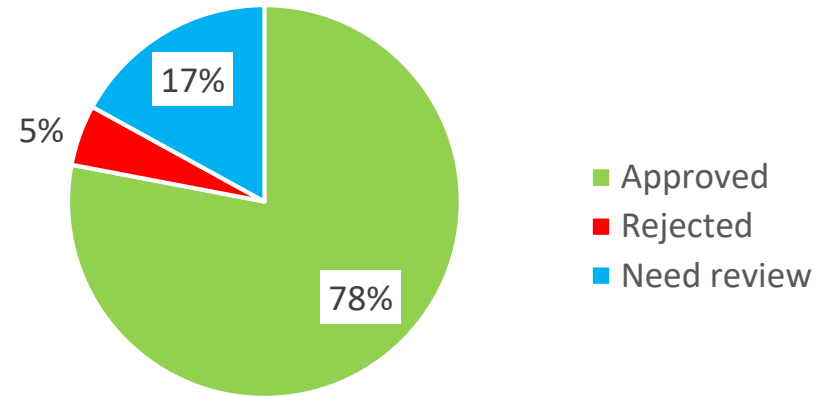


- Group is waiting for 2.0.4 test case RfP to be issued
 - RfP is being prepared in the Licensing Group
 - Waiting for the unit test descriptions to be completed
 - Please see Nigel Moore or Stuart Savage if you're interested

HbbTV Specification Workflow

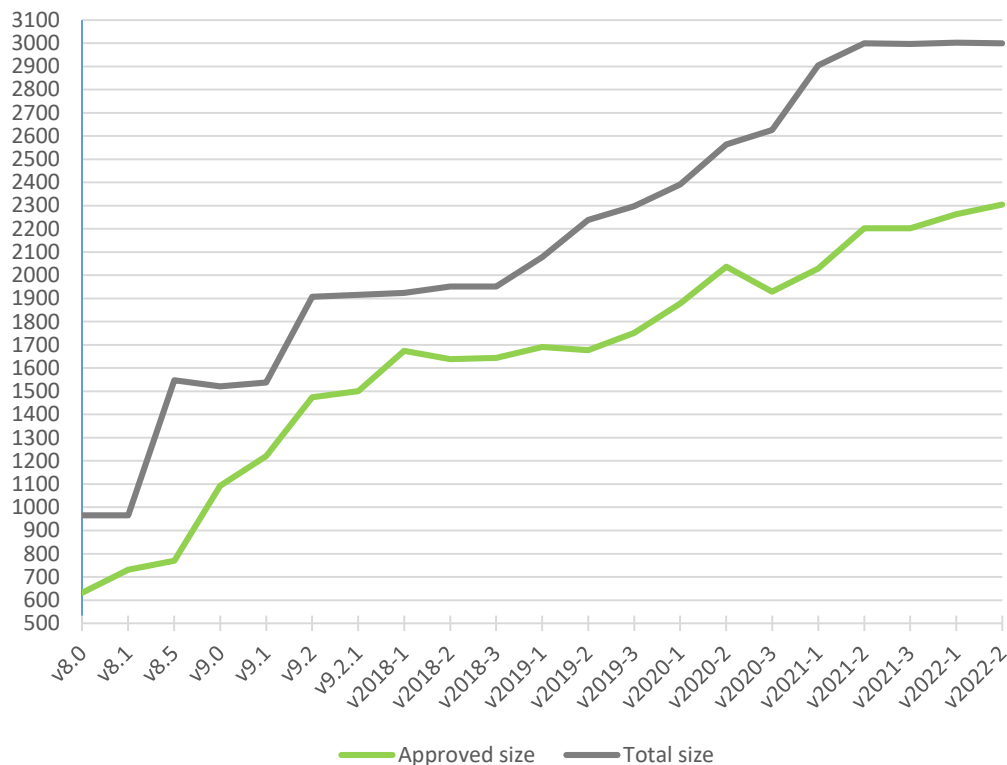


- The test suite for TVs and STBs implementing HbbTV is a key achievement of the Association.
- With many independent implementations, if something's not tested, it won't work – at least on some of them.
- Balancing coverage, availability and quality of tests needs a lot of care and attention.
- Well done Van, Rob and the other participants in the HbbTV Testing Group.



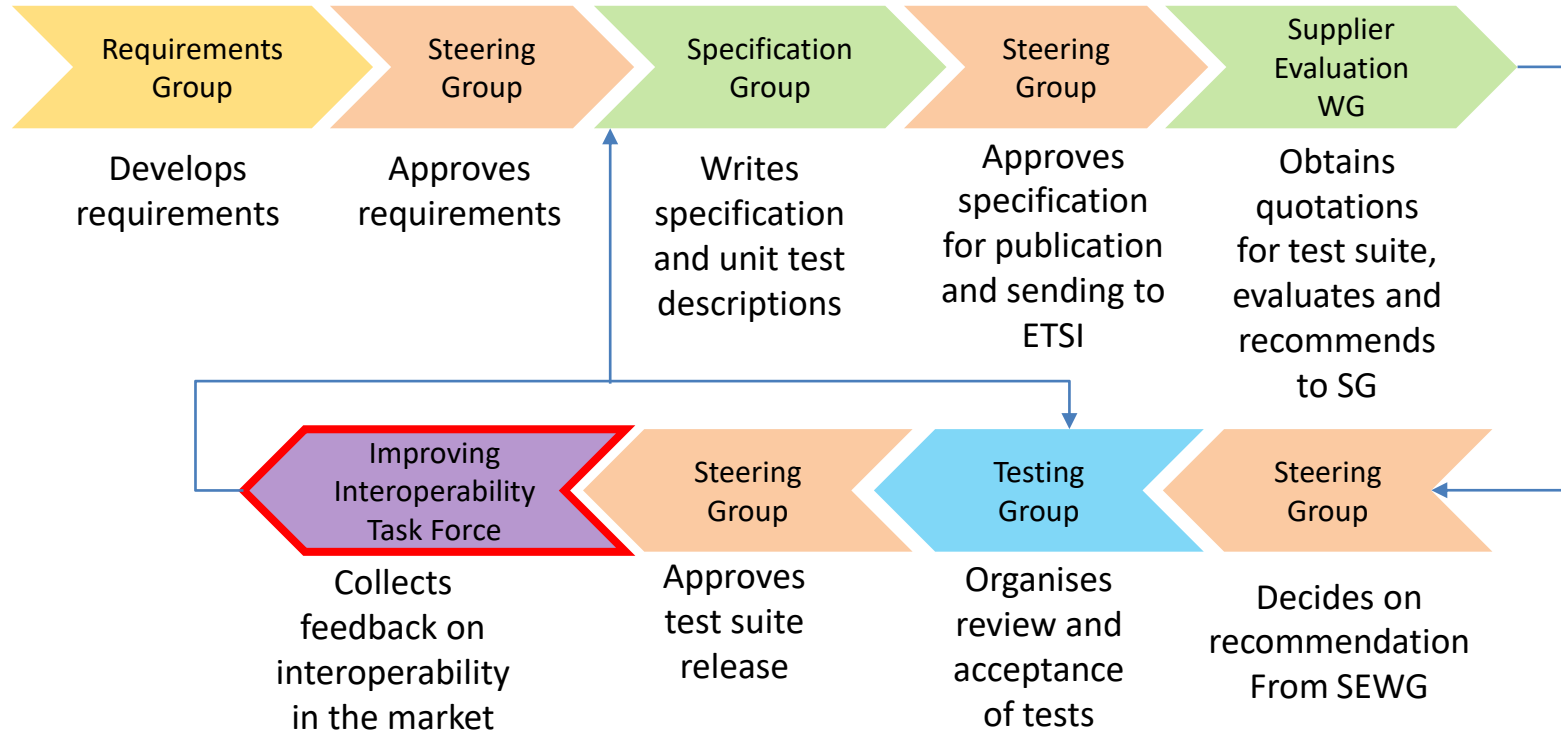
Test suite progress

Name	Approved size	% approved	Total size	Total size with Nordig & OIPF B	Date
v8.0	632	65%	966	966	31.07.2015
v8.1	731	76%	965	965	11.02.2016
v8.5	770	50%	1548	1548	31.08.2016
v9.0	1092	72%	1521	1715	31.10.2016
v9.1	1221	79%	1538	1791	16.01.2017
v9.2	1474	77%	1908	2102	20.07.2017
v9.2.1	1500	78%	1916	2110	17.11.2017
v2018-1	1674	87%	1924	2118	23.03.2018
v2018-2	1639	84%	1952	2146	04.07.2018
v2018-3	1644	84%	1951	2146	11.11.2018
v2019-1	1691	81%	2079	2274	15.03.2019
v2019-2	1677	75%	2239	2434	23.07.2019
v2019-3	1751	76%	2297	2492	12.11.2019
v2020-1	1879	79%	2391	2586	11.03.2020
v2020-2	2037	79%	2564	2759	13.07.2020
v2020-3	1929	73%	2626	2821	16.11.2020
v2021-1	2029	73%	2768	2963	26.03.2021
v2021-2	2202	79%	2799	3000	13.07.2021
v2021-3	2202	79%	2796	2997	17.11.2021
v2022-1	2263	81%	2801	3002	11.3.2022
v2022-2	2304	82%	2799	3000	14.7.2022



- Continual churn of challenges to existing test cases
 - Need to be analysed, fixed & fixes reviewed
- Review and acceptance of new tests, e.g. 2.0.4
- Integration of tests using W3C test runner
 - *W3C web platform tests*; Working on prioritising a few hundred tests as there are (far!) too many to include all
 - *CTA WAVE MSE media playback tests*; Finalise review of AVC test streams and code ahead of formal release
 - These should both be included in the HbbTV Test Suite during 2023
- Push OpApp and TA tests through to "Approved"
 - Never approved OpApp tests need reviewing & resulting issues fixing
 - Challenged TA tests need fixing & re-reviewing

HbbTV Specification Workflow



- [DASH-DRM reference app](#)
 - HbbTV pays for the app to be created and run in a representative receiver zoo
 - 2017: 10 models, 2018: 8 models, 2019: 11 models, 2020: 14 models, 2021: 14 models, 2022: 13 models, (2023: 5 models)
 - HbbTV gets anonymised results showing how well the various tests are supported
 - Illustrates the importance of conformance regimes that are on the table for this afternoon
 - Recent extensions in the ['staging' instance](#)
 - Multi-Period DASH - 7 different variations
 - PlayReady SL3000
 - New features in the ['testing' instance](#)
 - 'cbcs' encryption (PlayReady 4.x and Apple)
 - Widevine
 - Still pending are key rotation and persistent licenses
- DASH validator re-architecting
 - Joint project with ATSC, CTA-WAVE, DASH-IF and DVB
 - Improving robustness, reliability, a better starting point for future extensions
 - Will be possible to integrate in workflows

1080p

6.1 Live multiperiod

1080p

6.4 Live (Simple, Playready)

1080p

6.7 Static, gaps in subtitles (Play..

1080p

6.2 Live multiperiod (Playready)

1080p

6.5 Live, gaps in subtitles (Playre..

1080p

6.3 Live multiperiod (Simple)

1080p

6.6 Static, gaps in subtitles (Play..

Model year	Index	HbbTV	DRM ID	DRM	Subtitles	Audio Switch	Ad insertion	Live	Multiperiod (MSE-EME)	SL3000 (OIPF)
2020	66	1.5.1	Playready	OK	OK	OK	OK	NOT OK	OK	NOT OK
2020	68	1.5.1	Playready	OK	OK	OK	OK	NOT OK	OK	OK
2020	70	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK
2020	71	1.5.1	Playready	OK	OK	OK	OK	OK	OK	NOT OK
2020	74	1.5.1	Playready	OK	OK	OK	OK	OK	OK	NOT OK
2020	75	1.2.1	Playready	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2020	76	1.5.1	Playready	N/A	NOT OK	NOT OK	NOT OK	OK	OK	OK
2020	77	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK
2020	78	1.5.1	Playready	OK	NOT OK	NOT OK	OK	NOT OK	NOT OK	NOT OK
2020	81	1.5.1	Playready	OK	OK	OK	OK	OK	OK	NOT OK
2021	83 / 84	1.5.1	Playready	OK	N/A	N/A	N/A	OK	OK	OK
2021	86	1.5.1	Playready	OK	NOT OK	OK	NOT OK	OK	OK	NOT OK
2020	89	1.5.1	Playready	OK	OK	OK	NOT OK	OK	OK	NOT OK
2021	90	1.5.1	Playready	OK	OK	OK	OK	OK	OK	NOT OK
2020	91	1.2.1	Playready	OK	NOT OK	NOT OK	OK	OK	N/A	NOT OK
2021	95	1.5.1	Playready	OK	OK	OK	OK	OK	OK	NOT OK
2021	97	1.5.1	Playready	OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	OK
2020	98	1.5.1	Playready	OK	OK	OK	NOT OK	OK	OK	OK
2021	101	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK
2021	105	1.5.1	Playready							
2021	106	1.5.1	Playready	N/A	NOT OK	NOT OK	NOT OK	OK	OK	NOT OK
2021	107	1.5.1	Playready	OK	OK	NOT OK	OK	OK	OK	NOT OK
2021	109	1.5.1	Playready	OK	NOT OK	OK	OK	OK	OK	OK
2021	110	1.5.1	Playready	OK	NOT OK	NOT OK	OK	OK	OK	NOT OK
2022	111	1.6.1	Playready	OK	OK	NOT OK	NOT OK	OK	OK	NOT OK
2021	112	1.5.1	Playready	OK	NOT OK	NOT OK	NOT OK	OK	OK	OK
2022	113	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK
2022	114	1.5.1	Playready	OK	OK	OK	OK	OK	NOT OK	OK
2021	116	1.5.1	Playready	OK	NOT OK	OK	NOT OK	NOT OK	OK	NOT OK
2021	117	1.5.1	Playready	OK	NOT OK	OK	NOT OK	OK	OK	OK
2021	118	1.5.1	Playready	OK	OK	OK	NOT OK	OK	OK	NOT OK
2021	120	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK
2022	123	1.5.1	Playready	NOT OK	NOT OK	NOT OK	NOT OK	OK	OK	NOT OK
2022	124	1.5.1	Playready	OK	NOT OK	NOT OK	NOT OK	NOT OK	OK	NOT OK
2022	125	1.5.1	Playready	OK	OK	OK	OK	OK	NOT OK	OK
2022	126	1.5.1	Playready	OK	OK	OK	OK	OK	OK	OK

- If your company is an HbbTV member, please come & participate in the working groups and task forces
- If your company is not an HbbTV member & you see something interesting or important, please join and participate