

Energy Efficiency of Games Consoles

Draft Outline proposal to further improve the energy
consumption of Games Consoles

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Table of Contents

1	Scope of document.....	3
2	Key Definitions and Principles	3
2.1	Tiers.....	3
2.2	Games Consoles	3
2.3	Operational Modes	4
2.4	General Auto-Power Down Requirements	6
2.5	General Definitions	7
3	General Principles of Games Consoles Design	8
4	Power Caps	8
5	Test Procedure for All Modes for Game Consoles	9
5.1	Scope.....	9
5.2	Testing Requirements	10
5.2.1	Game and Media Selection	10
5.3	Number and selection of units to be tested.....	10
5.4	Approved meters, testing accuracy and test conditions	10
5.5	Equipment Unit Under Test (UUT) Preparation	10
5.6	Energy Consumption Measurement and Auto-Power Down Verification Test Method	11
5.6.1	Navigation Mode Testing	11
5.6.2	Media Playback DVD	11
5.6.3	Media Playback Blu-ray Disc	11
5.6.4	Streaming HD	12
5.6.5	Off/Standby after pressing the Off button	12
5.6.6	Off/Standby when switched Off from controller.....	12
5.6.7	Navigation Mode APD	12
5.6.8	Active Gaming APD.....	12
5.6.9	Disk-Based Media Playback APD	13
5.6.10	Media Streaming Playback APD	13

1 Scope of document

This proposal defines an agreement for improved energy efficiency of Games Consoles, which use more than 20 watts in Active game mode, for voluntary adoption by manufacturers. To foster innovation, the following requirements shall be followed unless an alternative means is employed which can be demonstrated to provide equivalent or greater energy savings, or unless it can be demonstrated that a specific requirement does not provide energy savings in the context of a new innovation. Specific criteria and a process for appending alternative approaches to this standard will be review and discussed in further detail.

Game software is not included in the scope of this proposal.

This document is intended to supplement, but does not replace, applicable laws, directives and implementing measures currently in place. Manufacturers are responsible for complying with all regulations applicable for jurisdictions in which their products are in service or on the market.

Compliance with this document shall be demonstrated through the tests described within. Unless otherwise specified, the tests shall be conducted with retail software written specifically for the console under test, certified by the console manufacturer.

The estimated energy savings of this proposal are presented in the attached document entitled Energy Savings of the Console Manufacturer Industry Proposal.

2 Key Definitions and Principles

2.1 Tiers

Tier 1: 1 January 2013

Tier 2: 1 January 2017

2.2 Games Consoles

A Games Console is a computing device whose primary function is to play video games. Games Consoles share many of the hardware architecture features and components found in general personal computers (e.g. central processing unit(s), system memory, video architecture, optical drives and/or hard drives or other forms of internal memory). Games Consoles falling in the scope of this proposal are those that:

- Typically utilise either dedicated handheld or other interactive controllers designed for enhancing game playing (rather than the mouse and keyboard used by personal computers).

- Are equipped with audio visual outputs for use with external televisions or video projectors as the primary display.
- Typically use dedicated console operating systems (rather than using a conventional PC operating system).
- May include other features such as optical disk player, digital video and picture viewing, digital music playback, etc.
- Are mains powered devices that use more than 20 watts in Active Game mode with either internal or dedicated external power supply units.

2.3 Operational Modes

The principal operational modes applicable to Games Consoles are defined below. It is understood that not all games consoles necessarily provide all the modes listed, and some consoles may have other modes that are not listed. In the future, consoles may develop new modes.

- A. Active Gaming: mode in which the Games Console is actively performing its primary function of game playing.
- B. Media Playback: media mode is defined as the playing of anything up to high definition (1080p) content including the following Formats:

AVI

- File extensions: .avi, .divx
- Containers: AVI
- Video profiles: MPEG-2, MPEG-4 Part 2 (Simple Profile and Advanced Simple Profile)
- Video bit rate: 5 Mbps with resolutions of 1280 × 720 at 30 fps
- Audio profiles: Dolby® Digital (2 channel and 5.1 channel), MP3
- Audio max bit rate: No restrictions

H.264

- File extensions: .mp4, .m4v, mp4v, .mov, .avi
- Containers: MPEG-4, QuickTime
- Video profiles: Baseline, main and high (up to level 4.1)
- Video bit rate: 10 Mbps with resolutions of 1920 × 1080 at 30 fps
- Audio profiles: AAC, 2-channel, Low Complexity
- Audio max bit rate: No restrictions

MPEG-4 Part 2

- File extensions: .mp4, .m4v, .mp4v, .mov, .avi
- Containers: MPEG-4, QuickTime
- Video profiles: MPEG-4 Part 2 (Simple Profile and Advanced Simple Profile)

- Video bit rate: 5 Mbps with resolutions of 1280 × 720 at 30 fps
- Audio profiles: AAC, 2-channel, Low Complexity
- Audio max bit rate: No restrictions

SPTE 421M, WMV (VC-1), MPEG MVC

- File extensions: .wmv
- Containers: ASF
- Video profiles: WMV7 (WMV1), WMV8 (WMV2), WMV9 (WMV3), VC-1 (WVC1 or

WMVA) in simple, main and advanced up to level 3

- Video bit rate: 15 Mbps with resolutions of 1920 × 1080 at 30 fps
- Audio profiles: WMA7/8, WMA9 Pro (stereo and 5.1), WMA Lossless
- Audio max bit rate: No restrictions

C. Navigation: mode in which no other mode is engaged and the game console is displaying a menu of functions from which the user may select.

D. Network Standby: a power mode where a product is:

- directly or indirectly connected to the mains, and is
- connected to a network with the respective network interface enabled (meaning that signals from that network can be received and analysed - which may include decoding and verifying - or signals can be sent) and provides one or more of the following functions:
 - reactivation via network (means that based on an incoming signal the process of switching the product into another mode is initiated).
 - network integrity communication (means maintaining a network connection by executing a network protocol, including the exchange of status information).

F. Standby: mode in which the Games Console is connected to the mains power source, depends on energy input from the mains power source to work as intended and provides only reactivation function, or reactivation function and only an indication of enabled reactivation function, and/or information or status displays. These functions may persist for an indefinite time.

a. The Games Console may enter a Standby mode from any other mode after:

- i. The Games Console receives a notification from the user to enter the standby mode, or

- ii. The Games Console initiates an automatic power down to the Standby mode.
- b. The Games Console may exit the standby mode in order to carry out any maintenance activity. After the activity is complete, the Games Console shall return to the previous standby mode.

2.4 General Auto-Power Down Requirements

The following requirements, which will be introduced region by region to determine acceptance by users, form the basis of an advanced auto-power down proposal (APD) for games consoles. These requirements combine best practices across several categories of Energy related Products:

- Games consoles with forced menu on initial activation of the games console shall provide auto-power-down as the default choice on initial activation of the console. If the user selects a mode other than auto-power-down on initial activation of the console, a second selection process shall be prompted to confirm this choice.
- When auto-powering down consoles shall auto-power down to Standby mode, Network Standby mode or another condition that does not exceed the maximum power consumption permitted for Standby mode.
- Consoles shall be shipped with activation of an auto-power down mode that complies with applicable laws.
- The user shall have the option to disable APD for all modes. Consoles may present the option of disabling APD for Active Game mode only first so as to encourage users to leave APD enabled for other modes.
- The user may have the option to change the time settings for the auto-power down function from within the equivalent system settings menu options e.g. for retail display purposes or for heavy game users.
- For Operational modes other than Media Playback, the period of inactivity required to trigger auto-power down shall be set at 1 hour or less from the time of the last user input. In Media Playback mode, auto-power down shall be triggered after 4 hours or less of audio or video media playback (including video files, streaming audio-visual content, IPTV or Digital TV) or triggered by user inactivity of 1 hour or less after termination of video media content.
- In limited circumstances, users may be prompted to suspend APD temporarily to allow certain types of games or software applications to run without user input, e.g. simulation games and video streaming which run without user input for periods

longer than 1 hour. Once selected, the temporary APD suspension may remain enabled for replay of such game or media content upon restart of the console.

- APD shall be suspended temporarily to allow for the uninterrupted performance of any system update, system maintenance, software installation or content download and shall not occur during the display of an error message to users in the event of a system error.
- After an automatic wake event, consoles shall power down within 5 minutes after performing required system maintenance and downloads, or other functions that may require an automatic wake-up.
- Accessories bundled with the console and using the console as a direct power source shall also power down and shall be included in auto-power down power measurements.
- Console operating systems shall communicate an imminent auto-power down event through an application programmable interface (API) or other means.
- Some software published for current or previous-generation consoles may not necessarily be compatible with the APD functions described in this proposal. Console manufacturers will use best efforts to work with the video game software industry with a view to incorporating these APD functions when publishing software for consoles covered by this proposal.
- Individual console producers may introduce new and innovative approaches to APD as and when the same or better energy saving are possible along with improved consumer experiences. As possible this guideline will be updated to reflect any such significant innovations.

2.5 General Definitions

Standard Definition: support for video output with resolutions of less than 720p (1280 pixels x 720 lines at 50 frames/s progressive) or 1080i (1920 pixels x 1080 lines at 25 frames/s interlaced)

High Definition: support for video output with resolutions greater or equal to 720p (1280 pixels x 720 lines at 50 frames/s progressive) or 1080i (1920 pixels x 1080 lines at 25 frames/s interlaced)

Gesture- and Speech- Recognition Natural User Interface (NUI) functionality: Functionality which allows the user to interact with the games console without the need for a game pad, external controller or other external device. This is accomplished by sensing and recognition of physical gestures and/or voice commands.

3 General Principles of Games Consoles Design

- Games Consoles are designed so as to reduce energy consumption within the constraints of their operational specification.
- Games Consoles may perform multiple functions, in addition to the primary function of game playing. In such cases, the Games Console design shall take into consideration the scaling down of power use in proportion to function when new technologies/functionality are introduced.
- Whilst adhering to the general principle of designing products to reduce energy consumption, Games Consoles manufacturers and software providers are constantly innovating their products as new service concepts and technologies develop. To avoid stifling such innovation, any unanticipated additional functionality which consumes significant energy but which is not listed in this document shall be deactivated during the measurement process. However, in the event that such deactivation is either inappropriate or unnecessary, then this requirement shall not be compulsory. The test results shall explicitly list any functions that were deactivated during the measurement process.
- Software downloads to Games Consoles shall not increase the power consumption requirements above the initial power cap for Media Playback and Navigation.
- If a console has networked standby capability, then this functionality shall comply with requirements set out in this proposal and applicable local regulations. Inclusion of network functionality or modes for all consoles is not mandatory.

4 Power Caps

The criterion to be used in order to further ensure energy efficiency of Games Consoles is modular 'power caps', which are applicable to the Media Playback, inactive default Navigation, Network Standby, and Standby modes. For cases in which additional functionality as defined in this document is provided, the power cap shall be increased to include the allowance as noted in the Additional Functionality Allowance Table below.

Tier 1 requirements are to be implemented in 2013, and Tier 2 in 2017.

Power Caps for Media Playback mode

Tier 1 Power Cap (W)

Tier 2 Power Cap (W)

90

70

Power Caps for Navigation mode

Tier 1 Power Cap (W)

Tier 2 Power Cap (W)

90

70

Power Caps for Networked Standby mode where such modes exist

We will comply with requirements of applicable regulations within each country.

Additional Functionality Allowance

Function	Tier 1 Allowance (W)	Tier 2 Allowance Cap (W)
NUI	20	15

Power Caps for Standby mode

	Tier 1 Power Cap (W)	Tier 2 Power Cap (W)
Standby (only reactivation and indication of enabled reactivation)	0.5	0.5
Standby (information and status display)	1	1

5 Test Procedure for All Modes for Game Consoles

This is a tentative draft outline being considered in the industry and concrete requirements will be considered in the future.

5.1 Scope

The purpose of this test method is two-fold:

- Measure game console energy use in the major operating modes
- Verify conformity with the auto-power down standard.

This test procedure covers the game console major operating modes listed below. It is understood that not all game consoles provide all the modes listed.

1. Active Gaming
2. Navigation
3. Media Playback
 - a. DVD
 - b. Blu-ray Disc
 - c. Streaming HD
4. Off/Standby after Auto-Power Down
5. Off/Standby after pressing the Off button
6. Off/Standby when switched off from controller
7. Other modes for research purposes

5.2 Testing Requirements

5.2.1 Game and Media Selection

Game title: The tests shall be conducted with retail software written specifically for the console under test, certified by the console manufacturer. Select the top 3 selling game titles for the console under test in the previous calendar year.

5.3 Number and selection of units to be tested

The selection and number of units to be tested shall follow the requirements of the regulation or voluntary standard this test procedure is being used to verify.

5.4 Approved meters, testing accuracy and test conditions

Refer to IEC 62087 specification on “Methods of measurement for the power consumption of audio, video and related equipment”.

5.5 Equipment Unit Under Test (UUT) Preparation

1. Record the manufacturer and model name of the UUT on the test sheet.
2. Connect to display through HDMI connection if available, or AV connection if the console is not High Definition capable.
3. Power the UUT on.
4. Console to peripherals connections, such as Infra Red and Bluetooth, should be configured as shipped.
5. Network connection: For consoles with wireless capability, power to a wireless LAN radio (e.g. IEEE 802.11) should remain on during testing and must maintain a live wireless connection to a wireless router or network access point, which supports the highest and lowest data speeds of the client radio, for the duration of testing. For consoles without wireless capability, the Ethernet connection should be enabled.
6. Ensure DVD upscaling is set to on
7. Remove any disk (media or game) from UUT.

8. Apart from above settings, ensure that the UUT is configured as shipped including all accessories and motion sensor bar if available connected, Wake-on-LAN (WOL) enabled, power management and software shipped by default.
9. Power the UUT off.
10. Connect an approved meter capable of measuring true power to an ac line voltage source set to the appropriate voltage/frequency combination for the test.
11. Plug the UUT into the measurement power outlet on the meter. No power strips or UPS units should be connected between the meter and the UUT. For a valid test to take place the meter should remain in place until power data is recorded for all modes.
12. Record the ac voltage and frequency.
13. Power the UUT on.

5.6 Energy Consumption Measurement and Auto-Power Down Verification Test Method

The following modes, if provided in the UUT, shall be tested as indicated below:

5.6.1 Navigation Mode Testing

14. Power the UUT on.
15. Wait until the operating system has fully loaded, and the Home Menu is displayed and stable.
16. Disable all power management.
17. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for a minimum of 5 minutes and record the average (arithmetic mean) value observed during that period.

5.6.2 Media Playback DVD

18. Insert the test DVD movie.
19. Navigate through DVD menu and play the video for 15 minutes.
20. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for the first 5 minutes of the video and record the average (arithmetic mean) value observed during that 5 minute period.
21. Eject the DVD.

5.6.3 Media Playback Blu-ray Disc

22. Insert the test Blu-ray Disc (BD) movie.
23. Navigate through BD menu and play the video for 15 minutes.
24. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for the first 5 minutes of the video and record the average (arithmetic mean) value observed during that 5 minute period.
25. Eject the BD.

5.6.4 Streaming HD

26. Enter the console's online movie service, and access the test movie (same title as for the DVD and Blu-ray test).
27. Play the movie for 15 minutes.
28. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for the first 5 minutes of the video and record the average (arithmetic mean) value observed during that 5 minute period.
29. Exit video streaming mode, go back to Home Menu.

5.6.5 Off/Standby after pressing the Off button

30. Press Off button
31. Wait for 5 minutes for the Off/Standby mode power to stabilize
32. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for at least 5 minutes and record the average (arithmetic mean) value observed during the measurement period.
33. Power the UUT back on.

5.6.6 Off/Standby when switched Off from controller

34. Power UUT Off using controller. If the controller offers several ways to power the console Off, use the most commonly used/most intuitive way, and record your choice
35. Wait for at least 5 minutes for the Off/Standby mode power to stabilize
36. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for at least 5 minutes and record the average (arithmetic mean) value observed during that 5 minute period.
37. Power the UUT back on.

5.6.7 Navigation Mode APD

38. Wait until the operating system has fully loaded, and the Home Menu is displayed and stable.
39. Wait for 65 minutes and do not perform any interaction with the console or controller so as not to delay APD.
40. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for at least 5 minutes and record the average (arithmetic mean) value observed during the measurement period.
41. Power the UUT back on.

5.6.8 Active Gaming APD

42. Wait until the operating system has fully loaded, and the Home Menu is displayed and stable.
43. Insert disk into console

44. Start game, move beyond any introduction section, play game regularly for at least 5 minutes
45. Wait for 65 minutes and do not perform any interaction with the console or controller so as not to delay APD.
46. Note the time when the console auto-powers down.
47. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for at least 5 minutes and record the average (arithmetic mean) value observed during the measurement period.
48. Start the timer
49. Power console back on by pushing a button/key on the controller or console

5.6.9 Disk-Based Media Playback APD

50. Power the UUT back on.
51. Wait until the operating system has fully loaded, and the Home Menu is displayed and stable.
52. Insert movie test title into console
53. Start the movie, move beyond movie menu
54. Once movie is playing, start timer
55. Wait for 245 minutes and do not perform any interaction with the console or controller so as not to delay APD.
56. Note the time when the console auto-powers down.
57. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for at least 5 minutes and record the average (arithmetic mean) value observed during the measurement period.
58. Power the UUT back on

5.6.10 Media Streaming Playback APD

59. Wait until the operating system has fully loaded, and the Home Menu is displayed and stable.
60. Locate test movie title on Netflix or the equivalent
61. Start the movie, move beyond movie menu
62. Once movie is playing, start timer
63. Wait for 245 minutes and do not perform any interaction with the console or controller so as not to delay APD.
64. Note the time when the console auto-powers down.
65. Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulate power values for at least 5 minutes and record the average (arithmetic mean) value observed during the measurement period.
66. Power the UUT back on

End of test procedure.