

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LENOVO (UNITED STATES) INC., DELL INC.,
DELL TECHNOLOGIES, INC., HP INC.,
Petitioner,

v.

UNIVERSAL CONNECTIVITY TECHNOLOGIES, INC.,
Patent Owner.

Case IPR2024-01481
U.S. Patent No. 7,746,798

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311–319 AND 37 C.F.R. § 42.100 *et seq.***

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Exhibit	Description
1001	U.S. Patent No. 7,746,798
1002	File History for U.S. Patent No. 7,746,798
1003	Declaration of Paul S. Min, Ph.D.
1004	U.S. Patent No. 5,686,965 (Auld)
1005	ISO/IEC 13818-1, First edition, 1996-04-15 (MPEG-2, Part 1)
1006	U.S. Patent No. 5,974,464 (Shin)
1007	U.S. Patent No. 5,801,781 (Hiroshima)
1008	Infringement Contention Claim Chart for U.S. Patent No. 7,746,798, <i>Universal Connectivity Technologies Inc. v. Lenovo Group Limited</i> , No. 2:23-cv-00449
1009	USB 3.2 Specification
1010	Declaration of June Ann Munford
1011	U.S. Patent No. 4,308,557 (Dietrich)
1012	S. Dolinar & K. M. Cheung, <i>Frame Synchronization Methods Based on Channel Symbol Measurements</i> , Telecomm. Data Acquisition Rep. (1989).

I. INTRODUCTION

Lenovo (United States) Inc., Dell Technologies, Inc., and HP Inc. (collectively, “Petitioners”) respectfully request the Board institute *inter partes* review of and cancel claims 1–9, 11–26, and 28 (“Challenged Claims”) of U.S. Patent No. 7,746,798 (“’798 patent”).

II. STANDING, MANDATORY NOTICES, AND FEE AUTHORIZATION

Grounds for Standing: Pursuant to 37 C.F.R. § 42.104(a), Petitioners certify that the ’798 patent is eligible for IPR and the Petitioners are not barred or estopped from requesting IPR challenging the patent claims on the grounds identified in this petition.

Real Parties-in-Interest: Petitioners hereby name Lenovo (United States) Inc., Dell Inc., Dell Technologies Inc., and HP Inc. as real parties-in-interest and, solely because it is named as a defendant in a co-pending district court case listed below, further identify Lenovo Group Ltd. (“LGL”) as a real party-in-interest.

Related Matters Under 37 C.F.R. § 42.8(b)(2):

Patent Owner asserted eight patents, including the ’798 patent, against Dell in *Universal Connectivity Technologies Inc. v. Dell Technologies Inc. et al.*, CA 1:23-cv-01506 (W.D. Tex.), against HP in *Universal Connectivity Technologies Inc. v. HP Inc.*, CA 1:23-cv-01177 (W.D. Tex.) (terminated and transferred) and *Universal Connectivity Technologies Inc. v. HP Inc.*, CA 4:24-cv-04097 (N.D. Cal.), and

against Lenovo Group Limited in *Universal Connectivity Technologies Inc. v. Lenovo Group Limited*, Civ. 2:23-00449 (E.D. Tex.).

Petitioners are concurrently filing this Petition and IPR petitions for other asserted patents: IPR2024-01428 (U.S. Patent No. 7,154,905), IPR2024-01429 (U.S. Patent No. 7,187,307), IPR2024-01478 (U.S. Patent No. 8,680,712), IPR2024-01479 (U.S. Patent No. 9,232,265), IPR2024-01480 (U.S. Patent No. 9,852,103), IPR2024-01481 (U.S. Patent No. 7,746,798), IPR2024-01482 (U.S. Patent No. 7,856,520).

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Pursuant to 37 C.F.R. § 42.10(b), Petitioners have filed powers of attorney with the above designation of counsel.

37 C.F.R. §42.8(b)(4) Service Information: Service information is provided in the designation of counsel above. Petitioners consent to service of all documents via electronic mail at the email addresses above and at Lenovo-UCT-IPR@cov.com, DL-DELL-UCT-MWE@mwe.com, and HP-UCT-IPR@shb.com.

Payment of Fees Under 37 C.F.R. §42.103: The Office is authorized to charge the fee set forth in 37 C.F.R. §42.15(a)(1) for this Petition to Deposit Account No. 60-3160. The undersigned further authorizes payment for any additional fees that may be due in connection with this Petition.

III. NOTE

Petitioners cite to exhibits' original page numbers. Emphasis in quoted material has been added. Claim terms are presented in *italics*.

IV. SUMMARY OF THE '798 PATENT

The '798 patent describes a “serial communications architecture for communicating between hosts and data storage devices.” Ex. 1001 ('798 patent), Abstract. “In one embodiment, the serial communications architecture defines multiple primitives to operate as synchronization signals,” which are “typically used by the physical layer to help ensure correct alignment of symbols.” *Id.* at 14:31–35. This generally refers to a process commonly known at the time of the purported invention of the '798 patent as “frame synchronization.” *See* Ex. 1003 (Min) ¶¶ 22–25. The '798 patent teaches the use of “synchronization primitives” to “operate as synchronization signals” in achieving this frame synchronization process. *Id.* at 14:39–41. As the patent explains:

A synchronization signal is typically used by the physical layer to help ensure correct alignment of symbols. A transmitting communications node periodically transmits synchronization primitives so that the receiving communications node can properly align with that synchronization primitive. When a communications node receives a synchronization primitive, it knows that the primitive is correctly aligned on a symbol boundary.

Id. at 14:34–42.

These “synchronization primitives” are, in turn, comprised of “synchronization symbols,” i.e., discrete groupings of bits in the bitstream. *Id.* at 15:22–24, 17:60–64. Table 3 illustrates example synchronization primitives that are

comprised of pairs of 9-bit synchronization symbols:

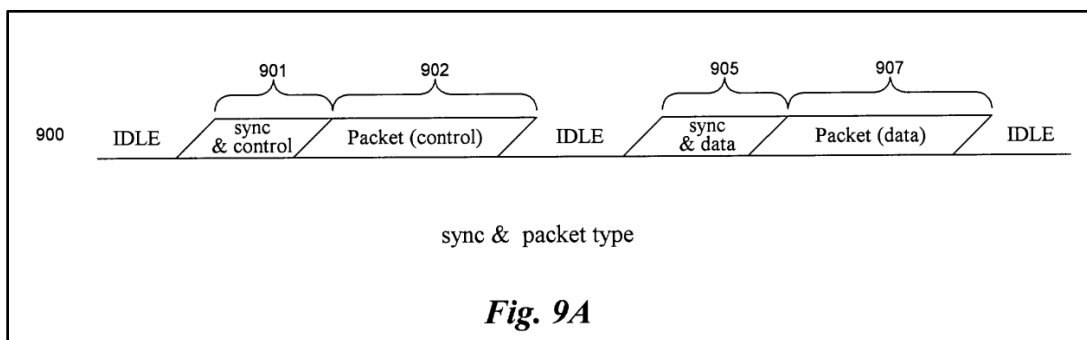
TABLE 3		
	Falling Edge	Rising Edge
0	100000001 - 100111111	011000000 - 011111110
1	100000011 - 100011111	011100000 - 011111100
2	100000111 - 100001111	011110000 - 011111000
3	100001111 - 100000111	011111000 - 011110000
4	100011111 - 100000011	011111100 - 011100000
5	100111111 - 100000001	011111110 - 011000000

Id. at Table 3.

The '798 patent further describes “[t]he use of multiple synchronization primitives” to “allow[] for encoding packet type within a synchronization primitive.”

Id. at 14:41–42. That is, one can encode the “type” of a packet (i.e., packetizations of data created by the transport layer, *id.* at 8:27–29) into different synchronization primitives and thus later identify the packet type using the synchronization primitive.

Id. at 14:43–46, 15:27–20. This is illustrated by an example embodiment in Figure 9A:



Id. at Figure 9A. Figure 9A illustrates two example synchronization primitives 901

and 905 which indicate an associated packet type. Synchronization primitive 901 identifies a packet of type “control,” and synchronization primitive 905 identifies a packet of type “data.” *Id.* at 15:8–10, 15:14–16.

V. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) as of the time of the alleged invention of the ’798 patent would have had a bachelor’s degree in electrical engineering, computer engineering, computer science, or equivalent training, and three years of experience with data communications systems or interfaces, including at least some experience with serial or display data communications systems or interfaces. Additional education can substitute for less work experience, and vice versa.

VI. CLAIM CONSTRUCTION

Petitioner does not believe that any specialized constructions are necessary for purposes of addressing the grounds in this Petition. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“[T]erms need only be construed to the extent necessary to resolve the controversy”).

VII. RELIEF REQUESTED

Petitioner asks that the Board institute a trial for *inter partes* review and cancel the Challenged Claims in view of the analysis below.

A. Challenged Claims

Claims 1–9, 11–26, and 28 are the “Challenged Claims.”

B. Statutory Grounds for Challenges

Ground	Claims	Basis
#1	1, 4, 5, 6, 7, 9, 11, 14, 15, 16, 18, 19, 22–25, and 28	Obvious under 35 U.S.C. § 103 over Auld (US Patent No. 5,686,965) in view of MPEG-2, Part 1.
#2	2, 3, 12, 13, 20, and 21	Obvious under 35 U.S.C. § 103 over Auld in view of MPEG-2, Part 1 and Shin (US Patent No. 5,974,464).
#3	8, 17, and 26	Obvious under 35 U.S.C. § 103 over Auld in view of MPEG-2, Part 1 and Hiroshima (US Patent No. 5,801,781).

U.S. Patent Application No. 10/045,625, which resulted in the '798 patent, was filed on November 7, 2001, and claims priority to U.S. Provisional Application No. 60/252,724, filed November 22, 2000. Ex. 1002 (Prosecution History). The Board does not need to determine whether the '798 patent is entitled to the filing date of this provisional application because Petitioners' prior art pre-dates this date.

Auld (U.S. Patent No. 5,686,965, Ex. 1004) was filed on September 8, 1995, and issued on November 11, 1997, and is thus prior art under at least pre-AIA 35 U.S.C. §§ 102(a), (b), and (e).

MPEG-2, Part 1 (ISO/IEC 13818-1, first edition 1996-04-15, Ex. 1005) is a standard specification that was published in April 1996 and qualifies as prior art under at least pre-AIA 35 U.S.C. §§ 102(a) and (b). As demonstrated in the accompanying declaration of librarian June Munford, this document was published

by the International Standards Organization (ISO) in April 1996 and accessible to interested members of the public before the critical date, as confirmed by the ISO website and other web pages as catalogued by the Internet Archive (Wayback Machine). Ex. 1010 (Munford declaration).

Shin (U.S. Patent No. 5,974,464, Ex. 1006) was filed on September 30, 1996, and issued on October 26, 1999, and is thus prior art under at least pre-AIA 35 U.S.C. §§ 102(a), (b), and (e).

Hiroshima (U.S. Patent No. 5,801,781, Ex. 1007) was filed on June 19, 1996, and issued on September 1, 1998, and is thus prior art under at least pre-AIA 35 U.S.C. §§ 102(a), (b), and (e).

None of these references were before the Office during prosecution. Additionally, the supporting declaration of Paul Min (Ex. 1003) was not before the Office. Therefore, the prior art and arguments in this Petition are not the same (or substantially the same) as those previously presented to the Office under 35 U.S.C. § 325(d).

VIII. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

A. Ground 1: Claims 1, 4, 5, 6, 7, 9, 11, 14, 15, 16, 18, 19, 22–25, and 28 are obvious under 35 U.S.C. § 103 over Auld in view of MPEG-2, Part 1.

1. Summary of Auld (U.S. Patent No. 5,686,965)

Auld teaches “[a] novel synchronization scheme for use in connection with

[a] digital signal video decoder.” Ex. 1004 (Auld) at [Abstract]. Similar to the ’798 patent, Auld discloses a “synchronization scheme” that uses specific bit patterns to ensure synchronization and alignment of bitstream. *See id.* at 7:26–29. In Auld, this synchronization procedure is described as part of the process for decoding a bitstream—a video program which has been “converted into digital format, compressed and encoded in accordance with an established compression algorithm or methodology”—containing audio and video data. *Id.* at 1:38–43.

Auld teaches that “[s]ynchronization generally involves finding a unique pattern of bits, often termed sync codes or start codes, in the multiplexed system bitstream, and aligning the bitstream data following the sync code.” *Id.* at 6:24–28. In Auld’s synchronization scheme, “the packet sync code, stream ID, and packet length information ... are used to identify the type of packet being analyzed.” *Id.* at 39–42.¹

As Auld explains, “[t]he various groupings of bits making up the bitstream are often referred to as variable length symbols. These variable length symbols typically represent specific signal information in accordance with the syntax of the encoding

¹ As explained further below, the “sync codes” or “start codes” in Auld are analogous to the *synchronization primitives* discussed in the ’798 patent. *See generally* ’798 patent at 14:32–17:64 (describing synchronization primitives).

and decoding algorithm employed, such as the MPEG standard.” *Id.* at 6:28–33. In an embodiment of the invention, Auld discloses that “the multiplexed system bitstream” that is being decoded may be “of a type conforming to the MPEG standard,” specifically, the MPEG “system stream” standard, *id.* at 10:9–20, which is set forth in MPEG-2, Part 1. As Auld explains, the MPEG bitstream typically comprises a “sequence of one or more packets,” where the packets “may carry either audio or video data.” Auld at 10:29–33. “It should be noted that each packet ... may contain one or more synchronization codes, referred to in the art as sync code, which are necessary to properly synchronize and align the encoded bitstream.” *Id.* at 10:42–45.

2. Summary of MPEG-2, Part 1

MPEG-2, Part 1 is a standard specification promulgated by the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC). Ex. 1005 (MPEG-2, Part 1) at vii. It “addresses the combining of one or more elementary streams of video and audio, as well as other data, into single or multiple streams which are suitable for storage or transmission.” *Id.* at viii.

MPEG-2, Part 1 describes a “Program Stream” which “can be decoded with synchronization.” *Id.* at ix. The standard further includes a specification of the “Program Stream,” including its syntax and semantics. *Id.* at Section 2.5.3. Video and audio data compressed according to the specification of the “Program Stream”

“are packetized to produce PES [packetized elementary stream] packets.” *Id.* at viii.

The structure of these PES packets is set out in Table 2-17 of MPEG-2, Part 1:

Table 2-17 – PES packet		
Syntax	No. of bits	Mnemonic
<pre>PES_packet() { packet_start_code_prefix stream_id PES_packet_length if (stream_id != program_stream_map && stream_id != padding_stream && stream_id != private_stream_2 && stream_id != ECM && stream_id != EMM && stream_id != program_stream_directory && stream_id != DSMCC_stream && stream_id != ITU-T Rec. H.222.1 type E stream) {</pre>	<pre>24 8 16</pre>	<pre>bslbf uimbsf uimbsf</pre>

Id. at Table 2-17 (excerpted). In the PES packet, a series of bits which comprise a “packet_start_code_prefix” are transmitted first, followed by a series of bits which comprise a “stream_id.” *Id.* “The stream_id specifies the type and number of the elementary stream” packet (i.e., the packet type)—e.g., audio or video bitstream packet. *Id.* at 29.

Collectively, the “packet_start_code_prefix” and “stream_id” are referred to as the “start code.” *See id.* at 4 (“Start codes consist of a 24-bit prefix (0x000001) and an 8-bit stream_id.”).

The possible values for the “stream_id” are presented in Table 2-18 of MPEG-2, Part 1:

stream_id	Note	Stream coding
1011 1100	1	program_stream_map
1011 1101	2	private_stream_1
1011 1110		padding_stream
1011 1111	3	private_stream_2
110x xxxx		ISO/IEC 13818-3 or ISO/IEC 11172-3 audio stream number x xxxx
1110 xxxx		ITU-T Rec. H.262 ISO/IEC 13818-2 or ISO/IEC 11172-2 video stream number xxxx
1111 0000	3	ECM_stream
1111 0001	3	EMM_stream
1111 0010	5	ITU-T Rec. H.222.0 ISO/IEC 13818-1 Annex B or ISO/IEC 13818-6 DSMCC_stream
1111 0011	2	ISO/IEC 13522_stream
1111 0100	6	ITU-T Rec. H.222.1 type A
1111 0101	6	ITU-T Rec. H.222.1 type B
1111 0110	6	ITU-T Rec. H.222.1 type C
1111 0111	6	ITU-T Rec. H.222.1 type D
1111 1000	6	ITU-T Rec. H.222.1 type E
1111 1001	7	ancillary_stream
1111 1010 ... 1111 1110		Reserved data stream
1111 1111	4	program_stream_directory

Id. at Table 2-18 (excerpted). PES packets with a stream_id corresponding to the “110x xxxx” format convey audio data, and PES packets with a stream_id corresponding to the “1110 xxxx” format thus convey video data. *Id.*

3. Motivation to Combine Auld and MPEG-2, Part 1

Auld on its face teaches its mutual operability with MPEG-2, Part 1, disclosing that its synchronization scheme may be used where the “multiplexed system bitstream is of a type conforming to the MPEG standard,” and specifically referencing the MPEG “ISO (International Standards Organization) system stream.” Auld at 10:9–20; *see also id.* at 6:29–33, 10:9–45, Figure 5, claims 1, 15. MPEG-2, Part 1 is the ISO standard for MPEG bitstreams, as a person of ordinary skill would readily appreciate. Min ¶ 32.

Thus, Auld supplies an express teaching, suggestion, or motivation to use its synchronization scheme with the MPEG bitstreams set forth in MPEG-2, Part 1—including the MPEG “start code” (which includes the “stream-id” symbol that identifies the packet type), to serve as Auld’s “sync code or start code,” Auld at 6:24–28. Indeed, Auld specifically illustrates in Figure 5 the structure of this MPEG bitstream and its data packets, noting that “each packet ... may contain one or more synchronization codes, referred to in the art as a sync code,” Auld at 41–45, and then teaching the use of that code for Auld’s synchronization process,” *id.* at 10:46–11:6. At a minimum, combining the teachings of Auld and MPEG-2, Part 1 in such a manner would constitute combining prior art elements according to known methods to yield predictable results, and with a reasonable expectation of success.

4. Claim 11²

[11(pre)] A method for identifying packet types of packets of symbols, the method comprising:

To the extent the preamble is limiting, Auld discloses this element. Min ¶¶ 33–36. Specifically, Auld discloses a “method for synchronizing a video decoder,” Auld at 1:12–14, in which *packet types of packets of symbols are identifi[ed]*.

² Petitioners begin their analysis with independent claim 11 (and corresponding dependent claims). Independent claim 1 (and corresponding dependent claims) are addressed subsequently.

As Auld explains, “[t]ypically, the video and audio signals comprising a video program are converted into a digital format, compressed and encoded in accordance with an established compression algorithm or methodology.” *Id.* at 1:35–38. This compressed format, which Auld also refers to as a “bitstream,” includes both audio and video data. *Id.* at 1:38–43. “The various groupings of bits making up the bitstream are often referred to as variable length symbols.” *Id.* at 6:28–29. “A decoder is then typically employed to decompress and decode the received system signal in accordance with the same compression algorithm or methodology previously mentioned.” *Id.* at 1:43–46.

Auld discloses an approach for decompressing and decoding such a bitstream that was compressed and encoded, for example, “conforming to the MPEG standard.” *Id.* at 8:61–64, 10:9–11. Specifically, Auld describes an example wherein the bitstream conforms to the MPEG “system stream” standard. *Id.* at 10:16–20.³ In

³ The MPEG “system stream” standard, known as “MPEG-2, Part 1,” refers to ISO/IEC standard 13818-1, promulgated by both the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). MPEG-2, Part 1 at vii. MPEG-2, Part 1—first published in 1996—is a widely known standard still in use today, with the latest version published in 2023. *See Min* ¶ 28; (continued...)

an MPEG bitstream, data is transmitted in a series of packets, *id.* at 10:20–24, which “typically contain[] either encoded audio or encoded video stream data,” *id.* at 10:29–31. Auld teaches “identify[ing] the type of packet analyzed”—i.e., audio or video—through information provided at the packet layer. *Id.* at 11:39–42 (“Essentially, the packet sync code, Stream ID, and packet length information at the packet layer are used to identify the type of packet being analyzed....”).

[11(a)] receiving a synchronization symbol⁴ by a receiver indicating a packet type, each packet type having a different synchronization symbol;

Auld in view of MPEG-2, Part 1 discloses and/or renders obvious this

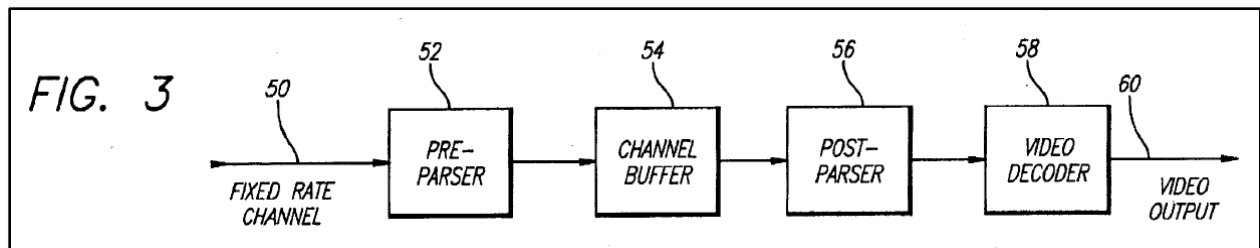
Ex. 1010 (Declaration of June Ann Munford) (demonstrating public availability of MPEG-2, Part 1).

⁴ Patent Owner argues in its infringement allegations that the “[p]hysical layer of the transmitting USB-C device transmits the HPSTART, DPPSTART, or LCSTART framing symbol set that corresponds to the identified packet type.” Ex. 1008 (Infringement Chart), 54. As such, according to Patent Owner, the alleged synchronization symbol is included within the packet. For example, the DPPSTART is a “[f]rame ordered set used to denote the start of a data packet payload.” Ex. 1009 (USB 3.2 Specification), Section 2, p.7. Petitioners adopt, for purposes of this proceeding only, Patent Owner’s position that this limitation allows for the synchronization symbol to be within the packet.

element. Min ¶¶ 37–45. First, Auld discloses *receiving* a synchronization code *by a receiver*. Second, Auld in connection with MPEG-2, Part 1 teach that this synchronization code comprises a *synchronization symbol ... indicating a packet type, each packet type having a different synchronization symbol*.

- a) Auld discloses *receiving* a synchronization code *by a receiver*.

Auld’s method utilizes a *receiver*, illustrated in Figure 3 below, which receives an “initial multiplexed bitstream” and provides “video output.” *Id.* at 8:61–64.



Auld’s receiver includes a pre-parser 52, and “[w]ithin the pre-parser 52, a system stream synchronizer 62, coupled to input channel 50, synchronizes to the multiplexed system bitstream.” *Id.* at 9:29–32. In particular, Auld’s synchronizer 62 “searches for a sync code, or start code,” in the bitstream. *Id.* at 10:49–50. “When the sync code is located, ... the bitstream is considered synchronized.” *Id.* at 10:67–11:01.

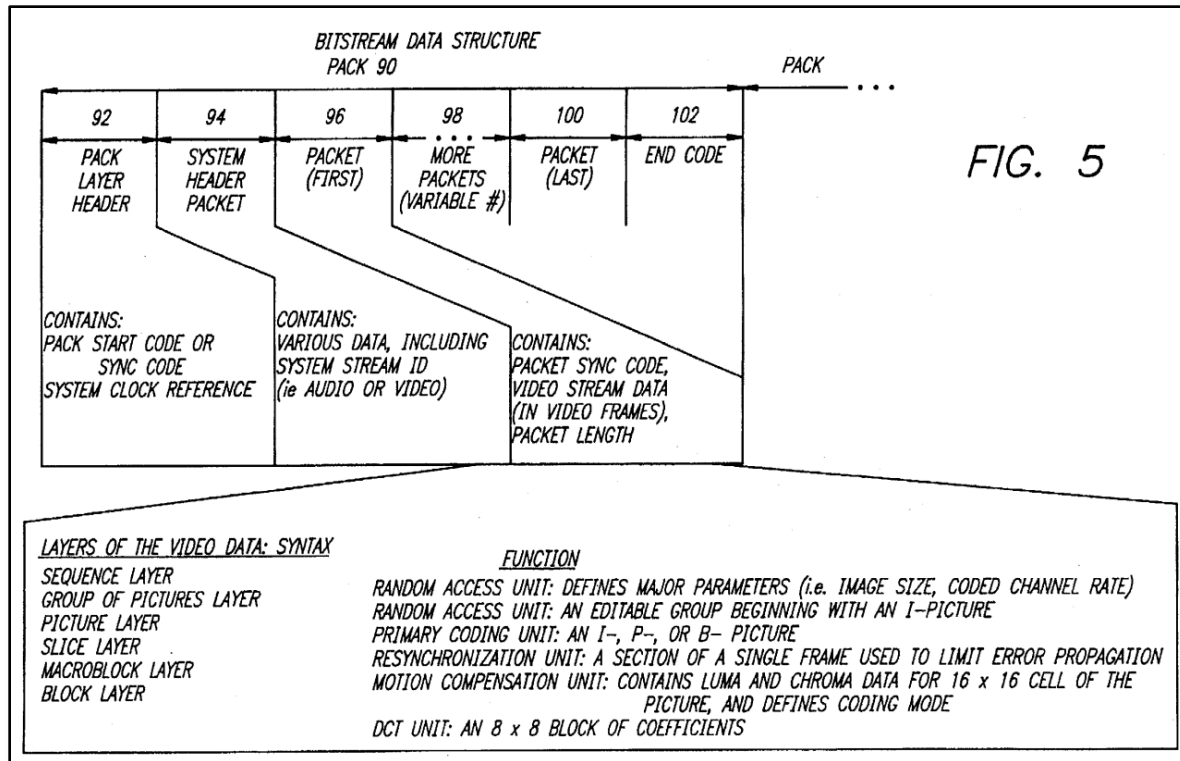
As Auld explains, “[s]ynchronization involves the alignment of data within a packet relative to the position of a sync word within the bitstream.” *Id.* at 11:12–14. Synchronization is necessary to properly interpret the bitstream. Information in such

a bitstream is represented using “groupings of bits ... often referred to as variable length symbols.” Accordingly, it is necessary to “establish the alignment of the symbols” before the symbols can be translated. *Id.* at 6:39–42. This synchronization process “involves finding a unique pattern of bits, often termed sync codes or start codes, in the multiplexed system bitstream, and aligning the bitstream data following the sync code.” Auld at 6:24–28.

- b) Auld in connection with MPEG-2, Part 1 teach that Auld’s synchronization code comprises a *synchronization symbol*.

The “sync codes” in Auld consist of sequences of symbols that are used for synchronization, and therefore qualify as *synchronization symbols*.

As discussed for element [11(pre)] above, Auld teaches that its approach may be used for decoding a bitstream conforming to the MPEG “system stream” standard of MPEG-2, Part 1. *See, e.g.*, Auld at 10:16–20. Auld illustrates the logical structure of such a bitstream (including the sync codes) in Figure 5:



Ex. 1004 (Auld), Figure 5. Specifically, the bitstream of Auld comprises “a sequence of packets 96, 98, and 100,” where the packets “may carry either audio or video data.” *Id.*, 10:21–33. Each packet contains a “sync code,” *id.*, 10:42–45, as illustrated in Figure 5 for packet 96.

The MPEG-2, Part 1 standard provides further detail regarding the content of the “sync codes” that may be used in Auld, which Auld also refers to as “start codes.” *See id.*, at 6:29–33. The MPEG-2, Part 1 standard explains, “[t]he packet layer of the [MPEG] Program Stream is defined by the PES packet layer.” Ex. 1005 (MPEG-2, Part 1), 55. A PES packet begins with a “start code” consisting of two symbols: a “packet_start_code_prefix” and a “stream_id.” *Id.*, 4 (“Start codes consist of a 24-

bit prefix (0x000001) and an 8-bit stream_id.”). These are illustrated in Table 2-17:

Table 2-17 – PES packet

Syntax	No. of bits	Mnemonic
PES_packet() { packet_start_code_prefix stream_id PES_packet_length if (stream_id != program_stream_map && stream_id != padding_stream && stream_id != private_stream_2 && stream_id != ECM && stream_id != EMM && stream_id != program_stream_directory && stream_id != DSMCC_stream && stream_id != TU-T P H.222 Lane E stream) {	24 8 16	bslbf uimbsf uimbsf

Id., Table 2-17. A person of ordinary skill would understand that Auld’s sync codes are the “start codes” discussed in the MPEG specification, as Auld uses the terms “sync code” and “start code” interchangeably. *See, e.g.*, Auld at 6:24–26 (“Synchronization generally involves finding a unique pattern of bits, often termed sync codes or start codes....”), 10:49–50 (“[T]he system synchronizer 62 searches for a sync code, or start code, comprising the packet layer 96....”).

Thus, a person of ordinary skill would understand MPEG 2, Part 1 to teach that these “packet_start_code_prefix” and “stream_id” symbols may be used to collectively form Auld’s “sync code.” These symbols qualify as *synchronization symbols* under the ’798 patent, as they are symbols used to form the sync code that Auld uses to “synchronize and align the encoded bitstream.” Auld at 10:42–45. *See generally* ’798 patent at 17:2–64 (identifying “synchronization symbols” used to form “synchronization primitives”), 14:33–35 (explaining that these

synchronization primitives “operate[s] as synchronization signals ... to help ensure correct alignment of symbols”).⁵

Further, the “stream_id” synchronization symbol constitutes a *synchronization symbol ... indicating a packet type*—e.g., a symbol indicating whether the associated packet is a type for audio or video data. As explained by the MPEG-2, Part 1 standard, “the stream_id specifies the type and number of the elementary stream.” *Id.*, 29. At least two different stream_id values are provided for video and audio packets, as shown in Table 2-18 of the MPEG-2, Part 1 standard:

⁵ As discussed in more detail below for element [11(d)], Auld’s “sync codes” qualify as *synchronization primitives* under the ’798 patent. The ’798 patent identifies exemplary synchronization primitives consisting of pairs of 9-bit synchronization symbols. ’798 patent at 16:52–17:64. Auld’s sync codes similarly consist of a sequence of synchronization symbols (i.e., the “packet_start_code_prefix” and “stream_id.”).

Table 2-18 – Stream_id assignments

stream_id	Note	stream coding
1011 1100	1	program_stream_map
1011 1101	2	private_stream_1
1011 1110		padding_stream
1011 1111	3	private_stream_2
110x xxxx		ISO/IEC 13818-3 or ISO/IEC 11172-3 or ISO/IEC 13818-7 or ISO/IEC 14496-3 audio stream number x xxxx
1110 xxxx		ITU-T Rec. H.262 ISO/IEC 13818-2 or ISO/IEC 11172-2 or ISO/IEC 14496-2 video stream number xxxx
1111 0000	3	ECM_stream
1111 0001	3	EMM_stream
1111 0010	5	ITU-T Rec. H.222.0 ISO/IEC 13818-1 Annex A or ISO/IEC 13818-6 DSMCC_stream
1111 0011	2	ISO/IEC_13522_stream
1111 0100	6	ITU-T Rec. H.222.1 type A
1111 0101	6	ITU-T Rec. H.222.1 type B
1111 0110	6	ITU-T Rec. H.222.1 type C
1111 0111	6	ITU-T Rec. H.222.1 type D
1111 1000	6	ITU-T Rec. H.222.1 type E
1111 1001	7	ancillary_stream
1111 1010		ISO/IEC14496-1_SL-packetized_stream
1111 1011		ISO/IEC14496-1_FlexMux_stream
1111 1100 ... 1111 1110		reserved data stream
1111 1111	4	program_stream_directory

Id., Table 2-18. For example, a stream_id of “110x xxxx” corresponds to an “audio stream,” and a stream_id of “1110 xxxx” corresponds to a “video stream.” Thus, the stream_id synchronization symbol *indicat[es] a packet type* (e.g., whether the associated packet contains audio or video data), with *each packet type having a different synchronization symbol*.

[11(b)] receiving a packet of symbols;

Auld discloses and/or renders obvious this element. Min ¶ 46. As explained above for claim element [11(pre)], Auld discloses receiving a bitstream comprised of groupings of bits referred to as *symbols*. *See* claim [11(pre)]. As further explained above with respect to claim element [11(pre)], Auld describes receiving data from

an MPEG bitstream, which comprises “a sequence of packets,” carrying audio or video data. Auld at 10:21–33, Fig. 5 (illustrating packets in MPEG bitstream). Thus, Auld discloses *receiving a packet of symbols*.

[11(c)] indicating that the received packet of symbols has the packet type of the received synchronization symbol; and

Auld in view of MPEG-2, Part 1 renders obvious this element. Min ¶¶ 47–48. As explained above for claim element [11(a)], Auld discloses receiving a synchronization symbol (stream_id) indicating the packet type of the associated packet—e.g., whether the packet contains audio or video data. That is, the synchronization symbol specifies *that the received packet of symbols has the packet type of the received synchronization symbol*.

Further, Auld discloses *indicating* that the packet has the packet type of the synchronization symbol. The synchronization symbol (stream_id) is used by a system stream pre-parser 63, which “separates the video signal component, commonly referred to as a video bitstream, from the multiplexed system bitstream.” Auld at 9:32–35, Fig. 4. “Any non-video information components, such as the audio portion of the system bitstream, are discarded by the system stream pre-parser.” *Id.* at 11:37–39. To accomplish this, Auld teaches that “the packet sync code, stream ID, and packet length information at the packet layer are used to identify the type of packet being analyzed, and to skip any non-video packets.” *Id.* at 11:39–42. Accordingly, a person of ordinary skill would understand that the synchronization

symbol (stream_id) is used to *indicat[e]*, for the associated packet, *that the received packet of symbols has the packet type of the received synchronization symbol.*

[11(d)] the synchronization symbol permitting proper alignment upon receiving with a synchronization primitive to be correctly aligned on a symbol boundary.

Auld in view of MPEG-2, Part 1 renders obvious this element. Min ¶¶ 49–53.

As explained above, Auld discloses that “[s]ynchronization generally involves finding a unique pattern of bits, often termed sync codes or start codes, in the multiplexed system bitstream, and aligning the bitstream data following the sync code.” Auld at 6:24–28. “[E]ach packet or layer may contain one or more” of these sync codes. *Id.* at 10:42–45. That is, a synchronizer “must establish the alignment of the symbols” before the symbols can be translated. *Id.* at 6:39–42.

In other words, Auld discloses that synchronization involves using a *synchronization symbol* to permit *properly aligning ... on a symbol boundary* so that the symbols may be properly parsed from the bitstream and interpreted. As Auld further explains:

Synchronization involves the alignment of data within a packet relative to the position of a sync word within the bitstream. . . . Alignment involves the recognition of word or byte boundaries within a system bitstream in accordance with the syntax of the selected compression algorithm. The location of sync words distributed within the system bitstream delineates the boundaries between informational word groupings within the packet. These word groupings conform to the particular grammar and syntax rules dictated by the compression

algorithm employed for data encoding. Once aligned, the organization of the data structure comprising a particular informational word grouping following a sync code is thus of an established format.

Auld at 11:12–26.

The synchronization process in Auld further constitutes alignment *with a synchronization primitive to be correctly aligned on a symbol boundary*. As explained for element [11(a)] above, Auld relies on “sync codes” to “synchronize and align the encoded bitstream.” Auld at 10:42–45. These sync codes which are (made up of the “packet_start_code_prefix” and “stream_id” symbols) qualify as *synchronization primitives* under the ’798 patent.

In the ’798 patent, synchronization primitives are sequences of symbols that “operate as synchronization signals ... to help ensure correct alignment of symbols.” ’798 patent at 14:33–35. These primitives are transmitted periodically “so that the receiving communications node can properly align with that synchronization primitive.” *Id.* at 14:35–39. For example, the ’798 patent describes “primitives” comprising pairs of synchronization symbols, “where a symbol is assumed to have nine bits.” *Id.* at 15:23–25. Table 3 illustrates examples of synchronization primitives comprising pairs of nine-bit synchronization symbols:

TABLE 3		
	Falling Edge	Rising Edge
0	100000001 - 100111111	011000000 - 011111110
1	100000011 - 100011111	011100000 - 011111100
2	100000111 - 100001111	011110000 - 011111000
3	100001111 - 100000111	011111000 - 011110000
4	100011111 - 100000011	011111100 - 011100000
5	100111111 - 100000001	011111110 - 011000000

'798 patent at Table 3; *see also id.* at 17:60–64 (referring to “100000001” and “100111111” as “synchronization symbol[s]”). The “sync codes” in Auld similarly consist of sequences of symbols (the “packet_start_code_prefix” and “stream_id” symbols) that operate as synchronization signals, and therefore constitute *synchronization primitives*.

As the MPEG-2, Part 1 standard explains, “decoders must include a means to look for start codes . . . in order to begin decoding correctly, and to identify errors, erasures or insertions while decoding.” MPEG-2, Part 1 at 8. Thus, Auld’s disclosure of alignment using a sync code (*synchronization primitive*) comprising the stream ID (*synchronization symbol*) constitutes a teaching of *the synchronization symbol permitting properly alignment upon receiving with a synchronization primitive to be correctly aligned on a symbol boundary*.

5. Claim 14

[14] The method of claim 11 wherein the synchronization symbol is received before the symbols of the packet⁶ are received.

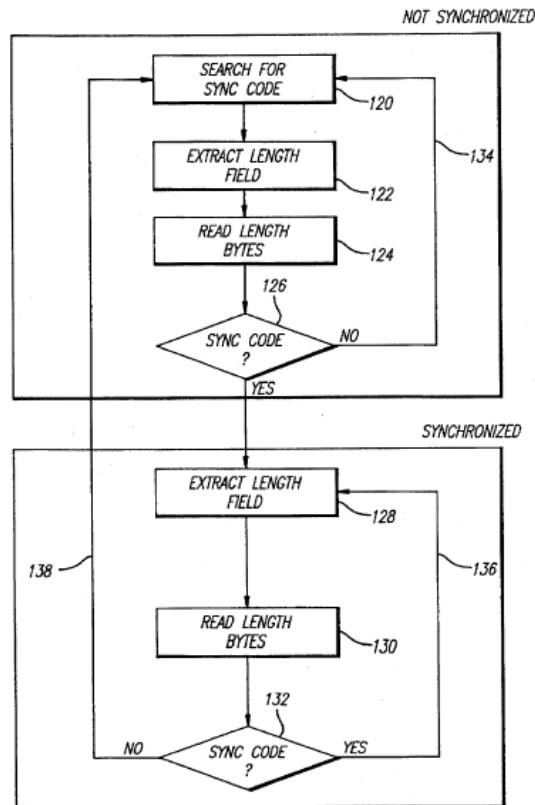
Auld in view of MPEG-2, Part 1 discloses this claim and/or renders it obvious.

Min ¶¶ 54–57.

Auld discloses that “[s]ynchronization generally involves finding a unique pattern of bits, often termed sync codes or start codes, in the multiplexed system bitstream, and aligning the bitstream data following the sync code.” Auld at 6:24–28. Auld also discloses this process in detail in Fig. 6 (shown below), where a synchronization system first checks for a sync code and subsequently reads a packet. Auld at 10:46–65.

⁶ Patent Owner argues in its infringement allegations that “transmit[ting] the HPSTART, DPPSTART, or LCSTART framing symbol set” before the packet payload meets this limitation. Ex. 1008, 9–10. HPSTART, DPSTART, and LCSTART are included in the packet header received prior to the packet payload. Ex. 1009 (USB 3.2 Specification), 115, 487. As such, according to Patent Owner, the “symbols of the packet” are the symbols of the packet payload. Petitioners adopt, for purposes of this proceeding only, Patent Owner’s position that “the symbols of the packet” corresponds to the packet payload.

FIG. 6



Therefore, a POSITA would have understood that the sync code—which comprises the stream_id that constitutes the *synchronization symbol*, as explained for claim 11—is transmitted first, and is used to align a subsequent bitstream, which includes the *symbols of the packet*. Min ¶¶ 54–57.

Additionally, MPEG-2, Part 1 teaches that the *synchronization symbol* is transmitted before the *symbols of the packet*, as part of the packet “start code” which comprises the *synchronization symbol* (“stream_id”). See MPEG-, Part 1, 4 (“Start codes consist of a 24-bit prefix (0x000001) and an 8-bit stream_id.”). As shown in Table 2-17, the packet_start_code_prefix and stream_id appear at the beginning of

the packet, before transmitting the packet's data (e.g., the “payload”).

Table 2-17 – PES packet		
Syntax	No. of bits	Mnemonic
<pre> PES_packet() { packet_start_code_prefix stream_id PES_packet_length if (stream_id != program_stream_map && stream_id != padding_stream && stream_id != private_stream_2 && stream_id != ECM && stream_id != EMM && stream_id != program_stream_directory && stream_id != DSMCC_stream && stream_id != ITU-T Rec. H.222.1 type E stream) { </pre>	24 8 16	bslbf uimsbf uimsbf

Id. at Table 2-17 (excerpted). Similarly, Figure F.0.2 shows that the `stream_id` (*synchronization symbol*) is transmitted before the packet data bytes (i.e., the *symbols of the packet*).

F.0.2 PES packet

See Figure F.2.

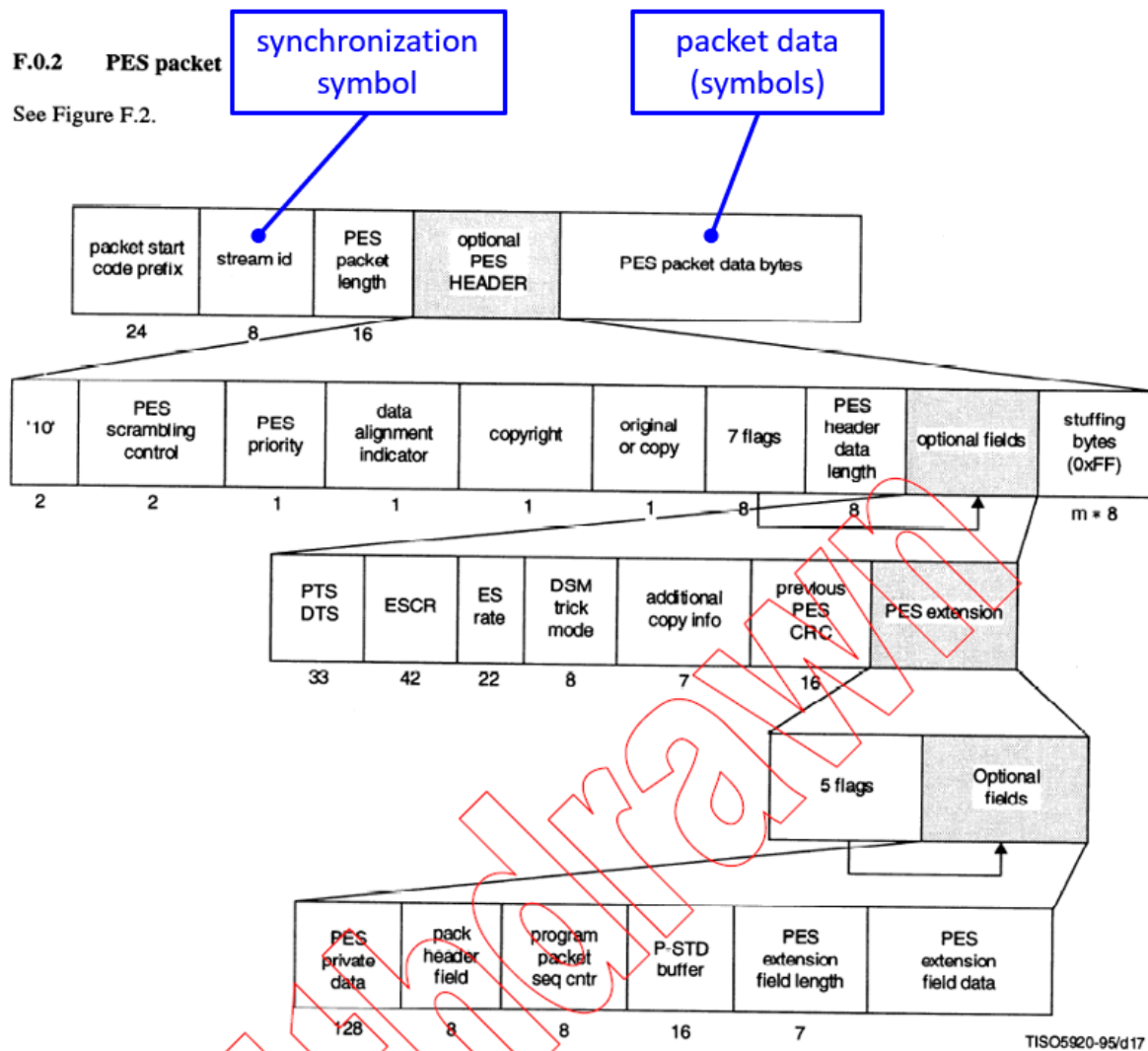


Figure F.2 – PES packet syntax diagram

Id. at Figure F.0.2 (annotated).

6. Claim 15

[15] The method of claim 11 wherein the packet types include a data packet.

Auld in view of MPEG-2, Part 1 discloses this claim and/or renders it obvious.

Min ¶¶ 58–59.

Auld’s bitstream includes video data packets (“data packet”). Auld at 5:23–

26, 10:20–24.

7. Claim 16

[16] The method of claim 11 wherein the packet types include a control packet.

Auld in view of MPEG-2, Part 1 discloses this claim and/or renders it obvious.

Min ¶¶ 60–62.

As explained above with respect to claim element [11(a)], Auld discloses a decoding scheme involving synchronization and alignment of bitstream data that was encoding and compressed according to the MPEG-2, Part 1 standard. As further described above with respect to claim element [11(a)], the “stream_id” field identifies potential packet types that may correspond to each packet, including “audio stream” and “video stream” data:

stream_id	Note	Stream coding
1011 1100	1	program_stream_map
1011 1101	2	private_stream_1
1011 1110		padding_stream
1011 1111	3	private_stream_2
110x xxxx		ISO/IEC 13818-3 or ISO/IEC 11172-3 audio stream number xxxx
1110 xxxx		ITU-T Rec. H.262 ISO/IEC 13818-2 or ISO/IEC 11172-2 video stream number xxxx
1111 0000	3	ECM_stream
1111 0001	3	EMM_stream
1111 0010	5	ITU-T Rec. H.222.0 ISO/IEC 13818-1 Annex B or ISO/IEC 13818-6_DSMCC_stream
1111 0011	2	ISO/IEC_13522_stream
1111 0100	6	ITU-T Rec. H.222.1 type A
1111 0101	6	ITU-T Rec. H.222.1 type B
1111 0110	6	ITU-T Rec. H.222.1 type C
1111 0111	6	ITU-T Rec. H.222.1 type D
1111 1000	6	ITU-T Rec. H.222.1 type E
1111 1001	7	ancillary_stream
1111 1010 ... 1111 1110		Reserved data stream
1111 1111	4	program_stream_directory

The notation x means that the value '0' or '1' are both permitted and results in the same stream type. The stream number is given by the values taken by the x's.

NOTES

- 1 PES packets of type program_stream_map have unique syntax specified in 2.5.4.1.
- 2 PES packets of type private_stream_1 and ISO/IEC_13522_stream follow the same PES packet syntax as those for ITU-T Rec. H.262 | ISO/IEC 13818-2 video and ISO/IEC 13818-3 audio streams.
- 3 PES packets of type private_stream_2, ECM_stream and EMM_stream are similar to private_stream_1 except no syntax is specified after PES_packet_length field.
- 4 PES packets of type program_stream_directory have a unique syntax specified in 2.5.5.
- 5 PES packets of type DSM-CC_stream have a unique syntax specified in ISO/IEC 13818- 6.
- 6 This stream_id is associated with stream_type 0x09 in Table 2-29.
- 7 This stream_id is only used in PES packets, which carry data from a Program Stream or an ISO/IEC 11172-1 System Stream, in a Transport Stream (refer to 2.4.3.7).

MPEG-2, Part 1 at Table 2-18.

Another type of packet that may be transmitted according to the MPEG-2, Part 1 standard is the program_stream_map packet (stream_id of “1011 1100”)—i.e., *a control packet*. *Id.* A program stream map packet, unlike an audio or video packet, does not include program data. As the MPEG-2, Part 1 standard explains, a “Program Stream Map (PSM) provides a description of elementary streams in the Program Stream and their relationship to one another.” *Id.* at 55. That is, it provides instructions, or *control* information regarding how to read the different types of bitstream data. *See* Min ¶ 62. Therefore, Auld in view of MPEG-2, Part 1 renders

obvious that the *packet types include a control packet*.

8. Claim 18

[18] The method of claim 11 wherein the synchronization primitive is made up of a sequence of bit-string synchronization symbols.

Auld in view of MPEG-2, Part 1 discloses this claim and/or renders it obvious.

Min ¶¶ 63–65.

As explained above for claim 11, Auld discloses a “sync code” that corresponds to the “start code” in MPEG-2, Part 1 and constitutes the claimed *synchronization primitive*. This synchronization primitive, in turn, is *made up of a sequence of bit string symbols* comprising the “packet_start_code_prefix” and “stream_id” symbols as set forth for example in Table 2-17 of MPEG-2, Part 1.

Table 2-17 – PES packet		
Syntax	No. of bits	Mnemonic
PES_packet() { packet_start_code_prefix stream_id PES_packet_length if (stream_id != program_stream_map && stream_id != padding_stream && stream_id != private_stream_2 && stream_id != ECM && stream_id != EMM && stream_id != program_stream_directory && stream_id != DSMCC_stream && stream_id != ITU-T Rec. H.222.1 type E stream) {	24 8 16	bslbf uimbsf uimbsf

MPEG-2, Part 1 at Table 2-17 (excerpted); see also *id.* at 4 (“Start codes consist of a 24-bit prefix (0x000001) and an 8-bit stream_id.”).

As a person of ordinary skill would recognize, the “packet_start_code_prefix” and “stream_id” comprise a *sequence of bit string symbols* as they are made up of symbols comprising strings of bits. For example, the “stream_id” is a string of 8 bits

as shown in Table 2-17 above.

9. Claim 19

[19(pre)] A communications device for transmitting packet types of packets, comprising:

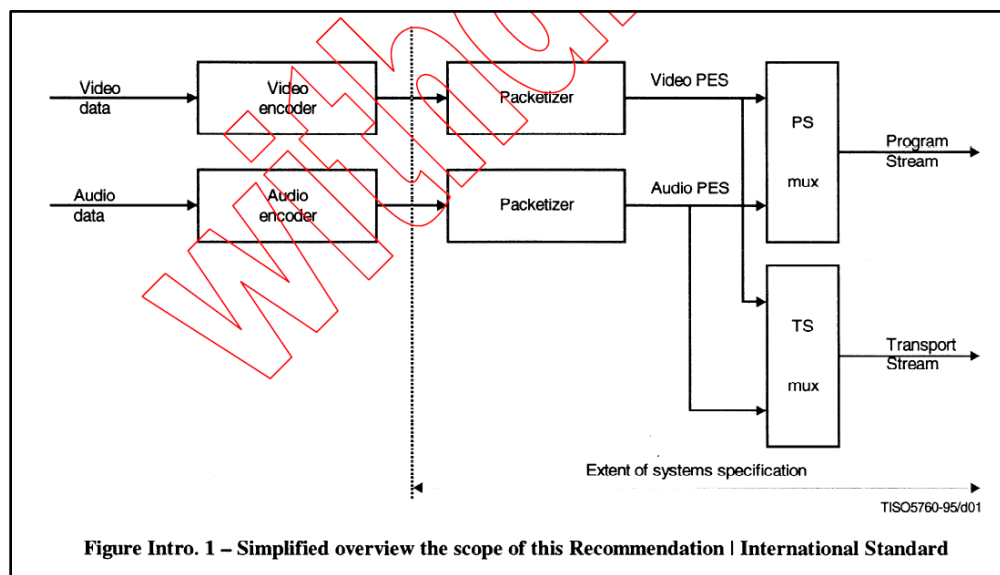
To the extent the preamble is limiting, Auld in view of MPEG-2, Part 1 discloses this element and/or renders it obvious. Min ¶¶ 66–69.

Auld discloses a *communications device for transmitting* comprising a “transmitter including an encoder for encoding data in accordance with an MPEG standard for producing and transmitting a multiplexed bitstream.” Auld at Claim 1.

Further, it is clear from Auld that its “novel video decoding architecture,” *id.* at 8:62–63, may be used to decode a bitstream that is transmitted from a communications device. In the “Background of the Invention,” for example, Auld explains that “[t]he compressed system signal or bitstream, ... may ... be transmitted over existing television channels, cable television channels, satellite communication channels, and the like,” where “[a] decoder is then typically employed to decompress and decode the received system signal in accordance with the same compression algorithm or methodology previously mentioned.” *Id.* at 1:38–46; *see also id.* at 5:66–6:1 (explaining that the “multiplexed system bitstream may ... be stored in a digital storage media 24 or transmitted along an appropriate transmission channel 24”), Fig. 1. Thus, at a minimum it would have been obvious to use a *communications device for transmitting* in connection with Auld’s decoding

architecture.

Additionally, as discussed above with respect to claim element [11(a)], Auld discloses a decoder which receives *packet types of packets* encoded according to the MPEG-2, Part 1 standard. It would be obvious to a person of ordinary skill in the art that in order to receive packet types of packets, the corresponding transmitter which compressed and encoded the bitstream data must transmit the packet types of packets. Moreover, the MPEG-2, Part 1 standard describes the requirements and specifications of a transmitter preparing a bitstream in accordance with said standard, as show in Figure Intro 1:



MPEG-2, Part 1 at Figure Intro 1. As described above with respect to claim element [11(a)], the `stream_id` symbol included in the transmitted bitstream identifies the packet type of each packet. Thus, Auld in view of MPEG-2, Part 1 discloses and/or renders obvious *a communications device for transmitting packet types of packets*.

[19(a)] an identification component that identifies a packet type of a packet of symbols; and

Patent Owner has proposed in the co-pending litigation against Dell that this limitation requires no construction and is not governed by 35 U.S.C. § 112(6).⁷ Under Patent Owner's position that this limitation is not a means-plus function limitation and instead encompasses any form of component, which Petitioners adopt for purposes of this proceeding only, Auld in view of MPEG-2, Part 1 discloses and/or renders obvious this element. Min ¶¶ 70–71.

As described above with respect to claim element [11(a)], Auld in view of MPEG-2, Part 1 discloses/renderers obvious receiving a synchronization symbol (the `stream_id`) which indicates a packet type of a packet. Further, as described above with respect to claim [11(pre)], Auld discloses receiving packets which are comprised of symbols. The MPEG-2, Part 1 standard discloses a bitstream including a `stream_id` which identifies a packet type of a packet. *See* MPEG-2, Part 1 at 29. It would be obvious to a person of ordinary skill in the art that in order to include the `stream_id` in the bitstream which identifies the packet type, that the transmitter must

⁷ Petitioners reserve the right to argue in the co-pending litigations that this limitation is a means-plus-function limitation that lacks disclosed corresponding structure and is, therefore, indefinite. However, this Petition applies Patent Owner's proposed construction.

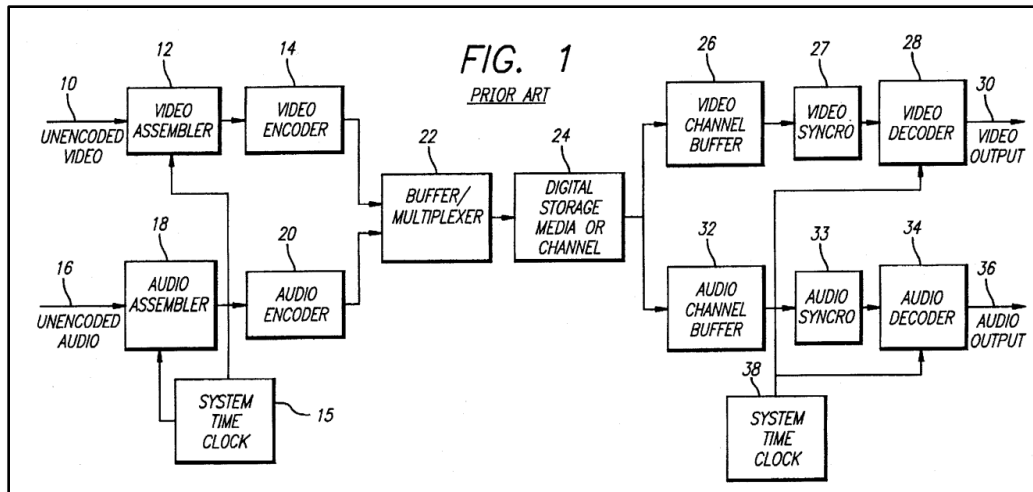
include an *identification component* that identifies the packet type of the packet.

[19(b)] a transmission component that transmits a synchronization symbol⁸ that corresponds to the identified packet type,

Patent Owner has proposed in the co-pending litigation against Dell that this limitation requires no construction and is not governed by 35 U.S.C. § 112(6). Under Patent Owner's position that this limitation is not a means-plus function limitation and instead encompasses any form of component, which Petitioners adopt for purposes of this proceeding only, Auld in view of MPEG-2, Part 1 discloses and/or renders obvious this element. Min ¶¶ 72–73.

As described above with respect to claim element [19(pre)], Auld in view of MPEG-2, Part 1 discloses/rendering obvious transmitting packet types of packets. Further, as described above with respect to claim elements [11(a)] and [19(a)], the it would be understood that the transmitter must *transmit[] a synchronization symbol* that indicates the packet type (i.e., *corresponds to the identified packet type*). A person of ordinary skill in the art would understand that in order to transmit a synchronization symbol that corresponds to the packet type, the transmitter must include a *transmission component* that transmits said synchronization symbol. Such a transmission component is disclosed in, for example, Figure 1 of Auld:

⁸ See *supra* note 4.



Auld at Figure 1. As Auld explains, after buffer/multiplexer 22 “produce[s] a multiplexed bitstream,” the bitstream “is transmitted along an appropriate transmission channel 24 for later reception, decoding, and display,” i.e., by a *transmission component*.⁹

[19(c)] the transmitted synchronization symbol providing synchronization information and each packet type having a different synchronization symbol and

Auld in view of MPEG-2, Part 1 renders obvious this element. Min ¶¶ 74–76.

As described above with respect to claim element [11(a)], Auld in view of MPEG-2, Part 1 discloses/renderers obvious receiving a *synchronization symbol with*

⁹ Although Auld’s Figure is presented as “prior art,” it would be readily understood that Auld’s “novel video decoding architecture,” *id.* at 8:62–63, is intended to be used with such a transmission component of Figure 1. Indeed, claim 1 of Auld recites a data transmission system comprising such a transmitter.

each packet type having a different synchronization symbol. As described above with respect to claim element [19(b)], it would have been obvious to a person of ordinary skill in the art that in order to receive a synchronization symbol, the transmitter must *transmit* that symbol.

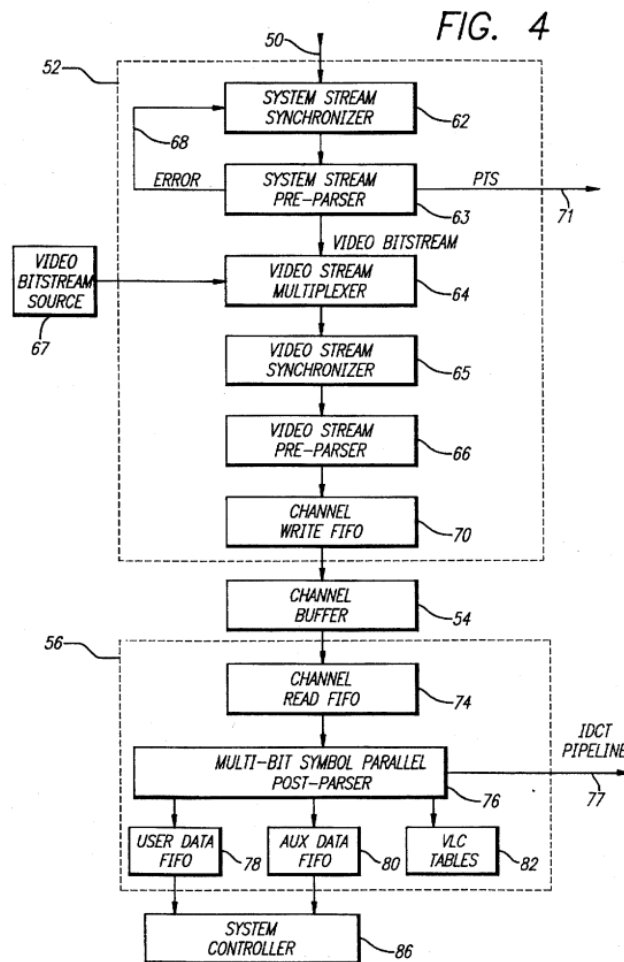
Auld in view of MPEG-2, Part 1 also discloses/renders obvious that the synchronization symbol (stream_id) provides *synchronization information*. As explained above with respect to claim element [11(a)], the stream_id together with the packet_start_code_prefix collectively form the start code, or sync code. This sync code is used to provide *synchronization information* that allows the decoder to synchronize and align the bitstream data. *See* Auld at 6:24–28 (“Synchronization generally involves finding a unique pattern of bits, often termed sync codes or start codes, in the multiplexed system bitstream, and aligning the bitstream data following the sync code.”).

[19(d)] permitting an external receiving node to properly align with a synchronization primitive to be correctly aligned on a symbol boundary, and

Auld in view of MPEG-2, Part 1 discloses this claim and/or renders it obvious.
Min ¶¶ 77–78.

As described above with respect to claim element [11(d)], Auld in view of MPEG-2, Part 1 discloses/renders obvious receiving a “synchronization symbol [that permits] properly alignment [sic] upon receiving with a synchronization primitive to be correctly aligned on a symbol boundary.” Auld discloses that this

synchronization and alignment process is performed by a pre-parser which receives the compressed and encoded bitstream (i.e., *external receiving node*). See Auld at 7:35–49. As shown in Figure 4 of Auld, “[t]he pre-parser 52 performs an initial channel synchronization to the multiplexed system bitstream received from the fixed rate channel 50,” *id.* at 9:7–9:



Id. at Figure 4.

[19(e)] that transmits the symbols of the packet.

Auld in view of MPEG-2, Part 1 discloses this claim and/or renders it obvious.

Min ¶¶ 79–80.

As described above with respect to claim element [19(b)], Auld in view of MPEG-2, Part 1 discloses/renders obvious *transmitting symbols of a packet*.

10. Claim 22

[22] The communications device of claim 19 wherein the synchronization symbol is transmitted before transmitting the symbols of the packet.¹⁰

This claim is satisfied for the same reasons as explained above for claim [14].

11. Claim 23

[23] The communications device of claim 19 wherein the packet has a header with a field that indicates packet type and the identification component checks the field of the header that indicates packet type.

Auld in view of MPEG-2, Part 1 discloses this claim and/or renders it obvious.

Min ¶¶ 82–85.

As set forth in Table 2-17 of MPEG-2, Part 1, the “start code” (which Auld also describes as a “sync code”) comprising the packet_start_code_prefix and stream_id (*see* MPEG-, Part 1, at 4) appears as fields at the beginning of the packet. That is, they appear as *fields* of the *header* of the packet.

¹⁰ *See supra* note 6.

Table 2-17 – PES packet		
Syntax	No. of bits	Mnemonic
<pre> PES_packet() { packet_start_code_prefix stream_id PES_packet_length if (stream_id != program_stream_map && stream_id != padding_stream && stream_id != private_stream_2 && stream_id != ECM && stream_id != EMM && stream_id != program_stream_directory && stream_id != DSMCC_stream && stream_id != ITU-T Rec. H.222.1 type E stream) { </pre>	24 8 16	bslbf uimsbf uimsbf

Id. at Table 2-17 (excerpted). Indeed, MPEG-2, Part 1 explains that such “leading fields in a PES packet up to and not including the PES packet data byte fields” may be referred to as a “PES packet header.” MPEG-2, Part 1 at 4.

Accordingly, the packet *has a header with a field that indicates packet type*. That is, the packet has a header including a field (i.e., the stream ID) that indicates the type of the packet as discussed above for claims 11 and 19.

As discussed above with respect to claim element [19(a)], Auld in view of MPEG-2, Part 1 discloses/renderers obvious an “identification component that identifies a packet type of a packet of symbols.” It would be obvious to a person of ordinary skill in the art that in order for the identification component to identify the packet type of the packet of symbols, wherein—as described above—the packet type is identified by the stream_id field included in the PES packet header—the identification component must *check the field of the header that indicates the packet type*.

12. Claim 24

[24] The communications device of claim 19 wherein the packet types include a data packet.

This claim is satisfied for the same reasons as explained above for claim [15].

13. Claim 25

[25] The communications device of claim 19 wherein the packet types include a control packet.

This claim is satisfied for the same reasons as explained above for claim [16].

14. Claim 28

[28] The communications device of claim 19 wherein the synchronization primitive is made up of a sequence of bit-string synchronization symbols.

This claim is satisfied for the same reasons as explained above for claim [18].

15. Claim 1

Claim 1 is a method claim that closely tracks claim 19 and is satisfied for similar reasons as explained below.

[1(pre)] A method for transmitting packet types of packets, the method comprising:

To the extent the preamble is limiting, Auld in view of MPEG-2, Part 1 discloses this element and/or renders it obvious for the same reasons as discussed above for element [19(pre)].

For example, Auld discloses a *method for transmitting* utilizing a “transmitter including an encoder for encoding data in accordance with an MPEG standard for producing and transmitting a multiplexed bitstream.” Auld at Claim 1. Additionally,

Auld discloses a decoder which receives *packet types of packets* encoded according to the MPEG-2, Part 1 standard. It would be obvious to a person of ordinary skill in the art that in order to receive packet types of packets, the corresponding transmitter which compressed and encoded the bitstream data must transmit the packet types of packets. Thus, Auld in view of MPEG-2, Part 1 discloses and/or renders obvious a *method for transmitting packet types of packets*.

[1(a)] receiving a packet having symbols;

Auld in view of MPEG-2, Part 1 discloses this element and/or renders it obvious.

As explained above for element [19(a)] it would have been obvious that Auld's transmitter must include an identification component for identifying the packet type of a packet comprised of symbols. In order to be able to perform such identification, a POSITA would appreciate that the identification component would need to *receiv[e] a packet having symbols*.

[1(b)] identifying a packet type of the packet;

Auld in view of MPEG-2, Part 1 discloses this element and/or renders it obvious for the same reasons as explained above for element [19(a)]. As explained for that element, it would have been obvious that Auld's transmitter must include an identification component for *identifying a packet type of the packet*.

[1(c)] transmitting a synchronization symbol¹¹ that corresponds to the identified packet type,

Auld in view of MPEG-2, Part 1 discloses this element and/or renders it obvious for the same reasons as explained above for element [19(b)]—namely, that it would be understood that the transmitter must *transmit[] a synchronization symbol* that indicates the packet type (i.e., *corresponds to the identified packet type*).

[1(d)] wherein the transmitted synchronization symbol provides synchronization information and wherein each packet type has a different synchronization symbol, and

Auld in view of MPEG-2, Part 1 discloses this element and/or renders it obvious for the same reasons as explained above for element [19(c)].

[1(e)] the synchronization symbol permitting an external receiving node to properly align with a synchronization primitive to be correctly aligned on a symbol boundary; and

Auld in view of MPEG-2, Part 1 discloses this element and/or renders it obvious for the same reasons as explained above for element [19(d)].

[1(f)] transmitting the symbols of the received packet.

Auld in view of MPEG-2, Part 1 discloses this element and/or renders it obvious for the same reasons as explained above for element [19(e)].

¹¹ See *supra* note 4.

16. Claim 4

[4] The method of claim 1 wherein the synchronization symbol is transmitted before transmitting the symbols of the packet.¹²

This claim is satisfied for the same reasons as explained above for claims [14] and [22].

17. Claim 5

[5] The method of claim 1 wherein the packet has a header with a field that indicates packet type and the identifying of the packet type includes checking the field of the header that indicates packet type.

This claim is satisfied for the same reasons as explained above for claim [23].

18. Claim 6

[6] The method of claim 1 wherein the packet types include a data packet.

This claim is satisfied for the same reasons as explained above for claims [15] and [24].

19. Claim 7

[7] The method of claim 1 wherein the packet types include a control packet.

This claim is satisfied for the same reasons as explained above for claims [16] and [25].

¹² See *supra* note 6.

20. Claim 9

[9] The method of claim 1 wherein the synchronization primitive is made up of a sequence of bit-string synchronization symbols.

This claim is satisfied for the same reasons as explained above for claim [28].

B. Ground 2: Claims 2, 3, 12, 13, 20, and 21 are obvious under 35 U.S.C. § 103 over Auld in view of MPEG-2, Part 1 and Shin.

1. Claim 12

[12] The method of claim 11 wherein the symbols of the packets¹³ include in-band symbols and the synchronization symbols are out-of-band symbols.

Auld, MPEG-2, Part 1 and Shin render obvious this claim. Min ¶¶ 104–13.

As described above with respect to claim element [19(a)], Auld discloses the use of sync codes or start codes in order to synchronize and align bitstream data, and MPEG-2, Part 1 provides further information about the syntax and composition of such bitstreams and such codes. Although Auld does not directly disclose that *the symbols of the packet include in-band symbols and the synchronization symbols are out-of-band symbols*, this approach is expressly taught in the Shin reference.

According to the '798 patent, “[a] packet . . . typically comprises in-band symbols with certain desirable characteristics, such as with its number of bit transitions optimized.” ’798 patent at 11:39–42. Conversely, an “out-of-band symbol” is “a symbol that does not normally appear within a packet because it may

¹³ See *supra* note 6.

not have the same desirable characteristic as an in-band symbol (e.g., bit transitions not optimized).” *Id.* at 11:46–50. Further to this example, the ’798 patent describes an embodiment wherein an out-of-band symbol contains “three or less transitions” and an in-band symbol contains “four or more transitions.”¹⁴ *Id.* at 23:66–24:3.

Shin—which is an earlier patent sharing two of the same inventors of the ’798 patent that qualifies as prior art under 35 U.S.C. § 102(b)—similarly discloses a high-speed video data transmission system that uses “in-band characters” and “out-of-band characters” to optimize transmissions. Indeed, Shin discloses the same transition-controlled encoding scheme as the ’798 patent, wherein out-of-band characters may serve as synchronization or control characters, so that they can be readily distinguished from in-band characters in the data stream:

In accordance with another aspect of the invention, various synchronization and other special characters are defined using the high-transition and low-transition sets of out-of-band characters. Each character corresponding to one of these “out-of-band” characters associated with the high-transition set includes less than four logical transitions, and each of the out-of-band characters associated with the low-transition set of code characters includes more than four logical

¹⁴ As explained in the ’798 patent, here a transition “is defined as a bit value of 1 followed by a bit value of 0 or a bit value of 0 followed by a bit value of 1.” ’798 patent at 23:12–14.

transitions. The difference in the number of transitions between in-band and out-of-band characters allows selected out-of-band characters to serve as control characters, and to be readily distinguished from in-band characters within the transmitted data stream.

Ex. 1006 (Shin) at 9:63–10:8; *see also id.* at 14:46–49, 17:16–18. Moreover, just like the '798 patent Shin discloses a “high transition mode” in which in-band codes (or *symbols*) comprise “four or more logical transitions” and out-of-band codes comprise “less than four logical transitions.” Shin at 9:13–16, 9:66–10:2.

A POSITA would have been motivated to combine the teachings of Shin with those of Auld and MPEG-2, Part 1. Min ¶¶ 108–12. For example, Auld discloses sync codes (also called “start codes”) that enable efficient transmission and reception of video data packets, *see* Auld at 11:39–41, and MPEG-2, Part 1 provides further details on such codes (i.e., the MPEG “Start codes”), *see* MPEG-2, Part 1 at 4, 31. Shin, which is directed to high speed video signal transmission, is analogous art to Auld and MPEG-2, Part 1, as it similarly discloses using sync codes to properly align bitstreams and increase transmission efficiency between devices. Shin at 1:11–6, 2:60–65, 17:16–18; Auld at 10:43–45, 10:56–58.

A POSITA starting with the Auld video communication and synchronization system and the further details in MPEG-2, Part 1 would have looked to Shin because Shin discloses a high-speed video data transmission system that uses particular characters to optimize transmissions. *See* Shin, 9:63–10:8, 14:46–49, 17:16–18; Min

¶¶ 108–12. In particular, Shin explains how the use of out-of-band synchronization or control characters allows for them to be readily distinguished from in-band characters within the transmitted data stream. Shin at 9:63–10:8, 14:46–49. This furthers the objectives of Auld and MPEG-2, Part 1, which entail using particular sync codes or start codes so that the codes can be readily distinguished from the rest of the bitstream and therefore used for purposes of synchronizing to the bitstream.

Additionally, a POSITA would have appreciated that Shin’s teachings can be readily incorporated into the approach of Auld and MPEG-2, Part 1, by using in-band codes (or *symbols*) with four or more logical transitions for the packet data, while retaining the same sync code (or start code) as taught in Auld and MPEG-2, Part 1.

MPEG-2, Part 1 permits the use of packet data that is not “coded according to a standard specified by ITU-T | ISO/IEC.” MPEG-2, Part 1 at 111. This is known as using “private data.” *Id.* MPEG-2, Part 1 discloses the use of such private data for the *data* of the packet while still using the “first three fields” of the PES header (i.e., including the start code). Shin’s “high transition mode” data encoding scheme thus may be combined with Auld and MPEG-2, Part 1 through use of these private data stream options disclosed by MPEG-2, Part 1. Thus, the *symbols of the packet* would include *in-band symbols* (private data field symbols with four or more transitions, as disclosed by Shin).

Additionally, a POSITA would recognize that the *synchronization symbols* in this system (i.e., the stream id of the sync code) would constitute *out-of-band symbols*. As explained above with respect to claim element [11(a)], the “stream_id” field corresponds to potential types of packets. As denoted by Table 2-18 Note 3 below, packets of type private_stream_2, ECM_stream, and EMM_stream each may be chosen to convey private data for audio and video while still following the syntax for the PES header start code (“syntax . . . specified [before] PES_packet_length field”).

Table 2-18 – Stream_id assignments		
stream_id	Note	Stream coding
1011 1100	1	program_stream_map
1011 1101	2	private_stream_1
1011 1110		padding_stream
1011 1111	3	private_stream_2
110x xxxx		ISO/IEC 13818-3 or ISO/IEC 11172-3 audio stream number xxxx
1110 xxxx		ITU-T Rec. H.262 ISO/IEC 13818-2 or ISO/IEC 11172-2 video stream number xxxx
1111 0000	3	ECM_stream
1111 0001	3	EMM_stream
1111 0010	5	ITU-T Rec. H.222.0 ISO/IEC 13818-1 Annex B or ISO/IEC 13818-6 DSM-CC_stream
1111 0011	2	ISO/IEC 13522_stream
1111 0100	6	ITU-T Rec. H.222.1 type A
1111 0101	6	ITU-T Rec. H.222.1 type B
1111 0110	6	ITU-T Rec. H.222.1 type C
1111 0111	6	ITU-T Rec. H.222.1 type D
1111 1000	6	ITU-T Rec. H.222.1 type E
1111 1001	7	ancillary_stream
1111 1010 . . . 1111 1110		Reserved data stream
1111 1111	4	program_stream_directory
The notation x means that the value '0' or '1' are both permitted and results in the same stream type. The stream number is given by the values taken by the x's. NOTES 1 PES packets of type program_stream_map have unique syntax specified in 2.5.4.1. 2 PES packets of type private_stream_1 and ISO/IEC 13552_stream follow the same PES packet syntax as those for ITU-T Rec. H.262 ISO/IEC 13818-2 video and ISO/IEC 13818-3 audio streams. 3 PES packets of type private_stream_2, ECM_stream and EMM_stream are similar to private_stream_1 except no syntax is specified after PES_packet_length field. 4 PES packets of type program_stream_directory have a unique syntax specified in 2.5.5. 5 PES packets of type DSM-CC_stream have a unique syntax specified in ISO/IEC 13818- 6. 6 This stream_id is associated with stream_type 0x09 in Table 2-29. 7 This stream_id is only used in PES packets, which carry data from a Program Stream or an ISO/IEC 11172-1 System Stream, in a Transport Stream (refer to 2.4.3.7).		

MPEG-2, Part 1 at Table 2-18; *see also id.* at Table 2-17. Each potential stream_id

corresponding to Note 3 includes less than four transitions: 1011 1111 (private_stream_2, 2 transitions); 1111 0000 (ECM_stream, 1 transition); and 1111 0001 (EMM_stream, 2 transitions). *Id.* at Table 2-18. That is, these *synchronization symbols are out-of-band symbols* under the '798 patent.

Accordingly, the combination of Auld, MPEG-2, Part 1, and Shin renders obvious *wherein the symbols of the packet include in-band symbols and the synchronization symbols are out-of-band symbol*.

2. Claim 13

[13] The method of claim 12 wherein the in-band symbols are transition optimized and the out-of-band synchronization symbols are not transition optimized.

Auld, MPEG-2, Part 1 and Shin render obvious this claim. Min ¶¶ 114–16.

For the same reasons described above with respect to claim 12, Auld, MPEG-2, Part 1, and Shin render obvious “wherein the in-band symbols have has three or fewer transitions and the out-of-band synchronization symbols have four or more transitions.”

As the '798 patent explains, “[t]ransition control may be optimized to either maximize or minimize the number of transitions in symbols that are to be transmitted.” '798 patent at 23:10–12. Further, the patent explains that the described coding technique uses the optimization approach of “maximiz[ing] the number of transitions in symbols to be transmitted.” *Id.* at 23:21–23. This optimization method corresponds to the '798 patent’s teaching—as described above with respect to claim

12—that in-band symbols have “at least four transitions” and out-of-band symbols have “three or less transitions.” *See id.* at 23:66–24:3; *see also* Shin at 9:13–16, 9:66–10:2 (describing “high-transition mode” transition encoding, i.e., *transition optimiz[ation]* using a maximizing scheme). Thus, for the same reasons described above with respect to claim 12, the combination of Auld, MPEG-2, Part 1, and Shin render obvious *wherein the in-band symbols are transition optimized and the out-of-band synchronization symbols are not transition optimized.*

3. Claim 20

[20] The communications device of claim 19 wherein the symbols of the packet¹⁵ include in-band symbols and the synchronization symbols are out-of-band symbols.

This claim is satisfied for the same reasons as explained above for claim [12].

4. Claim 21

[21] The communications device of claim 20 wherein the in-band symbols are transition optimized and the out-of-band synchronization symbols are not transition optimized.

This claim is satisfied for the same reasons as explained above for claim [13].

¹⁵ *See supra* note 6.

5. Claim 2

[2] The method of claim 1 wherein the symbols of the packet¹⁶ include in-band symbols and the synchronization symbols are out-of-band symbols.

This claim is satisfied for the same reasons as explained above for claim [20].

6. Claim 3

[3] The method of claim 2 wherein the in-band symbols are transition optimized and the out-of-band synchronization symbols are not transition optimized.

This claim is satisfied for the same reasons as explained above for claim [21].

C. Ground 3: Claims 8, 17, and 26 are obvious under 35 U.S.C. § 103 over Auld in view of MPEG-2 Part 1 and Hiroshima

1. Claim 17

[17] The method of claim 11 wherein the symbols are received from a switch.

Auld, MPEG-2, Part 1, and Hiroshima render obvious this claim. Min ¶¶121–24.

The Auld system discloses video transmission between interconnected components (Auld at 1:31–47, 14:53–55) but does not expressly disclose a network type for the interconnected components.

Hiroshima discloses a video-on-demand system that includes an asynchronous transfer mode (ATM) network. Ex. 1007 (Hiroshima) at 5:44–48. Furthermore, Hiroshima discloses that the ATM network “operates in an

¹⁶ See *supra* note 6.

asynchronous transfer mode [] in which a transmission rate is equal to 156Mbps.” *Id.* at 5:44–46. A POSITA would have understood that Auld’s components may be readily connected through a well-known network such as Hiroshima’s ATM network, which allows data transfer at high speeds. Min ¶¶ 121–24. Implementing the prior art teachings in this manner would entail having *the symbols ... transmitted over a switch network* (i.e., Hiroshima’s ATM network).

A POSITA would have been motivated to combine the teachings of Hiroshima with those of Auld and MPEG-2, Part 1. Min ¶¶ 121–24. Hiroshima, which is directed to an “apparatus for converting moving picture stream[s],” in which MPEG data is converted for transmission on a transport stream (Hiroshima at 2:10–25), is analogous art to Auld and MPEG-2, Part 1, which discloses pertain to video encoding/decoding for storage and transmission (Auld at 3:5–20). In Hiroshima a multiplexer “divides the video and audio packetized elementary streams into transport packets each having a fixed length (188 bytes) and, thereafter, multiplexes the transport packets, thereby converting to a transport stream.” *Id.* at 2:25–30. Hiroshima further discloses a straightforward networked approach that would provide a natural and ready way to implement the data transmission taught in Auld.

2. Claim 26

[26] The communications device of claim 19 wherein the symbols are transmitted to a switch network.

This claim is satisfied for the same reasons as explained above for claim [17].

1. Claim 8

[8] The method of claim 1 wherein the symbols are transmitted to a switch network.

This claim is satisfied for the same reasons as explained above for claims [17] and [26].

IX. CONCLUSION

Petitioner respectfully requests that the Challenged Claims be cancelled for the aforementioned reasons.

Date: October 2, 2024

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

I certify that the foregoing complies with the type-volume limitation of 37 C.F.R. § 42.24 and contains 9,367 words based on the word count indicated by the word-processing system used to prepare the paper, and excluding those portions exempted by § 42.24(a).

Date: October 2, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6 and 42.105, I hereby certify that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 7,746,798 under U.S.C. §§ 311–319 and 37 C.F.R. § 42.100 *et seq.*, together with its supporting exhibits, and Power of Attorney was served by Priority Mail Express® on the Patent Owner at the following correspondence address of record at listed on the USPTO Patent Center:

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