

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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AMAZON.COM, INC. and AMAZON.COM SERVICES LLC,  
Petitioner

v.

INTERDIGITAL MADISON PATENT HOLDINGS, SAS,  
Patent Owner

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Case IPR2026-00195  
U.S. Patent No. 10,250,877

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**PATENT OWNER PRELIMINARY RESPONSE  
UNDER 37 C.F.R. § 42.107(a)**

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U.S. Patent and Trademark Office  
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Alexandria, VA 22313-1450

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**PATENT OWNER'S EXHIBIT LIST**

| <b>Exhibit No.</b> | <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2001               | Complaint, <i>InterDigital, Inc. v. Amazon.com Services LLC</i> , Case No. 2:25-cv-00822 (EDVA Dec. 18, 2025)                                                                                                                                                                                                                                                                                       |
| 2002               | Complaint, <i>InterDigital, Inc. v. TCL Industries Holdings Co., Ltd.</i> , Case No. 2:26-cv-00101 (EDTX Feb. 9, 2026)                                                                                                                                                                                                                                                                              |
| 2003               | Complaint, <i>InterDigital, Inc. vs. Hisense Co., Ltd.</i> , Case No. 1:26-cv-00754 (NDGA Feb. 9, 2026)                                                                                                                                                                                                                                                                                             |
| 2004               | Motion Denying Summary Judgment, <i>InterDigital, Inc. v. Lenovo (United States) Inc.</i> , Case No. 5:23-cv-00493 (EDNC July 17, 2024)                                                                                                                                                                                                                                                             |
| 2005               | Complaint, <i>InterDigital, Inc. v. Lenovo (United States) Inc.</i> , Case No. 5:23-cv-00493 (EDNC Sept. 1, 2023)                                                                                                                                                                                                                                                                                   |
| 2006               | Complaint, <i>Certain Electronic Devices Including Smartphones, Computers, Tablet Computers, and Components Thereof</i> , Inv. No. 337-TA-1373 (ITC Sept. 1, 2023)                                                                                                                                                                                                                                  |
| 2007               | “InterDigital enforces patents against Amazon,” <i>InterDigital</i> , available at <a href="https://ir.interdigital.com/news-events/press-releases/news-details/2025/InterDigital-enforces-patents-against-Amazon/default.aspx">https://ir.interdigital.com/news-events/press-releases/news-details/2025/InterDigital-enforces-patents-against-Amazon/default.aspx</a> (last accessed Mar. 3, 2026) |
| 2008               | Complaint, <i>Certain Video-Capable Electronic Devices, Including Smart Televisions, Monitors, and Components Thereof</i> , Inv. No. 337-TA-3889 (ITC Feb. 25, 2026)                                                                                                                                                                                                                                |
| 2009               | ITC Time to Milestones                                                                                                                                                                                                                                                                                                                                                                              |
| 2010               | “Licensing at InterDigital,” <i>InterDigital</i> , available at <a href="https://www.interdigital.com/licensing">https://www.interdigital.com/licensing</a> (last accessed Feb. 20, 2026)                                                                                                                                                                                                           |
| 2011               | Declaration of Ryan Pohlman                                                                                                                                                                                                                                                                                                                                                                         |

| Exhibit No. | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2012        | “InterDigital renews license agreement with Sony,” <i>InterDigital</i> , available at <a href="https://ir.interdigital.com/news-events/press-releases/news-details/2026/InterDigital-renews-license-agreement-with-Sony/default.aspx">https://ir.interdigital.com/news-events/press-releases/news-details/2026/InterDigital-renews-license-agreement-with-Sony/default.aspx</a> (last accessed Mar. 3, 2026)                                                                                                                                 |
| 2013        | “InterDigital signs license agreement with HP,” <i>InterDigital</i> , available at <a href="https://ir.interdigital.com/news-events/press-releases/news-details/2025/InterDigital-signs-license-agreement-with-HP/default.aspx">https://ir.interdigital.com/news-events/press-releases/news-details/2025/InterDigital-signs-license-agreement-with-HP/default.aspx</a> (last accessed Mar. 3, 2026)                                                                                                                                          |
| 2014        | “2025: InterDigital’s Year In Review,” <i>InterDigital</i> , available at <a href="https://www.interdigital.com/post/2025-interdigitals-year-in-review">https://www.interdigital.com/post/2025-interdigitals-year-in-review</a> (last accessed Mar. 3, 2026)                                                                                                                                                                                                                                                                                 |
| 2015        | Enforcement and Non-waiver of 37 C.F.R. § 42.104(b)(4) and Permissible Uses Of General Knowledge In <i>Inter Partes</i> Reviews (July 31, 2025), available at <a href="https://www.uspto.gov/sites/default/files/documents/aapa_memo_final__signed.pdf">https://www.uspto.gov/sites/default/files/documents/aapa_memo_final__signed.pdf</a> (last accessed March 5, 2026)                                                                                                                                                                    |
| 2016        | InterDigital, Inc. Form 10-K (Annual Report), United States Securities and Exchange Commission, File No. 1-33579                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2017        | <i>Amazon.com, Inc. et al. v. InterDigital et al.</i> , Claim No. HP-2025-000043 Transcript of Proceedings December 3, 2025 in the High Court of Justice, London, England                                                                                                                                                                                                                                                                                                                                                                    |
| 2018        | Additional Discretionary Institution Considerations – U.S. Manufacturing and Small Business Use of AIA Proceedings (March 11, 2026), available at <a href="https://www.uspto.gov/sites/default/files/documents/Additional_Discretionary_Institution_Considerations_US_Manufacturing_and_Small_Business_Use_of_AIA_Proceedings.pdf">https://www.uspto.gov/sites/default/files/documents/Additional_Discretionary_Institution_Considerations_US_Manufacturing_and_Small_Business_Use_of_AIA_Proceedings.pdf</a> (last accessed March 12, 2026) |
| 2019        | Statement on the Public Interest by InterDigital, <i>Certain Video-Capable Electronic Devices, Including Smart Televisions, Monitors, and Components Thereof</i> , Inv. No. 337-TA-3889 (ITC Feb. 25, 2026)                                                                                                                                                                                                                                                                                                                                  |

| Exhibit No. | Description                                                                                                                                                                       |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2020        | Joint Outline of Issues, <i>Certain Electronic Devices Including Smartphones, Computers, Tablet Computers, and Components Thereof</i> , Inv. No. 337-TA-1373 (ITC Sept. 27, 2004) |

## I. INTRODUCTION

As set forth in the Office’s July 31, 2025 Memorandum regarding the “Enforcement and Non-waiver of 37 C.F.R. § 42.104(b)(4),” the “Board<sup>[1]</sup> shall deny an IPR petition” that relies on “expert testimony... to supply a missing claim limitation.” EX2015, 1. The Petition in the above-captioned proceeding does precisely that. Across its three Grounds, the Petition improperly relies on testimony from its expert, Dr. Havlicek, to supply no less than six limitations missing from the asserted references. For instance, the Petition relies on expert testimony to supply (1) the claimed decoding device and method missing from Nakagawa; (2) the claimed vertical GFv filter missing from Sita; (3) the claimed horizontal GFH filter missing from Fimoff; (4) the claimed coding device and method missing from Wiegand-Davies; (5) the claimed “reconstructing a current block” missing from Wiegand; and (6) the claimed at least one circuit missing from Wiegand.

By relying on Dr. Havlicek to supply these missing elements, the Petition fails to “specify where each element of the claim is found in the prior art patents or

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<sup>1</sup> Effective October 20, 2025, the Director determines whether to institute trial in an IPR. *See* USPTO Memorandum (Squires), “Director Institution of AIA Trial Proceedings,” (Oct. 17, 2025).

printed publications relied upon,” as required by 37 C.F.R. §42.104(b)(4), in blatant disregard of the Office’s directive in the Memorandum. The Director should deny institution for this reason alone. But the Director should also deny institution because the Petition’s three Grounds fail to demonstrate a reasonable likelihood of unpatentability of any challenged claim.

For Ground 1, Petitioner’s combination modifies Nakagawa to collapse its separate resampling and motion compensation operations into a single operation, as allegedly taught by Sita. But Sita teaches no such single operation. In fact, Sita explicitly describes its upsampling and motion compensation interpolation operations as a “two step process.” Petitioner relies on Dr. Havlicek to argue that this explicit disclosure in Sita is inaccurate. Dr. Havlicek’s testimony should be disregarded because it contradicts Sita, is improperly incorporated into the Petition by reference, and is conclusory. Further, even if Sita did teach such a single operation, a POSITA would not have implemented Sita’s teachings in Nakagawa because Nakagawa requires these operations to be separate. Collapsing them would render Nakagawa unable to generate motion vectors, which are necessary for motion compensation.

For Ground 2, Petitioner’s combination similarly modifies the combination of Wiegand and Davies to collapse its separate resampling and motion compensation interpolation operations into a single operation, as allegedly taught

by Fimoff. This Ground fails because Petitioner fails to show that Wiegand and Davies were publicly accessible printed publications. Moreover, Fimoff does not teach a single vertical filter that performs motion compensation on columns of reference block, as claimed. Thus, even if the combination of Wiegand and Davies is modified based on Fimoff, the combination still does not satisfy the independent claims.

For Ground 3, the Petition combines Wiegand and Davies with Sita. This Ground fails for the reasons provided above with respect to Wiegand, Davies, and Sita for Grounds 1 and 2.

Thus, the Director should deny institution in this proceeding because the Petition fails to demonstrate a reasonable likelihood of unpatentability of any challenged claim.

## **II. OVERVIEW OF THE PRIOR ART**

### **A. Nakagawa**

Nakagawa describes “[a] video coding apparatus for performing predictive coding of digital video input signals.” EX1007, Abstract. The “video coding apparatus [] provides proper and prompt control of the resolution of source pictures to regulate the amount of coded data at an appropriate level.” EX1007, 2:49-53. To accomplish this, “[t]he apparatus comprises resolution selection control means for selecting picture resolution to be used in coding of a source picture of a current

frame based on coding information in a previous frame.” EX1007, 2:54-62. In particular, Nakagawa’s apparatus selects images to have either a high resolution “common intermediate format (CIF)” or a low resolution “quarter-CIF (QCIF).” EX1007, 4:44-46.

Nakagawa explains that “a CIF/QCIF converter 11 converts the CIF picture resolution of source pictures to the QCIF picture resolution according to instructions from a CIF/QCIF selection controller 25.” EX1007, 4:52-56. “The output of the CIF/QCIF converter 11 is sent to a prediction parameter calculator 12 and prediction error calculator 14.” EX1007, 4:56-58. “A reconstructed (or decoded) picture of the previous frame stored in a frame memory 22 is also sent to the prediction parameter calculator 12 via a CIF/QCIF converter 23.” EX1007, 4:58-61. The CIF/QCIF converter 23 may convert the picture retrieved from the frame memory 22 to a different resolution or simply forward the retrieved picture to the prediction parameter calculator 12. EX1007, 6:8-22, 6:27-35.

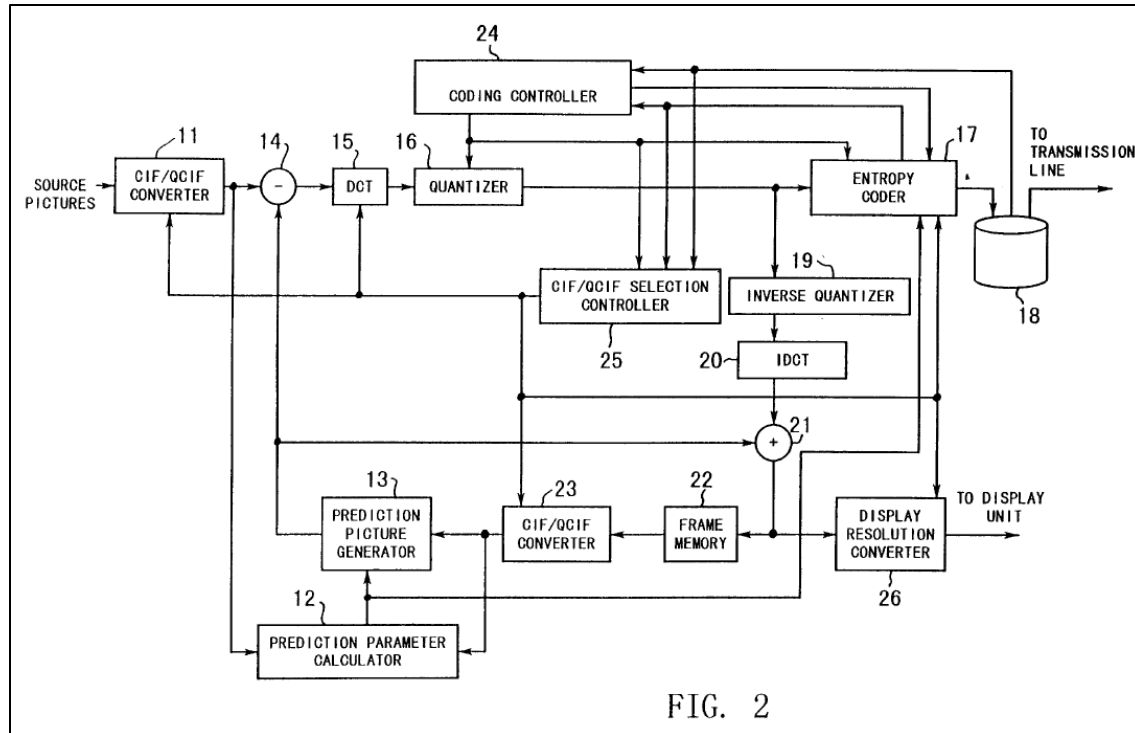


FIG. 2

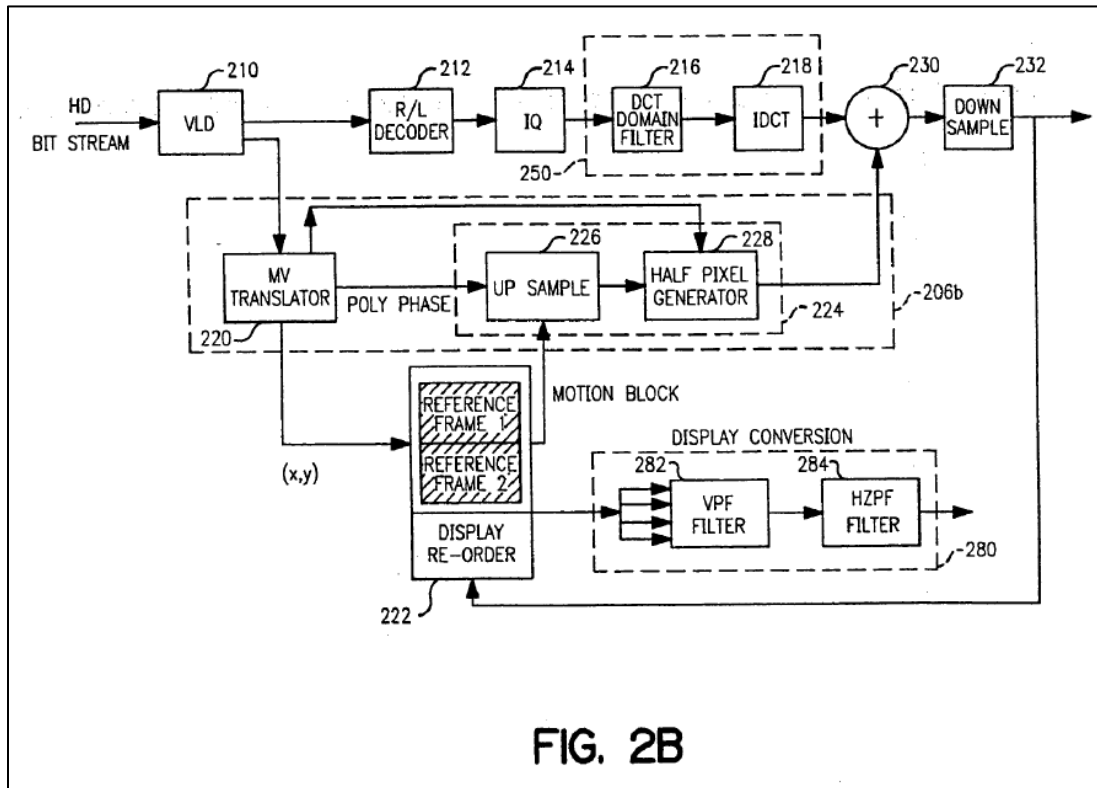
EX1007, FIG. 2

As a result, the prediction parameter calculator 12, prediction error calculator 14, and reconstructed picture generator 21 have a unified resolution. EX1007, 6:22-26, 6:35-39. “The prediction picture generator 13 receives, in addition to the motion vectors [from the prediction parameter calculator 12], a decoded image of the previous frame from the frame memory 22 via the CIF/QCIF converter 23.” EX1007, 5:4-7. “Based on the decoded image of the previous frame and the motion vectors, the prediction picture generator 13 produces a prediction picture of the current frame and sends it to a prediction error calculator 14 and a reconstructed picture generator 21.” EX1007, 5:7-12.

## B. Sita

Sita describes “a digital video signal processing system which receives,

decodes and displays video signals that have been encoded in a plurality of different formats.” EX1008, ¶9. Sita explains that the MPEG-2 standard defines several different resolutions. EX1008, ¶¶4-5. Sita proposes to decode conventional HDTV signals to provide video signals having a lower resolution. EX1008, ¶48.



EX1009, FIG. 2B.

Such a process is performed by a down conversion system shown in FIG. 2B. A reference frame memory 222 stores previously decoded reference frames having a down-sampled picture resolution. EX1008, ¶82. A high-resolution motion block generator 224 also receives low resolution motion blocks from the reference frame memory 222 to upsample the motion blocks and perform half-pixel interpolation as needed. EX1008, ¶82. In particular, the high-resolution motion

block generator 224 performs a two-step process that includes: (1) upsampling of downsampled image frame in an upsampling processor 226, and (2) half pixel interpolation by averaging of nearest pixel values by a half pixel generator 228. EX1008, ¶¶89, 99. Then “[t]he upsampled and aligned prediction block is added in summing network 230 to the current filtered block.” EX1008, ¶89. Because the output of the summing network 230 is in high resolution format, it is downsampled in a downsampling processor 232 and then provided back to the reference frame memory 222 for future operations. EX1008, ¶100, FIG. 2B.

### **C. Wiegand**

Wiegand is a working draft submitted for High-Efficiency Video Coding (HEVC) standard. EX1009, 1. Wiegand explains that “[a]s the costs for both processing power and memory have reduced, network support for coded video data has diversified, and advances in video coding technology have progressed, the need has arisen for an industry standard for compressed video...” EX1009, 13. The standard “is also designed to enable the use of the coded video representation in a flexible manner for a wide variety of network environments.” EX1009, 13.

Wiegand describes a decoding process of NAL units.<sup>2</sup> EX1009, 85. The

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<sup>2</sup> A NAL unit is “A *syntax structure* containing an indication of the type of data to follow and *bytes* containing that data in the form of an *RBSP* interspersed as

decoding process includes multiple stages. EX1009, 85-86. For intra-coded coding units, prediction is derived from neighboring samples in the same picture. EX1009, 93. For inter-coded units, prediction is derived from reference pictures. EX1009, 109-110. Specifically, the decoder derives motion vectors and reference indices. EX1009, 112. Using these, it performs motion-compensated prediction to obtain predicted samples. EX1009, 123. The decoder further processes residual signals. EX1009, 130-32.

#### **D. Davies**

Davies is an Input Document submitted during HEVC development that proposed to implement “[a] method for changing the resolution of frames within a sequence” in HEVC. EX1010, 1. Davies explains that video streams are “frequently rescaled” to adapt image resolution, such as “at times of network stress.” EX1010, 2. Despite this, prior video coding standards did not allow predictive coding “across resolutions.” EX1010, 2. Upon changing video resolutions mid-stream, such coding standards required an Instantaneous Decoder Refresh (IDR) frame to be sent. These IDR frames instructed the decoder to re-initialize the stream for subsequent predictive coding. EX1010, 2. According to Davies, these IDR frames “cause[] significant problems” because they are large

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necessary with *emulation prevention bytes*.” EX1009, 18 (emphasis in original).

and “complex to decode.” EX1010, 2.

To address this, Davies proposed “to allow video communications to use re-scaling to adapt seamlessly to adverse network conditions.” EX1010, 1. In Davies, when a current image is re-scaled to a different resolution than the reference images used to predict that image, the reference images are “simply re-scaled as needed” and picture prediction proceeds as normal. EX1010, 3. This eliminates the need for the IDR frame to be sent. EX1010, 3. Davies proposed to re-scale the reference images using “simple, zero-phase separable down- and up-scaling filters.” EX1010, 4.

#### **E. Fimoff**

Fimoff describes “a down converting decoder for down converting and decoding high resolution encoded video for display by a lower resolution receiver.” EX1011, 1:16-18. Fimoff explains that “MPEG-2 ... includes the encoding and decoding of video at high resolution (HDTV).” EX1011, 3:37-38. “In order to permit people to use their existing NTSC televisions so as to view HDTV transmitted programs, it is desirable to provide a decoder that decodes high resolution MPEG-2 encoded data as reduced resolution video data for display on existing NTSC televisions.” EX1011, 3:38-43.

To do that, a down converting decoder 100 includes a filtering and down sampling module 102 that down converts incoming residuals to a lower resolution.

EX1011, 7:66-8:15, FIG. 5. A motion compensator 104 retrieves downsampled pixels from a memory 106. EX1011, 19:51-60, FIG. 5. The retrieved downsampled pixels are then upsampled by the motion compensator 104 using an upsampling filtering operation. EX1011, 20:1-24. When the motion vector is an even value, the upsampled pixels are downsampled using a downsampling filter. EX1011, 20:32-47. When the motion vector is an odd value, the upsampling must be followed by a half pixel linear interpolation and then a downsampling filter. EX1011, 20:61-21:14. The result of the motion compensator 104 is supplied to an adder 108 together with the residuals from the filtering and down sampling module 102 to produce reconstructed macroblocks, which are stored in the memory 106. EX1011, 30:33-37, FIG. 5.

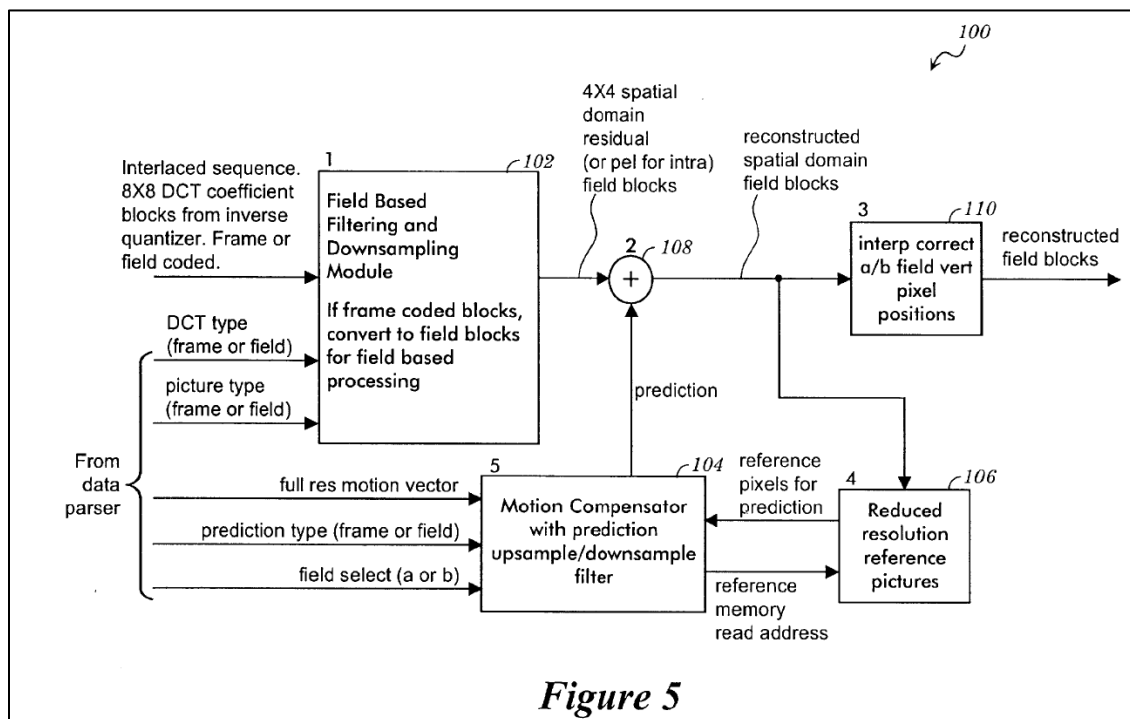


**Figure 5**  
EX1011, FIG. 5.

**III. PETITIONER’S PERVASIVE RELIANCE ON EXPERT TESTIMONY AND POSITA KNOWLEDGE TO SUPPLY MISSING LIMITATIONS DOOMS ITS PETITION.**

The Director should deny institution because the Petition pervasively relies on expert testimony and POSITA knowledge to supply limitations not disclosed by the asserted references. The statutory basis for *inter partes* review limits invalidity grounds to prior art “consisting of patents or printed publications.” 35 U.S.C. § 311(b). The corresponding regulation requires a petition to “specify where each element of the claim is found *in the prior art patents or printed publications relied upon.*” 37 C.F.R. § 42.104(b)(4). The Petition here fails to do this.

On July 31, 2025, Acting Director Stewart issued a memorandum (the “Memorandum”) explaining the Board’s interpretation of § 42.104(b)(4) in *inter partes* reviews. *See generally* EX2015. The Memorandum explains that enforcement of this rule means that “expert testimony... may not be used to supply a missing claim limitation.” EX2015, 1. The Memorandum further states that “the Board shall deny an IPR petition that fails to comply with Rule 104(b)(4).” EX2015, 1.

As explained below, the Director should deny the Petition here because it improperly relies on expert testimony and POSITA knowledge to supply no less than **six** missing limitations across its three asserted Grounds, and thus fails to “specify where each element of the claim is found in the prior art patents or printed

publications relied upon” as required by § 42.104(b)(4) (emphasis added).

**A. Petitioner improperly relies on expert testimony and POSITA knowledge to supply the claimed decoding device and method missing from Nakagawa.**

Petitioner’s Ground 1 relies on Nakagawa to satisfy the “decoding method” and “decoding device” respectively recited in elements 1[pre] and 7[pre]. Pet., 15, 36. Nakagawa does not disclose either element. Petitioner admits this, arguing merely that Nakagawa “**implicitly** describes a decoder and the process by which the decoder would decode a bitstream into video.” Pet., 15.<sup>3</sup> Petitioner thus argues that “[a] POSITA therefore would have understood how (and thus found it obvious) to implement a decoder that would operate in accordance with Nakagawa.” Pet., 17.

Indeed, Nakagawa is directed to a “video coding apparatus” (i.e., an encoder), and does not disclose a decoding device (i.e., a decoder) or any methods performed by a decoding device. *E.g.*, EX1007, Abstract. Petitioner argues that Nakagawa “implicitly” discloses a decoder because “a POSITA would have readily understood which components would be needed at the decoder” based on the internal “decoding loop” included within the encoder. Pet., 15-16. But Petitioner does not point to any such decoder in Nakagawa, nor can it.

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<sup>3</sup> Emphasis added unless otherwise noted.

Petitioner does not appear to be relying on the encoder's internal decoding loop as the claimed decoder. *See* Pet., 17 (explaining a POSITA would have found it obvious to implement a decoder *based on* the internal decoding loop). To the extent it does so, the internal decoding loop does not satisfy the claims at least because it does not decode a “binary stream,” as claimed. Petitioner points to Nakagawa's “bit stream” as the claimed binary stream. Pet., 17. The bit stream is generated by the entropy coder 17 and stored in the code buffer 18 for transmission. EX1007, 3:60-63, 5:38-41. It is not decoded by the internal decoding loop because the internal decoding loop is upstream of the entropy coder and code buffer and thus does not receive the bit stream. *Id.*, *see also* FIG. 2.

Because Nakagawa does not disclose a decoding device or method, Petitioner relies on Dr. Havlicek's testimony to supply these missing elements. Pet., 15 (citing EX1003, ¶¶117-24). Dr. Havlicek confirms that Nakagawa itself does not disclose a decoder. EX1003, ¶118 (“Nakagawa focuses on describing an *encoder*, as opposed to a *decoder*”). He then parrots the Petition's argument that “a POSITA would have [] understood that Nakagawa [] implicitly describes how a separate decoder compatible with Nakagawa's encoder would work.” EX1003, ¶118.

Dr. Havlicek also admits that a decoder compatible with Nakagawa's encoder would not exactly replicate the encoder's decoding loop. For instance, Dr.

Havlicek admits that “[a] typical decoder will have *many* of the same components as the encoder’s decoding loop” (i.e., not all). EX1003, ¶53. He further admits that encoders merely provide “*some* detail about the operation of the decoder,” and that corresponding decoders may also “differ in some details” from the encoder decoding loop. EX1003, ¶¶119-20. He further acknowledges that decoders merely “follow[] a *similar* process as the encoder’s decoding loop.” EX1003, ¶53.

Thus, even to the extent that Nakagawa’s encoder’s decoding loop provides “some detail” about compatible decoders, Nakagawa does not explicitly disclose a decoder. Petitioner fails to point to any such decoder and relies on Dr. Havlicek’s testimony regarding the knowledge of a POSITA to supply the missing decoding device/method elements. This is improper under Rule 42.104(b)(4).

Moreover, Dr. Havlicek fails to show that Nakagawa renders a decoder obvious. Indeed, Nakagawa fails to provide the details necessary to derive a decoder from its encoder. As one example, it does not disclose the encoder’s bitstream syntax, nor any particular syntax elements specifying the size of each frame. Accordingly, Nakagawa does not disclose any means for the decoder to determine the size of each image. Without this information, the decoder will be unable to correctly reconstruct images. Nakagawa’s encoder-side approach is not concerned with decoder operation and thus does not teach a POSITA how to implement such a decoder.

Because Nakagawa does not disclose *any* decoding device or method, it also does not disclose the *specifically claimed* decoding device or method. Petitioner thus relies on Dr. Havlicek's testimony to supply each element of claims 1 and 7 that are missing from Nakagawa.

For instance, with respect to elements 1[pre] and 7[a], Petitioner relies on Dr. Havlicek to argue that Nakagawa's *implicit* decoder reconstructs or accesses "a reference image reconstructed at a different size from the size of" a current image." Pet., 18, 36-37. Because Nakagawa does not disclose a decoder, the Petition must rely on Dr. Havlicek to support its argument that "[a] POSITA would have understood that if the current and reference pictures have different sizes at the encoder, they *would also have* different sizes when being reconstructed at the decoder." Pet., 19 (citing EX1003, ¶¶128-29).

Petitioner also relies on Dr. Havlicek to support its argument that Nakagawa's *implicit* decoder would store reference images in a decoded picture buffer, as claimed. Specifically, Petitioner alleges that "[a] POSITA would have understood that a decoder *would have* a buffer or frame memory for storing reference pictures as well." Pet., 19 (citing EX1003, ¶131). Similar reliance on Dr. Havlicek and POSITA knowledge permeates throughout Ground 1. *See, e.g.*, Pet., 26 ("A POSITA would have also understood that implementing a decoder consistent with Nakagawa" would teach element 1[b]), 27 ("A POSITA would

have understood, or at least found it obvious, that [] implementing a decoder consistent with Nakagawa” would teach element 1[c]), 29 (“A POSITA would have been motivated to modify Nakagawa’s decoding loop (and, accordingly also implement at a decoder)” to teach element 1[d]), 33 (“a POSITA would have understood that the... decoder” would teach element 1[f] “because Nakagawa describes this arrangement in the context of a decoding loop”).

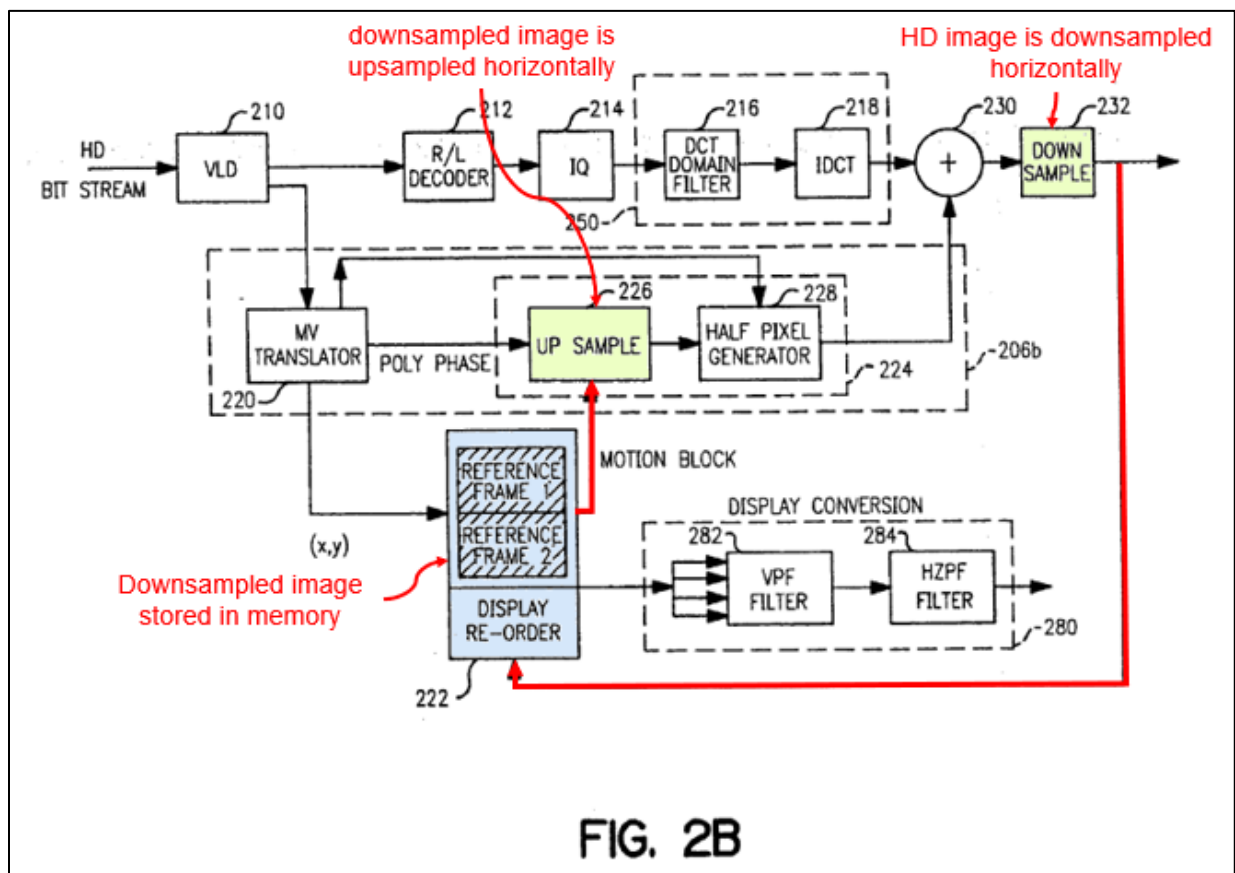
Petitioner does not and cannot point to a decoding method/device in Nakagawa. Nor can it point to a decoding device/method having the specific features required by claims 1 and 7. Petitioner’s reliance on expert testimony and POSITA knowledge to supply these missing elements is improper under Rule 42.104(b)(4). For this reason, Petitioner’s Ground 1 fails.

**B. Petitioner improperly relies on expert testimony and POSITA knowledge to supply the claimed vertical GFv filter missing from Sita.**

Petitioner’s Grounds 1 and 3 rely on Sita as allegedly teaching the claimed horizontal and vertical filters (GFH and GFv, respectively), which are required by all independent claims. In particular, Petitioner relies on Sita’s “resampling (226) and motion-compensation-interpolation (228) filter operation (collectively filter 224)” as teaching the claimed GF filters. Pet., 21. But Petitioner admits that Sita’s filter operation 224 does not include a vertical filter, stating that Sita only “expressly describes these [filter] operations in the context of a horizontal filter.”

Pet., 29, *see also* 21 (“Sita does not expressly show that its filter (224) applies separate horizontal and vertical filters, as claimed”).

Indeed, Sita’s filtering operation 224 only applies upsampling in the horizontal direction. *See* EX1008, ¶¶98, 100, 107, Table 4. This is because Sita’s downsampling processor 232 “only reduce[s] the horizontal components of the image.” EX1008, ¶98. Thus, when upsampling processor 226 pulls these downsampled images from the reference frame memory 222, it only needs to upsample in the horizontal direction. *See* EX1008, ¶¶98, 100, 107, Table 4.



EX1008, FIG. 2B (annotated).

Despite this, Petitioner argues that “a POSITA would have understood—or

at least found it obvious—that” the filtering operations 224 would use vertical filters for motion compensation as well. Pet., 21. Petitioner argues that “a POSITA would know how to perform these operations in both directions using separate horizontal and vertical filters.” Pet., 22. But Petitioner does not and cannot point to any such vertical filter in Sita.

Consequently, Petitioner again relies on Dr. Havlicek to supply the missing vertical filter. Pet., 21-22 (citing EX1003, ¶¶137-41), 29 (citing EX1003, ¶181). Dr. Havlicek confirms that “Sita represents filter (224) as a single filter and does not expressly show separate horizontal and vertical filter operations, as claimed.” EX1003, ¶137. Dr. Havlicek then relies on POSITA knowledge to supply the missing vertical filter, arguing that “a POSITA would have understood that filter (224) would apply separate horizontal and vertical filter operations, or at the very least would have known how and been motivated to configure Sita that way.” EX1003, ¶137. Dr. Havlicek also argues that “Sita’s description of horizontal filtering was merely representative of the filtering process, and a POSITA would have known how to apply it in the vertical direction as well.” EX1003, ¶181, *see also* ¶186. Dr. Havlicek further argues that “a POSITA would have been motivated and reasonably expected to” implement such separate vertical filter operation. EX1003, ¶141. Thus, Dr. Havlicek again relies on POSITA knowledge to supply this missing element.

Dr. Havlicek relies on Sita's disclosure that "[o]ne skilled in the art could easily extend the following discussion to motion translation in the vertical direction *if desired*." See Pet., 22 (citing EX1008, ¶95). But this is not a disclosure of a separate vertical filter. Sita is silent as to how any such vertical motion translation would be performed, and such implementation would not necessarily result in separate horizontal and vertical filters as claimed. For instance, in a different filtering process, Sita teaches that "filtering can be done in *either* horizontal *or* vertical direction or both by *combining* horizontal and vertical filters." EX1008, ¶118. That is, rather than separate horizontal and vertical filters, Sita teaches, or at least suggests, applying a combined (two-dimensional) filter that is applied in both vertical and horizontal directions.

Moreover, Dr. Havlicek acknowledges that Sita's discussion on vertical motion translation is not an explicit disclosure of a separate vertical filter. Indeed, Dr. Havlicek admits that, to implement such a vertical filter, a POSITA would "need to configure Sita's filter operations from one direction (horizontal) to another direction (vertical)." EX1003, ¶186. Sita does not teach any such vertical filter, and Dr. Havlicek relies on knowledge of a POSITA to supply this missing element.

Petitioner does not and cannot point to the claimed vertical filter GFv in Sita. Petitioner's reliance on expert testimony and POSITA knowledge to supply

this missing element is improper. The Director should thus deny institution

because the Petition again fails to comply with Rule 42.104(b)(4). EX2015, 1.

**C. Petitioner improperly relies on expert testimony and POSITA knowledge to supply the claimed horizontal GFH filter missing from Fimoff.**

Petitioner's Ground 2 relies on Fimoff's horizontal prediction filter 152 as the claimed horizontal filter GFH. Pet., 52, 57. All independent claims require this GFH filter to be applied "successively on the lines... of pixels of said reference block," and to include both a "horizontal motion compensation interpolation filter" and a "horizontal resampling filter." Petitioner admits that Fimoff's filter 152 does not explicitly disclose these elements.

For instance, Petitioner admits that "Fimoff does not expressly say... that Fimoff's horizontal filter is applied successively to lines of pixels" of a reference block as claimed. Pet., 52. Petitioner further admits that Fimoff does not "provide[] detail about the inner working of the horizontal filter," and asserts that Fimoff merely "suggest[s]" the claimed horizontal GFH filter. Pet., 58.

Indeed, Fimoff describes the operation of the horizontal filter 152 in a single sentence: "Horizontal prediction filtering occurs in the horizontal prediction filter 152 and is the same as previously described in connection with the minimum drift prediction for a four point [inverse discrete cosine transform (IDCT)]." EX1011, 30:21-24. Fimoff does not teach that the filter 152 is applied successively on the

pixel lines of a reference block, or that it jointly applies a horizontal motion compensation interpolation filter and a horizontal resampling filter, as claimed.

Petitioner again relies on Dr. Havlicek's testimony to supply this missing horizontal filter. Pet., 52, 58. Dr. Havlicek confirms that "Fimoff did not describe the horizontal filter." EX1003, ¶282; *see also* ¶¶259 ("Fimoff does not say exactly how the horizontal filter operates"), 281 (Fimoff does not "expressly describe the exact composition and operation of the horizontal filter"). He again relies on POSITA knowledge to supply the missing elements. For instance, he argues that a "POSITA would have understood that Fimoff's horizontal filter is applied successively to lines of pixels as well because this was standard practice of horizontal filters." EX1003, ¶259. He also argues that "a POSITA would have understood that Fimoff would require a resampling filter in both the vertical and horizontal directions," and that "a POSITA would have understood that Fimoff's horizontal filter would have needed a motion-compensation-interpolation filter." EX1003, ¶¶287-88. He cites *other* prior art to substantiate his claim of such alleged POSITA knowledge. *See* EX1003, ¶¶292-93. Dr. Havlicek thus relies on POSITA knowledge to supply this missing element.

Petitioner does not and cannot point to the claimed horizontal filter GFH in Fimoff. Petitioner's reliance on expert testimony and POSITA knowledge to supply this missing element is improper. The Director should thus deny institution

because the Petition again fails to comply with Rule 42.104(b)(4). EX2015, 1.

**D. Petitioner improperly relies on expert testimony and POSITA knowledge to supply the claimed coding device and method missing from Wiegand-Davies.**

Petitioner's Grounds 2 and 3 reply on the combination of Wiegand and Davies to satisfy the "coding method" and a "coding device" respectively recited by elements 4[pre] and 8[pre]. But Petitioner admits that these references do not disclose either element. Pet., 63-64, 70. In particular, Petitioner admits that Wiegand "focuses on the decoder, not the encoder." Pet., 63. Petitioner further admits that Wiegand does not include a "section for the encoding process." Pet., 63. Petitioner again turns to POSITA knowledge to satisfy these elements, arguing that "implementing... the encoder would [have] been obvious to a POSITA." Pet., 64.

For support, Petitioner again relies on Dr. Havlicek. Pet., 64 (citing EX1003, ¶¶305-07). Dr. Havlicek confirms that Wiegand "focuses on describing the operation of the decoder and pays less attention to describing the encoder." EX1003, ¶301. He then parrots the Petition's argument that implementing the encoder would have been obvious. In particular, he alleges that, "because Wiegand and Davies together teach a decoding method... a POSITA would have [been] motivated and reasonably expected to also provide an encoder that would perform a coding method..." EX1003, ¶309. He thus relies on POSITA knowledge to

supply this missing element.

Petitioner does not and cannot point to the claimed coding device/method in Wiegand-Davies-Fimoff. Petitioner's reliance on expert testimony and POSITA knowledge to supply this missing element is improper. The Director should thus deny institution because the Petition again fails to comply with Rule 42.104(b)(4). EX2015, 1.

**E. Petitioner improperly relies on expert testimony and POSITA knowledge to supply the claimed “reconstructing a current block” missing from Wiegand.**

Petitioner's Grounds 2 and 3 rely on Wiegand as allegedly teaching reconstructing a current block from a residue block and motion compensated reference block, as required by elements 1[c] and 7[d]. Pet., 54, 69. Petitioner fails to show that Wiegand teaches such reconstructing. As Petitioner admits, Wiegand merely discloses that a “picture reconstruction process... is invoked.” EX1009, 109; *see also* Pet., 54. Wiegand does not disclose the actual process, and thus does not disclose reconstructing a current block from a residue block and from a motion compensated reference block, as claimed. Indeed, Wiegand states that it does not include the actual “picture reconstruction process” because such process had not been written yet. EX1009, 109 (step 4) (“Revisit after writing picture reconstruction process”). Wiegand also includes a placeholder, “subclause XXXX,” for the picture reconstruction process, and does not provide any details

regarding the actual process. *See* EX1009, 109 (step 4). This placeholder contrasts with the other processes in Wiegand that were written, such as the “inter prediction process” and “decoding process for the residual signal,” which list subclauses 8.4.1 and 8.4.3, respectively. EX1009, 109 (step 4); *see also* 110-11 (disclosing subclause 8.4.1), 130-31 (disclosing subclause 8.4.3).

Despite this, Petitioner argues that “[a] POSITA would have understood that a current block is [conventionally] reconstructed by adding the residue block to the predicted, motion-compensated reference block,” and that “a POSITA would have found it obvious to continue using that process when basing predictions on reference images of different sizes than the current block.” Pet., 54-55. Petitioner again turns to Dr. Havlicek for support.

Dr. Havlicek confirms that “Wiegand does not describe the exact reconstruction process.” EX1003, ¶274. Dr. Havlicek further explains that Wiegand’s “final reconstruction process” had not been written yet. *See* EX1003, ¶269. Despite this, Dr. Havlicek argues that a “POSITA [] would have understood that Wiegand would follow [standard practice] to reconstruct frames.” EX1003, ¶274. He thus relies on POSITA knowledge to supply this missing element.

Petitioner does not and cannot point to the claimed reconstructing in Wiegand-Davies-Fimoff. Petitioner’s reliance on expert testimony and POSITA knowledge to supply this missing element is improper. The Director should thus

deny institution because the Petition again fails to comply with Rule 42.104(b)(4).

EX2015, 1.

**F. Petitioner improperly relies on expert testimony and POSITA knowledge to supply the claimed decoding or encoding device comprising at least one circuit missing from Wiegand.**

Petitioner's Grounds 2 and 3 rely on Wiegand as allegedly teaching the decoding device comprising at least one circuit recited by element 7[pre] and the coding device comprising at least one circuit recited by element 8[pre]. Pet., 68, 70. Wiegand does not disclose either device. First, as explained in Section III.D, Wiegand does not disclose an encoding device at all, let alone one with the claimed at least one circuit. Petitioner relies on Wiegand's decoder disclosures as implicitly disclosing an encoder. *See* Pet., 62-64, 70. But Petitioner fails to point to a decoding device comprising any specific circuitry in Wiegand. Instead, it argues that "a POSITA would have understood or found it obvious that Wiegand's decoding process was intended for computers, which would have required at least a computer processor and memory that constitutes a circuit." Pet., 68. Dr. Havlicek similarly relies on POSITA knowledge to supply the coding/decoding devices comprising at least one circuit but also fails to identify any specific circuitry as allegedly corresponding to the claimed at least one circuit. EX1003, ¶¶327 ("a POSITA would have understood that Wiegand's decoding process was intended to operate on computers that contain at least a processor and memory"), 335.

Petitioner thus does not and cannot point to the claimed decoding/coding device circuits in Wiegand. Petitioner's reliance on expert testimony and POSITA knowledge to supply this missing element is improper. The Director should thus deny institution because the Petition once again fails to comply with Rule 42.104(b)(4). EX2015, 1.

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As explained above, Petitioner improperly relies on expert testimony and POSITA knowledge to supply no less than **six missing elements** across its three Grounds. The Director should thus deny this Petition pursuant to 35 U.S.C. § 312(a)(4), for failing to comply with 37 C.F.R. § 42.104(b)(4). EX2015, 1. Petitioner's use of expert testimony is not merely to support a motivation to combine or to demonstrate knowledge as to how a POSITA would have understood a reference's disclosure to teach a claim limitation. Rather, based on Petitioner's own admissions, it relies on Dr. Havlicek to supply elements that are *not disclosed in the asserted prior art references*.

Moreover, although Patent Owner provides six examples above, pursuant to the Memorandum, the Director should deny institution if he finds even one of the examples above to fail to comply with 37 C.F.R. § 42.104(b)(4). EX2015, 1. ("Per 35 U.S.C. § 312(a)(4), the Board shall deny an IPR petition that fails to comply with Rule 104(b)(4).").

**IV. PETITIONER FAILS TO SHOW THAT A POSITA WOULD HAVE COMBINED NAKAGAWA AND SITA.**

Petitioner's Ground 1 fails to show that a POSITA would have combined Nakagawa and Sita to arrive at the claims. Petitioner alleges that a POSITA would have found it obvious to combine Nakagawa's resampling and motion compensation processes into a single filtering operation, based on Sita's teachings. *See* Pet., 23. But Petitioner fails to show that a POSITA would have combined these references in this manner. Indeed, combining Nakagawa's resampling and motion compensation processes would render Nakagawa unable to generate motion vectors, and thus unable to perform motion compensation.

Because Nakagawa fundamentally relies on motion compensation to implement its "predictive coding," modifying Nakagawa as proposed by Petitioner would render it inoperable for its intended purpose. EX1007, Abstract; *see also* EX1003, ¶¶42-53 (explaining the predictive coding process), 84, 123; *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1382 (Fed. Cir. 2007) ("a reference teaches away from a combination when using it in that combination would produce an inoperative result").

All independent claims require a "single vertical filter GFv" comprising a "vertical motion compensation interpolation filter" (MCIFv) and a "vertical resampling filter" (SCFv), as well as a "single horizontal filter GFH" comprising a "horizontal motion compensation interpolation filter" (MCIFH) and a "horizontal

resampling filter” (SCFH). Independent claims 1 and 7 implement these GF filters decoder-side, while independent claims 4 and 8 implement them encoder-side.

Petitioner admits that Nakagawa does not disclose the claimed GF filters (i.e., GFv and GFH) but alleges that Sita does. *See* Pet., 28-29. Petitioner further argues that “[a] POSITA would have been motivated to modify Nakagawa’s decoding loop [] to perform Sita’s joint resampling/motion-compensation-interpolation filter operations.” Pet., 29. Petitioner is wrong. Modifying Nakagawa in this manner would render its encoder unable to generate motion vectors, which are required to perform motion compensation.

**A. Nakagawa’s Encoder**

Independent claims 4 and 8 respectively recite a coding method and coding device that implement the above-described GF filters comprising combined motion compensation interpolation and resampling filters. As Petitioner admits, Nakagawa’s encoder does not include such filters but instead implements separate filters for its respective resampling and motion compensation processes. *See* Pet., 28. In particular, as shown in Figure 2, the CIF/QCIF converter 23 converts (e.g., resamples) “the reconstructed picture of the previous frame” from CIF resolution to QCIF resolution (and vice-versa), and then the prediction picture generator 13 performs motion compensation to “produce[] a prediction picture of the current frame.” EX1007, 5:4-12, 6:19-39. These processes are implemented separately by

the converter 23 and prediction picture generator 13.

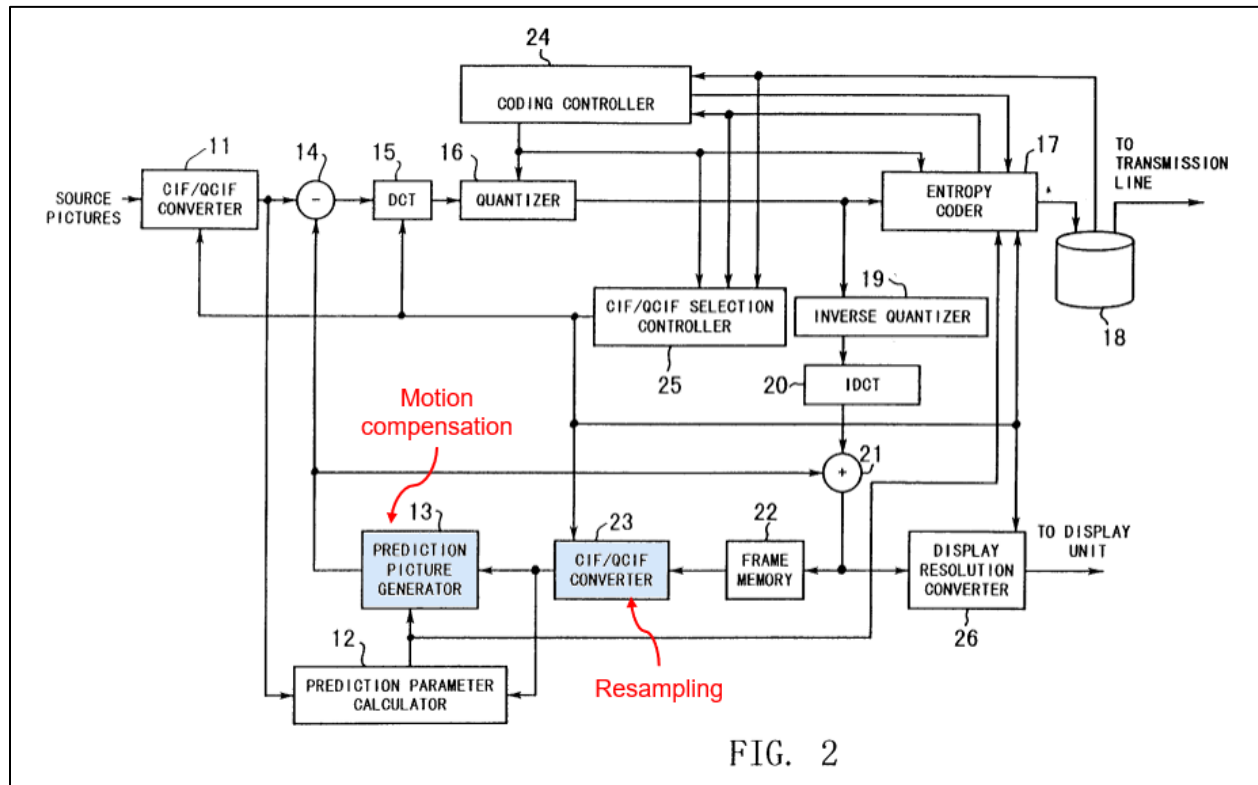


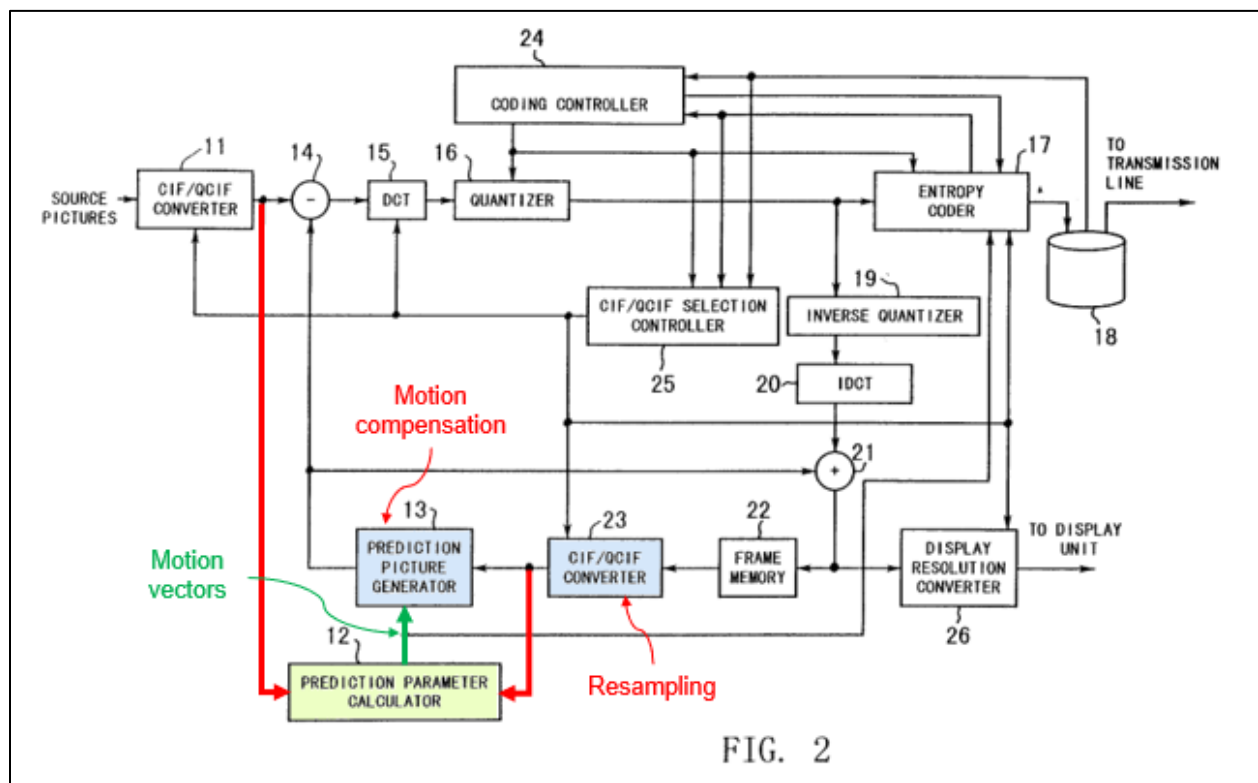
FIG. 2

EX1007, FIG. 2 (annotated).

A POSITA would *not* have been motivated to modify Nakagawa to combine these processes into a single operation, as Petitioner proposes. *See* Pet., 29. Doing so would render Nakagawa's encoder unable to generate accurate motion vectors. Nakagawa's architecture relies on the intermediate resampled, but not yet motion compensated, reference frames output by CIF/QCIF converter 23 to generate motion vectors. Petitioner's proposed combination would collapse resampling and motion compensation into a single operation such that no such intermediate resampled reference frame is created.

As shown in Figure 2 below, Nakagawa's predictive coding process

implements three sequential steps. EX1007, 4:52-5:12. First the CIF/QCIF converter 13 selectively resamples a reference image so that its resolution matches that of a current image. EX1007, 4:52-5:12. Second, the prediction parameter calculator 12 uses the current image and the resampled reference image to generate motion vectors that characterize how the objects in the image have moved between the current image and reference image. EX1007, 4:52-5:12. Third, the prediction picture generator 13 performs motion compensation using the motion vectors. EX1007, 4:52-5:12.



EX1007, FIG. 2 (annotated).

To generate the motion vectors, the calculator 12 compares the current image output by the CIF/QCIF converter 11 with a reference image output by the

CIF/QCIF converter 23. EX1007, 4:56-66. Critically, the converter 23 selectively resamples (e.g., converts to CIF or QCIF) the reference image before providing it to the calculator 12. EX1007, 4:56-61, 6:15-39. The output from the converter 23 thus represents an intermediate, resampled but not yet motion compensated, reference image. EX1007, 4:56-61, 6:15-39. As shown above, the prediction parameter calculator 12 uses this intermediate reference image to generate the motion vectors. EX1007, 4:56-5:2.

This intermediate reference image is essential. Because the CIF/QCIF converter 11 at the encoder's input selectively resamples incoming source pictures, the converter 23 must also selectively resample the reference images to unify the resolutions of the current and reference images. EX1007, 4:62-5:2, 6:15-39. Without such unification, the calculator 12 would compare images at different resolutions, and would thus not be able to determine accurate motion vectors. EX1007, 6:15-39.

Dr. Havlicek confirms this. He states that “[t]o accurately predict a frame, [] **the size of the reference frame should match that of the current frame...** Otherwise, the motion vectors, predictions, and residuals... will not line up properly when applied to a case where the current frame and reference frame have different sizes.” EX1003, ¶67. Dr. Havlicek further confirms that, in Nakagawa, the converter 23 is configured to solve this exact problem, i.e., by unifying the

current and reference image resolutions. EX1003, ¶84 (converter 23 configured to resample the reference frame to “match the size of the frame being predicted”); *see also* ¶¶123, 134.

A POSITA would thus not have modified Nakagawa as proposed by Petitioner because doing so would eliminate the intermediate reference image required to generate Nakagawa’s motion vectors. Importantly, according to Petitioner’s own theory, “**Sita does not directly produce a ‘resampled version’ of a reference image** [] because Sita performs both resampling and motion-compensation-interpolation operations together.” Pet., 33. In other words, according to Petitioner, Sita’s process does not produce the intermediate resampled, but not yet motion compensated, reference image required by Nakagawa’s calculator 12. In Nakagawa’s encoder, collapsing the resampling (at the CIF/QCIF converter 23) and motion compensation (at prediction picture generator 13) into a single operation would render the encoder unable to generate this intermediate resampled reference image, which would render the prediction parameter calculator 12 unable to generate accurate motion vectors for motion compensation. *See In re ICON Health & Fitness, Inc.*, 496 F.3d at 1382.

Moreover, a POSITA would not have restructured Nakagawa’s architecture to provide reference images directly from the frame memory 22 to the calculator 12 (i.e., without being resampled by the converter 23). As Dr. Havlicek explained

above, such implementation would cause the reference images to be a different resolution than the current images, which would result in inaccurate predictions. EX1003, ¶67; *see also* EX1007, 6:15-39.

A POSITA would have recognized that the converter 23 is fundamental to enabling Nakagawa's adaptive resolution techniques. As Petitioner acknowledges, Nakagawa's primary purpose is to alter the resolution of source images in real time to "regulate the amount of coded data at an appropriate level." EX1007, 2:49-53; *see also* Pet., 13; EX1003, ¶82. However, as Dr. Havlicek explains, "this means that sometimes a current frame will be reconstructed using predictions from a different-sized reference frame." EX1003, ¶84. According to Dr. Havlicek, Nakagawa "solve[s] that problem" by implementing the CIF/QCIF converter 23 to "match the size" of the current and reference images. EX1003, ¶84; *see also* ¶¶123, 134 ("Nakagawa discloses a resolution converter ('CIF/QCIF converter') that resamples the reference image so that its size will match that of the current image.").

The CIF/QCIF converter 23 outputs a resampled reference frame that has not been motion compensated. Without this intermediate output, the prediction parameter calculator 12 would be unable to accurately determine the motion vectors, because it would be comparing images of two different resolutions. *See* EX1007, 4:62-5:2, 6:22-26, 6:35-39, 9:25-28; *see also* EX1003, ¶¶67, 84. A

POSITA would thus not have chosen to eliminate the intermediate output, as proposed by Petitioner.

Moreover, a POSITA also would not have implemented Sita's filtering operations in Nakagawa because Nakagawa does not use motion compensation *interpolation*. Petitioner admits this. Pet., 28. Nakagawa's disclosed encoder is designed to be compliant with the "[International Telecommunication Union Telecommunication Standardization Sector (ITU-T)] standard H.261." EX1007, 4:43-51. As Petitioner acknowledges, H.261 does not use motion compensation interpolation—it implements motion compensation using full pixel precision. *See* Pet., 34, 28. Implementing sub-pixel interpolation in Nakagawa, as taught by Sita, would render Nakagawa incompatible with H.261, the coding standard it was expressly intended to implement. It would also require a fundamental redesign of Nakagawa. For instance, because the encoder is designed for pixel precision, introducing half pixel precision as taught by Sita would require extensive changes to at least Nakagawa's prediction parameter calculator 12 and prediction picture generator 13. It would also require extensive changes to the encoder's bitstream syntax to enable compliant processing of interpolated pictures.

Petitioner's combination does not account for these fundamental incompatibilities between Nakagawa and Sita. The Petition asserts that modifying Nakagawa as proposed "would have involved little more than computer coding to

operate on simple data structures, such as arrays.” Pet., 25; *see also* 30 (“a POSITA would need only modify some mathematical equations in computer code”). The Petition thus proposes merely to modify the resampling and motion compensation filters themselves and does not provide for any change to the encoder architecture.

But as just described, combining the filters in this manner would render Nakagawa’s encoder unable to generate motion vectors with which to perform motion compensation. Thus, even to the extent that a POSITA *could* have combined the filters, a POSITA would not have done so. *See In re ICON Health & Fitness, Inc.*, 496 F.3d at 1382; *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993-94 (Fed. Cir. 2017) (that references *could be* combined “does not imply a motivation to pick [the references] and combine them to arrive at the claimed invention.”); *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“Obviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.”) (emphasis original). The combination of Nakagawa and Sita thus fails to render obvious independent claims 4 and 8.

#### **B. Nakagawa’s Decoder**

As explained above, independent claims 1 and 7 recite a decoding method and device that implements the above-described GF filters comprising combined

motion compensation interpolation and resampling filters. A POSITA would not have combined the motion compensation and resampling in Nakagawa's decoder for the same reasons provided above for the encoder, and because, according to Petitioner, the encoder's internal decoding loop and the decoder should have the "same arrangement." Pet., 33.

As explained above in Section III.A, Nakagawa does not explicitly disclose a decoder. Even Petitioner admits that it at best "implicitly describes a decoder." Pet., 15. According to Petitioner, "a POSITA would have readily understood which components would be needed at the decoder" because "Nakagawa describes a decoding method within the encoder." Pet., 15-17 ("Nakagawa effectively described the decoder built into the encoder."). Petitioner thus argues that Nakagawa's decoder would have "the same arrangement" as the encoder's internal decoding loop. Pet., 33; *see also* EX1003, ¶124 ("Because Nakagawa provides an express disclosure of the decoding loop within the encoder, in my opinion, a POSITA would have understood exactly how to implement a decoder (and decoding process) that complies with Nakagawa's coding system.").

This is reflected in Petitioner's arguments for the encoder and decoder claims. For instance, Petitioner relies entirely on its discussion for decoder elements 1[a], 1[d], and 1[e] when discussing corresponding encoder elements 4[a], 4[d], and 4[e], and 8[b], 8[e], and 8[f]. Pet., 34-35, 38-39. That is, Petitioner's

arguments for the decoder elements apply equally to the encoder elements.

Thus, a POSITA would not have modified Nakagawa's decoder to combine its resampling and motion compensation processes in the manner proposed by Petitioner for the same reasons as described for the encoder above. Again, this is because, according to Petitioner, Nakagawa's decoder has the "same arrangement" as the encoder's internal decoding loop. Pet., 33. Because a POSITA would not have combined resampling and motion compensation processes in Nakagawa's encoder, it also would not have combined the resampling and motion compensation processes in the decoder.

**V. PETITIONER FAILS TO SHOW THAT SITA'S UPSAMPLING AND MOTION COMPENSATION PROCESSES ARE IMPLEMENTED USING A SINGLE FILTER.**

Petitioner's Grounds 1 and 3 fail to show that Sita teaches the claimed GF filters. All independent claims require GFH and GFv filters that comprise a combined motion compensation interpolation filter (MCIF) and vertical resampling filter (SCF), such that  $GF(s) = MCIF(SCF(s))$ . Petitioner relies on Sita's "resampling (226) and motion-compensation-interpolation (228) filter operation" for the claimed GF filters. Pet., 21, 23. However, Petitioner fails to show that Sita's filtering operation comprises a combined resampling and motion compensation interpolation filter.

Sita expressly discloses that its upsampling and motion compensation

interpolation processes are performed in two sequential steps. Despite this, Petitioner relies on Dr. Havlicek to argue that these processes are actually performed as a single operation. The Director should disregard Dr. Havlicek's testimony because it is improperly incorporated into the Petition by reference. But even if the Director considers Dr. Havlicek's testimony, he fails to show that Sita implements these processes as a single operation.

**A. Sita expressly discloses upsampling and motion compensation interpolation as separate steps in a two-step process.**

Sita explains that its upsampling 226 and motion compensation 228 operations are performed as “a two step process.” EX1008, ¶99. “[F]irst, pixel accuracy motion estimation in the original image frame may be accomplished by upsampling of down-sampled image frame in the Up Sampling Processor 226 of FIGS. 2A and 2B, **then** the half pixel Generator 228 performs a half pixel interpolation by averaging of nearest pixel values.” EX1008, ¶99. Sita further explains, a “prediction block is upsampled by the Up-Sampling Processor 226... **and then** half pixel values are generated—if indicated by the motion vector for the up-sampled prediction block in the Half Pixel Generator 228.” EX1008, ¶89.



EX1008, FIG. 2B (annotated).

This explicit recitation of a separate “two step” upsampling and motion compensation process does not satisfy the claims, which require a *combined* motion compensation interpolation filter (MCIF) and resampling filter (SCF), such that resampling and motion compensation interpolation are “*applied jointly*.” Sita discloses two sequential steps—first upsampling and then motion compensation interpolation. EX1008, ¶¶89, 99. Furthermore, the motion compensation interpolation is conditional, only being applied “as needed.” EX1008, ¶82. For this reason, Sita does not disclose the claimed GF filters, or motion compensating a

reference block using the claimed GF filters.

**B. The Director should disregard Dr. Havlicek's testimony because it is improperly incorporated by reference into the Petition.**

Despite Sita's explicit disclosure of a "two step process," Petitioner alleges that Sita's upsampling and motion compensation interpolation processes are actually performed as a single operation. *See* Pet., 21, 25, 29. Petitioner does not provide any reasoning for this assertion. Instead, it outsources the entire argument to Dr. Havlicek. In particular, the Petition states **in a single sentence** that Sita "both upsamples and performs motion-compensation interpolation as part of a single operation." Pet., 29. To support this conclusory assertion, the Petition cites to **16 paragraphs** of Dr. Havlicek's declaration, spanning **13 pages** of testimony. Pet., 29 (citing EX1003, ¶¶165-81). The Director should disregard Dr. Havlicek's testimony because it is improperly incorporated into the Petition by reference.

Office Rules explicitly prohibit arguments from being "incorporated by reference from one document into another document." 37 C.F.R. § 42.6. The informative holding in *Cisco Sys., Inc. v. C-Cation Techs., LLC* provides that citing "large portions of another document, without sufficient explanation of those portions, amounts to incorporation by reference." IPR2014-00454, Paper 12 at 8 (P.T.A.B. Aug. 29, 2014) (informative). *Cisco* also provides that the "practice of citing the Declaration to support conclusory statements that are not otherwise supported in the Petition also amounts to incorporation by reference." *Id.* at 9.

In *Cisco*, the Board found improper incorporation by reference where the Petition included “seven pages” of argument but cited to “seventeen pages” from an expert declaration as support. The Board also found separate instances of improper incorporation by reference where “the Petition include[d] citations to the Declaration to support conclusory statements for which the Petition [did] not otherwise provide an argument or explanation.” *Cisco*, 9. In one instance, the Board found improper incorporation by reference where the Petition provided “a one sentence quotation from the reference” and cited to four paragraphs of the declaration. *Id.* In another instance, the Board found improper incorporation by reference where the Petition provided one “conclusory paragraph” and cited to “one and a half pages” of the declaration. *Id.*

Petitioner’s incorporation by reference here is much more egregious. Again, the Petition provides a single conclusory sentence that directly contradicts Sita’s express disclosure of the upsampling and motion-compensation interpolation being a “two step process.” EX1008, ¶¶89, 99. Rather than explaining the basis for its assertion, the Petition merely cites to **16 paragraphs spanning 13 pages of testimony** from Dr. Havlicek. Pet., 29 (citing EX1003, ¶¶165-81). This is contrary to 37 C.F.R. § 42.6, and the Director should disregard the incorporated arguments from Dr. Havlicek.

Other panels have found improper incorporation by reference in situations

far less extreme than the one here. *Canadian Solar Inc. v. Maxeon Solar PTE. Ltd.*, IPR2024-01039, Paper 13, 27 (P.T.A.B. Jan. 14, 2025) (finding incorporation by reference of “ten paragraphs” from the declaration); *3M Co. v. Evergreen Adhesives, Inc.*, 860 F. App’x. 724, 728 (Fed. Cir. 2021) (finding the Board did not abuse its discretion in excluding evidence improperly incorporated by reference when the Petition only argued that a feature was within POSITA knowledge without further explanation in Petition); *LG Elecs., Inc., v. Advanced Micro Devices, Inc.*, IPR2015-00328, Paper 20, 7 (P.T.A.B. July 8, 2015) (Petitioner’s reliance on nine paragraphs of expert testimony is improper incorporation by reference); *Vanguard Prods. Grp., Inc., v. Invue Sec. Prods., Inc.*, IPR2020-00014, Paper 10, 4-6 (P.T.A.B. Apr. 21, 2020) (Petitioner’s bare citation to expert testimony risks having the testimony not considered by the Board.); *Hopkins Mfg. Corp. & The Coast Distrib. Sys., Inc., v. Cequent Performance Prods., Inc.*, IPR2015-00616, Paper 9, 13-15 (P.T.A.B. Aug. 17, 2015) (Petitioner’s reliance on five paragraphs of the expert report violates against incorporation by reference). The Director should not deviate here.

Consistent with *Cisco*’s informative guidance and the numerous other panels who have held similarly, the Director should disregard paragraphs 165-181 of Dr. Havlicek’s declaration as being improperly incorporated into the Petition by reference. *See Cisco*, 10. Indeed, rather than making all arguments accessible to the

Board, Petitioner asks the Director and the Board “to play archeologist with the record,” which is a “pointless imposition on the [Board’s] time.” *Id.* (quoting *DeSilva v. DiLeonardi*, 181 F.3d 865, 866-67 (7th Cir. 1999)). The Director should not countenance Petitioner’s attempt to circumvent the word limit by incorporating an additional 13 pages into the Petition.

**C. Dr. Havlicek fails to show that Sita discloses a single upsampling/motion compensation filter.**

Even if the Director were to consider Dr. Havlicek’s testimony, Petitioner still fails to show that Sita teaches the claimed GF filters. Dr. Havlicek acknowledges that Sita depicts its upsampling 226 and motion compensation interpolation 228 operations “as two steps.” EX1003, ¶165. But Dr. Havlicek argues that the specification is inaccurate, stating that “these descriptions are for ease-of-reference, and not because Sita actually implements these two operations separately.” EX1003, ¶165. Furthermore, Dr. Havlicek’s analysis that the specification is inaccurate fails to provide the basis for his opinions and is thus conclusory. The Director should thus disregard Dr. Havlicek’s testimony regarding Sita’s filtering operations. *Ericsson Inc. v. Intell. Ventures I LLC*, 890 F.3d 1336, 1346 (Fed. Cir. 2018) (“To contradict a reference, an unsupported opinion is not substantial evidence.”).

Dr. Havlicek alleges that Sita’s “Tables 7B and 7C provide specific filter coefficients... for a single joint filter to calculate both the upsampled and half-

pixel interpolation values in a single combined filtering operation.” EX1003, ¶168.

Dr. Havlicek provides a 10-page description explaining the alleged operation of these tables. *See* EX1003, ¶¶168-80. But despite the length of his explanation, Dr. Havlicek does not ever explain *how* the Table coefficients represent a combined upsampling and interpolation operation.

For instance, Dr. Havlicek walks through various subpixel values listed in Table 7B, asserting that, for each subpixel location, “filter coefficients are applied to the original pixel values of the reference image.” EX1003, ¶170; *see also* ¶¶171-73. He further alleges that applying those coefficients “generate[s] the new upsampled and motion compensation-interpolated output pixel value” for each subpixel location. *E.g.*, EX1003, ¶170. But Dr. Havlicek never explains how application of these coefficients produces this result. *See* EX1003, ¶¶170-74. Instead, he simply states the outcome as a conclusion. Although he slowly walks through Tables 7B and 7C, he never provides the underlying basis for his claim that applying the coefficients in these Tables results in a motion compensation interpolated and upsampled pixel value. He does not provide calculations, numerical examples, or data corroborating his assertion. His testimony merely provides an unsupported, conclusory characterization of the Tables.

Sita does not expressly teach that these tables combine upsampling and motion compensation interpolation. *See* EX1008, ¶¶110-14. To the contrary, as

explained above, Sita explains that these operations are performed as a sequential “two step process.” EX1008, ¶99. Dr. Havlicek’s assertion to the contrary fails to provide the basis for his opinions and is thus conclusory. The Director should thus disregard Dr. Havlicek’s testimony regarding Sita’s Tables 7B and 7C.

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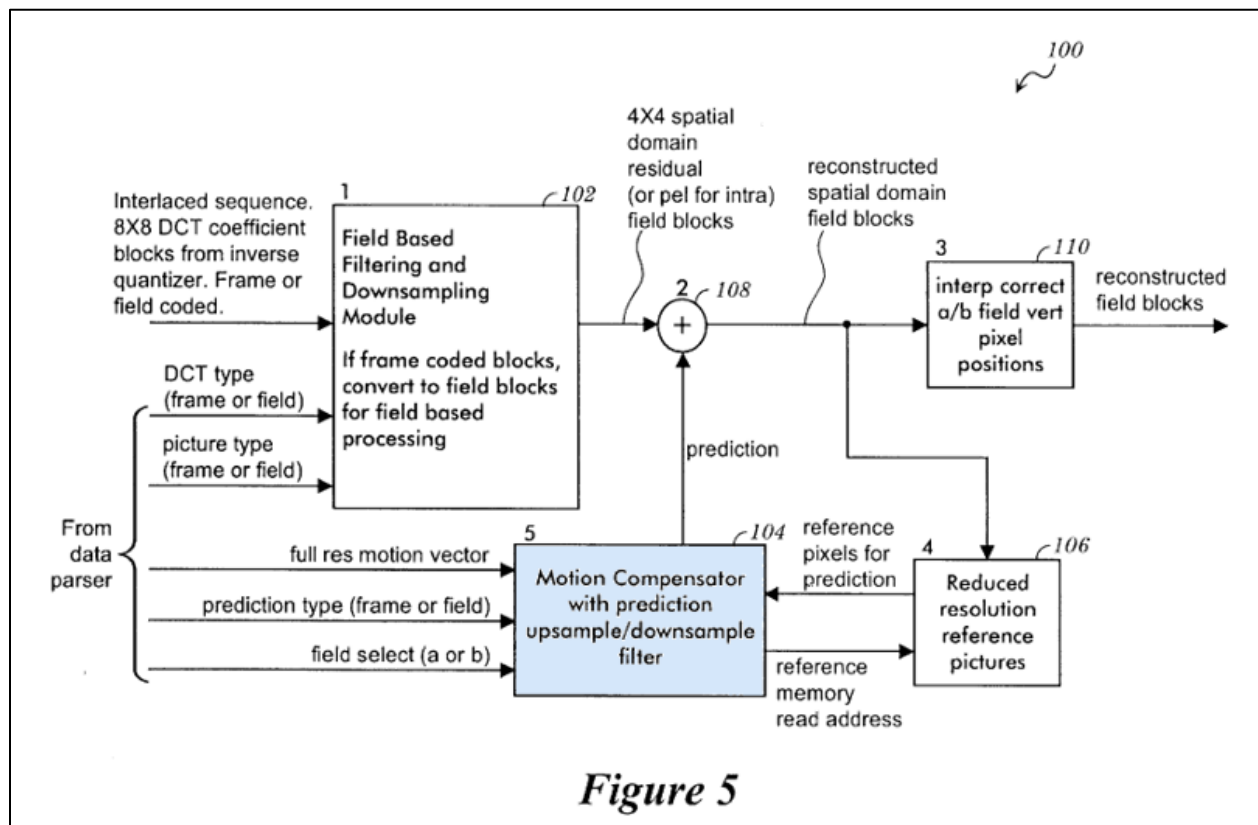
Without Dr. Havlicek’s testimony, Petitioner is left with a single unsupported sentence alleging that Sita combines its upsampling and motion compensation interpolation functions into a single operation. *See* Pet., 29. But as explained above, this single sentence (and the extensive expert testimony it cites) contradicts Sita’s explicit disclosure. Petitioner thus fails to show that Sita teaches the claimed GF filters, which must comprise combined resampling and motion compensation interpolation filters. Petitioner’s Grounds 1 and 3 fail for this reason.

## **VI. FIMOFF DOES NOT TEACH THE CLAIMED VERTICAL GFV FILTER.**

Petitioner’s Ground 2 fails to show that Fimoff teaches the vertical GFv filter required by all independent claims. The independent claims require the vertical GFv filter to comprise a jointly applied motion compensation interpolation filter (MCIFv) and resampling filter (SCFv), such that  $GFv(s) = MCIFv(SCFv(s))$ . Petitioner relies on Fimoff’s vertical filter 154 as the claimed GFv filter. Pet., 55. But as explained below, this filter does not satisfy the claimed vertical GFv filter.

Fimoff discloses a down converting decoder 100 “for down converting and

decoding high resolution encoded video for display by a lower resolution receiver.” EX1011, 1:16-18, 7:56-65. This “allow[s] the viewing of HDTV signals without requiring viewers to buy expensive HDTV displays.” EX1011, 3:37-47. As part of this process, the decoder must perform motion compensation to predict portions of the current frame based on a previously decoded reference frame. To this end, the converter 100 includes a “motion compensator 104” that generates predicted pixel values from a stored reference image based on motion vectors that indicate how image content has shifted from one frame to the next. EX1011, 20:60-21:9.



EX1011, FIG. 5 (annotated).

Fimoff’s “motion compensator 104” motion compensates a reference block

by applying a vertical filter to pixels of the reference block. The vertical filter comprises two distinct operators, [PL-odd] and [PL-ev], that are applied to motion compensate Fimoff's reference blocks. EX1011, 20:47-21:25 (disclosing [PL-odd], [PL-ev] operators), 30:25-37 ("the correct vertical filter operator [PL] is read from a memory"). Fimoff dynamically selects between these operators depending on whether a vertical motion vector ("vmv") associated with a pixel is even or odd.

These operators have different mathematical structures. [PL-odd] is mathematically formed by multiplying a downsampling filter [d0], a linear interpolation filter [LI], and an upsampling filter [u].<sup>4</sup> Fimoff notates this operator mathematically as  $[PL-odd] = [d0][LI][u]$ . EX1011, 21:10-28. Conversely, [PL-ev] is formed by multiplying the upsampling and downsampling components, such that  $[PL-ev] = [d0][u]$ . EX1011, 20:32-59.

Petitioner argues that a linear interpolation filter by itself is a motion compensation interpolation filter. Petition, 50. However, this theory is not supported by Fimoff. For example, Fimoff explains that its linear interpolation filter [LI] simply takes the average of nearby pixels to obtain half pixel values. EX1011, 20:61-21:8. Fimoff's linear interpolation filter [LI] does not consider a

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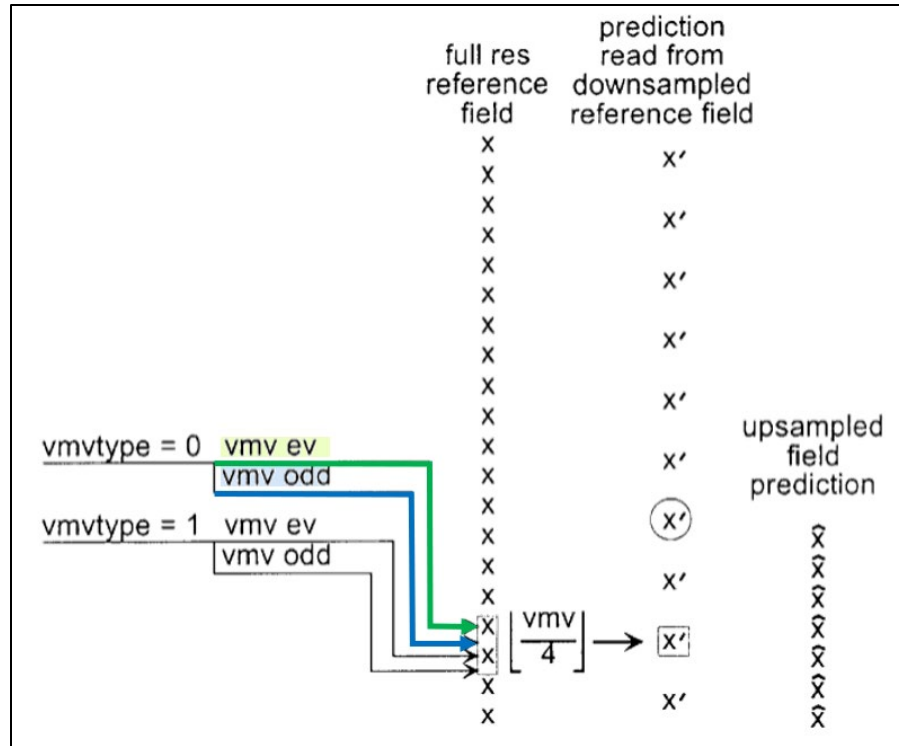
<sup>4</sup> Petitioner argues that the linear interpolation filter [LI] implements a motion compensation interpolation process. Pet., 50.

motion vector, and is thus not a motion compensation filter, let alone the claimed MCIFv. Furthermore, as explained below, this [PL-ev] operator omits the linear interpolation [LI] component entirely, thus the [PL-ev] operator is not formed by jointly applying a resampling filter (SCFv) with a motion compensation interpolation (MCIFv) as claimed, even under Petitioner's own theory, because it does not include the alleged MCIFv component.

Fimoff's motion compensator 104 selectively applies the [PL-odd] and [PL-ev] operators to different reference blocks to motion compensate the block.<sup>5</sup> In particular, the motion compensator selects these filters based on whether a pixel has an associated even or odd valued motion vector (vmv). Fimoff explains that an even vmv points directly at a full resolution reference pixel and an odd vmv "points between pixels at full resolution." This is shown in Figure 7.

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<sup>5</sup> Petitioner's proposed combination omits this downsampling component. Pet., 56. In such configuration, [PL-odd] = [LI][u] and [PL-ev] = [u].



EX1011, FIG. 7 (excerpt, annotated).

When the vmv is odd, it points between two vertical pixel rows. In this situation, the decoder mathematically reconstructs an “in-between” pixel value. Fimoff accomplishes this by applying [PL-odd], which incorporates the linear interpolation [LI] component in addition to the upsampling and downsampling components. The linear interpolation operation effectively averages two adjacent reference pixels to generate a pixel value corresponding to the half-pixel offset specified by the motion vector. EX1011, 20:60-21:28.

When the vmv is even, and thus points directly to an existing pixel, no half-pixel interpolation is performed. See EX1011, 21:28-54. The motion compensator forms the prediction for that pixel by applying [PL-ev], which simply upsamples and downsamples the reference image using the upsampling [u] and

downsampling [d0] components. EX1011, 21:28-51. Because no half-pixel interpolation is necessary, the [PL-ev] operator omits the linear interpolation [LI] component entirely (i.e., [PL-ev] = [d0][u]). EX1011, 21:28-51.

Fimoff's "single vertical filter (154)" thus comprises both the [PL-odd] and [PL-ev] filters as components of a single filter. *See* Pet., 55, *see also* EX1003, ¶259; EX1011, 20:47-21:25, 30:25-37. This filter does not satisfy the claims because it includes an operator ([PL-ev]) that does not include a linear interpolation (alleged motion compensation interpolation (MCIFv)) component, or an operator ([PL-odd]) that has to include an extra downsampling filter (after upsampling and interpolation), and is thus not formed by jointly applying a resampling component with a linear interpolation component. Fimoff's filter thus does not teach the  $GF_v(s) = MCIF_v(SCF_v(s))$  structure required by the claims.

Moreover, Fimoff's horizontal filtering operation also fails to meet the claimed GFH filter. As Petitioner admits, Fimoff does not explicitly describe the motion compensator 104's horizontal filtering operations. *See* Pet., 58-59. However, Petitioner argues that a POSITA would have understood that the horizontal filters are configured the same way as the vertical filters. *See* Pet., 57-59 ("A POSITA would have also understood, or found it obvious, that [Fimoff's vertical filter] teachings apply to the horizontal filter."). To the extent Petitioner is correct, Fimoff does not disclose the single horizontal filter GFH for the same

reasons as provided above for Fimoff's vertical filter.

Thus, Fimoff fails to teach a single horizontal filter GFH and a single vertical filter GFv, as required by all independent claims. For this reason, Petitioner's Ground 2 fails.

**VII. PETITIONER FAILS TO SHOW THAT WIEGAND OR DAVIES WERE PUBLICLY ACCESSIBLE.**

Petitioner's Grounds 2 and 3 rely on Wiegand and Davies, which were both proposals for the development of the High-Efficiency Video Coding (HEVC) standard. Petitioner fails to show that Wiegand or Davies were publicly accessible printed publications.

"[A]t the institution stage, the petition must identify, with particularity, evidence sufficient to establish a reasonable likelihood that the reference was publicly accessible before the critical date of the challenged patent and therefore that there is a reasonable likelihood that it qualifies as a printed publication." *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29, 13 (P.T.A.B. Dec. 20, 2019) (precedential) ("*Hulu*"). A reference is considered publicly accessible if "persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it." *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 772 (Fed. Cir. 2018).

Petitioner fails to show that either Wiegand or Davies were publicly accessible. The Petition limits its argument for each reference to a footnote. These

footnotes nakedly cite to 26 paragraphs (spanning 13 pages) of Dr. Reader's declaration. Pet., 39, 41 (each stating "[Wiegand/Davies] was publicly accessible." and citing to "Ex-1005, ¶¶43-69; *see also generally* Ex-1005"). The Director should disregard Dr. Reader's testimony because it is improperly incorporated into the Petition by reference under 37 C.F.R. § 42.6 and *Cisco*. *See* discussion in Section V.B *supra*.

The Petition also provides alleged examples of "others" who cited to Wiegand and Davies in documents. Pet., 39, 41 (citing to EX1042, EX1047, EX1048, EX1049). But these citations fail to show public accessibility. At the outset, Petitioner merely includes string cites to entire documents without pointing to any particular citations in the document. This fails *Hulu's* "particularity" requirement. Moreover, these citations fail to show that Wiegand or Davies were locatable by ordinarily skilled artisans exercising reasonable diligence.

Again, Petitioner's entire argument is included in a footnote, with a conclusory assertion that the citations "demonstrat[e] that those interested had access and knew where to find it." Pet., 39, 41. The Petition does not provide arguments as to how or where such references could be found. Nor does it provide arguments showing that these citations were provided by *ordinarily skilled artisans* who were able to find the Davies and/or Wiegand exercising reasonable diligence. The Petition thus fails to demonstrate that either Wiegand or Davies were publicly

accessible printed publications.

Moreover, even if the Director considers Dr. Reader's declaration, Petitioner still fails to show that Wiegand or Davies were publicly accessible. Dr. Reader argues that these references were publicly available because they were "provided on the JCT-VC website." EX1005, ¶45.

The Federal Circuit has previously affirmed a Board decision finding that documents provided on the same JCT-VC website were *not* accessible to the public. *Samsung Elecs. Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363 (Fed. Cir. 2019). In *Samsung*, the Board found that documents on the JCT-VC website were not publicly accessible because "identifying a meeting location was key to navigating the JCT-VC site," and "a person who did not know to search for the [] reference by looking under the "Torino" folder – named for the Torino meeting – then a person would not have found the [] reference." *See id.* at 1371. The Federal Circuit held that the public accessibility inquiry "properly focused on whether those outside of the JCT-VC knew about the JCT-VC website." *Id.* at 1372. In confirming that the Board's findings were consistent with substantial evidence, the court found that "even a person who found the JCT-VC website lacked a reasonable way of locating the WD4 reference unless they already knew what to look for and where to look for it." *Id.* The court also provided the following summary: "the structure of the [JCT-VC] website, which organized content by meeting and lacked a way to

search by subject matter, meant that a person would only find the [] reference if they knew where to look.” *Id.* at 1373.

Dr. Reader’s testimony attempting to demonstrate that the references were available on the JCT-VC website is consistent with the insufficient evidence offered in *Samsung*. Dr. Reader explains that “the documents on the JCT-VC website were organized by meeting,” and that “[o]nce a meeting was selected from the menu, all of the input and output documents associated with that meeting were viewable.” EX1005, ¶58. Dr. Reader also explains that one could only search for documents within directories for respective meetings. EX1005, ¶60. Thus, as stated in *Samsung*, this means “that a person would only find the [] reference if they knew where to look.” *Samsung*, 929 F.3d at 1372. Because documents provided by the JCT-VC website are “organized only in a hierarchical manner and not by subject matter,” they are not “publicly accessible.” *Roku, Inc. v. Universal Elecs., Inc.*, No. 2024-1188, 2025 WL 1692663, at \*3 (Fed. Cir. June 17, 2025) (characterizing the prior *Samsung* decision).

Moreover, Dr. Reader provides no evidence that ordinarily skilled artisans would have known of or would have been able to locate documents on the JCT-VC website. Dr. Reader testifies that he personally monitored “the development of... each document that was published to the JCT-VC website.” EX1005, ¶44. But Dr. Reader was intimately familiar with the standardization process, and admittedly

possessed more than ordinary skill in the art. *See* EX1005, ¶¶15 (“I was a co-founder of the MPEG4 standard”); 18 (“I was an invited expert to the H.264/MPEG4 Pt. 10 JVT standard development”).

Petitioner submits that an ordinarily skilled artisan would have a “bachelor’s degree” and “three years of experience in... relevant multimedia processing.” Pet., 11. Dr. Reader’s knowledge of the JCT-VC website does not reflect that of an ordinarily skilled artisan. Dr. Reader provides no evidence that the JCT-VC website was intended for, or accessible by, people of this skill level.

Dr. Reader relies on evidence stating that the JCT-VC input and output documents were publicized in order to “facilitate cross-organisational communication,” i.e., so that the JCT-VC “parent bodies” would be able to communicate regarding contribution documents. EX1031, 2. That is, these documents were intended to be viewed by those developing the standard, not by ordinary skilled artisans outside of the JCT-VC.

Thus, even if the Director considers Dr. Reader’s improperly incorporated arguments on public accessibility, Petitioner has failed to show that Wiegand or Davies were publicly accessible printed publications under 35 U.S.C. § 102. For these reasons, Petitioner’s Grounds 2 and 3 fail.

## **VIII. CONCLUSION**

The Petition fails to show a reasonable likelihood that any of the challenged

claims is unpatentable as obvious in view of the cited art and, therefore, the  
Director should deny institution.

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**CERTIFICATE OF WORD COUNT (37 C.F.R. § 42.24(d))**

1. This Patent Owner Preliminary Response complies with the type-volume limitation of 14,000 words, comprising 10,915 words, excluding the parts exempted by 37 C.F.R. § 42.24(a)(1).

2. This Patent Owner Preliminary Response complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word 2016 in 14-point Times New Roman font.

Respectfully submitted,

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**CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e))**

I certify that the above-captioned **PATENT OWNER PRELIMINARY  
RESPONSE UNDER 37 C.F.R. § 42.107(a)** was served in its entirety on April  
15, 2026, upon the following parties via electronic mail:

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