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Dynamic metadata high dynamic range impacts on TV power consumption

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colour inside

Dynamic metadata high dynamic range impacts on TV power consumption

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DYNAMIC METADATA HIGH DYNAMIC RANGE IMPACTS ON TV POWER CONSUMPTION

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100/3862/DTR	100/3886/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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INTRODUCTION

HDR technologies affect the entire video ecosystem from production and processing, through to distribution and presentation. HDR-capable television sets typically have higher peak luminance and better low-luminance capabilities than non-HDR TVs and can take advantage of HDR video signals which typically represent scenes with much higher luminance and more detailed low-luminance levels than was possible in traditional analogue and digital non-HDR video systems.

As the luminance range of an HDR signal might not match the luminance range capabilities of the display device, the signal must be adjusted before being displayed. This luminance adjustment is called tone-mapping and is implemented as a processing step in the TV. The tone mapping process can be improved with metadata, which describes the properties of the content to be displayed.

Dynamic metadata based HDR tone-mapping approaches and behaviours are seeing an ever-increasing application in consumer televisions; however, representative standardized test content for measurement of the power consumption impact of those technologies on televisions is not available. To prepare objective test materials (video clips), a study of power and luminance behaviour was conducted, the results of which are described in Clauses 5 and 6.

This document assesses the impact of dynamic HDR on TV luminance and power consumption using two technologies currently in deployment.

A small sample of TVs that supported the two technologies were studied using "representative" content prepared by PT100-24 members. Test results show that dynamic metadata HDR content, delivered to a dynamic metadata capable TV, can provide pictures with even greater dynamic range (higher peak luminance and more detailed luminance levels with wider colour gamut) than static HDR at the same or lower TV power consumption versus static HDR or SDR content delivered to that same TV.

DYNAMIC METADATA HIGH DYNAMIC RANGE IMPACTS ON TV POWER CONSUMPTION

1 Scope

This document presents a study of the impact of high dynamic range (HDR) technologies with "dynamic metadata" on TV luminance and power consumption. It compares the power consumption of content with dynamic metadata to the same content without dynamic metadata. Non-dynamic "static metadata" HDR technologies such as HDR10 and non-metadata HDR such as HLG, were previously studied in IEC TR 63274:2021.

This document also reviews the current HDR TV market and analyses existing HDR TV power measurement methods and considerations for any changes to those power measurement standards.

While this document studies the results of content that include Dolby Vision® and HDR10+ dynamic metadata, any comparison of these two technologies is outside of the scope of this document.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1 Terms and definitions

3.1.1
average picture level
APL
average level of all the pixels of a single video signal frame in the linear luminance domain

EXAMPLE Display equipment such as television sets or computer monitors that internally use linear encoding after undoing the non-linearity of the input signal.

[SOURCE: IEC TR 63274:2021, 3.1.10]