

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SNAP INC.,

Petitioner,

v.

NOKIA TECHNOLOGIES OY,

Patent Owner.

IPR2025-01114

U.S. Patent No. 8,175,148

PATENT OWNER'S PRELIMINARY RESPONSE

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TABLE OF EXHIBITS

Ex. No.	Title	Previously Submitted
2001	Declaration of R. Mitch Verboncoeur in Support of <i>Pro Hac Vice</i> Admission	X
2002	Declaration of R. Mitch Verboncoeur in Support of Patent Owner's Notice of Intent to Designate a Provisionally Recognized PTAB Attorney as Back-up Counsel	X
2003	Corrected Declaration of R. Mitch Verboncoeur in Support of Patent Owner's Notice of Intent to Designate a Provisionally Recognized PTAB Attorney as Back-up Counsel	X
2004	Original Complaint in <i>Nokia Technologies Oy v. Amazon.com, Inc., et al.</i> ; Civil Action No. 1:23-cv-01236 in the District of Delaware	X
2005	Petition for <i>Inter Partes</i> Review of U. S. Patent No. 8,175,148 in IPR2024-01176	X
2006	Declaration of Dr. Eli Saber, Ph.D. Regarding U. S. Patent No. 8,175,148 in IPR2024-01176	X
2007	Decision Granting Institution of <i>Inter Partes</i> Review 35 U.S.C. § 314 in IPR2024-01176	X
2008	Termination Due to Settlement After Institution of Trial in IPR2024-01176	X
2009	Original Complaint in <i>Nokia Technologies Oy v. Amazon.com, Inc., et al.</i> , Case No. 1:23-cv-01236-UNA (D. Del.). October 31, 2023	X
2010	Complaint for Declaratory Judgment in <i>Element Television Co., LLC v. Nokia Corporation et al.</i> , Case No. 24-cv-4269 (LMB/DTS) (D. Minn.), November 25, 2024	X
2011	Declaration of Dr. Douglas A. Chrissan	
2012	CV of Dr. Douglas A. Chrissan (June 2025)	

I. INTRODUCTION

As an initial matter, this Petition is nearly identical to one filed by Amazon in August 2024, regarding the same claims of the '148 Patent. Ex-2005 (*Amazon.com, Inc. V. Nokia Technologies OY*, IPR2024-01176, Paper 1 (Aug. 30, 2024)) (“Amazon Petition”). Snap’s copycat attack should not be instituted because it fails on the merits.

The Amazon Petition relied on two grounds (MPEG-1 and H.263) and the declaration of Dr. Eli Saber. *Id.* at 2; Ex-2006 (“Amazon Saber Declaration”). The PTAB instituted IPR, finding it was “reasonably likely that [Amazon] would prevail in showing that claim 1 is unpatentable based on MPEG-1” but that Amazon had not “shown a reasonable likelihood of prevailing in its challenge to [the claims] with respect to H.263.” Ex-2007 (“Amazon Institution Decision”) at 16, 20-21. Snap’s Petition relies on the same two grounds (MPEG-1 and H.263) and the Declaration of Dr. Eli Saber, which appears to have been copied directly from the Amazon proceeding. *Compare* Ex-1003 *with* Ex-2006 (“Amazon Saber Declaration”). This type of serial attack has been discouraged by the PTAB in the past. *See, e.g., Webgroup Czech Republic, A.S. v. Dish Technologies LLC*, IPR2025-00467, Paper 14 at 2-3 (PTAB July 16, 2025) (denying institution because the challenged patent had “already been the subject of multiple proceedings”); *Murata Manufacturing Co.,*

Ltd, v. Georgia Tech Research Corp., IPR2025-00383, Paper 13 at 2-3 (PTAB July 29, 2025) (“A failure to seek early review of the patent favors denial”).

Moreover, Snap’s Grounds (repeated from the Amazon Petition) fail. Petitioner’s first Ground is based on MPEG-1 (Ex-1005). This ground fails at least because it does not disclose the ’148 Patent’s “default level of quantization.” MPEG-1 describes a level of quantization determined at the individual slice or block level. This level of quantization is determined by a decoder through a quantization step size, which is signaled at the slice or block layer for every slice and/or block. Petitioner does not allege the quantization step size constitutes a “default level of quantization.” MPEG-1 also describes a parameter called “Quantizer Matrix,” which is what Petitioner incorrectly relies on as a “default level of quantization.” However, MPEG-1’s Quantizer Matrix does not define a level of quantization. Rather, the Quantizer Matrix is a block of values that indicates how a Quantization Parameter (whose scaling is set by MPEG-1’s quantizer scale for every block or slice) is applied to the transform coefficient values in a block—i.e., whether the quantizer scale is applied uniformly or not. Indeed, MPEG-1’s default Quantizer Matrix amounts to applying the signaled quantizer scale equally to all transform coefficients with no alteration to the quantization. Because the Petition relies on a misunderstanding of MPEG-1’s Quantizer Matrix, Petitioner has failed to show that MPEG-1 includes a default level of quantization that is signaled for a video sequence.

The panel writing the Amazon Institution Decision instituted proceedings based on this MPEG-1 Ground. The panel found, for purposes of institution, that selecting the values of the Quantization Matrix constituted selecting a level of quantization. Ex-2007 at 11 (““[D]efining” a default level of quantization in an encoder encompasses selecting or determining the level of quantization to be used until the next update.’ ... In either case, [when *load_non_intra_quantizer_matrix* is set to 0 or 1] MPEG-1 teaches or suggests the claimed [element].”) (quoting Amazon Pet. at 16). Nokia respectfully disagrees. The Quantization Matrix does not set the level of quantization. Another variable, the quantizer step size, selects the level of quantization for a block and/or slice based on the quantizer scale (which signals on the block and/or slice level) and the Quantization Matrix (which signals how the quantizer scale should be applied to arrays of pixels). Crucially, both the quantizer scale and the Quantization Matrix are required to determine the level of quantization. Because the quantizer scale is signaled at the slice and/or block layer, the quantizer step size is signaled at the same layer. Given that the level of quantization is signaled at the slice and/or block layer and must be signaled for each slice and/or block there is no default level for a video sequence in MPEG-1.

Petitioner’s second Ground is based on H.263 (Ex-1006). H.263 is another prior video coding standard that describes signaling the level of quantization at the picture level. The panel considering the Amazon Petition found that the H.263

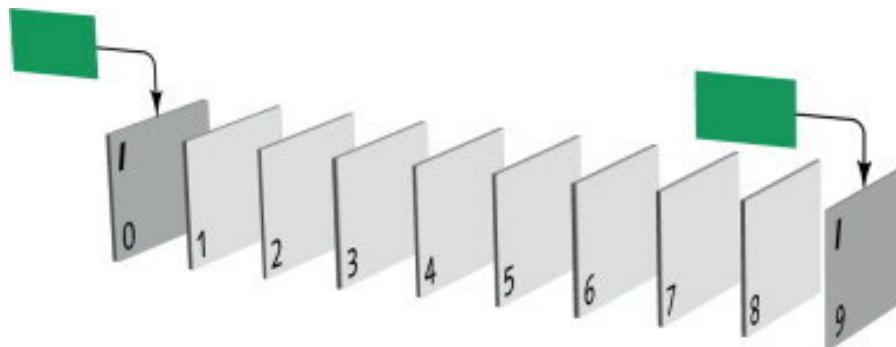
references failed to disclose several claim elements, including the claimed “sequence-level parameter,” “means for selecting,” and “means for providing.” Ex-2007 at 20 (“Petitioner has not sufficiently explained why *PQUANT* is a sequence-level parameter”); *Id.* at 22 (“Petitioner offers no additional explanation [beyond referencing Nokia’s position in prior litigation] of why H.263’s Picture-layer quantization parameter meets the claimed ‘means for selecting’ and ‘means for providing’”). Petitioner, without altering any substance of the Amazon Petition, incorrectly attempts to liken H.263 and H.264 parameters due to Patent Owner’s statements in a prior litigation regarding Amazon’s encoding of H.264-compliant bitstreams. *Nokia Techs. Oy, v. Amazon.com, Inc., Amazon.com Services LLC, and Twitch Interactive, Inc.*, No. 1:23-cv-01236 (D. Del.). However, Petitioner’s arguments mischaracterize Patent Owner’s statements and fail to acknowledge significant differences between the way in which quantization levels are signaled in H.263-compliant bitstreams versus H.264-compliant bitstreams. Petitioner argues that if H.264’s level of quantization within a picture parameter set meets the claim limitations, then H.263’s level of quantization sent with each picture likewise meets the claim limitations. Not so. H.264 includes the concept of picture parameter sets. Picture parameter sets include information used by the decoder to correctly decode pictures. Notably, a picture parameter set can be referenced by several distinct pictures in H.264. This means that a picture parameter set can include a level of

quantization for multiple pictures in a sequence and need only be transmitted a single time. On the other hand, an H.263-compliant bitstream must signal quantization information for each and every picture. There is no feature of H.263 that allows for a level of quantization to be transmitted once for multiple pictures. Petitioner's likening of H.263 to H.264 is flawed. Ground 2 fails.

II. BACKGROUND

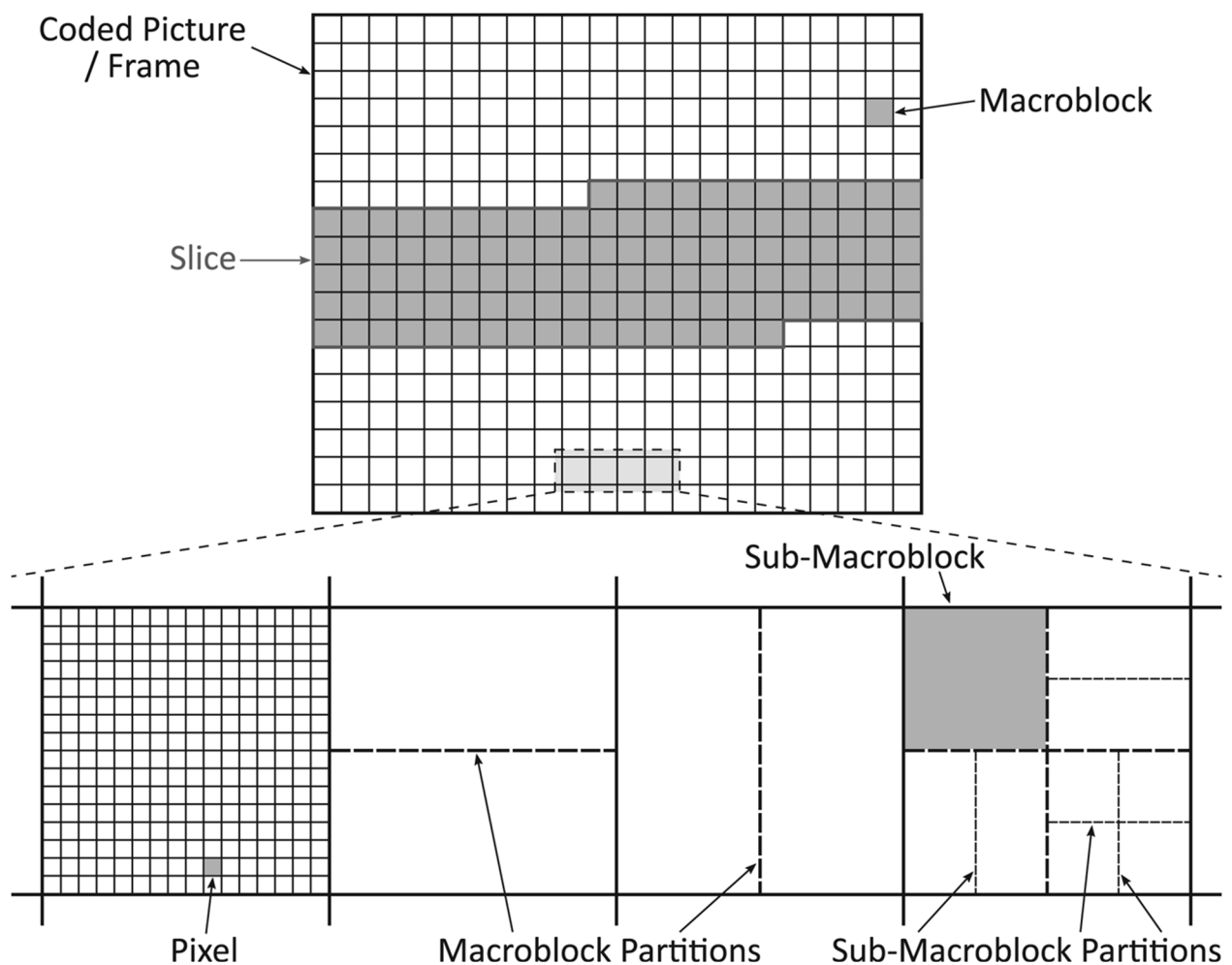
A. Technical Background

Video playback involves the rapid display of successive still images (or frames) which creates the illusion of motion. In video coding, videos are broken up into smaller sections, referred to as sequences, for organization. A sequence can include multiple frames. For example, the sequence illustrated below contains frames 0-8. Ex-2011 at ¶ 34-35.



Each frame can be broken up into smaller segments as well, typically referred to as slices. Slices consist of a group of even smaller segments known as blocks or

macroblocks.¹ Blocks can vary in size and are made up of an NxM grid of pixels. Pixels are the smallest addressable unit in video coding and can vary in both brightness and color. A depiction of a frame partitioned into smaller segments is represented below. Ex-2011 at ¶ 36.



¹ A macroblock is a processing unit in video processing typically consisting of a block of 16 x 16 samples.

Modern displays with high-definition resolutions, such as 4K, include over 8 million pixels in one frame. Due to the massive pixel count in high resolution video, sending full size images with individual pixel values for each pixel would take an enormous amount of bandwidth. Because of this, video coding is necessary to encode (compress) video for transmission. Video coding utilizes a variety of techniques to code (i.e., encode) video files that allow for reduced file sizes while maintaining image quality. '148 Patent at 1:20-38; Ex-2011 at ¶ 42.

One key to video compression is the exploitation of redundancies in the video. The two main types of redundancies are temporal and spatial. Temporal redundancy refers to redundancies between frames and is associated with Inter coding. Spatial redundancy refers to redundancies within a given frame and is associated with Intra coding. Video encoders take advantage of these redundancies by transmitting information referencing previously decoded information rather than retransmitting that same information for a new frame or block. One method of video coding that relies on temporal redundancy is called motion compensated prediction. In motion compensated prediction an encoder can code and transmit a motion vector to the decoder. The decoder receives the motion vector and uses the motion vector to generate a “prediction” from the pixel values of a corresponding region from a previously decoded reference frame. The corresponding region used to generate a prediction is located by the decoder by following the motion vector provided by the

encoder. However, motion compensated prediction does not always provide a perfect match for the original image content and can introduce errors in the decoding process. To address these errors, video encoders also provide prediction error information. The prediction error information represents values that are to be added to a predicted block to create an output block that more accurately represents the original input image. Prediction error is typically referred to as a prediction error signal or residual information. Prediction error typically goes through a process called transform coding to be compressed prior to being coded in the bitstream. '148 Patent at 3:27-44; Ex-2011 at ¶ 43-44.

Transform coding refers to a process of creating transform coefficients that, when applied to corresponding basis functions, represent values in an array. In the context of video coding, transform coding can be used to represent all NxM prediction error values for a given block of a video frame in a compressed manner. This is done through the use of a corresponding NxM array of transform coefficient values, each of which is a multiplier for one of the basis functions of the transform. Ex-2011 at ¶ 46.

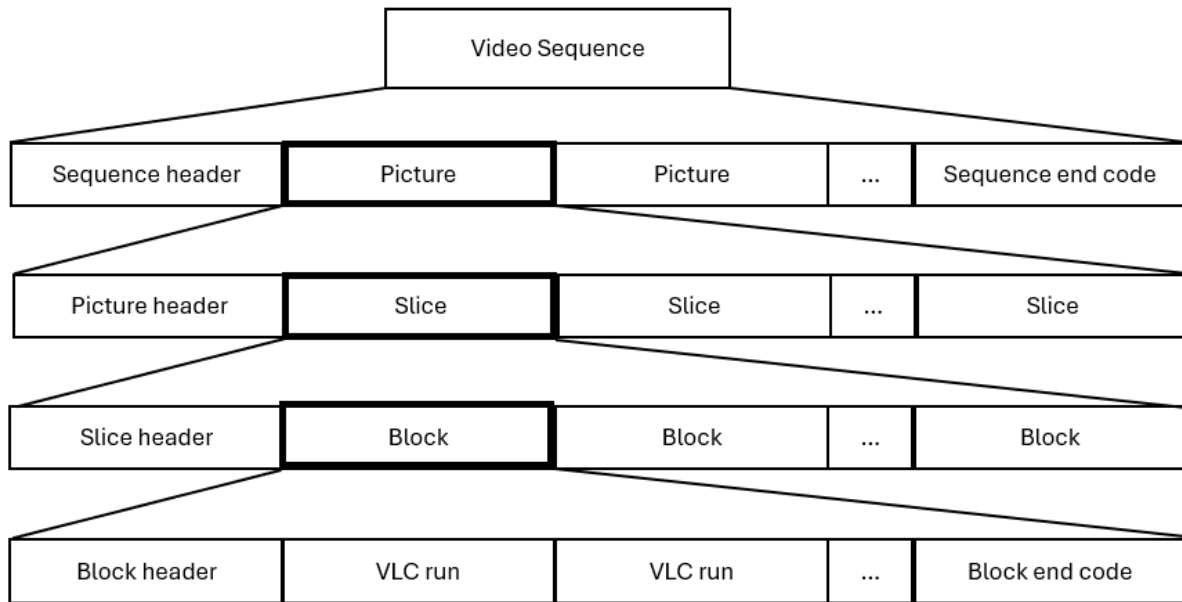
Once the transform coefficients are derived for a block, the transform coefficients are quantized by “dividing each coefficient value by the quantization parameter QP and rounding the result to the nearest integer.” '148 Patent at 4:33-42. This results in quantized coefficient values that, in general, “may be represented by

a smaller number of data bits than required to represent the corresponding coefficient before quantization.” *Id.* A larger QP will result in greater compression at the cost of video quality, while a smaller QP will retain image quality at the cost of compression. Because of this tradeoff, it is important for encoders to vary the quantization parameters used to “adjust the number of bits required to encode a video sequence to take into account e.g. the bandwidth available for transmission of the encoded sequence or the desired quality of the coded video.” ’148 Patent at 4:52-57; Ex-2011 at ¶ 47.

For the quantized coefficients to undergo dequantization on the decoder side, the decoder must “know the exact value of the QP used in the coded video sequence.” ’148 Patent at 10:34-40. Traditionally, the QP value was transmitted once per slice “leading to [an] increase in the number of bits needed to encode the image.” *Id.* As QPs change at the encoder, the decoder must be able to follow the same changes to ensure proper decoding of a video sequence. In prior art systems, QPs were indicated at the picture, slice, or even macroblock layer. ’148 Patent at 10:44-11:17. Video encoders transmit information consistent with the layers of video coding discussed earlier. This means that information can be sent that applies to an entire sequence, picture, slice, or block layer. Each lower layer of syntax relies on the information sent for the higher layer. As an example, the chart below contains a Sequence, Picture, Slice, and Block layer of syntax. The block syntax is nested inside

of the syntax going up each layer and can make use of that syntax during coding.

Ex-2011 at ¶ 38, 48.



Indicating a QP at these lower layers is “very costly in terms of the number of bits required to represent the quantization parameter information, particularly in situations where frames are divided into many slices and/or the available bandwidth available for transmission of the encoded video sequence is low.” ’148 Patent at 10:60-67. The ’148 Patent provides a novel solution to gain the benefits of precise QP signaling, while exploiting redundancy in the QP values within a video sequence.

Ex-2011 at ¶ 48.

B. U.S. Patent No. 8,175,148

U.S. Patent No. 8,175,148 claims priority to U.S. Provisional Application No. 60/374,667, which was filed on April 23, 2002. The '148 Patent describes a new method of signaling QPs in a bitstream, through “introducing a sequence [layer] QP” that pertains to multiple pictures in a sequence. '148 Patent at 11:25-36. This sequence layer QP or “reference sequence QP” allows for an efficient transmission of the level of quantization, while still allowing for precise adjustments to be made to ensure appropriate video quality. This improves upon prior art methods because “instead of coding the absolute values of picture/slice QPs, it is enough to code the difference between the reference sequence QP and the actually used picture/slice QP.” '148 Patent at 11:25-36; Ex-2011 at ¶ 49.

The '148 Patent explains that the level of quantization applied to the transform coefficients is signaled by quantization parameters. '148 Patent at 8:45-49, 9:31-34. The '148 Patent goes on to teach that the quantization level for a sequence involves a “default level of quantization to be used throughout the encoding of the digital video sequence.” '148 Patent at 11:59-62. The video sequence described by the '148 Patent “comprises a number of frames, each frame of the sequence comprising an array of pixels and is divided into a plurality of blocks, each block comprising a certain number of pixels.” '148 Patent at 11:47-50. A video sequence must contain

at least two frames that share a default level of quantization to achieve the efficiency gains claimed by the '148 Patent. Ex-2011 at ¶ 49.

The '148 Patent also teaches that the actual level of quantization to be used in a particular segment can be “represented as a difference with respect to the default level of quantization” such that “an indication of the difference with respect to the default level of quantization is provided in the encoded bit-stream.” '148 Patent 12:55-13:4. Thus, the '148 Patent contemplates that the actual level of quantization for a particular segment of pixels may differ from the default level for the video sequence, but rather than signaling an entirely new level of quantization, an offset can be sent instead. This means that the default level of quantization for the sequence, while being the starting point for every frame in that sequence, can be built upon to efficiently encode the actual levels used throughout each segment in the frames of that sequence. Ex-2011 at ¶ 50.

An encoder may have several reasons to vary the level of quantization within a video sequence. An encoder may need to reduce the accuracy of transform coded information to conserve bandwidth in certain scenarios or prioritize high-accuracy for information more noticeable to the human eye. Encoders achieve this goal by varying the level of quantization used in quantizing the DCT [transform] coefficients. '148 Patent at 6:23-27; Ex-2011 at ¶ 50.

The '148 Patent's approach provides multiple benefits when encoding video. As a first example, when encoding a sequence of pictures, an encoder need only send a single default quantization level for a given sequence. This level is then used by each picture in the sequence as the default. This saves in bitstream overhead by reducing the need to send a level of quantization for each picture in a video sequence. As another example, the default level of quantization can be modified through the "statistically smaller difference value," rather than sending an entire level of quantization for individual pictures, slices, or macroblocks. Ex-2011 at ¶ 51.

C. The Asserted Prior Art

Petitioner relies on two prior art references in the Petition: MPEG-1 and H.263. Both references are prior video coding standards that address quantization levels in a manner consistent with the prior art described in the specification of the '148 Patent. Both references were well known standards at the time of the '148 Patent and well understood by the drafters of "Joint Model Number 1," Doc. JVT-A003, Joint Video Team ("JVT") of ISO/IEC MPEG and ITU-T VCEG, January 2002, which was an early draft of the H.264 Standard cited by and discussed throughout the '148 Patent.

1. MPEG-1 (Ex. 1005)

ISO/IEC 11172-2 (1st ed.) Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s –

Part 2: Video (August 1, 1993) (“MPEG-1”) is a video coding standard published in the early 1990s. For quantization control, MPEG-1 signals a quantizer matrix and a quantizer scale. The quantizer scale serves as a scaling factor for the quantization level and is signaled at the slice or macroblock layer. EX-1005 at 92, 95. The quantizer matrix is signaled on a sequence layer and provides the decoder information as to whether to uniformly apply a quantization level or modify the quantization level for each transform coefficient in a block. The quantization matrix does not provide a level of quantization but rather instructions to modify the level of quantization at a block layer. Ex-2011 at ¶ 54-56.

The quantization matrix and quantization scale are used in tandem to determine the quantizer step size. It is this quantizer step size that performs the same functions as the Quantization Parameter, or quantization level, and this quantizer step size that is used to quantize coefficients, as MPEG-1 explains:

Each array of 8 by 8 coefficients produced by the DCT transform operation is quantized to produce an 8 by 8 array of quantized coefficients. ... *The value of the coefficient is divided by the quantizer step size and rounded to the nearest whole number to produce the quantized coefficient. ... The quantizer step size is derived from the quantization matrix and the quantizer scale.*

Ex-1005 at 104–05 (emphasis added).

MPEG-1's quantizer scale is a scaling factor that allows for slice and macroblock-level control of quantization. This ingredient serves a similar regulating function as the Quantization Parameter, but it is only a factor in determining the level of quantization. Ex-2011 at ¶ 80. For example, MPEG-1 discloses:

One method by which an encoder controls the bit rate is to vary the quantizer scale. This is set in each slice header, and may be set at the beginning of any macroblock, giving the encoder excellent control over the bit rate within a picture.

Ex-1005 at 94.

Likewise, the '148 Patent states the following regarding Quantization Parameters. Ex-2011 at ¶ 81.

[Q]uantization of DCT coefficient values does provide the possibility to adjust the number of bits required to encode a video sequence to take into account e.g. the bandwidth available for transmission of the encoded sequence or the desired quality of the coded video. More specifically, by increasing the value of QP used to quantize the DCT coefficients, a lower quality, but more compact representation of the video sequence can be created. Conversely, by reducing the value of QP, a higher quality but less compressed encoded bit-stream can be formed.

'148 Patent 4:53-62.

The quantizer matrices, on the other hand, do not provide a level of quantization. The quantizer matrices in MPEG-1 provide information on how to apply the quantization scale to the block of transform coefficients. For non-intra quantization, such as the quantization used when quantizing transform coefficients, a flag is sent signaling whether the default quantizer matrix, or a custom quantizer matrix is used. Ex-2011 at ¶ 57-74. Regardless of whether the default or a custom quantizer matrix is used, the matrix does not set a level of quantization, much less provide a default. Rather, the quantization matrix scales individual coefficients within individual blocks. In other words, the matrix controls differences in quantization levels inside a block, not across a sequence. This control occurs at a lower-than-block level; it does not occur at the sequence level.

D.5.1.11 Load non-intra quantizer matrix

This is a one-bit flag. If it is set to 1, sixty-four 8-bit integers follow in zigzag scan order. None of these integers can be zero.

If the flag is set to zero, the non-intra quantization matrix must be reset to the following default value which consists of all 16s.

Ex-1005 at 83.

The default quantizer matrix is a matrix containing the value “16” for every position in the matrix. This is known as a “flat default quantization matrix”, which was adopted from H.261. Ex-1005 at 84; Ex-2011 at ¶ 69. When a flat default quantization matrix is used, the quantization scale is applied equally to each

coefficient in a given block (represented as “niqmatrix” with all values = 16 in the extract from the MPEG-1 Standard presented below):

D.6.4.5 Quantization of P-pictures

Intra macroblocks in P and B-pictures are quantized using the same method as described for I-pictures.

Non-intra macroblocks in P and B-pictures are quantized using the quantizer scale and the non-intra quantization matrix. Both dc and the ac coefficients are quantized the same way.

The following quantization formula was derived by inverting the reconstruction formula given in 2.4.4.2. Note that the divisor indicates truncation towards zero.

```
int coefforig;    /* original coefficient */
int coeffqant;    /* quantized coefficient */
int coeffrec;     /* reconstructed coefficient */
int niqmatrix;    /* non-intra quantization matrix */
int quantscale;   /* quantizer scale */

coeffqant = (8 * coefforig) / (quantscale * niqmatrix);
```

The process is illustrated below:

niqmatrix	16	16	16	16	16
quantscale	10	10	10	10	10
coefforig	-39~20	-19~19	20~39	40~59	60~79
coeffqant	-1	0	1	2	3
coeffrec	-29	0	29	49	69

Ex-1005 at 115.

However, if a non-flat default quantization matrix is used, the niqmatrix will vary depending on the coefficient location. This merely alters the quantization scale when applied to the given coefficient value within a block. In other words, the quantizer matrix provides quantization information at the coefficient level, which is even lower than the slice or block level.

2. H.263 (Ex-1006)

ITU-T Recommendation H.263 (February 1998) (“H.263”) is a video coding standard published in the 1990s. H.263 uses a “hierarchical structure with four primary layers:” (1) Picture; (2) Group of Blocks, or slice, or video picture segment; (3) Macroblock; and (4) Block. Ex-1006 at 13. The highest quantization parameter syntax layer available is at the picture layer. This means that for each picture in a sequence, the picture layer syntax including a quantization parameter is sent.

When INTER coding P-Pictures, H.263 performs motion compensation and calculates prediction error. The prediction error is then transform coded using a discrete cosine transform. EX-1006 at 47-48. Transform coefficients are then quantized using a quantizer for a given picture (“QUANT”). Ex-1006 at 30; Ex-2011 at ¶ 76. The quantizer can be updated throughout the picture by sending a new indication of the level of quantization:

5.1.19 Quantizer Information (PQUANT) (5 bits)

A fixed length codeword of 5 bits which indicates the quantizer QUANT to be used for the picture until updated by any subsequent GQUANT or DQUANT. The codewords are the natural binary representations of the values of QUANT which, being half the step sizes, range from 1 to 31.

Ex-1006 at 30.

It should be noted that, each time the quantizer is updated, a codeword of the natural binary representation of the quantizer value (which, according to the standard always requires 5 bits) must be sent in the bitstream. Ex-2011 at ¶ 76.

The quantizer for a given picture is initially set with picture layer syntax PQQUANT. Any subsequent changes to the quantizer within the picture are sent at either the Group of Blocks layer (“GQUANT”) or the macroblock layer (“DQUANT”). H.263 does not disclose a method of indicating a default level of quantization for use in a video sequence because each quantizer is only applicable to a single given picture. Ex-2011 at ¶ 76.

D. POSITA

Patent Owner has applied Petitioner’s POSITA definition for the sake of this Response. (Pet., 5-6.) This Response does not depend on this skill level. Patent Owner reserves the right to argue in favor of different level of skill should trial be instituted.

E. Claim Construction

For the sake of this Response, Patent Owner does not challenge Petitioner’s proposed means-plus-function constructions. It is the Patent Owner’s present view that Petitioner’s proposed constructions do not affect the validity of the ’148 Patent and Patent Owner reserves the right to challenge Petitioner’s proposed constructions in the future.

III. ARGUMENT

F. Petitioner has not Established a Reasonable Likelihood that the Challenged Claims are Unpatentable in Light of Ground 1.

Petitioner has failed to show that Claims 1, 12, and 23 are obvious in light of MPEG-1 and therefore also failed to show that all claims depending from Claim 1 (Claims 2-11) and Claim 12 (Claims 13-22) are obvious.

1. Claim 1 is not Rendered Obvious in Light of MPEG-1

Petitioner's argument that Claim 1 is rendered obvious by MPEG-1 is premised on a misrepresentation of quantization disclosed by MPEG-1. Petitioner's position is premised on its statement that "[f]or encoding sequences, a quantizer matrix quantizes DCT coefficients." Pet. at 16. However, the portion of MPEG-1 that Petitioner and its expert, Dr. Eli Saber, cite in support of this statement, does not say that the quantizer matrix is used to quantize the DCT coefficients. Petitioner cites to page 83 of MPEG-1. The entirety of page 83 that relates to the non-intra quantizer matrix is reproduced below:

D.5.1.11 Load non-intra quantizer matrix

This is a one-bit flag. If it is set to 1, sixty-four 8-bit integers follow in zigzag scan order. None of these integers can be zero.

If the flag is set to zero, the non-intra quantization matrix must be reset to the following default value which consists of all 16s.

Ex-1005 at 83.

Petitioner does not explain how the quantizer matrix is used to quantize DCT coefficients. As such, Petitioner does not show that the quantizer matrix discloses

the limitation of a “default level of quantization” required by limitation 1[c]. This is because the level of quantization is not specified by the quantizer matrix alone in MPEG-1, but rather in combination with the quantizer scale.

a) In MPEG-1, the Level of Quantization is Determined Based on *Both* the Quantizer Scale and the Quantizer Matrix—Neither Sets a Default

Petitioner confuses the roles of MPEG-1’s quantizer scale and quantizer matrix in an attempt to find a “default level of quantization for use in encoding of the digital video sequence” within MPEG-1. The level of quantization is set at the slice or block level by the quantizer step size, which is a function of the quantizer scale and the quantization matrix. More specifically, the quantizer scale, set at the slice and/or block level, can be further adjusted at the individual transform coefficient level according to the transmitted quantization matrix. It should be understood that, absent either component, the decoder lacks the necessary information to reconstruct the transform coefficients. In other words, without *both* the quantizer scale *and* the quantization matrix, it is impossible for the decoder to determine the level of quantization. Because the quantizer scale is signaled at the slice and/or block layer, the quantization step size is signaled at the same layer. Given that the level of quantization is signaled at the slice and/or block layer, there is no default level for a video sequence in MPEG-1.

Specifically, MPEG-1's quantizer scale does not provide a default level of quantization, as it is signaled at the slice and/or macroblock layer. Pet. at 11; MPEG-1 at 39, 110-111. Petitioner states that the "quantizer_scale multiplies the outcome of inverse quantization ("reconstruction level") applied to a quantized coefficient ("retrieved DCT coefficient level"). Pet. at 11. However, Petitioner ignores that the quantizer_scale and the quantization matrix are applied at the same level of operation during inverse quantization, with the quantizer_scale applied first. This is evident from the MPEG-1 example code that Petitioner cites, reproduced below. Accordingly, the quantizer_scale is applied, as part of the inverse quantization, to reconstruct the transform coefficients before the application of what Petitioner alleges is a level of inverse quantization. Ex-2011 at ¶ 78-79.

```

for ( m=0; m<8; m++ ) {
    for ( n=0; n<8; n++ ) {
        i = scan[m][n];
        dct_recon[m][n] = ( ( (2 * dct_zz[i]) + Sign(dct_zz[i]) ) *
                             quantizer_scale * non_intra_quant[m][n] ) / 16 ;
        if ( (dct_recon[m][n] & 1) == 0 )
            dct_recon[m][n] = dct_recon[m][n] - Sign(dct_recon[m][n]);
        if (dct_recon[m][n] > 2047) dct_recon[m][n] = 2047;
        if (dct_recon[m][n] < -2048) dct_recon[m][n] = -2048;
        if ( dct_zz[i] == 0 )
            dct_recon[m][n] = 0;
    }
}

```

Pet. at 12 (citing MPEG-1 at 53) (further annotated).

In the Amazon Institution Decision, the panel noted that the prior petitioner claimed MPEG-1's decoder multiplies the quantizer_scale by the quantizer matrix

to reconstruct DCT coefficients at the decoder. It then noted that the prior petitioner claimed a POSITA “would have understood ‘defining’ a default level of quantization in an encoder encompasses selecting or determining the level of quantization to be used until the next update.” Ex-2007 at 11 (quoting Ex-2005 at 16). The prior petitioner then claimed that selecting the values of the quantization matrix alone constitutes selecting the level of quantization. *See id.* (“[W]hen an MPEG-1 encoder sets ‘load_non_intra_quantizer_matrix’ to ‘1,’ the values that follow in the sequence header (for the non_intra_quantizer_matrix) are levels of quantization selected or determined by the encoder.”) The current petitioner presents the same argument.

Nokia respectfully disagrees that selecting the quantization matrix alone constitutes determining the default level of quantization. The Board noted that the prior petitioner argued a default level of quantization must be selected or determined “until the next update.” Nokia acknowledges that MPEG-1 selects or determines a level of quantization; however, that level of quantization is not selected by the quantization matrix alone, and is not a “default level of quantization” as required by the ’148 Patent. As the MPEG-1 specification notes, coefficients are quantized by being “divided by the quantizer step size,” which is “derived from the quantization matrix *and* the quantizer scale.” Ex-1005 at 104–05 (emphasis added). Notably, it is the quantizer step size, which is a function of *both* the quantization matrix and quantizer_scale, that signals the level of quantization to be applied. Given that the

quantization matrix alone does not select the quantization level—that is done by the quantizer step size—it is not the case that the quantization matrix selects or determines the level of quantization. Instead, multiplying the quantizer_scale and the quantization matrix is how the quantizer step size—the level of quantization—is determined for individual coefficients within a transform coefficient block. Furthermore, because the quantizer scale is signaled at the slice and/or block layer, the quantizer step size (which is a function of the quantizer scale) is also signaled at the slice and/or block layer. Because the level of quantization—the quantizer step size—is not signaled for a sequence, there is no default level of quantization set for a video sequence.²

Petitioner also ignores the disclosures of MPEG-1 that demonstrate that the quantizer scale is necessary to determine the level of quantization described in the '148 Patent. For example, MPEG-1 describes varying the quantizer scale as “[o]ne method by which an encoder controls the bit rate.” Ex-1005 at 94. Similarly, the '148 Patent describes that “accuracy of prediction error coding can be adjusted

² In the prior institution decision, the Board correctly noted that a “default level of quantization” must be signaled at the sequence level or higher in the video syntax. POPR2024-01176 Paper 9 (Decision Granting Institution) at 19 (“claim 1 requires a sequence-level parameter”).

depending on the available bandwidth” which “is done by varying the Quantizer Parameter (‘QP’) used in quantizing the DCT coefficients.” ’148 Patent at 6:22-27. Petitioner also ignores that MPEG-1 states that the quantizer scale “is used by the decoder to calculate the DCT coefficients from the transmitted quantized coefficients.” Ex-1005 at 92. These characteristics are key in determining the level of quantization; they are absent from the quantization matrix alone. As such, the quantizer scale does not “multipl[y] the outcome of inverse quantization” as Petitioner claims. Pet. at 11. Rather, it is used to *perform* the inverse quantization. Ex-2011 at ¶ 80-82. The quantization matrix, on the other hand, provides a fine adjustment to the inverse quantization at the individual coefficient level (i.e., within blocks). Quantization matrices are set during encoding and thus must be signaled in the bitstream, but they carry coefficient-specific multipliers for quantization levels that are set at the slice or block level.

Again, this is significant, because the quantizer scale in MPEG-1 is not shared across multiple pictures in a video sequence. Rather the quantizer scale is signaled at the slice and/or block layer. The quantizer scale, key to determining the level of quantization, is not a default level for a video sequence in MPEG-1.

b) MPEG-1 Does not Render Obvious Limitation 1[c]

As discussed above, Petitioner incorrectly relies on MPEG-1’s quantization matrix to satisfy this claim limitation. MPEG-1’s quantizer matrix fails to meet this

claim limitation for two reasons. First, MPEG-1's quantizer matrix only signals whether the quantizer scale is uniformly applied to a block. It is the block or slice-specific quantizer scale that signals the general quantization level—the quantization matrix then signals a coefficient-specific multiplication for each coefficient within a block. Second, when in effect, MPEG-1's default quantizer matrix of all 16 values has no effect on the quantization process, as the quantizer scale is uniformly applied (that is, multiplied by one). Ex-2011 at ¶ 83.

As to the first point, when a nonuniform quantizer matrix is used, that matrix merely signals a multiplier to be used on each coefficient—this map of multipliers is used in tandem with the quantizer scale to set the quantization level. The example code found in MPEG-1 demonstrates how the quantizer scale is used during the inverse quantization process. Petitioner's annotated excerpt of the code is reproduced below:

```
for ( m=0; m<8; m++ ) {
    for ( n=0; n<8; n++ ) {
        i = scan[m][n];
        dct_recon[m][n] = ( ( (2 * dct_zz[i]) + Sign(dct_zz[i]) ) *
            quantizer_scale * non_intra_quant[m][n] ) / 16 ;
        if ( (dct_recon[m][n] & 1) == 0 )
            dct_recon[m][n] = dct_recon[m][n] - Sign(dct_recon[m][n]);
        if (dct_recon[m][n] > 2047) dct_recon[m][n] = 2047;
        if (dct_recon[m][n] < -2048) dct_recon[m][n] = -2048;
        if ( dct_zz[i] == 0 )
            dct_recon[m][n] = 0 ;
    }
}
```

Pet. at 12 (citing MPEG-1 at 53).

In the code, the variable `non_intra_quant[m][n]`, which represents the quantizer matrix, is used in the formula for calculating the reconstructed transform coefficient at location `[m][n]` in a block. Notably, the quantizer scale is consistent throughout the inverse quantization process at the block level and is multiplied by the value present in the `[m][n]` location of the quantizer matrix. If a uniform quantizer matrix is signaled—if `load_non_intra_quantizer_matrix` is set to 0—the quantizer scale is equally applied to each location within the block. This is the case when using the default quantizer matrix that consists of the value 16 in every location. When a non-default quantizer matrix is signaled—if `load_non_intra_quantizer_matrix` is set to 1—the quantizer scale is not uniformly applied during the inverse quantization, as a unique value is included for every block. The quantizer matrix is not a level of quantization but rather a map of how to apply the level of quantization, even when the `load_non_intra_quantizer_matrix` is set to 1. Ex-2011 at ¶ 84-85. Regardless of whether the “default” quantization matrix is used, coefficients cannot be reconstructed without both the quantization matrix and the quantizer scale—the quantization matrix alone is not the level of quantization. Because the quantizer scale is signaled at the slice and/or block level, the level of quantization is only known through information signaled at the slice and/or block level. There is no default level of quantization.

Second, as noted above, when `load_non_intra_quantizer_matrix` is set to 0, the “default” setting, the quantizer matrix includes the value “16” for every location. Looking back to Petitioner’s annotated excerpt of the example code, it can be seen that this default matrix provides no meaningful operation in the inverse quantization.

```

for ( m=0; m<8; m++ ) {
    for ( n=0; n<8; n++ ) {
        i = scan[m][n];
        dct_recon[m][n] = ( ( 2 * dct_zz[i] ) + Sign(dct_zz[i]) ) *
                           quantizer_scale * non_intra_quant[m][n] / 16;
        if ( ( dct_recon[m][n] & 1 ) == 0 )
            dct_recon[m][n] = dct_recon[m][n] - Sign(dct_recon[m][n]);
        if (dct_recon[m][n] > 2047) dct_recon[m][n] = 2047;
        if (dct_recon[m][n] < -2048) dct_recon[m][n] = -2048;
        if ( dct_zz[i] == 0 )
            dct_recon[m][n] = 0;
    }
}

```

Pet. at 12 (citing MPEG-1 at 53) (further annotated).

When discussing this code, Petitioner ignores the yellow highlighted portion of the example code. This section shows that the quantizer matrix “`non_intra_quant[m][n]`” is divided by 16—the same value that populates every location of the default quantizer matrix. This means that when the default quantizer matrix is used, it amounts to multiplying the quantization scale by 1. In other words, the default quantizer matrix has no effect on the level of quantization in MPEG-1. Ex-2011 at ¶ 85.

Petitioner’s Ground 1 is premised on misrepresentations of MPEG-1 that attempt to warp quantizer matrices into an appropriate disclosure of the ’148 Patent’s

default level of quantization. However, as discussed above, the quantizer matrices of MPEG-1 are not levels of quantization but rather contribute to the calculation of the level of quantization for individual coefficients in a block. Without the quantizer scale, coefficients cannot be reconstructed; quantization levels cannot be determined without the quantizer scale. MPEG-1 therefore does not disclose the limitation “defining a default level of quantization for use in encoding of the digital video sequence to quantize the sets of transform coefficient values.”

2. MPEG-1 Does not Render Obvious the Remaining Independent Claims

Petitioner’s arguments regarding Claims 12 and 23 fall short for the same reasons as Claim 1. Petitioner offers no additional argument remedying its incorrect reliance on quantizer matrices to fulfill the claim limitations. As such, Petitioner has failed to show that Claims 12 and 23 are rendered obvious in light of MPEG-1. *Ex-2011* at ¶ 90.

3. Petitioner’s Arguments Regarding the Dependent Claims fail

Petitioner’s arguments regarding Claims 2-11 and 13-22 fail because Petitioner failed to show that the independent claims from which these claims depend are obvious. Petitioner failed to show that Claims 1 and 12 are obvious in light of MPEG-1, so Petitioner’s arguments regarding the dependent claims fail as well. *See In re Fine*, 837 F.2d 1071, 1076 (Fed. Cir. 1988) (indicating that

“[d]ependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious.”). Ex-2011, ¶ 79; Ex-2011 at ¶ 89.

G. Petitioner has not Established a Reasonable Likelihood that the Challenged Claims are Unpatentable in Light of Ground 2.

The PTAB already found that the H.263 references failed to disclose several claim elements, including the claimed “sequence-level parameter,” “means for selecting,” and “means for providing.” Ex-2007 at 20 (“Petitioner has not sufficiently explained why *PQUANT* is a sequence-level parameter”); *Id.* at 22 (“Petitioner offers no additional explanation [beyond referencing Nokia’s position in prior litigation] of why H.263’s Picture-layer quantization parameter meets the claimed ‘means for selecting’ and ‘means for providing’”). This petition, which is almost identical to the prior failed petition, does not add anything to show that Claims 1 and 12 are obvious in light of H.263. Petitioner therefore failed to show that all claims depending from Claim 1 (Claims 2-11) and Claim 12 (Claims 13-22) are obvious.

1. Claim 1 is not Rendered Obvious in Light of H.263

Petitioner’s Ground 2 hinges on an incorrect interpretation of Patent Owner’s infringement allegations in a prior litigation regarding Amazon’s H.264-compliant bitstreams. *Nokia Techs. Oy, v. Amazon.com, Inc., Amazon.com Services LLC, and Twitch Interactive, Inc.*, No. 1:23-cv-01236 (D. Del.). Indeed, Petitioner acknowledges that its Ground 2 applies only “[t]o the extent PO argues that a picture-

layer quantization parameter in H.264 meets this limitation.” Pet. at 53. However, Petitioner ignores the significant differences in picture parameter sets in H.264 and picture parameters in H.263. Notably, a single picture parameter set in H.264 can be assigned to multiple pictures in a sequence. H.263, in contrast does not use picture parameter sets and instead has a separate picture header including the quantization parameter for each picture. Ex-1006 at 30. As a result, the quantizer value in the header of an H.263 picture (PQUANT) applies to at most that picture, so even if it were a “default level of quantization” it would be for at most a single picture. The picture parameter sets in H.264, in contrast, apply for the sequence and the H.264 picture header identifies which picture parameter set is to be used for a particular picture in the sequence. Ex-1009 at 5. This distinction, ignored by Petitioner, is crucial to the claim limitations, including “defining a default level of quantization for use in encoding of the digital video *sequence* to quantize the sets of transform coefficient values.” H.263 does not contain a default level of quantization for a video sequence. Ex-2011 at ¶ 92.

a) H.263’s picture parameters affect only a single picture

H.263 signals a picture quantization layer PQUANT, which “indicates the quantizer Quant to be used for the picture.” Ex-1006 at 30. Petitioner admits that “every picture includes PQUANT.” Pet at 54. Additionally, H.263 has no syntax layer higher than the picture layer. Ex-1006 at 13. All of this together shows that

each picture within a “digital video sequence” has its own level of quantization signaled in the bitstream. This is contrary to the claims requiring a “default level of quantization for use in encoding of the digital video sequence.” A picture-by-picture quantization level cannot satisfy the requirement that a default level be used for a sequence. Ex-2011 at ¶ 93.

Petitioner repeatedly premises its Ground 2 arguments on Patent Owners Complaint in a prior litigation regarding Amazon’s H.264-compliant bitstreams. Pet. at 53, 55. However, Petitioner ignores that the picture layer quantization parameter in H.264 (`pic_init_qp_minus26`) is signaled in a picture parameter set. A picture parameter set is “[a] *syntax structure* containing *syntax elements* that apply to zero or more entire *coded pictures* as determined by the `pic_parameter_set_id` *syntax element* found in each *slice header*.” Ex-1009 at 5 (emphasis in original). This means that a given picture parameter set can be used across multiple pictures in a sequence and the `pic_init_qp_minus26` value is set as the default level of quantization for each picture that uses the picture parameter set. This contrasts with H.263, wherein “every picture includes PQUANT.” Pet. at 54. Petitioner’s Ground 2 relies on a conflation of materially different parameters. There is no overlap between (a) Patent Owner noting Petitioner’s H.264-compliant bitstreams include `pic_init_qp_minus26` parameters that apply higher than the picture layer to multiple

pictures and (b) the fact H.263 discloses the picture-specific parameter PQUANT. Ex-2011 at ¶ 94.

2. Claim 12 is not Rendered Obvious in Light of H.263

Petitioner's arguments regarding Claim 12 fall short for the same reasons as Claim 1. Petitioner offers no additional argument remedying its incorrect reliance on H.263's picture layer quantization parameter to fulfill the claim limitations. As such, Petitioner has failed to show that Claim 12 is rendered obvious in light of H.263. Ex-2011 at ¶ 95.

3. Petitioner's Arguments Regarding the Dependent Claims fail

Petitioner's arguments regarding Claims 2-11 and 13-22 fail because Petitioner failed to show that the independent claims from which these claims depend are obvious. Petitioner failed to show that Claims 1 and 12 are obvious in light of H.263, so Petitioner's arguments regarding the dependent claims fail as well. *See In re Fine*, 837 F.2d 1071, 1076 (Fed. Cir. 1988) (indicating that "[d]ependent claims are nonobvious under section 103 if the independent claims from which they depend are nonobvious."). Ex-2011, ¶ 79; Ex-2011 at ¶ 97.

IV. CONCLUSION

For any or all the above-described reasons, PO respectfully requests that the Board deny institution.

Dated: October 7, 2025

Respectfully submitted,

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CERTIFICATION OF WORD COUNT

The undersigned hereby certifies that the portions of the above-captioned **PATENT OWNER'S PRELIMINARY RESPONSE** specified in 37 C.F.R. §42.24 has 6,762 words, in compliance with the 14,000 word limit set forth in 37 C.F.R. §42.24(b)(1). This word count was prepared using Microsoft Word 2010.

Dated: October 7, 2025

Respectfully submitted,

/s/Scott W. Hejny

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CERTIFICATION OF SERVICE

The undersigned hereby certifies that a copy of this **PATENT OWNER'S PRELIMINARY RESPONSE** pursuant to 37 C.F.R. § 42.10(b) has been served on Petitioner via email on the following counsel of record for Petitioner:

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