



ISO/IEC JTC 1/SC 29 "Coding of audio, picture, multimedia and hypermedia information"

Secretariat: JISC

Committee manager: Koike Mayumi Ms.



## Liaison statement from SC 29/WG 1 to 3GPP on JPEG learning based activities [SC 29/WG 1 N 100857]

Document type	Related content	Document date	Expected action
Project / Other		2024-04-26	<b>INFO</b>

### Description

In accordance with Recommendation 78 at the 103rd WG 1 Meeting, 2024-08-12, Virtual, the SC 29 Secretariat sends this liaison statement to 3GPP. [Requested action: For SC 29's information]



**INTERNATIONAL ORGANIZATION FOR STANDARDIZATION  
ORGANISATION INTERNATIONALE DE NORMALISATION**

**ISO/IEC JTC 1/SC 29/WG1  
(ITU-T SG16)**

**Coding of Still Pictures**

**JBIG**

Joint Bi-level Image  
Experts Group

**JPEG**

Joint Photographic  
Experts Group

**TITLE:** Liaison letter to 3GPP on JPEG learning-based activities

**SOURCE:** JPEG (ISO/IEC JTC 1/SC 29/WG1)

**PROJECT:** -

**STATUS:** Final

**REQUESTED**

**ACTION:** SC29 to distribute

**DISTRIBUTION:** 3GPP

**Contact:**

ISO/IEC JTC 1/SC 29/WG1 Convenor – Prof. Touradj Ebrahimi  
EPFL/STI/IEL/GR-EB, Station 11, CH-1015 Lausanne, Switzerland  
Tel: +41 21 693 2606, Fax: +41 21 693 7600, E-mail: [convenor@jpeg.org](mailto:convenor@jpeg.org)

The JPEG Committee would like to inform 3GPP regarding JPEG learning based standardization activities.

## **JPEG AI**

The scope of JPEG AI is the creation of a learning-based image coding standard offering a single-stream, compact compressed domain representation, targeting both human visualization with significant compression efficiency improvement over image coding standards in common use at equivalent subjective quality, and effective performance for image processing and computer vision tasks, with the goal of supporting a royalty-free baseline. JPEG AI targets a wide range of applications such as cloud storage, visual surveillance, autonomous vehicles and devices, image collection storage and management, live monitoring of visual data and media distribution.

At its 103<sup>rd</sup> meeting the JPEG Committee produced the DIS (Draft International Standard) of JPEG AI Part 1 “JPEG AI: Core Coding Engine” (6048-1). It is expected that the standard will be published as an International Standard in October 2024. JPEG AI offers a coding solution for standard reconstruction with significant compression efficiency improvements over previous image coding standards at equivalent subjective quality. The JPEG AI coding design allows for hardware/software implementation-friendly encoding and decoding, in terms of memory and computational complexity, efficient coding of images with text and graphics, and supports 8- and 10-bit depth, region of interest coding, and progressive decoding. To cover multiple encoder and decoder complexity-efficiency tradeoffs, JPEG AI supports a multi-branch coding architecture with two encoders and three decoders (6 possible compatible combinations) that have been jointly trained. Compression efficiency (BD-rate) gains of 12.5% to 27.9% over the VVC Intra anchor, for relevant encoder and decoder configurations, can be achieved with a wide range of complexity tradeoffs (7 to 216 kMAC/px at the decoder side).

Some relevant past public documents (available at [jpeg.org](http://jpeg.org)) are the following:

- ISO/IEC JTC 1/SC29/WG1 N100724, REQ "Use Cases and Requirements for JPEG AI", 102<sup>nd</sup> Meeting, San Francisco, January 2024.
- ISO/IEC JTC 1/SC29/WG1 N1100634, REQ "JPEG AI Future Plans and Timeline v2", 101<sup>st</sup> Meeting, Online, November 2023.
- ISO/IEC JTC 1/SC29/WG1 N100600, CPM "JPEG AI Common Training & Test Conditions v8.0", 100<sup>th</sup> Meeting, Covilhã, Portugal, July 2023.

## JPEG Pleno Learning based Point Cloud Coding

JPEG Pleno is working towards the integration of various modalities of plenoptic content under a single and seamless framework. Efficient and powerful point cloud representation is a key feature within this vision together with representation of light fields and holography. Point cloud data supports a wide range of applications including computer-aided manufacturing, entertainment, cultural heritage preservation, scientific research and advanced sensing and analysis. The JPEG Committee considers learning-based solutions to be powerful and efficient for point cloud coding as Part 6 of ISO/IEC 21794.

This standard targets both interactive human visualization, with competitive compression efficiency compared to state of the art point cloud coding solutions in common use, and effective performance for 3D processing and machine-related computer vision tasks, and has the goal of supporting a royalty-free baseline. This standard is envisioned to provide a number of unique benefits, including a single efficient point cloud representation for both humans and machines. The intent is to provide humans with the ability to visualize and interact with the point cloud geometry and attributes while providing machines the ability to perform 3D processing and computer vision tasks in the decompressed/reconstructed domain, notably by enforcing error constraints, and in the compressed domain (latents after entropy decoding). This is achieved by enabling lower complexity and higher accuracy through the use of compressed domain features extracted from the original instead of the lossy decoded point cloud. It is expected that a Draft International Standard (DIS) of Part 6 will be approved at the 104<sup>th</sup> JPEG meeting in July 2024 and the International Standard to be published during 2025. The 103<sup>rd</sup> meeting also marked the release of version 4.1 of the JPEG Pleno Point Cloud Verification Model.