# VIDAA

### **WebApp Development Technical Guide**

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Revision 2.3.5

### VIDAA USA Inc.

### **Revision History**

Revisio n	Changes	Issued Date
0.1	Initial version	11/15/2016
1.0	Change for MSD6586 platform	02/10/2018
1.1	<ol> <li>check the ability of 6886 and update</li> <li>add the method of setup new app</li> </ol>	04/16/2019
1.4	<ol> <li>Add the method of enable the remote debug function</li> <li>Add the media ability and DRM system version</li> <li>Add difference CPU architecture</li> </ol>	05/16/2019
2.0	<ol> <li>Highlight platform ability</li> <li>Adjust tables of contents</li> <li>Add multi-platform contents</li> </ol>	24/10/2019
2.2	<ol> <li>Add 5655/57 webengine</li> <li>Add CPU/GPU/Memory and other data of each platform</li> <li>Add new support key</li> <li>Modify DRM version</li> </ol>	11/11/2019
2.3	<ol> <li>Adjust HDR interface</li> <li>Modify 5658/5659 debug mode</li> <li>Add useragent specification for VIDAA U4</li> <li>Modify latest system architecture</li> <li>Add MT9602 Platform</li> </ol>	02/12/2020
2.3.1	<ol> <li>Modify how to enable debug mode on 5658/5659 platform</li> <li>Add webengine &amp; UA on MT9602 platform</li> <li>Add how to enable debug mode on MSD6886U4 platform</li> <li>Modify how to enable debug mode on MSD6886EU U3 platform</li> <li>Add buttons that suggest APP to enhance user experience</li> <li>Remove the requirement for APP access to API</li> </ol>	03/02/2020
2.3.2	<ol> <li>Modified the method of opening debug tools on the U4 platform (applicable to MSD6886EU and 9602), now you can open devtools without serial cable.</li> <li>Modified the keymap, added recommended keys</li> <li>Added the security content in the DRM spec to the performance optimization section and the user experience section.</li> <li>Modified API of hisense_getdeviceid, The return value is more accurate.</li> <li>MT9602 platform hardware parameters are now accurate.</li> </ol>	03/16/2020
2.3.3	<ol> <li>Added two new keys, OTT Apps can use them.</li> <li>Added Playready+DASH examples.</li> <li>Modified the keymap added keys that MUST be implemented.</li> <li>Added feature guide to close the app using the back key.</li> <li>Added flash drive requirements for firmware upgrade.</li> <li>Modified the firmware name of the MSD6886 platform for unifying with the MSD6886 U4 platform.</li> </ol>	04/16/2020
2.3.4	<ol> <li>Modified and Added recommended video profiles.</li> <li>Modified DRM spec.</li> <li>Added 4k&amp;hdr support.</li> <li>Added Exit feature demand.</li> <li>Added H5 feature online search website.</li> </ol>	05/22/2020

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	6.Updated WebGL requirements.	
225	1.Added VKB control feature.	06/23/2020
2.3.5	2. Modified how to enable devtools on U4 mass production	00,23,2020

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### **1 System Overview**

### 1.1 Introduction

This document provides a detailed technical introduction on HTML5 application (app) development for the VIDAA TV.

This document outlines the platform functionalities and provides guidelines on how to develop Web APP for VIDAA TV.

This document is targeted for an audience who are interested in understanding the technical details surrounding web app development for VIDAA TV. It is assumed that the target audience is familiar with basic HTML5 technologies.

The keywords "**MUST**", "**MUST NOT**", "**SHOULD**", "**SHOULD NOT**", and "**MAY**" in this specification are to be interpreted as described in RFC2119. An abridged list is included below for reference:

- MUST This word, or the terms "REQUIRED" or "SHALL", mean that the definition is an absolute requirement of the specification.
- SHOULD This word, or the adjective "RECOMMENDED", mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed against the negative impact on the end-user experience.
- MAY This word, or the adjective "OPTIONAL", mean that an item may or may not be implemented at the discretion of the implementer.

### **1.2** Architecture Overview

The following figure illustrates the architecture of VIDAA Platform. VIDAA platform is a Linux based system that is divided into several architectural layers. The supporting layers include the operating system (OS), driver and middleware layers. The upper layer consists of the application and application framework layer. This document will discuss the upper layers in further detail.

VIDAA platform provides rich media playback functionalities including play, pause, stop and scaling. Various streaming protocols including HTTP\HLS\DASH\MSS are supported by the media player plugin module. It also has a DRM manager to manage digital rights and a streaming manager to control the stream.



### 1) Web App Framework

The web application (app) framework allows developers to use HTML5 and related web technologies to develop apps that run on the VIDAA platform.

It is a browser-based environment that supports standard HTML5, CSS, Javascript, Javascript Library(e.g., jQuery), UI Framework(e.g., Bootstrap), Javascript Framework(e.g., Vue, Angular) as well as some VIDAA proprietary System API that enables developers to enrich their app's functionality. These proprietary Javascript APIs are described in section VIDAA System API.

### 2)Apps

VIDAA platform supports two types of applications; web-based applications(hosted app, recommended) and native applications.

The hosted app is executed by the URL with the web app framework on your TV. The hosted app downloads app resources from a remote server and displays them on your TV.

Because hosted (server hosted) web apps reside on a web server, you need to consider connectivity to a remote webserver to serve the content of the apps successfully. However, you can update them at any time without having to worry about pushing updates to the TV.

### 3)Launcher

The Launcher Screen provides information about access to apps, connected devices, content search, and recommendation.

When the Web APP is developed and submitted, your app will be preset to the VIDAA system or stored in the APP Store, according to different cooperation agreements. Users can install APPs from the APP Store to the Launcher. Users can choose to launcher your APP from Launcher, search or according to the recommended content provided by the system. For more information about the recommendation and deep-link, please refer to Metadata Integration Specification.

### 2 Quick Deploying

This section just shows how to quickly deploy the web app to the real TV for validation under existing web app, for more instructions on how to developing and debugging, please *refer to <u>Chapter 9</u>*. *Debugging and Deployment*.

- 1) Open the browser and input: hisense://debug in address bar, then enter
- 2) Input the name, URL and icon(optional), then click install. A keyboard here is recommended to make your operation convenient. Once the "INSTALL" button is clicked, the information above is submitted and the application is installed, The right area as bellow shows some information of the debug platform that may be critical to the developer, you can operate more correctly with it.
  - a) The "**Installed Apps**" selector shows the items of the apps one has installed by the debug platform. If one has never installed some apps, this item shows null. You could not input anything in this section.
  - b) The "**App Name**" item indicates that one must input the app's name he has developed, which is necessary for installation. So one should not leave this input null.
  - c) The "**Thumbnail**" (optional)represents the icon of an app on the launcher of the TV. It must be filled in the format of a URL like www.hisense.com/logo.png which shows the source of the image used as the icon.
  - d) This "**IconSmall**" (optional)and "**IconLarge**" (optional) items also needs an "URL-format" input individually for the use of some interactive scenario. When one of these items is neglected, a default image (as the illustration below) is provided to finish the installation, which is as same as the "Thumbnail" item.
  - e) The "**App Url**" input box is also necessary and must be input in the format of a URL. More importantly, this URL should start with "http" or "https" which, once violated, could not start an application. The developer should believe in this rule and recognize it as the most important. The "App Url" indicates the location of the application the developer will install, so this input box should be filled inaccurately.
  - f) The "**Resolution**"(720 default) item indicates that the resolution of an app, if your app is designed for FHD resolution, please select 1080, otherwise 720(HD).
- 3) Press the 'Exit' button on remote and press the 'apps' button to the apps page and enter the application at the bottom.
- 4) If everything is ok, you can see your Web APP on the TV screen.
- 5) You can find the web app installed on the launcher-apps, also you can uninstall the application by pressing the red key of remote controller.

Installed Apps	
,	
*App Name	
Thumbnail	
IconSmall	
IconLarge	
*App Url	
*Resolution 720 •	
INSTALL	

### 3 Web Engine

A web app on the VIDAA platform runs within a browser engine based on Chromium. Almost all Chromium features and Chromium supported web standards are available to app developers. The developer should keep in mind, a TV will have limitations, normally without a keyboard, mouse and/or touch screen support. TVs also tend to have a slower CPU and less memory (RAM) compared to a typical PC, tablet or handset.

SoC version	Region	Release Year	Web Engine
MT5655/5657	ALL	2015~2016	Opera core(Presto 2.12)
MT5658	ALL	2016-2017	Opera core(OMI/4.9 Martell-2.312 Chromium 53)
MT5659	ALL	2017-2018	Opera core(OMI/4.11 Martell-3.103 Chromium 53)
MSD6586	ALL	2017-2018	Opera core(OMI/4.9 Martell-2.312 Chromium 53)
MSD6886	AU	2019-2020	Odin core(Chromium 57)
MSD6886	EU	2019	Sraf core (Chromium 47)
MSD6886	EU	2020	Opera core(OMI/4.20 Chromium 77)
MT9602	ALL	2020	Opera core(OMI/4.20 Chromium 77)

The following table shows web engine versions depending on VIDAA chipset versions:

### 3.1 Features

VIDAA Platform implements the VIDAA browser engine, which is based on WebKit as an application programming environment for content providers and content aggregators. The supported features are listed in the following list.

- HTTP,HTTPS
- HTML 4.01 5.0
- XML\XSLT\XPath\XHTML 1.0/1.1
- CSS 2.1 3
- Video & Audio
- Track & Media
- Web Messaging & WebSocket
- Canvas & SVG
- Javascript 1.6 and above
- AJAX
- JSON
- History
- Cookies & Storage
- offline web applications
- WebRTC (software decoding)

Below is a list of browser features that are not supported by VIDAA platform and apps for the VIDAA platform MUST NOT rely on. This list is not intended to be exhaustive or exact but highlights some important exclusions. There may be other features that are unavailable or have limited functionality compared to a desktop or mobile browser.

- Adobe Flash
- Audio Output Device API

- Device Orientation
- Downloaded Plug-ins (including NPAPI and PPAPI)
- Drag and Drop Directories
- Extensions
- FTP
- Geolocation
- High-Resolution Timestamp
- JavaScript dialogs
- Password manager
- Pointer Events
- Touch Events
- Vibration API
- Web Audio
- Web Notifications
- WebRTC (hardware decoding)
- JAVA
- Files

Any use of pop-ups windows or dialogs is prohibited for VIDAA TV WebApp and are blocked by the VIDAA.

To assess web standards compliance and the availability of a particular feature you can check these online resources:

- "Can I Use" (<u>http://caniuse.com/</u>)
- "Chromium Platform Status" (<u>http://chromestatus.com/</u>)

Look for the Chrome (Chromium) version in Specification and Software versions above.

Refer to Chapter 10. W3C/HTML5 standard for VIDAA Platform for detailed instructions.

### 3.2 Cookies

The maximum number of cookies stored in the MSD6586/6886 platform database is set to 2000, each using a maximum of 4096 bytes. An app MAY use up to 180 cookies per domain and each cookie will be available for minimum 30 days.

### 3.3 Temporary and Persistent storage

App developers must be aware that VIDAA TVs have very limited storage capacity.

An app SHALL NOT rely on Persistent Storage Quota request when using the Quota Management API.

Note that the Chrome 'unlimited storage' permission is not available to VIDAA TV apps.

### 3.4 User Agent

For VIDAA platforms, there are at least one "Hisense" (2019 or earlier) or "VIDAA" (2020 or later) keywords. The rest is changing, such as the SDK version of the chrome kernel version, model, and software version.

JavaScript application can get the string from the HTML DOM property, navigator.userAgent. The same string will be included in the HTTP request User-Agent header.

The following is an example of the User Agent strings Example,

2019 or earlier:

Mozilla/5.0 (Linux armv7l) AppleWebKit/537.36 (KHTML, like Gecko)

Chrome/57.0.2987.133 Odin/3.2987.2.10 Safari/537.36 Model/Hisense-\$Platform (\$Brand;\$modelName;\$softVersion)

2020 or later:

Mozilla/5.0 (Linux armv7l) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/77.0.3865.65 Safari/537.36 OPR/46.0.2207.0 OMI/4.20.0.378.Catcher2.28

Model/Hisense-\$chip

VIDAA/4.0(\$BrandName;SmartTV;\$modelname;\$chipset/\$firmware;\$Resolution)

Model/Hisense-\$chip is a constant strings, identify the manufacturer information. The 6886U4 is Model/Hisense-MSD6886, and the 9602 platform is Model/Hisense-MT9602

The following table illustrates the fields in User Agent string and User-Agent HTTP header.

- Brandname: brand name
- SmartTV: constant strings
- modelName: TV model name
- \$chipset: The 6886U4 is mstar6886, the 9602 platform is mt9602
- firmware: firmware version
- \$Resolution:'UHD' if platform support UHD, else FHD for 1080p and HD for 720p

User Agent strings may be different for different chips.

Chips	User Agent strings
MT5658	Mozilla/5.0 (Linux armv7l) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/53.0.2785.143 Safari/537.36 OPR/40.0.2207.0 OMI/4.9.0.237.Martell-2.312 Model/Hisense-MT5658-SDK4-9 (;Hisense;SmartTV;V0000.01.00a.J0727;HE55A6500UWTS)
MT5659	Mozilla/5.0 (Linux armv7l) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/59.0.3071.115 Safari/537.36 OPR/46.0.2207.0 OMI/4.11.3.57.Martell-3.103 Model/Hisense-MT5659-SDK4-11 (;Hisense;SmartTV;V0000.01.00A.J0802;HE39A5600FWTS)
MSD6586	Mozilla/5.0 (Linux armv7l) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/53.0.2785.143 Safari/537.36 OPR/40.0.2207.0 OMI/4.9.0.183.CATCH-412.26 Model
MSD6886AU U3	Mozilla/5.0 (X11; Linux armv7l) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/57.0.2987.133 Odin/3.2987.2.10 Safari/537.36 (Hisense;55A6502EA;V0000.01.00a.I1214) MSD6886
MSD6886EU U3	Mozilla/5.0 (X11; Linux x86_64;) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/47.0.2526.106 Safari/537.36 SRAF/4.0 Hisense-MSD6886(Hisense;HE55A7000EUWTS;V0000.01.00A.J0828)
MSD6886EU U4	Mozilla/5.0 (Linux armv7l) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/77.0.3865.65 Safari/537.36 OPR/46.0.2207.0 OMI/4.20.0.378.Catcher2.28 Model/Hisense-MSD6886 VIDAA/4.0(Hisense;SmartTV;HE55A6900FUWTS;mstar6886/V0000.01.00a.J1105;UHD)
MSD6886AU U4	Mozilla/5.0 (X11; Linux armv7l) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/57.0.2987.133 Odin/3.2987.2.10 Safari/537.36 Model/Hisense-MSD6886 VIDAA/4.0(Hisense;SmartTV;HA65U6F2UWTG;mstar6886/V0000.01.00B.J1230;UHD)

MT9602	Mozilla/5.0 (Linux armv7l) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/77.0.3865.120 Safari/537.36
	OPR/46.0.2207.0 OMI/4.20.2.31.Catcher3.21 Model/Hisense-MT9602
	VIDAA/4.0(Hisense;SmartTV;HU40E5600FFWV;MTK9602/V0000.01.00F.K0106;HD)

Apps SHOULD NOT associate specific User Agent strings with device feature sets. Apps should test for the presence of specific features whenever possible. Apps can get platform information from the System API.

### **4 Multimedia Player**

### 4.1 Streaming Protocol

The video player on VIDAA supports various standards and formats. It conforms to the MSE/ DVB-DASH/HLS/MSS specifications. The HTML5 based applications can use video tag to provide the streaming services to the end user.

However there are recommendations for the video and streaming formats on VIDAA, since those profiles are widely used and well tested already.

The following tables lists the recommended video formats used on VIDAA platform.

Protocol	Version or Profile	МІМЕ-Туре	Comments
Http Live Streaming	HLS Version 3	application/vnd.apple.mpegurl application/x-mpegURL	Only support basic features for VOD streaming and live streaming.
MPEG-DASH	ISO/IEC 23009-1 2014 ,Version 4.	application/dash+xml application/vnd.ms- playready.initiator+xml	Recommended. Conform to the DVB- DASH specifications.
Microsoft Smooth Streaming	Version 2	application/vnd.ms-sstr+xml application/vnd.ms- playready.initiator+xml	
HTTP/HTTPS	HTTP1.1		Recommended.

Apps MAY rely on Media Source Extensions to be supported according to the MSE specification.

The following combinations of containers and codecs are supported:

Container	Audio codecs	Video codecs	Comments
MP4	AAC / MP3	H.264 / H.265	Recommended
MP4	AAC / MP3	<no video=""></no>	
MP4	<no audio=""></no>	H.264 / H.265	
WebM	Opus / Vorbis	VP8 / VP9	
WebM	<no audio=""></no>	VP8 / VP9	
WebM	Opus / Vorbis	<no video=""></no>	

### 4.2 DRM System

VIDAA platform provides Digital Rights Management (DRM) service to support DRM protected content playback.

Microsoft PlayReady and Google Widevine (Modular) are the two DRM systems currently integrated on all VIDAA platform. Because of the different browser solutions, some DRM system rely on Opera SDK, some rely on Mstreamer of MTK solution such as 6886 platform, which separates EME type and non-EME type.

### 4.2.1 ClearKey

• Supported with EME

### 4.2.2 PlayReady

- Supported with EME
- Supported with Web Initiator
- PlayReady Header Object v4.0.0.0 is supported
- Supported for security level "2000" or higher

### 4.2.3 Widevine

- Supported if the platform has Widevine DRM installed
- supported with EME
- supported with security level "L1" or lower
- MAY support "server certificate" and "privacy mode" features
- MAY support persistent licences

### 4.2.4 AES-128

• Supported for HLS

EME can only be used on secure contexts, it can not be used on any pages served over HTTP. App developers MUST use a secure origin (HTTPS).

The more details as following:

Chips	Browser SDK Ver	DRM Supported
MT5655	Opera3.6	Playready 2.0
MT5657	Opera3.6	Playready 2.5
MT5658	Opera4.9	Playready2.5 + SL2000 Widevine3.2.2 + Level 1 (YouTube)
MT5659	Opera4.11	Playready2.5 + SL2000(Other apps) Playready3.0 + SL3000(Netflix5.0 only) Widevine3.2.2 + Level 1 (YouTube)
MSD6586	Opera4.9	Playready2.5 + SL2000 Widevine 3.2.1 + Level (YouTube)
MSD6886AU	Odin	Non-EME: Playready2.5 + SL2000 EME: Playready3.0 + SL 3000 Widevine3.2.2 + Level 1 (YouTube)
MSD6886EU U3	Sraf	Non-EME: Playready2.5 + SL2000 EME: Playready3.0 + SL 3000 Widevine3.2.2 + Level 1 (YouTube)
MSD6886EU U4	Opera4.20	PlayRead4.0 + SL3000

		Widevine 3.2.2 +Level1
MT9602 U4	Opera4.20	PlayRead4.0 + SL3000
		Widevine 3.2.2 +Level1

### 4.3 Supported Video Codec

Video codecs	Resolution	Bit Rate	Comments
MPEG 1/2	1080P@60fps	80Mbps	Recommended.
MPEG4	1080P@60fps	40Mbps	Recommended.
Divx 3.11	1080P@60fps	40Mbps	
Divx 4.12			
Divx 5.x			
Divx 6, XviD			
Sorenson H.263	1080P@60fps	40Mbps	
H.263	1080P@60fps	40Mbps	Recommended.
H.264	4096*2160@30fps	135Mbps	Recommended.
	1080P@60fps		
HEVC/H.265	4096*2176@60fps	100Mbps	Recommended.
MVC	1080P@30fps	80Mbps	
AVS	1080P@60fps	40Mbps	
AVS+	1080P@60fps	50Mbps	
WMV3	1080P@60fps	40Mbps	
VC1	1080P@60fps	40Mbps	
Motion JPEG	1080P@60fps	10Mbps	
VP8	1080P@60fps	20Mbps	
VP9	4096*2176@60fps	100Mbps	
RV30/RV40	1080P@60fps	40Mbps	

### 4.4 Supported Audio Codec

Audio codecs	Sample rate	Bit Rate	Comments
AAC-LC, HEAAC	8KHz~48KHz	-	
AC3	32KHz,44.1KHz, 48KHz	32Kbps~640Kbps	Recommended.
DRA	8KHz~48KHz	< 1533Kbps	

DTS	Up to 48KHz	< 1.5Mbps	
DTS LBR	12KHz, 22KHz, 24KHz, 44.1KHz, 48KHz,	Up to 2Mbps	
DTS XLL	Up to 96KHz	-	
EAC3	32KHz,44.1KHz, 48KHz	32Kbps~640Kbps	
FLAC	8KHz~96KHz	< 1.6Mbps	
G711 A/mu-law	8KHz	64Kbps~128Kbps	
IMA-ADPCM	8KHz~48KHz	384Kbps	
MS-ADPCM			
LBR(cook)	8KHz, 11.025KHz,	6Kbps~128Kbps	
	22.05KHz, 44.1KHz		
LPCM	8KHz~48KHz	64Kbps~1.5Mbps	
MPEG1/2 Layer1	16KHz~48KHz	32Kbps~448Kbps	Recommended.
MPEG1/2 Layer2	16KHz~48KHz	8Kbps~384Kbps	Recommended.
MPEG1/2 Layer3	16KHz~48KHz	8Kbps~320Kbps	Recommended.
VORBIS	Up to 48KHz	-	
WMA	8KHz~48KHz	128bps~320Kbps	
WMA 10 Pro M0	48KHz	< 192kbps	
WMA 10 Pro M1	48KHz	< 192kbps	
WMA 10 Pro M2	96KHz	< 768kbps	

### 4.5 Supported Image

Imgae	Photo	Resolution(suggests)
JPEG	Base-line	15360*8640 (1920*8 * 1080*8)
	Progressive	1024*768
PNG	non-interlace	9600*6400
	interlace	1200*800
BMP	-	9600*6400
MPO	Base-line	15360*8640 (1920*8 * 1080*8)
	Progressive	1024*768
GIF	-	6400*4800 (800*8 * 600*8)

### 4.6 Supported Container

Container	Audio codec	Video codecs	
ISO	AAC-LC	H.264	
BMFF(MPEG4)	HE-AAC v1	H.265	
	HE-AAC v2		
	MP3		
	Dolby AC3		
	Dolby E-AC-3		
MPEG2-TS	AAC-LC	h.264	
	HE-AAC v1		
	HE-AAC v2		
	MP3		
	Dolby AC3		
	Dolby E-AC-3		
ADTS / AAC	AAC-LC	None	
MP3	HE-AAC v1		
	HE-AAC v2		
	MP3		

### 4.7 Subtitles and Closed Captioning

Apps MAY rely on support for in-band and out-of-band text tracks according to the table below

Media delivery method	In-band Subtitles	Out-of-band Subtitles
Progressive playback	Not supported	supported
HLS	Not supported	supported
MPEG-DASH	supported	supported
Smooth Streaming	supported	supported
MSE	Not supported	supported

1) Internal subtitle

File Extention	Container	Subtitle Codec	Both 6586/6886
dat, mpg, mpeg, vob	MPG. MPEG	DVD Subtitle	Yes
ts, trp, tp	TS	DVB Subtitle	Yes
mp4	MP4	DVB Subtitle	Yes

		UTF-8 Plain Text	
		ASS, SSA,	
mkv	МКV	UTF-8 Plain Text	Yes
		VobSub	
		DVD Subtitle	
divy ovi	AVI(1.0, 2.0),	XSUB,	Vac
uivx, avi	DMF0,1,2	XSUB+	res

2) External subtitle

File Extention	Subtitle Parser	Both 6586/6886
.srt	SubRip	Yes
.ssa/,ass	SubStation Alpha	Yes
.smi	SAMI	Yes
.sub	SubViewer MicroDVD DVDSubtitleSystem Sublx(VobSub)	Yes
.txt	TMPlayer	Yes

### 4.8 4K Video & HDR

most VIDAA platforms supports 4K video resolution & HDR, the developer can get HDR support from <u>system API</u>, all platform(except MT5659 & 9602 2K platform) supports <u>4K video resolution</u>.

### **5** User Interface and Experience

5.1 IR remote



All VIDAA TV models support IR Remote. APP should be fully navigable with the remote control using the following keys:4 ways(Up/Down/Left/Right), OK, and Back.

VIDAA Platform apps MUST NOT rely on platform specific spatial navigation mechanisms and SHOULD provide such navigation implemented by Application (e.g. in JavaScript) instead. Spatial navigation SHOULD be explicitly blocked (by calling preventDefault) if the Applications implements its own navigation mechanism. The use of directional keys and the select key are mandatory and allow the user to navigate through the app. If the directional keys are not handled by the application, this MAY trigger automatic (spatial) navigation, but the result of this is undefined.

Once an application is launched, it is opened full screen in a new window and it runs completely "chromeless", with no address bar or user interface controls. Users will be able to close the application and return to the main TV screen (or dashboard) via the remote control's "Exit / Close" and/or "Back / Return" key (as mentioned above). Developers SHOULD nonetheless provide an explicit option or button in their in-frame layouts to close the app, with a simple call to the window.close() method. Note that again, Any use of pop-ups windows or dialogs is prohibited for VIDAA TV WebApps.

The Back/Return key is available on the remote control with the purpose of performing the back operation or closing of the app. The Back/Return key is passed to the app, so it can be handled by it. On the remote control, the key may be marked with "Back", "Return", or something similar. The Back/Return key should provide the user with typical back navigation and an exit path via window.close() to leave the application and return to the previous screen (i.e. the TV Store, if the application was launched from there). Optionally, the developer may add an exit confirmation dialog to prevent the user from closing the application accidentally.

To enhance the user experience during streaming media playback, we strongly recommend that users implement the PLAY, PAUSE, PLAY\_PAUSE, STOP, NEXT, PREV, FF, REWIND, and other buttons.

### 5.2 Key Mapping

VIDAA TV Devices provide standardized key codes to be used in apps. Note that system Key is not distributed to the app, Apps MUST NOT use these keys.

♦ Application developers can use them directly by keycode constant.

On VIDAA Platform, Browser has mapped these keys.

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Remote key	Keycode constant	Keycode value	Availability	Implementati on
$\uparrow$	VK_UP	38	Always present	Mandatory
$\rightarrow$	VK_RIGHT	39	Always present	Mandatory
$\downarrow$	VK_DOWN	40	Always present	Mandatory
÷	VK_LEFT	37	Always present	Mandatory
Confirm/Select/OK	VK_ENTER	13	Always present	Mandatory
Back/Return	VK_BACK_SPACE	8	Always present	Mandatory
BLUE	VK_BLUE	406	Usually present	Recommended
RED	VK_ RED	403	Usually present	Recommended
GREEN	VK_GREEN	404	Usually present	Recommended
YELLOW	VK_YELLOW	405	Usually present	Recommended
0	VK_0	48	Usually present	Recommended
1	VK_1	49	Usually present	Recommended
2	VK_2	50	Usually present	Recommended
3	VK_3	51	Usually present	Recommended
4	VK_4	52	Usually present	Recommended
5	VK_5	53	Usually present	Recommended
6	VK_6	54	Usually present	Recommended
7	VK_7	55	Usually present	Recommended
8	VK_8	56	Usually present	Recommended
9	VK_9	57	Usually present	Recommended
PLAY	VK_PLAY	415	Two independent keys (Play \ Pause) or one key (Play_Pause)	Mandatory
PAUSE	VK_PAUSE	19	Two independent keys (Play \ Pause) or one key (Play_Pause)	Mandatory
PLAY_PAUSE	VK_PLAY_PAUSE	463	Two independent keys (Play \ Pause) or one key (Play_Pause)	Mandatory
STOP	VK_STOP	413	Usually present	Mandatory
FF (Fast-Forward)	VK_FAST_FWD	417	Usually present	Recommended
REWIND	VK_REWIND	412	Usually present	Recommended
NEXT	VK_TRACK_NEXT	NULL	Not available in some remote controllers	Recommended
PREV	VK_TRACK_PREV	NULL	Not available in some remote controllers	Recommended
CHANNEL UP	VK_CHANNEL_UP	427	Experimental features	Recommended

CHANNEL DOWN	VK_CHANNEL_DOWN	428	Experimental features	Recommended
SUBTITLE	VK_SUBTITLE	System key	Not available in some remote controllers	Unavailable
INFORMATION	VK_INFO	System key	Not available in some remote controllers	Unavailable
Exit	N/A	System key	Always present	Unavailable
Menu	VK_MENU	System key	Usually present	Unavailable

### 5.3 Navigation Example

Below is an example of handling navigation with JavaScript.Application Developers can also implement navigation using a common framework.

```
document.addEventListener("keydown", function(ev) {
  switch (ev.keyCode) {
    case VK_LEFT:
      // Handle mandatory key ←
      break;
    case VK_RIGHT:
      // Handle mandatory key \rightarrow
      break;
    case VK_UP:
      // Handle mandatory key 个
      break;
    case VK_DOWN:
      // Handle mandatory key \downarrow
      break;
    case VK_ENTER:
      // Handle mandatory key Confirm / Select / OK
      break;
    case VK_BACK_SPACE:
      // Handle mandatory key Back / Return
      break;
 }
 // Block the browser from handling the keydown event.
  ev.preventDefault();
}, false);
```

### 5.4 Exit

Because when an app is launched, it opens in a full screen in a new window on the TV, it runs completely "chromeless", with no address bar or user interface controls. The Developer MUST provide the ability to exit the app by pressing the remote control's Back key on the homepage with a simple call to the window.close() method.

Since some platform's remote don't have an Exit key, users will be able to close the app and return to the main TV screen or source(eg. VIDAA Free) via the remote control's Back/Return" key.

### 5.5 Virtual Keyboard

Even though VIDAA Platform Devices support input elements and forms, and also provide a "Virtual Keyboard" ("On-

Screen Keyboard") it is NOT RECOMMENDED to use input elements in Applications. Any use of <input>, all types, <textarea>, <form>, <fieldset>, <select>, <option>, <optgroup>, <datalist>, <keygen> elements SHOULD be avoided since these don't provide a great user experience on a TV.

VIDAA TV Devices provide an "On-Screen Keyboard" or "Virtual Keyboard". Applications MAY rely on this to allow the user to enter text. Application developers cannot make any assumptions about the visual appearance of this keyboard since this is dependent on the make and model of the device. Application developers should be aware that, when activated, the "Virtual Keyboard" covers part of the TV screen. Note that this sometimes leads to design inconsistencies in the application.

If the developers prefer the application to look according to their specific design for text inputs, they MAY implement their own text input mechanism in JavaScript (for example using contenteditable divs instead of text fields).

It is also important to note that on some VIDAA TVs the "Virtual Keyboard" supports only a few languages, (e.g. English, Spanish, French), some languages may be missing.

The following is an example to trigger the on screen keyboard with the <input> element:

<input id="user" placeholder="Enter your user name" type="text"/>
Input can be hidden from the screen by using the password value:
<input id="user" placeholder="Enter your password" type="password"/>

### 5.6 External Input Devices

Although VIDAA TV Devices support external input devices such as pointer remote, USB keyboard and mouse, Application developers MUST NOT rely on these.

### 5.7 UI Resolution

App developers should be aware of possible overscan issues and should ensure that the app works and displays correctly with margins applied within the visible area.

VIDAA Platforms may have a certain amount of overscan. This means that margins in your app may be shown outside the visible area of the TV display. While it is possible for users to turn off overscan, it is recommended that your app is designed with this invisible margin in mind, as most users are likely unaware of this option. The overscan amount varies between VIDAA Platforms but it is advisable to assume that a 5% margin might not be visible to the user. Background image or none critical graphics may be placed in over-scan area.All clickable items, text and company branding shall be placed within the safe area, only part of clickable elements may be placed in the overscan area as long as a large part is also in the safe area so it can be safely activated.

Although VIDAA Platforms may support different screen resolutions, apps MUST be designed for HD resolution (1280x720) and SHOULD BE scalable to Full HD (1920x1080). The MSD6586/6886 platform only supports HD resolution for apps. In addition, apps MAY be designed to be scalable to other resolutions for future-proofing. Apps SHOULD define the viewport META tag specifying the viewport resolution of the app. If the viewport size is not specified, the viewport will be set to HD resolution.

Apps designed to automatically adapt to different resolutions, either by responsive design or otherwise, MUST explicitly define the viewport to match the device resolution with the following META tag:

<meta name="viewport" content="width=device-width, height=device-height">

Apps specifically designed for Full HD (1920x1080) must define this with the following META tag:

<meta name="viewport" content="width=1920">

Note that VIDAA Platform does not set the physical screen size or pixel sizes in the firmware, so this information is not available from JavaScript.

Note that the Media Player of a device has its own capabilities and may be able to play video in other resolutions than the

application is rendered in. This can be detected in JavaScript by using the canPlayType method on the HTML5 video element.

Text size MUST be large enough to be seen on TV screen from 3m (10 feet), the average distance that a user sits from the TV. The minimum text size RECOMMENDED for VIDAA Platform apps is 3/100 of the screen height or "3vh" in CSS (this gives approximately 32px for a screen resolution of 1920x1080px)

### 5.8 Fonts

VIDAA Platforms provide Sans Serif fonts containing all the characters required to properly render the text in the languages available on the device. Right-to-left text rendering is also supported if required by any language available on the device. However, the identity looks and language coverage of these fonts cannot be guaranteed across all devices. Therefore, app developers SHOULD NOT rely on built-in fonts but instead use downloadable web fonts. The following should be considered while using web fonts:

- Font resources MUST be in the WOFF / WOFF2 (Web Open Font Format) or TTF (TrueType Font) file format
- Font resources SHOULD NOT be large, otherwise they can take a long time to download and also consume a lot of memory and CPU power
- The Font Loading API can be used to improve text rendering performance.

### 6 Performance & Optimization

Performance requirements for VIDAA TV apps are significantly stricter compared to web apps for PC or mobile. Performance considerations, recommendations for enhancements, and optimization approaches are similar across devices and can be applied to all VIDAA TV apps.

It is important to understand that even high-end TV devices have very limited computational, memory and graphics resources.

The following is the specification of different platform:

Chips	СРИ	GPU	RAM	Resolution
MT5658	ARM CA53x2;	GPU T860 MP2 @ 492MHz	~1.5GB	UHD
	CPU clock:1.1GHz			
MT5659	ARM CA9x2;	Mali450-MP2 @450MHZ	~1G(EU)/	FHD
	CPU clock:900MHz		~768M(US)	Max 2K 2160P
MSD6586	ARM CA9x2;	Mali400 MP2 @ 550MHz	~1.5GB	UHD
	CPU clock:1.2GHz			
MSD6886	ARM CA55x4;	Mali470 x 3 @ 470MHz	~1.5GB	UHD
	CPU clock:1.2GHz			
MT9602	ARM CA53x4;	Mali G52 @ 550MHz	~1G/1.5G	FHD
	CPU clock:1.15~1.45GHz			1366x768(32 inch
				only)
				1920x1080
				UHD

Large screen with Full HD (1920x1080, 2M pixels), or UHD (3840x2160, 8M pixels), this makes the VIDAA platform much slower than an average PC. Note that most of these resources are reserved for the platform, operating system, and browser engine, so apps may see as little as 300MB (may be different for different chips).

### 6.1 Memory Consumption

Memory consumption is one of the most sensitive parameters for an application in terms of performance. As mentioned above, the amount of memory available for applications is very limited on the VIDAA platform. Typically, TV devices have a hard memory limit which means there is a chance that apps will be killed if they use a lot of memory.

Note that in the case of excessive memory use, before being killed, apps may suffer from significant performance degradation. Therefore, VIDAA TV apps SHOULD NOT use more than 300MB of memory (may be different for different chips).

### 6.2 Graphics requirements and animations

VIDAA TV apps SHOULD NOT use heavy graphics and complex animations.

Even though modern TV devices are now using specialized GPU chipsets, their graphics performance is usually still quite modest.

### 6.3 Hardware Accelerated Features

Unfortunately, not all TV devices support OpenGL ES 2.0, so app developers MAY NOT rely on CSS 3D transforms and WebGL features.

### 6.4 Transport Layer Security

Apps should be protected with HTTPS, even if there is no sensitive communication. HTTPS provides critical security and

data integrity both for the Application and for the people that entrust the Application with their personal information.

### 6.5 Same-Origin Policy

VIDAA Smart TV Devices apply the Same-Origin policy. This is sometimes less permissive than other browser engines and applications may need to adapt if they are porting their applications from such a platform. The straightforward way to fix applications breaking the Same-Origin policy is to use CrossOrigin Resource Sharing (CORS).

### 6.6 Mixed Content

All kinds of Active Mixed Content (mixing secure and insecure requests) are serious security vulnerabilities and not allowed in VIDAA Smart TV Applications. The insecure requests will be blocked by the browser engine.

### 6.7 Tips

- Since TV has lower performance than PC, optimization must be done with JavaScript functions. A time-consuming task should be separated into several tasks so that it can be implemented with several functions.
- If animation and transition features are implemented without considering performance using UI Framework library which is based on JavaScript and CSS, performance issues can be caused.
- Although the Transparent function with the usage of CSS filter is useful for making fancy UI, it may cause performance issue due to the huge operations.
- If you minimize the usage of JavaScript functions in the initial page, the execution time will be reduced. Hence, we recommend to make the 'onload' function simple.
- For Web application's optimization, we recommend to analyze and optimize the contents to the page speed. (https://developers.google.com/speed/pagespeed/)
- The speed of Web application will be significantly different depending on the size of each page and how complex the Web application is. If a Web application consists of one page implemented with multiple content blocks including hidden blocks, this may cause performance issues. In this case, the application has to be divided into multiple images, and each page has to be consists of limited number of content blocks to improve the performance.
- It is recommended not to use a redirect page because it deteriorates the performance by increasing the loading time.
- Keep pagesize small and limit the number of elements in a page.
- Avoid using large size images.
- Resources need to be released at the end of streaming.

video.src = ""; // if using source tag, video.children[0].src = ""
video.load();

### 7 VIDAA System API

### 7.1 System Information

### 1) Get DeviceID

Get device ID interface. This interface will retrieve a unique id for the device.		
Interface Name		
Hisense_GetDeviceID( )		
Return	Returns a 56bytes(max) string that represents the device id.	
	Example:	
	U4: 8610030090000600000641a9ceff9b0d3706276f8712e3d4b793d8	
	U3: aa:bb:cc:dd:ee:ff	
Usage		
Var deviceID;//Hisense Unique ID		
deviceID= Hisense_GetDeviceID();//Get Hisense unique device ID		

### 2) Get Firmware Version

Get firmware version interface. This interface will retrieve the firmware version for the device.	
Interface Name	
Hisense_GetFirmWareVersion()	
Return	Returns a string that represents the firmware version.
	Example: V00.01.00a.F0116
Usage	
Var Version;//Hisense FirmWareVersion	
Version= Hisense_GetWareVersion();//Get Hisense FirmWareVersion firmware	

### 3) Get Country Code

Get country code interface. This will retrieve the country code for the device.		
Interface Name		
Hisense_GetCountryCode( )		
Return	Returns a Country abbreviations string that represents the country code.	
	Example : CAN—Canada, MEX—Mexico	
Usage		
var countryld :		

countryId = Hisense\_GetCountryCode () ;//get the country abbreviations string

#### comment:

The country abbreviation represents country code as follows

USA—USA ,CAN—Canada, MEX—Mexico, PAN—Panama ,CRI—CostaRica, NIC—Nicaragua , HND—Honduras, SLV—
Salvador, GTM—Guatemala ,DMA—Dominican, CUB—Cuba, TTO—Trinidad , JAM—Jamaica , CUW—Curacao, BRB—
Barbados, MAF—St.Maarten PRI—PuertoRico

#### 4) Get 4K Support Status

Get 4K support status interface. This will retrieve the 4K support status for the device.	
Interface Name	
Hisense_Get4KSupportState( )	
ParamName	Description
Return	Returns true if 4K is supported otherwise returns false.
Usage	
var 4kSupport;	
4kSupport = Hisense_Get4KSupportState();//Get 4k support	

### 5) Get TV Brand

Get TV brand interface. This will retrieve the TV brand for the device.	
Interface Name	
Hisense_GetBrand()	
ParamName	Description
Return	Returns a brand fullname string that represents the TV brand.
	Example: hisense, sharp
Usage	
var brand;	
brand = Hisense_GetBrand();	

#### 6) Get TV Model Name

Get TV model name interface. This will retrieve the TV model name (hardware version) for the device.	
Interface Name	
Hisense_GetModelName( )	
ParamName	Description
Return	Returns a string that represents the TV model name.
Usage	

var modelName;

modelName = Hisense\_GetModelName();

#### 7) Get Support for HDR

Get HDR support status interface. This will retrieve the TV brand for the device.		
Interface Name		
Hisense_GetSupportForHDR( )		
ParamName	Description	
Return	Returns a string that is type of HDR, depending on what the platform currently supports.	
	Example: # 0:NOT support; 1:HDR10; 2:HLG; 3:HDR10+HLG ; 4:HDR10+HLG+(HDR10+)	
Usage		
var hdr;		
hdr = Hisense_GetSupportForHDR();		

#### 8) Get Picture Mode List

Г

Get picture mode list interface. This will retrieve the list of the picture modes for the device.	
Interface Name	
Hisense_GetPictureModeList ( )	
ParamName	Description
Return	Returns a string that includes all the picture modes available, including HDR and SDR picture modes.
Usage	
var list;	
list = Hisense_GetPictureModeList();	

#### 9) Get Picture Mode

Get picture mode interface. This will retrieve the current picture mode for the device.	
Interface Name	
Hisense_GetPictureMode ( )	
ParamName	Description
Return	Returns a int value that represents the current picture mode, including HDR and SDR picture mode.
	(HDR) Vivid – 0; (HDR) Standard – 1; (HDR) Energy Saving– 2; (HDR) Theater – 3; (HDR) Game – 4; (HDR) Sport – 5; (HDR) Calibrated – 6;
Usage	

#### var pictureMode;

pictureMode = Hisense\_GetPictureMode();

#### 10) Set Picture Mode

Set picture mode interface. This will retrieve true or false of set picture mode for the device.		
Interface Name		
Hisense_SetPictureMode (pictureMode )		
ParamName	Description	
Return	Returns a bool that true represents set picture mode successful, false represents set picture mode failed.	
Usage		
var boolean;		
boolean = Hisense_SetPictureMode();		

#### 11) Get Resolution

Get resolution interface. This will retrieve the resolution information of current input signal.		
Interface Name		
Hisense_GetResolution ( )		
ParamName	Description	
Return	Returns a string that represents the resolution information of current input signal. Example : 1920,1080,0,0 separately represents framewidth, frameheight, interlaced(0 represents p ,1 represents i) ,framerate.	
Usage		
var resolution;		
resolution = Hisense_GetResolution();		

### 7.2 Parental Control

### 1) Get Parental Control Lock Status

Get parental control lock status interface. This will get the parental control lock status.		
Interface Name		
Hisense_GetParentalControlEnabled()		
ParamName	Description	
Return Returns true if parental control lock is enabled otherwise returns false.		
Usage		

var parentalControlEnabled;

parentalControlEnabled= Hisense\_GetParentalControlEnabled();//Get PC lock state

### 2) Get Parental Controller Status

Get parental controller status interface. This will get the parental controller locker status.		
Interface Name		
Hisense_GetRatingEnable()		
ParamName	Description	
Return	Returns true if parental control lock is locked otherwise returns false.	
Usage		
Var ratingEnable;		
ratingEnable=Hisense_GetRatingEnalbe(); //Get PC lock status		

#### 3) Get TV Rating

Get TV rating interface. This will get the value of the current TV rating set for the parental controller.	
Interface Name	
Hisense_GetTvRating()	
ParamName	Description
Return	Returns a string that represents the TV rating. TV rating can be one of the following strings:
	TV-Y, TV-Y7, TV-G, TV-PG, TV-14, TV-MA, OFF.
Usage	
var tvRating ;	
tvRating = Hisense_GetTvRating();//Get the value of TV rating.	

### 4) Get TVChildrenRating

Get TV rating interface. This will get the value of the current TV rating set for the parental controller.		
Interface Name		
Hisense_GetTvChildrenRating()		
ParamName	Description	
Return	Returns a string that represents the TV rating. TV rating can be one of the following strings:	
	TV-Y, TV-Y7, OFF.	
Usage		
var tvChildrenRating;		

tvChildrenRating = Hisense\_GetTvChildrenRating();//Get the value of TV children rating.

#### 5) Get Movie Rating

Γ

Get movie rating interface. This will get the value of the current movie rating set for the parental controller.		
Interface Name		
Hisense_GetMovieRating()		
ParamName	Description	
Return	Returns a string that represents the movie rating. Movie rating can be one of the following strings:	
	G、PG、PG-13、R、NC-17、X、OFF	
Usage		
var movieRating;		
movieRating = Hisense_GetMovieRating();//Get the value of movie rating.		
Comment:		
If there is no movie rating settings, the default return value is OFF		
G:2; PG: 3; PG-13:4; R:5; NC-17:6; X:7.		

### 6) Get Canadian English Rating

Get Canadian English rating interface. This will get the Canadian English rating set for the parental controller.		
Interface Name		
Hisense_GetCanEngRating()		
ParamName	amName Description	
Return	Returns a string that represents the Canadian English rating. Canadian English rating can be one of the following strings:	
	C、C8+、G、PG、14+、18+、OFF.	
Usage		
var canEngRating;		
canEngRating = Hisense_GetCanEngRating();//Get the value of Canadian English rating.		

#### 7) Get Canadian French Rating

Get Canadian French rating interface. This will get the value of Canadian French rating set for the parental controller.	
Interface Name	
Hisense_GetCanFreRating()	
ParamName Description	

Return	Returns a string that represents the Canadian French rating. Canadian French rating can be one of the following strings:	
	G、8ans+、13ans+、16ans+、18ans+、OFF $_{\circ}$	
Usage		
var canFreRating ;		
canFreRating = Hisense_GetCanFreRating();//Get the value of Canadian French rating.		
Comment:		
If there is no Canadia French Ratings settings, the default return value is OFF.		
G:1; 8ans+:2; 13ans+:3; 16ans+:4; 18ans:5.		

### 8) Get Parental Control Information

Get parental control information interface. This will get the information of the parental control such as status, TV ratings, and movie ratings.		
Interface Name		
Hisense_GetParentControls( )		
ParamName	Description	
Return	Returns a JSON string with parental control information such as if it is enabled or not, US TV and movie ratings and Canadian TV ratings.	
Usage		
var parentControlInfo;		
parentControlInfo = Hisense_GetCanFreRating();//Get the structure with parental control information		
JSON example:		
{		
"enable": 0,		
"US_TV_Ratings": "TV-Y",		
"US_MOVIE_Ratings": "G",		
"Canadian_English_Ratings": "G",		
"Canadian_French_Ratings": "G"		
}		

#### 7.3 Virtual Keyboard Manager

1) Close Virtual Keyboard

Close virtual keyboard interface. This will disable the on screen virtual keyboard feature.

Interface Name

Hisense_disableVKB( )		
ParamName	Description	
Return	Null	
Usage		
Hisense_disableVKB() ;		
Comment:		
Please note that the VKB will not auto to disa	play.	
If you call the function "Hisense_disableVKB()" on one page,move the focus to input ,press OK key,you can find that the VKB will not show.It indicates that this interface effects.		
2) Open Virtual Keyboard		
Open virtual keyboard interface. This will enable the on screen virtual keyboard feature.		
Interface Name		
Hisense_enableVKB( )		
ParamName	Description	
Return	Null	
Usage		
Hisense_enableVKB();		
Comment:		
Please note that the VKB will not auto to disaplay.		
Call the function "Hisense_enableVKB()",move the focus to input,press OK key,the VKB will show. It indicates that this interface effects.		

### 8 Demo Code & Tutorials

### 8.1 Navigation Demo

Below is an example of handling navigation with JavaScript.Application Developers can also implement navigation using a common framework.

document.addEventListener("keydown", function(ev) { switch (ev.keyCode) { case VK\_LEFT: // Handle mandatory key ← break; case VK\_RIGHT: // Handle mandatory key  $\rightarrow$ break; case VK\_UP: // Handle mandatory key 个 break; case VK\_DOWN: // Handle mandatory key  $\downarrow$ break; case VK\_ENTER: // Handle mandatory key Confirm / Select / OK break; case VK\_BACK\_SPACE: // Handle mandatory key Back / Return break; } // Block the browser from handling the keydown event. ev.preventDefault(); }, false);

### 8.2 HTML+MSE

This specification extends HTMLMediaElement to allow JavaScript to generate media streams for playback. Allowing JavaScript to generate streams facilitates a variety of use cases like adaptive streaming and time shifting live streams.

```
<script>
function onSourceOpen(videoTag, e) {
var mediaSource = e.target;
if (mediaSource.sourceBuffers.length > 0)
return;
var sourceBuffer = mediaSource.addSourceBuffer('video/webm; codecs="vorbis,vp8"');
videoTag.addEventListener('seeking', onSeeking.bind(videoTag, mediaSource));
videoTag.addEventListener('progress', onProgress.bind(videoTag, mediaSource));
```

```
var initSegment = GetInitializationSegment();
```

```
if (initSegment == null) {
 // Error fetching the initialization segment. Signal end of stream with an error.
 mediaSource.endOfStream("network");
 return;
}
// Append the initialization segment.
var firstAppendHandler = function(e) {
 var sourceBuffer = e.target;
 sourceBuffer.removeEventListener('updateend', firstAppendHandler);
 // Append some initial media data.
 appendNextMediaSegment(mediaSource);
};
sourceBuffer.addEventListener('updateend', firstAppendHandler);
sourceBuffer.appendBuffer(initSegment);
}
function appendNextMediaSegment(mediaSource) {
if (mediaSource.readyState == "closed")
 return;
// If we have run out of stream data, then signal end of stream.
if (!HaveMoreMediaSegments()) {
 mediaSource.endOfStream();
 return;
}
// Make sure the previous append is not still pending.
if (mediaSource.sourceBuffers[0].updating)
   return;
var mediaSegment = GetNextMediaSegment();
if (!mediaSegment) {
 // Error fetching the next media segment.
 mediaSource.endOfStream("network");
 return;
}
// NOTE: If mediaSource.readyState == "ended", this appendBuffer() call will
// cause mediaSource.readyState to transition to "open". The web application
// should be prepared to handle multiple "sourceopen" events.
mediaSource.sourceBuffers[0].appendBuffer(mediaSegment);
}
function onSeeking(mediaSource, e) {
var video = e.target;
```

```
if (mediaSource.readyState == "open") {
  // Abort current segment append.
   mediaSource.sourceBuffers[0].abort();
 }
 // Notify the media segment loading code to start fetching data at the
 // new playback position.
 SeekToMediaSegmentAt(video.currentTime);
 // Append a media segment from the new playback position.
  appendNextMediaSegment(mediaSource);
 }
 function onProgress(mediaSource, e) {
 appendNextMediaSegment(mediaSource);
}
</script>
<video id="v" autoplay> </video>
<script>
var video = document.getElementById('v');
 var mediaSource = new MediaSource();
 mediaSource.addEventListener('sourceopen', onSourceOpen.bind(this, video));
video.src = window.URL.createObjectURL(mediaSource);
</script>
```

### 8.3 HLS

<video width="600px" height="400px" id="video1" style="width:100%;visibility:visible;height:100%;" controls="controls" autoplay="autoplay" "> <source src="hisense.m3u8" type="application/vnd.apple.mpegurl"/> </video> var v = document.getElementsById("video1");

v.play();

### 8.4 HTML5 + MSS/DASH + PlayReady (post-delivery method)

This is the so called post-delivery method. It is not required for the web application to handle whether the content is encrypted or not. The media source is set in a similar way to that of playing clear content. The platform media player will parse the protection header in the manifest file and handle the DRM license acquisition as well as content decryption.

As shown in the figure below, the client application calls the OTT Back End to acquire the URL of the content (the URL of the Manifest file) to set to the player. The player will connect to the content delivery network or media server to download it. It will call the License Server to acquire the content license once it parsed the DRM header.

At this point, the license server calls the back end to ensure that the user is allowed to see the content, and finally, if it's correct, the player receives a response of the PlayReady License Server with the content license.

The following is the HTML5 example for the playback of PlayReady protected MSS video. Note that the media type should be set to 'application/ vnd.ms-sstr+xml'.

<html></html>
<body bgcolor="FFFFF"></body>
<video autoplay="autoplay" controls="controls" height="400" id="player" width="800"></video>
<source <="" src="http://PlayReady.directtaps.net/smoothstreaming/SSWSS720H264PR/SuperSpeedway_720.ism/Manifest" td=""/>
type="application/ vnd.ms-sstr+xml">

The following is the HTML5 example for the playback of PlayReady protected DASH video. Note that the media type should be set to 'application/dash+xml'.

<html></html>
<body bgcolor="FFFFFF"></body>
<video autoplay="autoplay" controls="controls" height="640px" id="video1" width="720px"></video>
<source <="" src="http://mediaservices-samples.s3.amazonaws.com/iplayer_vod/int/uhd_hdr/client_manifest-all.mpd" td=""/>
type="application/dash+xml"/>

### 8.5 HTML5 + MSS + PlayReady (WebInitiator)

To play the PlayReady encrypted and licensed MSS content with this method, the player requires the web-initiator XML file URL to be set to the tag. The web initiator XML file contains the complete player configuration: Content URL, <video>, license server URL, custom data, etc.

The XML has to be provided by the OTT backend (it is not possible to create it temporarily in-memory directly on TV). It contains web-initiator which mainly consists of:

- URL with the Smooth Streaming manifest set in XML element <Content>
- License server URL set in XML element <LA\_URL>
- Custom data generated on the server side set in XML element <CustomData>

All other functions, events are same as in standard HTML5 <video> XML element.

Note: To play PlayReady protected MSS content with custom data, this method should be used. And the length of the custom data string should not exceed 512bytes.

The following is the XML file (webini.xml) and the HTML5 example:

xml version="1.0" encoding="utf-8"?
<playreadyinitiator xmins="http://schemas.microsoft.com/DRM/2007/03/protocols/"></playreadyinitiator>
<licenseacquisition></licenseacquisition>
<header></header>
<wrmheader version="4.0.0.0" xmins="http://schemas.microsoft.com/DRM/2007/03/PlayReadyHeader"></wrmheader>
<data></data>
<pre><protectinfo></protectinfo></pre>
<keylen>16</keylen>
<algid>AESCTR</algid>
<kid>AmfjCTOPbEOI3WD/5mcecA==</kid>
<checksum>BGw1aYZ1YXM=</checksum>
<customattributes></customattributes>

<iis_drm_version>7.1.1064.0</iis_drm_version>
<la_url>http://playready.directtaps.net/pr/svc/rightsmanager.asmx</la_url>
<ds_id>AH+03juKbUGbHl1V/QIwRA==</ds_id>
<customdata>PD94bWwgdmVyc2lvbj0iMS4wIiBlbmNvZGluZz0iVVRGLTgiPz48S2V5T0F1dGhlbnRpY2F0aW9uWE1MPg==a&gt;</customdata>
<content>http://playready.directtaps.net/smoothstreaming/SSWSS720H264PR/SuperSpeedway_720.ism/Manifest</content>
<html></html>
<body bgcolor="FFFFF"></body>
<video autoplay="autoplay" controls="controls" height="400" id="player" width="800"></video>
<source src="./webini.xml" type="application/vnd.ms-playready.initiator+xml"/>

</video>

</body> </html>

### 8.6 Widevine supported with EME/MPEG-DASH/CENC

The following diagram shows the components of the HTML5 Audio/Video playback infrastructure with the Widevine CDM (Content Decryption Module) which follows the EME specification and supported with security level "L1". It is intended to be integrated into a browser, enabling playback of EME-compliant encrypted HTML5 Video streams. A player application runs within the browser environment.

The application initiates playback of an HTML5 video stream and provides the URL for the specific item to be played. The incoming stream is processed by the HTML5 parser. If the stream is encrypted and conforms to the CENC stream format, it will contain one or more 'pssh' boxes, each of which uniquely identifies the video stream and contains additional license request information for a particular key system Widevine is one such key system. The HTML5 parser will extract the 'pssh' box information and send it to the application as a NEED\_KEY event. It will continue to pass the encrypted stream to the media stack.

The CDM is responsible for creating a valid license request message. It will pass this message back to the application in a KEY\_MESSAGE event. The application must send this message to the license server and wait for a response. When the application receives a message from the license server (presumably a license response message for a prior license request), it sends it to the CDM by calling the CDM's AddKey() API. The CDM will process the license response, extract the license and key information, and pass the keys to the OEMCrypto layer. The CDM will signal that the key(s) have been successfully added by sending the KEY\_ADDED event to the application.



It could be verified with DASH-IF's reference player.

http://dashif.org/reference/players/javascript/1.4.0/samples/dash-if-reference-player/

### 8.7 HTML + MPEG-DASH + CENC + DrmAgent + PlayReady

The MSD6586/6886 platform implements the "DRM feature" as defined by HbbTV/OIPF. The MSD6586/6886 platform supports a non-visual embedded object of type "application/oipfDrmAgent", with the following Javascript API, to enable in-session message exchange from the web page with an underlying DRM agent.

The VIDAA TV shall be able to work in Pre/Proactive license acquisition mode using above referenced OIPF SendDRMMessage API with the PlayReady DRM system.

String sendDRMMessage(String msgType, String msg, String DRMSystemID) msgType : "application/vnd.ms-playready.initiator+xml" msg : <PlayReady Initiator String, UTF8 encoded DRMSystemID : "urn:dvb:casystemid:19219" Returns : String msgID

The following is a code example:

<!DOCTYPE html PUBLIC "-//HbbTV//1.1.1//EN" "http://www.hbbtv.org/dtd/HbbTV-1.1.1.dtd">

<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="de" lang="de">

```
<head>
```

<title>mpeg\_dash\_playready</title>

</head>

<body bgcolor="FFFFFF">

<object id="video" style="position:absolute; top:0px;left:0px;" data="http://yt-dash-mse-

test.commondatastorage.googleapis.com/media/car-20120827-manifest.mpd" type="application/dash+xml" width="720" height="480" preload="none">

</object>

<object id="oipfDrmAgent" type="application/oipfDrmAgent" style="visibility:hidden"></object>

<script type="text/javascript">

// License Pre-acquistion

// send license request using sendDRMMessage

| function sendLicenceRequest()  |
|--|
| {  |
| console.warn(" add. sendLicenceRequest enter ");   |
| var msgType = "application/vnd.ms-playready.initiator+xml";  |
| var xmlLicenceAcquisition =  |
| <pre>'<?xml version="1.0" encoding="utf-8"?><playreadyinitiator< pre=""></playreadyinitiator<></pre>   |
| xmIns="http://schemas.microsoft.com/DRM/2007/03/protocols/"> <licenseacquisition><header><wrmheader< td=""></wrmheader<></header></licenseacquisition> |
| xmIns="http://schemas.microsoft.com/DRM/2007/03/PlayReadyHeader"   |
| version="4.0.0.0"> <data><protectinfo><keylen>16</keylen><algid>AESCTR</algid></protectinfo><la_url>http://playrea</la_url></data>                     |
| dy.digitaltv-  |
| labs.com/playready/rightsmanager.asmx <kid>Xjn+wkEUEeGrGY6/RyQBmw==</kid> <  |
| /LicenseAcquisition>';   |
| var DRMSysID = "urn:dvb:casystemid:19219";   |
| var oipfDrm = document.getElementById('oipfDrmAgent');   |
| console.warn(" add. sendLicenceRequest start ");   |
| oipfDrm.sendDRMMessage(msgType, xmlLicenceAcquisition, DRMSysID);  |
| console.warn( " add. sendLicenceRequest end ");  |
| }  |
|  |
| <input onclick="sendLicenceRequest()" style="position:relative; margin-top:480px;" type="button" value="license"/>                                     |
| <input onclick="document.getElementById('video').play(1)" type="button" value="play"/>   |
|  |
|  |

### 9 Debugging and Deployment

### 9.1 Overview

### 1) Clean Cache & Cookies

Application Developers may want to flush cookie and cache storage of the web engine. The VIDAA Platform allows application Developers to flush the cookie and cache repositories.

Cookie and cache can be also removed by executing "Clear Data" in Menu-Settings-System-Application Settings-Clean Cache & Delete Cookies.

#### 2) Enable remote devtools

It is possible to debug an app with the devtools. Follow the steps below to connect the platform with the toolset.

#### 3) Launch a Chromium-based desktop browser (Chromium 53 or later)

Make sure the PC and the TV set is in the same LAN network.

Input the IP address/port of the platform in the desktop browser to start the debugger. For example

#### http://192.168.0.3:9226

The port number is different for each platform.

Platform	Port
MT5658	9222
MT5659	9222
MSD6586	9222
MSD6886	9226

Then the devtools application will be loaded in the browser. **If the correct page is not rendered, please check the network status,** for some security considerations, some models do not open the port of devtools by default. In this case, please contact us on how to open the debugging tool.

### 4) Debugging with Chrome

Among the provided features are:

- DOM and style inspection,
- JavaScript debugging,
- JavaScript console,
- network profiling,
- page loading timeline,
- several JavaScript profiling features such as heap usage.

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For usage of the devtools, please refer to https://developers.google.com/web/tools/chrome-devtools/javascript/

#### 5) Submit & Deployment

The application could push online once the application is certified by the VIDAA QA team.

The CSP may provide the URL and the icon of the application then the VIDAA operation team will configure in Hisense Cloud to make it available for the end-user.

### 9.2 How to enable serial debug

#### 1) Preconditions

- 1. Prepare a 3.5mm to USB serial audio cable;
- 2. Setup serial port tools on your PC;
- 3. TV firmware updated to debug version yet.

### 2) Flows

- Plug the USB port of the serial Kit into the USB port of the computer, the Serial kit port into the Serial Port of the TV, (For the first time, you need to install the serial Kit driver), and view the corresponding COM port from the Computer Device Manager.
- 2. Use the serial port tool to open the COM port with a baud rate of "115200", turn off the RTS/CTS, turn on the XON/XOFF and keep other default states.
- 3. If you cannot enter the serial port mode, you need to open the UART in factory mode.
- 4. The method of entering the factory mode:
- 5. In the power-on state, press the setting button, select the "Sound" menu in the pop-up settings, enter the "Speakers" menu, move the focus on the "Balance" item, input "1969" with the remote control, then enter the factory mode.
- 6. In factory mode, press the setting button, select the "Options" menu, press OK or right to find the UART entry, confirm that the UART is "On".(DO NOT modify other settings).
- 7. Press the Power button to restart the TV.
- 8. If there is no output in the serial tool, just input '05328087' and 'Enter' key

### 9.3 How to flash debug firmware on MSD6586/6886

- 1. Unzip firmware(if compressed) to an USB flash drive(fat32 filesystem and less than 16GB) and rename it to 'MstarUpgrade.bin"
- 2. Plug flash drive into TV USB port.
- 3. Replug the TV power cable.
- 4. 1 )Method1: press the red power key on IR remote once, then long-press red power key(for 6886) or volume-key(for 6586) until the upgrading screen appears.

2)Method2: select Settings-Support-System Update-Upgrade from USB and wait for the upgrading screen to

appear.

5. After upgrade finished, the system will reboot by itself.

### 9.4 How to flash debug firmware on MTK5658/5659

### 1) Preconditions

- 1. Make sure serial debugging function is opened.
- 2. PC is connected to TV via serial.

### 2) Flows

### a) Method with serial tool

- 1. unzip firmware(if compressed) to an USB flash drive(fat32 filesystem and less than 16GB) and rename it to 'upgrade\_force.pkg"
- 2. plug flash drive to TV USB port.
- 3. use serial tools on pc and long press 'esc' key on the keyboard when restarting TV
- 4. after enter 'DTV>',input 'u' and enter
- 5. begin flash TV

### b) Method with Remote

- 1. unzip firmware to an USB flash drive and rename it to 'upgrade\_force.pkg"
- 2. plug flash drive to TV USB port.
- 3. replug the TV power cable.
- 4. press red power key, then long press red power key on IR remote until the upgrading screen appear.

### 9.5 How to debugging apps on MT5658/5659

### 1) Preconditions

- 1. USB to 3.5mm audio jack cable and the TV UART is ON.
- 2. Serial Tool(e.g. secureCRT)

### 2) Flows

1. just do the following in the serial port.

touch /3rd\_rw/appdata/debugmode touch /3rd\_rw/appdata/enable\_developer\_tools sync reboot

2. make sure TV and PC in the same network, launch the app you want to debug on your TV, use chrome v53 or upper to access <u>http://tv\_ip:9222</u>, the devtools will be loaded. (the port number may be 9224, depending on the model)

### 9.6 How to debugging apps on MSD6586

Mass production firmware can't start Hisense debug toolkit, please contact us to get more details.

### 9.7 How to debugging apps on MSD6886AU U3

make sure TV and PC in the same network, launch the app you want to debug on your TV, use chrome v53 or upper to access http://tv\_ip:9226, the devtools will be loaded.

### 9.8 How to debugging apps on MSD6886EU U3

Mass production firmware can't start Hisense debug toolkit, please contact us to get more details.

### 9.9 How to debugging apps on VIDAA U4

### 1) Method 1

If the developer has Hisense serial debugging cable and has connected to the TV through a computer, then you can simply execute the following command in serial tools.

touch /	var/local/debug_on
touch ,	/var/local/flag_platform_debug_sdk
sync	
reboot	

### 2) Method 2

If the developer havn't debugging cable, you can open hisense://debug in TV browser and move page to bottom and click debug\_on button, then replug TV power cable to restart TV.

After doing any of the above, make sure TV and PC in the same network, launch the app you want to debug on your TV, use chrome v53 or upper to access http://tv\_ip:9226, the devtools will be loaded.

### **10 W3C/HTML5 standard for VIDAA Platform**

The APIs listed in this section are part of the W3C specifications which have been tested on the MSD6586/6886 platform. Some of the APIs are stable while others are draft specifications. The draft APIs are subject to change as the W3C specification evolves.

The following feature marked in yellow is supported on the MSD6586/6886 platform. But we have no special test case to test and develop these features. When the application relies on these requirements, the developers should pay attention to these special points.

For U4 platforms, we used the chromium 77 kernel and support most of H5 standard features, for the support details of HTML5/CSS/JS, please use https://html5test.com.

### **10.1 HTML5 Video Audio**

Feature	attribute	value	6586/6886 U3
	autoplay		Supported
	controls		Supported
	poster		Supported
	loon	1	Not supported
	юор	Loop	Not supported
		Auto	Supported
	preload	None	Supported
		metadata	Supported
1. HIMLVideoElement		http	Supported
	src	File	Supported
		ftp	Not supported
	mediagroup	Group	Not supported
	muted		Not supported
	width	Number	Supported
	height	Number	Supported
	videoWidth	Number	Supported
	videoHeight	Number	Supported
	autoplay		Supported
	controls		Supported
	loon	1	Not supported
	ююр	Іоор	Not supported
		auto	Supported
2. HTMLAudioElement	preload	none	Supported
		metadata	Supported
		http	Supported
	src	file	Supported
	mediagroup muted	ftp	Not supported
		group	Not supported
			Not supported
	src	http	Supported
		file	Supported
		ftp	Not supported
		video/ogg	Not supported
3. HTMLSourceElement	Video type	video/mp4	Supported
		video/webm	Supported
		audio/ogg	Not Supported
	Audio turc	audio/mpeg	Supported
	Αυαίο τγρε	audio/mp4	Supported
		audio/webm	Supported

	media		Not supported
	AudioContext		Supported
	AudioNede	connect(audioNode)	Supported
	Audionode	disconnect	Supported
		createBufferSource	Supported
		buffer	Supported
		playbackRate	Supported
		Іоор	Not supported
	AudioBufferSourceNode	loopStart	Not supported
		loopEnd	Not supported
4. Web Audio		onended	Not supported
		start	Not supported
		stop	Not supported
		createBuffer	Supported
		decodeAudioData	Not supported
Audio		sampleRate	Supported
	AudioBuffer	length	Supported
		duration	Supported
		numberOfChannels	Supported
	getChannelData	Supported	

### 10.2 HTML5 Track & Media

feature	attribute	value	6586/6886
	default	default	Supported
		captions	Supported
		chapters	Supported
	kind	descriptions	Supported
		metadata	Supported
1. HTMLTrackElement		subtitles	Supported
	label	label	Supported
	src	vtt	Supported
	srclang	language_code	Supported
	readyState		Supported
	track		Supported
	error state	error	Supported
		src	Supported
		currentSrc	Supported
		crossOrigin	Not supported
	notSupported state	netSupportedState	Not supported
	netsupported state	preload	Supported
		buffered	Supported
		load()	Not supported
		canPlayType()	Supported
	ready state	readyState	Supported
	Teady state	seeking	Supported
		controls	Supported
2. HTMLMediaElement	controls	defaultMuted	Not supported
	controls	volume	Not supported
		muted	Not supported
		currentTime	Supported
		duration	Supported
		pause()	Supported
		paused	Supported
	playback state	ended	Supported
	μιαγραϊκ state	defaultPlaybackRate	Not supported
		playbackRate	Supported
		played	Supported
		seekable	Supported
		autoplay	Supported

	Ιοορ	Not supported
	play()	Supported
<b>.</b>	mediaGroup	Not supported
media controller	controller	Not supported
	textTracks	Supported
	audioTracks	Supported
multiple media tracks	videoTracks	Supported
	addTextTrack()	Supported
	buffered	Not supported
	seekable	Not supported
	duration	Not supported
	currentTime	Not supported
	paused	Not supported
	played	Not supported
	pause()	Not supported
MediaController	play()	Not supported
	defaultPlaybackRate	Not supported
	playbackRate	Not supported
	volume	Not supported
	muted	Not supported
	playbackState	Not supported
	unpause()	Not supported
	length	Supported
	VideoTrack()	Supported
	getTrackById	Supported
VideoTrackList	selectedIndex	Supported
	onchange	Not supported
	onaddtrack	Not supported
	onremovetrack	Not supported
	id	Supported
	kind	Supported
VideoTrack	label	Supported
	language	Supported
	selected	Supported
	length	Supported
	AudioTrack()	Supported
Audia Traduliat	getTrackById	Supported
AUDIOTRACKLIST	onchange	Not supported
	onaddtrack	Not supported
	onremovetrack	Not supported
	id	Supported
	kind	Supported
AudioTrack	label	Supported
	language	Supported
	enabled	Supported
	length	Supported
ToytTracklist	TextTrack[]	Supported
TEXTTACKLIST	onaddtrack	Not supported
	onremovetrack	Not supported
	kind	Supported
	label	Supported
	language	Supported
TextTrack	in Band Metadata Track Dispatc h Type	Not supported
ToutTrool: Curlint	mode	Supported
TextTrackCueList	cues	Supported
ToytTrackCuc()/TTCuc)	activeCues	Supported
	addCue()	Supported
	removeCue()	Supported
	oncuechange	Supported
	length	Supported

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	TextTrackCue	Supported
	getCueById	Supported
	track	Supported
	id	Supported
	startTime	Supported
	endTime	Supported
	pauseOnExit	Not supported
	vertical[growing right]	Not supported
	vertical[growing left]	Not supported
	vertical[horizontal]	Not supported
	snapToLines	Supported
	line	Supported
	position	Supported
	size	Supported
	align[end]	Supported
	align[middle]	Supported
	align[start]	Supported
	text	Supported
	getCueAsHTML	Supported
	onenter	Not supported
	onexit	Not supported
	loadstart	Supported
	progress	Supported
	suspend	Not supported
	abort	Supported
	error	Not supported
	emptied	Not supported
	stalled	Not supported
	play	Supported
	pause	Supported
	loadedmetadata	Supported
Madia Evant	loadeddata	Supported
Ivieula Event	waiting	Supported
	playing	Supported
	canplay	Supported
	canplaythrough	Supported
	seeking	Supported
	seeked	Supported
	timeupdate	Supported
	ended	Supported
	ratechange	Supported
	durationchange	Not supported
	volumechange	Not supported

### 10.3 Communication

feature	attribute	value	6586/6886
		data	Supported
		origin	Supported
	MessageEvent	lastEventId	Supported
		source	Supported
		ports	Supported
1.Web Messaging	Cross-document messaging	<pre>window.postMessage(messag e, targetOrigin [, ports ])</pre>	Supported
	MassageChannel	channel.Port1	Supported
	Wessagechanner	channel.Port2	Supported
	Maaaaa	<pre>port.postMessage(message [, ports] )</pre>	Supported
	MessagePort	port.start()	Supported
		port.close()	Supported
2.WebSocket API	WebSocket	readyState	Supported

		bufferedAmount	Supported
		onopen	Supported
		onerror	Supported
		onclose	Supported
		extensions	Supported
		protocol	Supported
		url	Supported
		close()	Supported
		onmessage	Supported
		binaryType	Supported
		send()	Supported
CloseEvent		wasClean	Supported
	CloseEvent	code	Supported
		reason	Supported
		readyState	Supported
		url	Supported
		withCredentials	Supported
3.Server-Sent Events	EventSource	onopen	Supported
		onmessage	Supported
		onerror	Supported
		close()	Supported

### 10.4 Graphic

feature	attribute	value	6586/6886		
	width	number	Supported		
	height	number	Supported		
1. HTMLCanvasElement	toDataURL		Supported		
<ol> <li>HTMLCanvasElement</li> <li>CanvasRenderingContext2D</li> </ol>	toBlob()		Not supported		
	getContext()		Supported		
	reference	canvas	Supported		
	stato	save()	Supported		
	State	value6586/68numberSupportednumberSupportedSupportedSupportedSupportedSupportedcanvasSupportedsave()Supportedrestore()Supportedscale(x,y)Supportedrotate(n)Supportedtranslate(x,y)Supportedtransform(a,b,c,d,e,f)SupportedglobalAlphaSupportedglobalCompositeOperationSupportedstrokeStyleSupportedfillStyleSupportedcreateRadialGradient(x0,y0,r0,x1,y1,r1)SupportedshadowOffsetXSupportedshadowOffsetYSupportedshadowOffsetYSupportedshadowOffsetYSupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)Supportedstroke()SupporteddrawSystemFocusRing()Not supportedarealDathatherias()Not supportedstroke()Not supportedstrokel()Not supportedstrokel()Not supportedstrokel()Supportedstro			
		scale(x,y)	Supported		
		rotate(n)	Supported		
	transformations	translate(x,y)	Supported		
		value6586, numbernumberSupportnumberSupportSupportSupportsave()SupportcanvasSupportsave()Supportrestore()Supportscale(x,y)Supportrotate(n)Supporttranslate(x,y)Supporttransform(a,b,c,d,e,f)SupportglobalAlphaSupportglobalCompositeOperationSupportstrokeStyleSupportfillStyleSupportcreateAlialGradient(x0,y0,x1,y1)SupportshadowOffsetXSupportshadowOffsetYSupportshadowColorSupportstrokeRect(x,y,w,h)SupportstrokeRect(x,y,w,h)SupportstrokeRect(x,y,w,h)SupportshadowColorSupportstrokeRect(x,y,w,h)SupportstrokeRect(x,y,w,h)SupportstrokeRect(x,y,w,h)Supportfill()SupportstrokeRetor()Supportfill()Supportstroke()Not sdrawSystemFocusRing()Not sscollPathIntoView()Not sclip()SupportisPointInPath(x,y)Supportfill(path)Not s			
		setTransform(a,b,c,d,e,f)	Supported		
	compositing	globalAlpha	Supported		
	compositing	globalCompositeOperation	Supported		
		strokeStyle	Supported		
		fillStyle	Supported		
	colors and styles	createLinearGradient(x0,y0,x1,y1)	Supported		
		number Supported number Supported Supported Not supported Canvas Supported save() Supported restore() Supported restore() Supported rotate(n) Supported rotate(n) Supported transform(a,b,c,d,e,f) Supported globalAlpha Supported globalCompositeOperation Supported strokeStyle Supported strokeStyle Supported createLinearGradient(x0,y0,x1,y1,r1) Supported createRadialGradient(x0,y0,r0,x1,y1,r1) Supported shadowOffsetX Supported shadowOffsetY Supported strokeRect(x,y,w,h) Supported fill(p) Not supported fill(p) Not supported fill(path) Not supported			
		createPattern()	Supported		
2. CanvasRenderingContext2D		shadowOffsetX	Supported		
	shadows	shadowOffsetY	Supported		
	SHOUWS	numberSupponumberSupponumberSupposuppoNot sucanvasSupposave()Supporestore()Supposcale(x,y)Supporotate(n)Suppotranslate(x,y)Suppotransform(a,b,c,d,e,f)SuppoglobalAlphaSuppoglobalAlphaSuppoglobalCompositeOperationSuppocreateLinearGradient(x0,y0,r1,y1)SuppocreateLinearGradient(x0,y0,r0,x1,y1,r1)SupposhadowOffsetXSupposhadowOffsetXSupposhadowColorSuppostrokeRet(x,y,w,h)SuppofillRet(x,y,w,h)SuppostrokeRet(x,y,w,h)Suppofill()SuppostrokeRet(x,y,w,h)Suppofill()Suppostroke()Not sudrawSystemFocusRing()Not suclip()SuppoisPointInPath(x,y)Suppofill(path)Not su			
		numberSupporternumberSupportersupporterSupporterSupporterSupportercanvasSupportersave()Supporterrestore()Supporterscale(x,y)Supporterrotate(n)Supportertranslate(x,y)Supportertransform(a,b,c,d,e,f)SupporterglobalAlphaSupporterglobalCompositeOperationSupporterstrokeStyleSupporterfillStyleSupportercreateLinearGradient(x0,y0,x1,y1,r1)SupportershadowOffsetXSupportershadowOffsetYSupportershadowOffsetYSupporterstrokeRect(x,y,w,h)SupporterfillRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x			
		clearRect(x,y,w,h)	Supported		
	rects	fillRect(x,y,w,h)	Supported		
		value6586/688numberSupporternumberSupporternumberSupporterSupporterSupportercanvasSupportersave()Supporterrestore()Supporterscale(x,y)Supporterrotate(n)Supportertransform(a,b,c,d,e,f)SupporterglobalAlphaSupporterglobalCompositeOperationSupporterstrokeStyleSupportercreateAlailGradient(x0,y0,x1,y1)SupportercreateAlailGradient(x0,y0,r0,x1,y1,r1)SupportershadowOffsetXSupportershadowOffsetYSupportershadowColorSupporterstrokeRect(x,y,w,h)Supporterfill()SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)SupporterstrokeRect(x,y,w,h)Supporterstroke()Not supporterstroke()Supporterstroke()Not supporterstroke()Not supporterstroke()No			
		beginPath()	Supported		
		value6586/6886numberSupportednumberSupportednumberSupportedSupportedSupportedcanvasSupportedsave()Supportedrestore()Supportedscale(x,y)Supportedrotate(n)Supportedtransform(a,b,c,d,e,f)SupportedglobalAlphaSupportedglobalCompositeOperationSupportedstrokeStyleSupportedfillStyleSupportedcreateRadialGradient(x0,y0,r0,x1,y1,r1)SupportedshadowOffsetXSupportedshadowColorSupportedshadowColorSupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)Supportedfill()SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)SupportedstrokeRect(x,y,w,h)Supportedfill()Supportedstroke()Not supporteddrawSystemFocusRing()Not supportedfill(path)Not supported			
		stroke()	Supported		
		drawSystemFocusRing()	Not supported		
	path API	drawCustomFocusRing()	Not supported		
		Not supportedSupportedSave()restore()scale(x,y)scale(x,y)supportedrotate(n)supportedranslate(x,y)supportedransform(a,b,c,d,e,f)supportedsetTransform(a,b,c,d,e,f)supportedglobalAlphaglobalCompositeOperationsupportedstrokeStyleSupportedstrokeStyleSupportedstrokeStylesupportedstrokeStylesupportedstrokeStylesupportedstrokeStylesupportedstrokeStylesupportedsupportedstrokeStyleSupportedsupported			
		clip()	Supported		
		isPointInPath(x,y)	Supported		
		fill(path)	Not supported		

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		11 1			
		stroke(path)	Not supported		
		drawSystemFocusRing(path,)	Not supported		
		drawCustomFocusRing(path,)	Not supported		
		scrollPathIntoView(path)	Not supported		
		clip(path)	Not supported		
		isPointInPath(nath x y)	Not supported		
		fillText(text x v maxWidth)	Supported		
	text	strokeText(text x v maxWidth)	Supported		
	lext	moosureText(text)	Supported		
		drawlmago/imago dv dv)	Supported		
	drawing images	drawimage(image,dx,dy,dy)	Supported		
	drawing images	drawimage(image,ux,uy,uw,un)	Supported		
		drawimage(image,sx,sy,sw,sn,dx,dy,dw,dn)	Supported		
	hit regions		Not supported		
		removeHitRegion()	Not supported		
		createImageData(sw,sh)	Supported		
		createImageData(sw,sh)SupportcreateImageData(imagedata)SupportgetImageData(imagedata,dx,dy,dirtyX,dirtyY,dirtySupportputImageData(imagedata,dx,dy,dirtyX,dirtyY,dirtySupportWidth,dirtyHeight)SupportputImageData(imagedata,dx,dy)SupportlineWidthSupportlineCapSupportlineIoinSupportmiterLimitSupportfontSupporttextAlignSupportsetLineDash()SupportgetLineDash()SupportlineTo(x,y)SupportlineTo(x,y)SupportudaraticCurveTo(cpx,cpy,x,y)SupportbezierCurveTo(cp1x,cp1y,cp2x,cp2y,x,y)SupportarcTo(x1,y1,x2,y2,r)Supportarc(x,y,r,sAngle,eAngle,counterclockwise)Supportrective width beight)Support			
	pixel manipulation	getImageData(sx,sy,sw,sh)	Supported		
		putImageData(imagedata,dx,dy,dirtyX,dirtyY,dirty Width,dirtyHeight)	Supported		
		putImageData(imagedata,dx,dy)	Supported		
		lineWidth	Supported		
	line cans / joins	lineCap	Supported		
	line caps / joins	lineJoin	Supported		
	asPathMethods = Action for the second seco	miterLimit	Supported		
		font	Supported		
3. CanvasDrawingStyles	text	textAlign	Supported		
		textBaseline	Supported		
		setLineDash()	Supported		
	dashed lines	getLineDash()	Supported		
		lineDashOffset	Supported		
		closePath()	Supported		
		moveTo(x,y)	Supported		
		lineTo(x,y)	Supported		
		quadraticCurveTo(cpx cpv x v)	Supported		
	Shared path API	$\frac{1}{2} \frac{1}{2} \frac{1}$	Supported		
4. CanvasPathMethods	methods	arcTo(x1 v1 x2 v2 r)	Supported		
	methods	$arc(x y, r s \Delta ngle e \Delta ngle counterclockwise)$	Supported		
		rect(x,y), shigle, children, counterclockwise)	Supported		
		ollingo(x, y, width, height)	Supported		
		Angle anticlockwise)	Supported		
E CanvacCradiant	anagua abiast	Angle, anticiockwise)	Supported		
5. CanvasGradient	opaque object		Supported		
		width	Supported		
	x-direction		Not supported		
			Not supported		
		fontBoundingBoxAscent	Not supported		
		fontBoundingBoxDescent	Not supported		
6. CanvasTextMetrics		actualBoundingBoxAscent	Not supported		
		actualBoundingBoxDescent	Not supported		
	y-direction	strokeText(text,x,y,maxWidth)SupportedmeasureText(text)SupporteddrawImage(image,dx,dy)SupporteddrawImage(image,dx,dy,dw,dh)SupportedaddHitRegion()Not supportremoveHitRegion()Not supportedcreateImageData(sw,sh)SupportedgetImageData(imagedata)SupportedgetImageData(imagedata,dx,dy,dirtyX,dirtyY,dirtySupportedwidth,dirtyHeight)SupportedputImageData(imagedata,dx,dy)SupportedlineVidthSupportedlineVidthSupportedmiterLimitSupportedfontSupportedgetLineDash()SupportedgetLineDash()SupportedgetLineDash()SupportedgetLineDash()SupportedgetLineDash()SupportedlineVidthSupportedlineDashOffsetSupportedclosePath()SupportedquadraticCurveTo(cpx,cpy,x,y)SupportedarcTo(x,y)SupportedarcTo(x,y,r,sAngle,eAngle,counterclockwise)SupportedactualBoundingBoxAscentNot supportdottlonudingBoxAscentNot supportfontBoundingBoxAscentNot supportactualBoundingBoxAscentNot supportdiataSupportedideographicBaselineNot supportdideographicBaselineNot supportdideographicBaselineNot supportdideographicBaselineNot supportdideographicBaselineNot supportdidataSupported <trt< td=""></trt<>			
		hangingBaseline	Not supported		
		fillText(text,xy,maxWidth)SupportedstrokeText(text,xy,maxWidth)SupportedmeasureText(text,xy,maxWidth)SupporteddrawImage(image,dx,dy)SupporteddrawImage(image,dx,dy)SupporteddrawImage(image,dx,dy,dw,dh)SupportedaddHitRegion()Not supportedcreateImageData(sw,sh)SupportedcreateImageData(imagedata)SupportedgetImageData(imagedata,dx,dy,dirtyX,dirtyY,dirtySupportedwidth,dirtyHeight)SupportedputImageData(imagedata,dx,dy)SupportedlineCapSupportedlineCapSupportedlineCapSupportedfontSupportedtextAlignSupportedtextAlignSupportedtextBaselineSupportedsetLineDash()SupportedgetIneDash()SupportedgudraticCurveTo(cpx,cpy,x,y)SupportedmoveTo(x,y)SupportedlineTo(x,y)SupportedarcTo(x1,y1,x2,y2,r)SupportedarctalBoundingBoxAscentNot supportedactualBoundingBoxAscentNot supporteddatBoundingBoxAscentNot supporteddiataSupportedsupportedSupported			
		ideographicBaseline	Not supported		
		width	Supported		
7. CanvasImageData	basic element	height	Supported		
		data	Supported		
	addPath()	addPath(path,transformation)	Not supported		
9 Canvac Path	addPathByStrokingPat		Not supported		
o. Canvasralli	h() addText( )	addText(text,styles,transformation,x,y,maxWidth)	Not supported		



		1				
		addText( text, styles, transformation, path, maxWidth)	Not supported			
	addDath DuCtualine Tay	addPathByStrokingText( text, styles,	Not supported			
		transformation, x, y, maxwidth)				
	τ()	addPathByStrokingText( text, styles,	Not supported			
		maxWidth)Not supportedaddPathByStrokingText( text, styles, transformation, x, y, maxWidth)Not supportedaddPathByStrokingText( text, styles, transformation, path, maxWidth)Not supportedlinearGradientSupportedradialGradientSupportedpatternSupportedfeGaussianBlurSupportedfeColorMatrixSupportedfeComponentTransferSupportedfeOffsetSupportedrectSupportedcircleSupportedellipseSupportedlineSupportedpolygonSupportedpathSupportedstrokeSupportedtextSupportedadSupportedadmathSupportedpathSupportedcircleSupportedgSupportedaSupported <td< td=""></td<>				
		linearGradient	Supported			
	colors and styles	radialGradient	Supported			
		pattern	Supported			
		feGaussianBlur	Supported			
		feBlend	Supported			
	filters	feColorMatrix	Supported			
		feComponentTransfer	Supported			
		feOffset	Supported			
		rect	Supported			
		circle	Supported			
		ellipse	Supported			
		line	Supported			
		polygon	Supported			
9. InlineSVG		polyline	Supported			
	shanos	path	Supported			
	shapes	stroke	Supported			
		text	Supported			
		tspan	Supported			
		textPath	Supported			
		а	Supported			
		g	Supported			
		image	Supported			
		a     Support       g     Support       image     Support       animate     Support       animateMotion     Support       animateTransform     Support				
	animation	addPatkByStrokingText( text, styles, transformation, x, y, maxWidth)Not supaddPathByStrokingText( text, styles, transformation, path, maxWidth)Not suplinearGradientSupporradialGradientSupporfeGaussianBlurSupporfeColorMatrixSupporfeColorMatrixSupporfeComponentTransferSupporcircleSupporellipseSupporpathSupporpolygonSupporpolygonSupporpolygonSupporpolygonSupporpathSupportextSupporfecorfsetSupporgagSupporpolygonSupporpolygonSupporgagSupportextASupportextPathSupporaSupporgSupporgSupporreateBufferSupporreateBufferSupporcreateFramebufferSupporcreateFramebufferSupporcreateFramebufferSupporcreateProgramSupporcreateProgramSupporcreateColorSupporcreateColorSupporcreateDufferSupporcreateDufferSupporcreateProgramSupporcreateBufferSupporcreateProgramSupporcreateProgramSupporcreateProgramSupporcreateDufferSupporcreateDufferSuppo				
		animateTransform	Supported			
		clipPath	Supported			
	clipping and mask	mask	Supported			
	WebGI Shader	createShader	Supported			
	WebGLBuffer	createBuffer	Supported			
	WebGLEatture	createTexture	Supported			
	WebGLTexture WebGLFramebuffer	createFramehuffer	Supported			
	WebGLProgram	createProgram	Supported			
	WebGEITogram	vertexAttribPointer	Supported			
		activeTexture	Supported			
		attachShader	Supported			
		hindBuffor	Supported			
		bindEramehuffer	Supported			
		gSupporterimageSupporteranimateSupporteranimateMotionSupporteranimateTransformSupporterclipPathSupportermaskSupportercreateShaderSupportercreateBufferSupportercreateTextureSupportercreateFramebufferSupportercreateProgramSupportervertexAttribPointerSupporteractiveTextureSupporterbindBufferSupporterbindRenderbufferSupporterbindRenderbufferSupporterclearSupporterclearColorSupporterclearDepthSupportercompileShaderSupporterdrawElementsSupporterenableSupporter				
		bindRenderbuiter	Supported			
		bufferDate	Supported			
		bullerData	Supported			
10. WebGL			Supported			
		clearColor	Supported			
	WebGLRenderingCont	clearDepth	Supported			
	ext	compileShader	Supported			
		addText(text, styles, transformation, path, maxWidth)Not supportedaddPathByStrokingText(text, styles, transformation, x, y, maxWidth)Not supportedaddPathByStrokingText(text, styles, transformation, path, maxWidth)Not supportedlinearGradientSupportedradialGradientSupportedfeGaussianBlurSupportedfeGaussianBlurSupportedfeConyDentTransferSupportedfeConyDentTransferSupportedfeConyDentTransferSupportedfeConyDentTransferSupportedfeConyDentTransferSupportedpolygonSupportedpolygonSupportedpolygonSupportedstrokeSupportedtextSupportedstrokeSupportedstrokeSupportedstrokeSupportedgSupportedimageSupportedanimateSupportedanimateSupportedanimateSupportedanimateSupportedcreateFarmebufferSupportedcreateFarmebufferSupportedcreateFarmebufferSupportedbindFarmebufferSupportedcreateFordSupportedbindRenderbufferSupportedcreateFarmebufferSupportedcreateFarmebufferSupportedcreateFarmebufferSupportedcreateFarmebufferSupportedcreateFarmebufferSupportedcreateFarmebufferSupportedcreateFarmebufferSu				
		drawElements	Supported			
		maxWidth) Not supported transformation, x, y, maxWidth) Not supported addPathByStrokingText( text, styles, transformation, path, maxWidth) Not supported fradialGradient Supported feGaussianBlur Supported feGomponentTransfer Supported feComponentTransfer Supported feComponentTransfer Supported feComponentTransfer Supported inear Gradient Supported feComponentTransfer Supported feComponentTransfer Supported feComponentTransfer Supported inear Supported inear Supported inear Supported fecomponentTransfer Supported inear Supported fecomponentTransfer Supported fecomponentTransfer Supported supported inear Supported inear Supported polygon Supported supported stroke Supported stroke Supported stroke Supported stroke Supported stroke Supported supporte				
		enableVertexAttribArray	Supported			
		framebufferRenderbuffer	Supported			
		framebufferTexture2D	Supported			
		generateMipmap	Supported			
		getAttribLocation	Supported			
		getExtension	Supported			
	-	getProgramParameter	Supported			
		getShaderInfoLog	Supported			

	getShaderParameter	Supported
	linkProgram	Supported
	pixelStorei	Supported
	renderbufferStorage	Supported
	shaderSource	Supported
	texImage2D	Supported
	texParameteri	Supported
	uniform1f	Supported
	uniform3f	Supported
	uniform1i	Supported
	viewport	Supported
	uniformMatrix3fv	Supported
	uniformMatrix4fv	Supported
	useProgram	Supported
	vertexAttribPointer	Supported
WebGLRenderbuffer	createRenderbuffer	Supported
WebGLUniformLocatio n	getUniformLocation	Supported

### **10.5** Web Applications

feature	attribute	value	6586/6886		
		status	Supported		
		update()	Supported		
		swapCache()	Supported		
		value6586/688statusSupporteupdate()SupporteswapCache()SupporteoncheckingSupporteonchoupdateSupporteondownloadingSupporteondownloadingSupporteoncachedSupporteoncachedSupporteonerrorSupporteonerrorSupportesessionStorageSupportelocalStorageSupportegetItem(key)SupportesetItem(key, value)Supporteremoveltem(key)Supporteclear()SupportekeyNot suppoldValueNot suppnewValueNot suppurlNot suppvalueSupportestorageAreaNot suppopen(name,version)SupportedeleteDatabase(name)Supportecomp(first, second, result)SupporteobjectStoreNamesSupportecreateObjectStore(name, optionalParameters)Supporteremaction(storeNames, mode)Supporte			
		onnoupdate	Supported		
0.Offline Web Applications	ApplicationCache	ondownloading	Supported		
		onprogress	Supported		
		oncached	Supported		
		onupdateready	Supported		
		ImportantSupportedoncheckingSupportedonnoupdateSupportedondownloadingSupportedonprogressSupportedoncachedSupportedonupdatereadySupportedonobsoleteSupportedonerrorSupportedsessionStorageSupportedlocalStorageSupportedlengthSupportedkey(index)SupportedgetItem(key)Supportedsettem(key, value)SupportedremoveItem(key)Supportedclear()SupportedkeyNot supportedvalueNot supportedvalueNot supportedurlNot supportedstorageAreaNot supportedcmp(first, second, result)SupportednameSupportedversionSupportedcopertedSupportedsupportedSupportedsupportedSupportedcopertedSupportedsupportedSupportedsupportedSupportedsupportedSupportedcopertedSupportedsupportedSupportedcopertedSupportedsupportedSupportedsupportedSupportedsupportedSupportedsupportedSupportedcopertedSupportedcopertedSupportedsupportedSupportedsupportedSupportedsupportedSupportedsupported			
		onerror	Supported		
	WindowSessionStorag e	sessionStorage	Supported		
	WindowLocalStorage	localStorage	Supported		
	le ke	length	Supported		
		key(index)	Supported		
	Interface	getItem(key)	Supported		
1 Starses	Interface	setItem(key, value)	Supported		
1.Storage		removeltem(key)	Supported		
		clear()	Supported		
		key	Not supported		
		oldValue	Not supported		
	Event	setItem(key, value)SupportedremoveItem(key)Supportedclear()SupportedkeyNot supportoldValueNot supportnewValueNot supporturlNot supportstorageAreaNot supportopen(name,version)SupporteddeleteDatabase(name)Supported			
		storageArea	Not supported		
		open(name,version)	Supported		
	IDBFactory	deleteDatabase(name)	Supported		
		cmp(first, second, result)	Supported		
	ApplicationCache ApplicationCacheApplicAthe Applicathe Ap	name	Supported		
		version	Supported		
		update()SupportedswapCache()SupportedoncheckingSupportedonnoupdateSupportedondownloadingSupportedondownloadingSupportedoncachedSupportedonupdatereadySupportedonobsoleteSupportedonerrorSupportedsessionStorageSupportedlocalStorageSupportedlengthSupportedkey(index)SupportedgetItem(key)SupportedsetItem(key, value)Supportedremoveltem(key)Supportedclear()SupportedkeyNot supporturlNot supporturlNot supporturlSupportedcheetDatabase(name)SupportedcreateObjectStore(name, optionalParameters)SupportedcreateObjectStore(name, optionalParameters)Supportedclase()SupportedonerrorSupportedclose()SupportedonerrorSupportedonerrorSupportedonerrorSupportedonerrorSupportedonerrorSupportedonpertedNamesSupportedcreateObjectStore(name)SupportedonversionchangeNot supportonerrorSupportedonpertedNamesSupportedonpertedNamesSupportedonpertedNamesSupportedonpertedNamesSupportedonpertedNamesSupportedonpertedNames			
2 Indexed DP Database		value6586/6886statusSupportedupdate()SupportedswapCache()SupportedonnoupdateSupportedonnoupdateSupportedondownloadingSupportedondownloadingSupportedondownloadingSupportedoncachedSupportedonupdatereadySupportedonerrorSupportedsessionStorageSupportedlocalStorageSupportedlengthSupportedkey(index)Supportedgetttem(key)Supportedsettem(key, value)Supportedremoveltem(key)SupportedoldValueNot supportoldValueNot supporturlNot supportdeleteDatabase(name)SupportedcreateObjectStore(name, optionalParameters)SupportedversionSupportedobjectStoreNamesSupportedclose()SupportedonversionchangeNot supportedclose()SupportedonversionchangeNot supportedonversionchangeNot supportedonversionchangeNot supportedonversionchangeSupportedonversionchangeSupportedonversionchangeSupportedonversionchangeSupportedonversionchangeSupportedonversionchangeSupportedonversionchangeSupportedonversionchangeSupportedonversionchangeSupportedonversionchang			
2.IIIdexedDB Database	IDPDatabasa	StatusSupportedupdate()SupportedswapCache()SupportedoncheckingSupportedonnoupdateSupportedondownloadingSupportedoncachedSupportedonupdatereadySupportedonerrorSupportedsessionStorageSupportedlocalStorageSupportedlengthSupportedkey(index)SupportedgetItem(key)SupportedsetItem(key, value)Supportedremoveltem(key)Supportedclear()SupportedkeyNot supportedvalueNot supportedurlNot supportedstorageAreaSupportedcopen(name,version)SupportedcleatObjectStoreNamesSupportedcreateObjectStoreNames, mode)Supportedclose()SupportedonversionchangeNot supportedclose()SupportedonpentrononportedonportedSupportedclose()Not supportedonpentrononportedonportedSupportedonportedSupportedclose()SupportedonpentronSupportedonportedSupportedonportedSupportedonpertorSupportedonportedSupportedonportedSupportedonportedSupportedonpertorSupportedonpertorSupportedonpertorSupported			
	IDDDatabase	sey(index)SupportedgetItem(key)SupportedetItem(key, value)SupportedemoveItem(key)Supporteddear()SupportedseyNot supportoldValueNot supportnewValueNot supporttorageAreaNot supportedpen(name,version)SupporteddeleteDatabase(name)SupportedsupportedSupportedopen(first, second, result)SupportedobjectStoreNamesSupportedobjectStoreNames, mode)SupportedsupportedSupportedsupportedSupportedobjectStore(name, optionalParameters)SupportedsupportedSupported			
		close()	Supported		
		onversionchange	Not supported		
		onerror			
		onabort	Not supported		
	IDBIndex	name	Supported		

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	Web App Development Teenmeur Suide	
	objectStore	Supported
	keyPath	Supported
	multiEntry	Supported
	count(key, retVal)	Supported
	unique	Supported
	get(key, retVal)	Supported
	getKey(key)	Supported
	openCursor(range, direction, retVal)	Supported
	openKevCursor(range, direction)	Supported
	openCursor(range direction, retVal)	Supported
	put(value kev)	Supported
	add(value, key)	Supported
	get(key)	Supported
	delete(key)	Supported
	index(name)	Supported
		Supported
IDDObiestChare		Supported
IDBObjectStore	count(key)	Supported
	createIndex(name, keyPath, optionalParameters)	Supported
	deleteIndex(indexName)	Supported
	autoIncrement	Supported
	transaction	Supported
	indexNames	Supported
	keyPath	Supported
	name	Supported
	source	Supported
	direction	Supported
	key	Supported
	primaryKey	Supported
IDBCursor	continue(key)	Supported
	advance(count)	Supported
	update(value)	Supported
	delete()	Supported
IDBCursorWithValue	value	Supported
12 Dearson With Value	mode	Supported
	error	Supported
	dh	Supported
	abiastStara(nama)	Supported
IDBTransaction	objectstore(name)	Supported Not supported
	abort()	Not supported
		Not supported
	oncomplete	Supported
	onerror	Supported
	error	Not supported
	onerror	Not supported
	onsuccess	Not supported
IDBRequest	readyState	Supported
	result	Not supported
	source	Supported
	transaction	Supported
	onblocked	Not supported
ореплекеquest	onupgradeneeded	Supported
IDBVersionChangeEve	oldVersion	Not supported
nt	newVersion	Not supported
	lower	Supported
	lowerOpen	Supported
	upper	Supported
	upperOpen	Supported
IDBKeyRange	only(value)	Supported
	hound(lower upper lowerOpen upperOpen)	Supported
	lowerBound(lower open)	Supported
	upperBound(upper, open)	Supported
	upperbound(upper, open)	Supported

### **10.6 User Interaction**

feature	attribute	value	6586/6886
	Attailente	draggable	Not supported
	Attribute	value6586/6886draggableNot supporteddropzoneNot supporteddragNot supporteddragstartNot supporteddragenterNot supporteddragleaveNot supporteddragendNot supporteddropNot supporteddragendNot supporteddropEffectNot supporteditemsNot supportedsetDragImage()Not supportedtypesNot supportedgetData()Not supportedfilesNot supportedlengthNot supportedlengthNot supportedkindNot supportedkindNot supported	
		drag	Not supported
		dragstart	Not supported
		dragenter	Not supported
	Events	dragover	Not supported
		draggableNot supporteddropzoneNot supporteddragNot supporteddragstartNot supporteddragenterNot supporteddragoverNot supporteddragleaveNot supporteddragendNot supporteddropNot supporteddragendNot supporteddropEffectNot supporteditemsNot supportedsetDragImage()Not supportedtypesNot supportedgetData()Not supportedfilesNot supportedlengthNot supportedltems[index]Not supportedadd()Not supportedkindNot supportedkindNot supportedkindNot supporteddtypeNot supported	
		drop	Not supported
		dragend	Not supported
		dropEffect	Not supported
		effectAllowed	Not supported
		effectAllowed Not supporter items Not supporter setDragImage() Not supporter	Not supported
		setDragImage()	Not supported
1.Drag & Drop	DataTransfer	setDragImage() types setData()	Not supported
		setData()	Not supported
		getData()	Not supported
		clearData()	Not supported
		files	Not supported
		length	Not supported
	DataTransferItemLi	Items[index]	Not supported
	st	clear()	Not supported
		add()	Not supported
		kind	Not supported
	DataTransforItem	type	Not supported
	Datamansientein	getAsString()	Not supported
		getAsFile()	Not supported
DragEvent	DragEvent	dataTransfer	Not supported

### 10.7 Supporteder

feature	attribute	value	6586/6886
1.Web Supporteders Supporteder		postMessage() Not supporte	
	Supporteder	terminate()	Not supported
		onmessage	Not supported
2.Shared Supporteders	SharedSupporteder	port	Not supported
3.Abstract Supporteders	AbstractSupporteder	onerror	Not supported

### 10.8 Files

Feature	attribute	value	6586/6886
	<b>Filelist</b>	length	Not supported
	FIIELISL	item(index)	Not supported
		size	Not supported
	Plah	type	Not supported
	ыор	slice()	Not supported
		close()	Not supported
	Filo	name	Not supported
	гпе	lastModifiedDate	Not supported
1.File API		readAsArrayBuffer()	Not supported
		readAsText()	Not supported
		readAsDataURL()	Not supported
		abort()	Not supported
	FileReader	readyState	Not supported
		result	Not supported
		error	Not supported
		FileReader.onloadstart	Not supported
		FileReader.onprogress	Not supported

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	FileReader.onload	Not supported		
	FileReader.onabort	Not supported		
	FileReader.onerror	Not supported		
	FileReader.onloadend	Not supported		
	readAsArrayBuffer()	Not supported		
FileReaderSync	readAsText()	Not supported		
	readAsDataURL()	Not supported		
1101	createObjectURL()	Not supported		
URL	revokeObjectURL()	Not supported		

### 10.9 History

feature	attribute	value	6586/6886
1. Session history	History	length	Supported
		state	Supported
		go()	Supported
		back()	Supported
		forward()	Supported
		pushState()	Supported
		replaceState()	Supported

### 10.10 Static CSS

feature	attribute	value	6586/6886
	Background-size	length(px)	Supported
		percentage(%)	Supported
		cover	Supported
		contain	Supported
		auto	Supported
		padding-box	Supported
	background-clip	border-box	Supported
		content-box	Supported
1 Background		padding-box	Supported
I.Dackground	background-origin	border-box	Supported
		content-box	Supported
	background-color	value	Supported
	background-image	url	Supported
	background-repeat	value, value	Supported
	background- attachment	value	Supported
	background-position	value	Supported
	background	value, value	Supported
		h-shadow	Supported
		v-shadow	Supported
	Poy chadow	blur	Supported
2.Borders and Outline	BOX-STIADOW	spread	Supported
		color	Supported
		inset	Supported
	border-bottom-left- radius		Supported
	border-bottom-right- radius		Supported
	border-radius		Supported
	border-top-left-radius		Supported
	border-top-right- radius		Supported
	border-image	source slice width outset repeat	Supported
	border-image-source	url	Supported
	border-image-slice		Supported

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	border-image-width		Supported
	border-image-outset		Supported
boi		stretch	Supported
	border-image-repeat	repeat	Supported
	0	round	Supported
		clone	Not supported
	box-decoration-break	slice	Not supported
		visible	Supported
	<i>.</i>	hidden	Supported
	overflow-x	scroll	Supported
		auto	Supported
3.Box		visible	Supported
	<i>c</i> i	hidden	Supported
	overflow-y	scroll	Supported
		auto	Supported
		RGB	Supported
		RGBA	Supported
	color	HSL	Supported
		HSLA	Supported
4.Color	opacity		Supported
		linear-gradient	Supported
		radial-gradient	Supported
	gradient	repeating-linear-gradient	Supported
		repeating-radial-gradient	Supported
	column-count		Supported
	column-gap		Supported
	column-rule		Supported
	column-rule-color	color	Supported
		none	Supported
		hidden	Supported
		dotted	Supported
		dashed	Supported
		solid	Supported
	column-rule-style	double	Supported
		groove	Supported
		ridge	Supported
		inset	Supported
		outset	Supported
	column-rule-width	thin	Supported
		medium	Supported
		thick	Supported
5.Columns		length	Supported
	column coon	1	Supported
	column-span	all	Supported
	column-width		Supported
	columns	width count	Supported
	column fill	auto	Not supported
		balance	Not supported
	break-inside	auto	Not supported
		avoid	Not supported
		avoid-column	Not supported
		auto	Not supported
	break-before	avoid	Not supported
		column	Not supported
		avoid-column	Not supported
		auto	Not supported
	break-after	avoid	Not supported
	איכמול־מונכו	column	Not supported
		avoid-column	Not supported
6.Flexible Box	align-content	flex-start	Supported
		flex-end	Supported

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		center	Supported
		space-between	Supported
		space-around	Supported
		stretch	Supported
		flex-start	Supported
		flex-end	Supported
	align-items	center	Supported
		stretch	Supported
		baseline	Supported
		flex-start	Supported
		flex-end	Supported
	align-self	center	Supported
		stretch	Supported
		baseline	Supported
		flex	Supported
	display	inline-flex	Supported
	flex	<pre>cflex_grows cflex_shrinks [] cflex_basiss</pre>	Supported
	flex-grow		Supported
	flox shrink	value	Supported
	flex basis	value	Supported
	TIEX-DASIS	value	Supported
		row	Supported
	flex-direction	row-reverse	Supported
		column	Supported
		column-reverse	Supported
	flex-flow	<flex-direction>    <flex-wrap></flex-wrap></flex-direction>	Supported
		nowrap	Supported
	flex-wrap	wrap	Supported
		wrap-reverse	Supported
		flex-start	Supported
		flex-end	Supported
	justify-content	center	Supported
		space-between	Supported
		space-around	Supported
	order		Supported
	text-shadow	h-shadow v-shadow blur color	Supported
	tout our flour	clip	Supported
	text-overflow	ellipsis	Supported
		normal	Supported
	word-break	break-all	Supported
		keep-all	Supported
		normal	Supported
	word-wrap	break-word	Supported
		auto	Not supported
	hyphens	manual	Not supported
	nyphens	none	Not supported
		normal	Supported
	overflow-wrap	horman break-word	Supported
7.Text			Supported
		right	Supported
		contor	Supported
	tout align		Supported
	text-align	JUSTIY	Supported
		start	Supported
		ena	Supported
		match-parent	Supported
		left	Not supported
		right	Not supported
	text-align-last	center	Not supported
		justify	Not supported
		start	Not supported
		end	Not supported
8. Fonts	@font-face	font-family src	Supported

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		font-style	Supported
		font-weight	Supported
		font-stretch	Not supported
		font-variant	
		unicode-range	Not supported
	font-size-adjust		Not supported
	10111-5120-003051	horder-box	Not supported
	hoy sizing	hadding box	Not supported
	DOX-SIZING	padding-box	Not supported
		content-box	
		both	Not supported
	resize	horizontal	Not supported
		vertical	Not supported
		none	Not supported
	outline-width	value	Supported
	outline-offset	value	Supported
		none	Supported
		hidden	Supported
		dotted	Supported
		dashed	Supported
		solid	Supported
9.01	outline-style	double	Supported
5.01		groove	Supported
		ridge	Supported
		inge	Supported
		Inset	Supported
		outset	Supported
	outline-color	value	Supported
	outline	color style width	Supported
	nav-up		Supported
	nav-right		Supported
	nav-down		Supported
	nav-left		Supported
		:valid   :invalid	Supported
		:in-range   :out-of range	Supported
	pseudo classes	:required   :optional	Supported
		:read-only   :read-write	Supported
	width	value	Supported
	height	value	Supported
	device-width	value	Supported
10 Media Queries	device-height	value	Supported
10. Media Queries	orientation		Supported
		value	Supported
	aspect-ratio	value	Supported
	device-aspect-ratio	value	Supported
		::TIRST-IINE	Supported
	pseudo elements	::Tirst-letter	Supported
11. Selectors		::before	Supported
		::after	Supported
		:target	Supported
		:enabled	Supported
		:disabled	Supported
		:checked	Supported
		:root	Supported
		:nth-child()	Supported
		:nth-last-child()	Supported
	pseudo classes	:nth-of-type()	Supported
		:nth-last-of-type()	Supported
		first-child	Supported
		·last-child	Supported
		inst-child	Supported
		last of type	Supported
		.idst-01-type	Supported
		:only-child	Supported
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	:empty	Supported
	::selection	Supported
	:not(X)	Supported
	[attribute^=value]	Supported
simple selectors	[attribute\$=value]	Supported
	[attribute*=value]	Supported
sibling combinators	element1~element2	Supported

### 10.11 Dynamic CSS

feature	attribute	value	6586/6886
		scale(x,y)	Supported
		scaleX(n)	Supported
	transform:scale	scaleY(n)	Supported
		scaleZ(n)	Supported
		scale3d(x,y,z)	Supported
		rotate(angle)	Supported
		rotateX(angle)	Supported
	transform:rotate	rotateY(angle)	Supported
		rotateZ(angle)	Supported
		rotate3d(x,y,z,angle)	Supported
		translate(x,y)	Supported
		translateX(x)	Supported
	transform:translate	translateY(y)	Supported
		translateZ(z)	Supported
1.Transforms		translate3d(x,y,z)	Supported
		skew(x-angle,y-angle)	Supported
	transform:skew	skewX(angle)	Supported
		skewY(angle)	Supported
		matrix(n,n,n,n,n)	Supported
	transform:matrix	matrix3d(n,n,n,n,n,n,n,n,n,n,n,n,n,n,n,n)	Supported
		preserve-3d	Supported
	transform-style	flat	Supported
		x-axis	Supported
	transform-origin	y-axis	Supported
		x-axis y-axis z-axis	Supported
	perspective		Supported
	perspective-origin	x-axis y-axis	Supported
	backface-visibility	visible	Supported
		hidden	Supported
	transition-property	all	Supported
		width	Supported
		height	Supported
	transition-duration	time (s)	Supported
		linear / cubic-bezier(0,0,1,1)	Supported
2. Transitions	transition-timing- function	ease / cubic-bezier(0.25,0.1,0.25,1)	Supported
		ease-in / cubic-bezier(0.42,0,1,1)	Supported
		ease-out / cubic-bezier(0,0,0.58,1)	Supported
		ease-in-out / cubic-bezier(0.42,0,0.58,1)	Supported
	transition-delay	time (s)	Supported
	transition	property duration timing-function delay	Supported
	@kevframes	animationname kevframes-selector {css-styles:}	Supported
	animation-name	keyframename	Supported
		none	Supported
	animation-duration	time (s)	Supported
3.Animation		linear	Supported
	animation-timing- function	ease	Supported
		ease-in	Supported
		ease-out	Supported

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	ease-in-out	Supported
	cubic-bezier	Supported
animation-delay	time (s)	Supported
animation-iteration-		Supported
count	infinite	Supported
animation direction	normal	Supported
animation-direction	alternate	Supported
	running	Supported
animation-play-state	paused	Supported
	forwards	Supported
animation-fill-mode	backwards	Supported
	both	Supported
animation	name duration timing-function delay iteration- count direction	Supported

### **10.12** iframe element

The web engine supports iframe and follows the Oct. 28th 2014 version of iframe.

Access restriction (sandboxing) for iframe content, supported attribute values: allow-same-origin, allow-scripts, allow-forms, allow-top-navigation.

Standard link: http://www.w3.org/TR/html5/embedded-content-0.html#the-iframe-element

### 10.13 WebSocket

The web engine supports the WebSocket Protocol with RFC\_6455 which offers bidirectional network connectivity using the WebSocket Handshake Protocol

### **10.14** Text-To-Speech (TTS)

Enable TTS feature in apps

Screen Reader (WAI-ARIA) There are several guide lines that can be followed:		
	the official WCAG 2.0 specification (http://www.w3.org/TR/WCAG20/)	
	http://webaim.org/standards/wcag/checklist	
	Attributes such as role and related aria attributes are not supported by the	
	MSD6586/6886 platform	
	Web Speech API is a high level JavaScript API to enable web developers to	
Wahspaach API	incorporate speech recognition and synthesis into their apps. The Web Speech API	
webspeech API	can be used for voice driven app features such as search.	
	https://dvcs.w3.org/hg/speech-api/raw-file/tip/speechapi.html	

The following is an example for Web Speech usage

### web speech usage

/html>

### 10.15 WebGL

WebGL is supported in MSD6586/6886 platform. But we do not have specific test case to develop this functionality and there may be some problems when you use.

This is normally supported on high-end devices, but typically require more platform resources than CSS/HTML/JavaScript.

Availability of WebGL can be detected by the app as follows:

```
if (!window.WebGLRenderingContext) {
   console.log("WebGL is not supported by browser");
} else {
   var canvas = document.createElement("canvas");
   var context = canvas.getContext("webgl");
   if (!context) {
      console.log("WebGL is supported by browser but disabled");
    } else {
      console.log("WebGL is supported by browser and enabled");
   }
}
```

App developers should also be aware that WebGL may require more platform resources than CSS/HTML/JavaScript.