Windows 7 Audio Logo Changes

November 13, 2009

Abstract

The Windows® 7 Logo Program is designed to help third-party vendors deliver compatible and reliable systems, software, and hardware products. End users trust the logo as an assurance of compatibility and reliability.

This paper highlights changes to Windows 7 Audio Logo requirements and tests that impact driver and hardware implementations. It is a convenient reference for these changes and does not duplicate the official logo requirement publications. Audio hardware, system, device, and driver developers and testers should read this paper in the earliest stages of design to ensure that your audio solution works well on Windows 7.

This information applies to the Windows 7 operating system.

References and resources discussed here are listed at the end of this paper.

For the latest information, see:
 <http://www.microsoft.com/whdc/device/audio/Win7Logo_Aud.mspx>

The presented information might eventually be provided in the Windows Logo Kit (WLK) and LogoPoint. If you encounter a conflict between this paper and the WLK or LogoPoint, consider the WLK and LogoPoint to be factually correct and this paper to be out of date.

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Document History

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| --- | --- | --- | --- | --- |
| Date | Change |  |  |  |
| November 13, 2009 | First publication |

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# Introduction

The Windows® Logo Kit (WLK) is designed to guarantee that devices and systems that ship with Windows provide customers with a great user experience. Logo tests check for hardware and driver issues that might be problematic in the Windows environment.

Audio device types have evolved, and new standards have been developed to ensure that audio hardware works well with Windows. This paper highlights Audio logo requirements that impact audio driver and hardware implementations for Windows 7. It describes new logo requirements and explains changes to existing requirements. Test changes and new tests for each requirement are also explained. These tests are shipped in WLK 1.4.

# New Audio Device Types, Standards, and Logo Programs for Windows 7

Audio device types have evolved, and new standards have been developed to ensure that audio hardware works well with Windows 7. This section describes the new and changed logo requirements and tests for these device types and standards.

## High-Definition Multimedia Interface (HDMI)

Windows 7 provides driver support for devices that comply with the Intel High Definition (HD) Audio and the Universal Serial Bus (USB) Audio specifications.

For HD Audio, the High-Definition Multimedia Interface (HDMI) connector is the common physical connector to stream both video and audio. The HD Audio class driver that ships with Windows 7 supports HD Audio HDMI implementations that are based on the following document change notifications (DCNs) to the Intel HD Audio specification:

* HDA034-A2: HDMI Content Protection and Multi-Channel Support
* HDA035-A: HDMI High Bit Rate Support
* HDA036-A: Display Port Support and HDMI Miscellaneous Corrections

Support for these DCNs is optional. If your hardware solutions follow these DCNs, they must comply with the following new and updated logo requirements:

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| **Requirement** | **GRAPHICS-0073 (NEW)** |
| **Title** | Display driver that contains either an HD Audio interface supporting multi-channel HDMI or a DisplayPort audio consistent with HD Audio must comply with HD Audio HDMI & DisplayPort DCNs |
| **Testing** | Graphics HDMI Test was added to validate this requirement. This test is a part of the WLK Display Kit, and does not exist in the Audio Devices Kit.  |

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| **Requirement** | **AUDIO-0077 (NEW)** |
| **Title** | HD audio drivers support specific properties to describe state of jack/connector |
| **Testing** | KS Topology Test verifies support for these properties through the following required test cases:* KS Pins\KSPROPERTY\_JACK\_DESCRIPTION
* KS Pins\KSPROPERTY\_JACK\_DESCRIPTION2

These test cases will be enabled in the WLK 1.5 release, but you can run KS Topology Test manually with them. Refer to the WLK documentation for instructions on how to run this test and manually select the test case. |

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| **Requirement** | **AUDIO-0078 (NEW)** |
| **Title** | If hardware supports multi-channel HDMI or DisplayPort audio consistent with the method defined by HD Audio, then the hardware must comply with the HD Audio HDMI Design Change Notifications (DCN). |
| **Testing** | UAA Test has been updated to include the following test case:* Codec Tests\ValidateHDMI

Various existing tests in the Audio Kit were updated.* Graphics HDMI Test was added to validate this requirement. This test is a part of the WLK Display Kit, and does not exist in the Audio Devices Kit.
 |

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| **Requirement** | **AUDIO-0079 (NEW)** |
| **Title** | Audio drivers using HD audio specification and exposing HDMI or DisplayPort endpoint support the KSPROPERTY\_JACK\_SINK\_INFO property |
| **Testing** | KS Topology Test verifies support for the required property through the following test case:* KS Pins\KSPROPERTY\_JACK\_SINK\_INFO

This test case will be enabled in the WLK 1.5 release, but you can run KS Topology Test manually with it. Refer to the WLK documentation for instructions on how to run this test and manually select the test case.  |

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| **Requirement** | **AUDIO-0049 (UPDATED)** |
| **Title** | Display adapter or chipset with HDMI audio or DisplayPort audio capabilities must implement two channel audio support that is compliant with the HD Audio specification |
| **Changes** | This existing requirement was updated to include DisplayPort devices. |
| **Testing** | Existing test cases apply to these new devices. |

## HD Audio Low-Power DCN

Battery life continues to be the focus of mobile computing, so it is important to save power in as many situations as possible.

The Intel HD Audio Low Power Capabilities Clarifications and Enhancements DCN HDA015-B enables HD Audio codecs to enter low-power states faster and with fewer side-effects. Support for the HD Audio Low Power DCN is optional. If your hardware solution implements this DCN, it must comply with the following new logo requirement:

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| **Requirement** | **AUDIO-0062 (NEW)** |
| **Title** | If HD Audio codec supports HD Audio Low-Power DCN then it needs to implement the Low-Power specification correctly in hardware, firmware and 3rd party software (driver)  |
| **Testing** | UAA Test: Various existing tests were updated. |

In addition, the USB Audio 1.0 specification allows software to control the power state of USB devices through a technology that is called Selective Suspend. To increase power savings, all bus-powered USB devices must support Selective Suspend on Windows 7, as shown in the following requirement:

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| **Requirement** | **CONNECT-0094 (EXISTING)** |
| **Title** | All Bus powered USB devices support USB Selective Suspend after periods of inactivity |
| **Testing** | USB Selective Suspend Test was added to validate this requirement. |

## Bluetooth Audio Devices and Drivers

Third-party Bluetooth audio devices and drivers must comply with all existing Audio logo requirements and with all new requirements that are specific to Bluetooth. These requirements check that Bluetooth audio devices are correctly integrated in Windows 7 and ensure a consistent user experience. Most Bluetooth audio-specific requirements focus on device description information that is reported to the system, device connection status, and driver feature support.

The use of Bluetooth audio devices on the Windows operating system has gradually increased. Some Bluetooth profile scenarios include the following:

* Hands-Free Profile (HFP) devices that are mainly used for communication-centric scenarios with voice-over-IP (VOIP) applications.
* Advanced Audio Distribution Profile (A2DP) devices that support stereo audio and are a reasonable choice for entertainment scenarios.
* Audio/Video Remote Control Profile (AVRCP) devices through which the device can also be used to control applications for media playback, volume setting, and so on.

The Headset Profile (HSP), HFP, A2DP, and AVRCP are collectively called *audio profile drivers*.

In Windows versions earlier than Windows 7, Bluetooth audio profile drivers were typically wrapped in a set of core Bluetooth radio drivers and profile drivers. Third-party driver providers often tested the audio profile driver under the Unclassified Device category. Logo Policy-0021 explicitly prohibits an audio profile driver from being shipped in a system that was submitted for a System logo because of the already established Audio Device category.

In Windows 7, the quality of Bluetooth audio profile drivers must be equal to audio drivers of other bus types. Because of this, you cannot ship an audio profile driver in a system if the driver was tested only under the Unclassified Device category. If you do not intend to ship your audio profile driver in a system that has the Windows 7 logo, we still strongly recommend that you not submit this driver under the Unclassified Device category because of the restrictions in Policy-0021. Issues about profile drivers that might be subjected to other non-audio category requirements are beyond the scope of this paper.

The requirements that are specific to Bluetooth audio devices include the following:

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| **Requirement** | **AUDIO-0057 (NEW)** |
| **Title** | Bluetooth audio devices expose Major/Minor Class of Device identifier and accurately reflect form factor/primary usage. |
| **Testing** | There is currently no test for this, but compliance is expected. |

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| **Requirement** | **AUDIO-0058 (NEW)** |
| **Title** | Bluetooth audio devices paired with a PC will automatically attempt to reconnect to the PC after they are powered up or come back into range |
| **Testing** | Bluetooth Audio Logo Test “Bluetooth Audio Reconnect\Verify manual disconnect and reconnect” is a manual test case that verifies the audio endpoint device connection status is completed within a reasonable time.  |

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| **Requirement** | **AUDIO-0060 (NEW)** |
| **Title** | Bluetooth Audio Device needs to support at least one of the below profiles (Handsfree, Headset, A2DP, AVRCP) |
| **Testing** | Wave Test “Compliance tests\Win7-UAA Compliance Test” and “Compliance tests\Enumerate Audio Devices” have been updated to allow the following Bluetooth audio profile drivers to be considered UAA device on Windows 7:* Headset Profile (HSP)
* Hands-Free Profile (HFP)
* Advanced Audio Distribution Profile (A2DP)
* Audio/Video Remote Control Profile (AVRCP)

No other profile support will be considered for Windows 7 Audio device submission.The Windows Vista version of the test is unchanged. |

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| **Requirement** | **AUDIO-0061 (NEW)** |
| **Title** | Bluetooth Audio Devices must complete an HCIDisconnect before powering down |
| **Testing** | Bluetooth Audio Logo Test “Bluetooth Audio Reconnect\Verify manual disconnect and reconnect” is a manual test case that verifies the audio endpoint device connection status is completed within a reasonable time without software control.  |

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| **Requirement** | **AUDIO-0087 (NEW)** |
| **Title** | Bluetooth Audio Device Driver Requirements:As of Windows 7 RC, AUDIO-0087 has a known exception that this requirement does not require compliance for **HID Call Control** support. Other requirements are still being enforced and exceptions will need to be handled separately based on contingency process. |
| **Testing** | * Bluetooth profile support is verified by the Wave Test “Compliance test” group (see AUDIO-0060).
* The Bluetooth SIG Qualification requirement is enforced by Bluetooth SIG. Please make sure your Windows 7 Bluetooth audio solutions are qualified.
* The auto-disconnect/connect features are verified by in Bluetooth Audio Logo Test as in AUDIO-0058 and AUDIO-0061.
* Volume change notifications on HFP drivers will be added in a future WLK release.
* INF files for Bluetooth Audio drivers are verified by “Run INF Test Against a Single INF.”
 |

In addition, the following Connectivity requirements for the Bluetooth bus type apply to Bluetooth Audio Device submissions:

* **CONNECT-0001** Bluetooth wireless technology device supports Plug and Play on the applicable bus
* **CONNECT-0006** Devices which support Bluetooth must implement the DeviceID profile, version 1.2

* **CONNECT-0007** Bluetooth Devices respond to Service Discovery requests before requiring authentication and while in inquiry scan state.
* **CONNECT-0008** Bluetooth wireless technology subsystem end product lists Windows operating system in its complementary subsystem list
* **CONNECT-0011** HID Devices which support Bluetooth support HID-initiated re-connect

* **CONNECT-0096** Devices which support Bluetooth must implement the Bluetooth 2.1 requirements

* **CONNECT-0097** Bluetooth Keyboards which implement Secure Simplified Pairing must support the Passkey authentication method

The complete set of Bluetooth-specific tests for Connectivity requirements are not currently mapped to the Audio Devices or Communication Devices categories in the WLK. This is likely to change in a future release of the WLK.

For test details, refer to the Driver Test Manager (DTM) documentation.

## Communication Device Logo Program

Windows 7 Audio provides a better user experience in communication-centric scenarios. For example, communication applications can:

* Leverage the additional default *communication* audio endpoint devices that the Windows 7 audio system exposes.
* Use the Windows 7 stream attenuation feature to dynamically adjust the audio volume of non-communication streams based on user settings in the sound control panel.

In addition, the ecosystem of devices that are intended to enable video and voice communication scenarios on the Windows system is growing. Examples of such devices include headphones, microphones, microphone arrays, headsets, handsets, phones, and Bluetooth devices that support HFP. It is important to ensure that this growing market of devices and drivers provide a base-level experience for Windows users. Communication devices that provide a great experience benefit both the device user and the video and audio recipient on the other side of the communication. The market on both sides of the video or voice communication continues to grow when the user experience is positive.

To ensure that all users in a Windows communication scenario have a good experience, we created a new Communication category in the WLK. Both the updated Audio Device and the new Communication categories ensure that communication devices and drivers work correctly with Windows. The new Communication category also provides a single submission for multifunctional devices such as webcams that have both video capture and audio capabilities.

The set of requirements in the Communication category includes the following:

* All existing Video Capture requirements.
* A subset of Audio requirements.
* New Audio requirements that are specific to communication scenarios.

Tests in the new Communication category include existing Audio and Video Capture tests. We modified the existing audio test cases in both categories to consider the difference in requirements between general audio devices and communication audio devices. In addition, we added new audio tests.

For the Communication category in WLK 1.4, we recommend that you submit only those communication-centric devices that have both audio and video capture functions. You should submit audio-only communication devices to the Audio Device category, which automatically skips the irrelevant test cases. Future releases of the WLK will likely allow submission of audio-only devices to the Communication category.

The list of Audio requirements that exist within the Communication category follows. There are no changes to the corresponding audio tests from the Audio category, and we assume you are already familiar with those.

|  |  |
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| **Requirement** | **AUDIO-0001 (EXISTING)** |
| **Title** | Audio device driver is based on the Windows WaveRT miniport WDM driver model |
| **Test** | Wave Test (Test Case: Compliance Tests\Verifying Pin is WaveRT) |

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| **Requirement** | **AUDIO-0008 (EXISTING)** |
| **Title** | Standalone USB Audio based microphone array device complies with the Microsoft USB Audio 1.0 design guidelines and Microsoft Microphone Array Design Guidelines |
| **Test** | A test is not implemented yet, but compliance is expected. |

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| **Requirement** | **AUDIO-0009 (EXISTING)** |
| **Title** | Audio device is compliant with one of the appropriate technology specifications supported by the UAA initiative |
| **Test** | Wave Test (Test Case: Compliance Tests\Win7 UAA-Compliance Test) |

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| **Requirement** | **AUDIO-0010 (EXISTING)** |
| **Title** | Audio device is designed to be WaveRT-port-friendly |
| **Test** | Wave Test (Test Case: Compliance Tests\Verifying Pin is WaveRT) |

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| **Requirement** | **AUDIO-0024 (EXISTING)** |
| **Title** | Audio subsystem supports full duplex operation |
| **Test** | Round Trip Test (new for Windows 7) |

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| **Requirement** | **AUDIO-0026 (EXISTING)** |
| **Title** | Audio device complies with related power management specifications |
| **Test** | Lullaby Test |

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| **Requirement** | **AUDIO-0033 (EXISTING)** |
| **Title** | The audio driver correctly reports all supported properties |
| **Test** | KS Topology Test |

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| **Requirement** | **AUDIO-0037 (EXISTING)** |
| **Title** | Audio solution that implements topology volume nodes uses a resolution equal to or better than 1.5 dB |
| **Test** | KS Topology Test |

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| **Requirement** | **AUDIO-0038 (EXISTING)** |
| **Title** | Audio driver that implements KSNODETYPE\_VOLUME correctly supports the KSPROPERTY\_AUDIO\_VOLUMELEVEL property |
| **Test** | KS Topology Test |

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| **Requirement** | **AUDIO-0039 (EXISTING)** |
| **Title** | Audio driver that implements KSNODETYPE\_SUPERMIX correctly implements the KSPROPERTY\_AUDIO\_MIX\_LEVEL\_TABLE property |
| **Test** | KS Topology Test |

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| **Requirement** | **AUDIO-0043 (EXISTING)** |
| **Title** | Audio subsystem supports time-synchronized sample rates if both input and output capabilities are present |
| **Test** | KS Position Test |

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| **Requirement** | **AUDIO-0044 (EXISTING)** |
| **Title** | USB audio device uses USB HID audio controls to keep the operating system informed of user interactions with the device  |
| **Test** | This is not tested currently but compliance is expected. |

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| **Requirement** | **AUDIO-0045 (EXISTING)** |
| **Title** | System effect in capture path provides RAW data from microphone array when requested by the client |
| **Test** | SysFx Test |

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| **Requirement** | **AUDIO-0047 (EXISTING)** |
| **Title** | Audio device driver supports WAVEFORMATEXTENSIBLE |
| **Test** | Wave Test |

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| **Requirement** | **AUDIO-0051 (EXISTING)** |
| **Title** | Third-party system effect audio processing objects (APOs) that expose property pages include a checkbox to disable processing |
| **Test** | SysFx UI Test |

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| **Requirement** | **AUDIO-0052 (EXISTING)** |
| **Title** | Audio Device Driver provides kernel streaming topology according to the documentation in the Microsoft Windows Driver Kit |
| **Test** | KS Position Test |

The following new requirement applies to both the Audio Device and Communication categories:

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| **Requirement** | **AUDIO-0053 (NEW)** |
| **Title** | Audio driver does not perform undiscoverable stream redirection or perform other hidden stream handling that is unknown and/or uncontrollable by user or the Windows Audio System |
| **Test** | The intent of this requirement is to prevent undiscoverable features in both hardware and software. There is no existing test; however, devices and drivers are expected to be compliant with this requirement.  |

The following new Audio requirements are specific to communication devices only:

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| **Requirement** | **AUDIO-0081** |
| **Title** | Voice Communication devices must be UAA compliant audio devices with an appropriate communication-centric form factor exposed to the operating system through available mechanisms |
| **Test** | The UAA compliance of various devices is enforced by Wave Test “Compliance tests\Win7 UAA-Compliance Test”.When you specify an appropriate device descriptor (such as HD Audio pin configuration, USB terminal types, or Bluetooth Class of Device) and an accurate device KSNODETYPE in the driver, the logo tests consider the device as a communication-centric device and test with the corresponding requirements listed in this section only. Please refer to the Design Notes of this requirement for details.However, if you specify an appropriate device descriptor and accurate KSNODETYPE for your communication-centric device, but the tests validate the device as a general audio device instead of a communication device, you can use the INF registry described in the Design Notes to pass the test as a communication device.If your submission does not include a third-party driver for Logo signature, do not ship this INF to end users because its sole purpose is to work around the limitation that might lie in the different descriptors. You can provide this INF to system vendors as a workaround in system submission.Please contact Microsoft immediately for recommendations on the choice of descriptors and KSNODETYPEs, or to have new descriptors and KSNODETYPEs be considered in future release of Windows. The support for this workaround might be removed in a future release of WLK. |

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| **Requirement** | **AUDIO-0082** |
| **Title** | Audio capable and video capable and audio/video capable USB communication devices implement HID controls according to USB HID Specifications |
| **Test** | USB Audio Logo Test has a set of manual test cases that test the specific HID controls that are called out in this requirement. Controls of the same functionalities as these HID controls can be implemented with different HID usages in the USB HID Usage Table. For example, a volume control can be implemented to use different usages supported by USB HID Usage Table, but the test currently only verifies designs that use certain usages. In that case, you can choose to skip the specific test case. |

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| **Requirement** | **AUDIO-0083** |
| **Title** | Communication device does not use undiscoverable and/or uncontrollable non-linear audio processing that is on by default |
| **Test** | The intent of this requirement is to prevent undiscoverable features in both hardware and software. There is no existing test; however, devices and drivers are still expected to be compliant with this requirement.  |

Communication devices must also adhere to all logo requirements in the and sections of this paper.

# Updates on Existing Requirements

This section provides updates on existing Audio logo requirements.

## WaveRT Event-Driven Mode Support

In Windows 7, we changed the user-mode audio engine to run in event-driven mode (also known as pull mode) by default to improve round-trip latency. Round-trip latency is the time period between when an audio sample is sent to the Windows Audio Session API (WASAPI API) for rendering and when the WASAPI API returns the same sample to higher level applications, through a loopback cable between one render endpoint device and one capture endpoint device. In other words, it represents the total latency between WASAPI, the audio subsystem, the driver, and hardware.

The requirement for audio drivers to support event-driven mode existed in Windows Vista®. In Windows 7, we improved logo test coverage for this requirement and added some design notes that had details on the INF file setting to configure the audio subsystem for the driver.

The default engine processing period (engine periodicity) is 10 milliseconds (ms). Third-party INFs can override this periodicity by using a value from 5 to 9 ms to further reduce the round trip latency. You must test your device and driver under this setting during logo submission. IHVs or OEMs who use this setting must also test that the device, driver, and system have no degradation in audio quality, yet have a significant system performance impact. This setting is not WaveRT-specific, but applies to all driver models.

The details of the INF entry are stated in the following requirement:

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| **Requirement** | **AUDIO-0054 (UPDATED)** |
| **Title** | WaveRT drivers support pull mode audio streaming technology by implementing the **IMiniportWaveRTStreamNotification** interface. |
| **Testing** | Testing of this requirement occurs at three levels:1. The driver must support the correct properties for a WaveRT driver. Wave Test “Compliance Tests\Verifying Pin Supports Pull-mode” verifies that the driver supports the KSPROPERTY\_RTAUDIO\_BUFFER\_WITH\_NOTIFICATION property in KSPROPSETID\_RtAudio.
2. The INF file for installing a third-party WaveRT driver must explicitly declare support for event-driven mode. This ensures system stability with legacy drivers that support event-driven mode properties but that do not do so correctly when migrated over to Windows 7.The preceding test case also verifies that the driver INF specifies PKEY\_AudioEndpoint\_Supports\_EventDriven\_Mode as the endpoint property key.
3. The WASAPI event-driven mode streaming must succeed. Audio Logo Test “Pull Mode\Render Exclusive” and “Pull Mode\Capture Exclusive” tests verifies that WASAPI exclusive-mode event-driven (pull mode) streaming is successful through all render and capture audio endpoint devices.

If you use a custom periodicity, your submission must contain a driver submission. In this case, “Run INF Test Against a Single INF” would run and its test case for media class INFs would verify the setting is correct.Microsoft recommends that you thoroughly test your driver solution with event-driven mode on Windows 7 audio systems.  |

## Improved Audio Fidelity Coverage

Since Windows Vista, we have encouraged a baseline audio fidelity experience for audio solutions on Windows systems. For a continued baseline experience, Windows 7 eliminates the difference between “Premium Logo” and “Basic Logo” in the WLK, and we added the following new requirement:

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| **Requirement** | **AUDIO-0006 (UPDATED)** |
| **Title** | Audio solution delivers a minimum fidelity audio experience |
| **Test** | Audio Fidelity Test |

This section describes updates to various audio fidelity requirements that relate to Requirement AUDIO-0006 and explains how you should run your tests for these requirements.

For more information about audio fidelity test, refer to “Audio Fidelity Testing” on the WHDC Web site.

### Capture Test

Before WLK 1.3, logo tests measured only the fidelity of electrical audio render devices such as line-out jacks and headphone jacks. Since WLK 1.3, we provide coverage for capture devices such as line-in jacks and microphone jacks. The following diagram illustrates the test setup.



To prevent captured signals from deviating too much from the middle of a sample range—such as the one shown in the following graph—we introduced the following Requirement AUDIO-0055:

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| **Requirement** | **AUDIO-0055 (NEW)** |
| **Title** | Audio capture device DC offset is limited within range of + or - 0.3 on scale from -1.0 to +1.0 |
| **Testing** | Audio Fidelity Test |

The following graph illustrates both a passing and failing signal under the preceding requirement.



The first sample sine wave (in blue) is a failing signal. It does not comply with the requirement because its average sample is roughly 0.5, which is greater than 0.3. The second sample sine wave (in green) is a passing signal because the average sample is close enough to zero. Specifically, the signal complies with the requirement because its average sample value is -0.25, which is between -0.3 and 0.3.

### System Activity Test

In real-world scenarios, few users maintain an isolated machine for audio streaming. However, these users reported that certain audio solutions or system setups provide a poor end-user audio fidelity experience.

To solve this problem, we added a “Real World Stress” tool to the WLK 1.3 Audio Fidelity Test. This tool simulates real-world user scenarios and loads on the system (such as video playback) and measures the audio fidelity against THD+N requirements. This prevents excessive noise that other hardware on the system generates.

### Skew Test for Sampling Frequency Accuracy

The clock in the audio device chipset must be accurate because audio streaming relies on an accurate clock. The Audio Fidelity requirement has a required sampling frequency accuracy. Since WLK 1.4, we verify the device clock against the reference clock in the Audio Precision (AP) analyzer.

The test plays a known high-frequency tone and uses the AP analyzer to measure the frequency of the analog tone. The aggregate accuracy of the clocks in the render path is equal to the measured frequency, divided by the expected frequency and multiplied by 100 percent.

### Power State Transition Test for Catching Pops and Clicks

Pops and clicks at system power state transition are annoying to users and risk damaging the audio device on the system. We added the following Power State Transition Test to WLK 1.4 to verify the device behavior according to THD+N requirements:

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| **Requirement** | **SYSFUND-0050 (EXISTING)** |
| **Title** | System employs anti-pop measures on all system audio outputs |
| **Testing** | Audio Fidelity Test(Test Case: Power State Transition Test) |

We continue to support the import/export option of fidelity logs from different vendor’s internal or external test partners. You cannot import an audio fidelity log from any previous WLK version into WLK 1.4 tests; this results in an error and a logged failure. For tests in preview mode (Skew Test and Power State Transition Test), we allow you to use a preview filter.

## Full Duplex Requirement: Round Trip

Audio drivers and hardware must support full-duplex operation. This requirement is not new for Windows 7, but we added a new test to the WLK Audio Device Kit that enforces it, as shown in the following requirement:

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| --- | --- |
| **Requirement** | **AUDIO-0024 (EXISTING)** |
| **Title** | Audio subsystem supports full-duplex operation |
| **Test** | Round Trip Test (new) |

For Windows Vista logo testing, the Full Duplex Test is used to verify the preceding requirement. In Windows 7, Round Trip Test replaces Full Duplex Test for this requirement because the technology in Full Duplex Test is outdated. Full Duplex Test will also be replaced in future releases of the Windows Vista Logo Kit.

Round Trip Test verifies that each audio endpoint device on a system streams correctly. Render and capture can occur at the same time, which fulfills the full-duplex requirement. Round Trip Test has the following two verification modes:

* In loopback mode, testers must plug in a hardware loopback cable between the endpoints that are under test.
* In in-air mode, testers must plug in a render device (such as a headphone) and a capture device (such as a microphone), depending on the endpoint under test.

Round Trip Test is documented in the WLK. The remainder of this section provides additional conceptual information to help you run the test.

Round Trip Test currently tests audio devices at the *audio endpoint device level*. You can find the technical details for an audio endpoint device on MSDN®. Typically, each audio endpoint device is a representation of a physical audio device that is seen by end users. For example, a 3.5‑millimeter (mm) analog speaker-out jack is an audio endpoint device, yet users who plug in a set of analog speakers see only the speakers. The speaker endpoint device (usually on HD Audio codec) can show its plug-in state and other properties, as shown in the following screen shot of the sound control panel (mmsys.cpl).



Each endpoint can be associated with more than one jack, such as a device that supports 5.1 surround sound, as shown in the following screen shot.



The latest version of Round Trip Test uses the jack information that is reported to the system through drivers to inform the tester which jack to plug in to test the audio endpoint device. This jack information depends on both a correct driver implementation and a correct device description in the BIOS or the hardware’s firmware (such as HD Audio pin-configuration, USB descriptors, or Bluetooth class of device (CoD)). Currently for multichannel devices, Round Trip Test tests the jack that streams only the first two channels.

Some systems or devices have multiplexed audio endpoint devices. For example, the two microphone endpoints in the following screen shot (one at the front panel and one at the rear panel) are multiplexed.



##

## HD Audio PNP ID Requirement Change

The following requirement adds a new test case to INF Test that catches invalid third-party HD Audio driver PNP ID strings:

|  |  |
| --- | --- |
| **Requirement** | **AUDIO-0019 (EXISTING)** |
| **Title** | INF file for HD Audio codec includes properly formatted device ID string for each supported codec device |
| **Test** | Run INF Test against a single INF: tests that run on media class installer INFs are modified to test for compliance of this requirement |

Specifically, the test catches the following invalid third-party HD Audio driver INF entries because they are not specific enough:

* HDAUDIO\FUNC\_XX&VEN\_YYYY
* HDAUDIO\FUNC\_XX

Valid HD audio driver INF entries include the following:

* HDAUDIO\FUNC\_XX&VEN\_YYYY&DEV\_ZZZZ&SUBSYS\_AAAAAAAA&REV\_BBBB
* HDAUDIO\FUNC\_XX&VEN\_YYYY&DEV\_ZZZZ&SUBSYS\_AAAAAAAA
* HDAUDIO\FUNC\_XX&VEN\_YYYY&DEV\_ZZZZ&REV\_BBBB
* HDAUDIO\FUNC\_XX&VEN\_YYYY&DEV\_ZZZZ

For details, refer to “Plug and Play Guidelines for High Definition Audio Devices” on the WHDC Web site.

# Resources

#### Intel:

High Definition Audio Specification

DCN HDA034-A2: HDMI Content Protection and Multi-Channel Support

DCN HDA035-A: HDMI High Bit Rate Support

DCN HDA036-A: Display Port Support and HDMI Miscellaneous Corrections

<http://www.intel.com/standards/hdaudio/>

DCN HDA015-B: Low Power Capabilities Clarifications and Enhancements

<http://www.intel.com/design/chipsets/hdaudio.htm>

#### Microsoft:

Microsoft Developer Network (MSDN)

<http://www.msdn.com>

Windows Logo Program

<http://www.microsoft.com/whdc/winlogo/default.mspx>

Windows Logo Kit

<http://www.microsoft.com/whdc/winlogo/wlk/default.mspx>

Plug and Play Guidelines for High Definition Audio Devices

<http://www.microsoft.com/whdc/device/audio/hd-aud_pnp.mspx>

Audio Fidelity Testing

<http://www.microsoft.com/whdc/whql/audiofidelity.mspx>

#### Universal Serial Bus (USB):

USB Device Class Definition for Audio Devices 1.0

USB Device Class Definition for Audio Data Format 1.0

USB Device Class Definition for Terminal Types 1.0

USB Device Class Definition for MIDI Devices

<http://www.usb.org/developers/devclass_docs/>