UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORP., DELL INC., DELL AND TECHNOLOGIES INC.,
Petitioner

IPR2025-01039
U.S. Patent No. 7,359,437

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104

TABLE OF CONTENTS

PETITIONER'S EXHIBIT LIST

Ex.1001	U.S. Patent No. 7,359,437.
Ex.1002	Prosecution History of U.S. Patent No. 7,359,437.
Ex.1003	Declaration of Dr. Andrew Wolfe under 37 C.F.R. § 1.68.
Ex.1004	*Curriculum Vitae* of Dr. Andrew Wolfe.
Ex.1005	U.S. Patent No. 5,835,498 to Kim et al. ("Kim")
Ex.1006	U.S. Patent No. 5,625,644 to Myers ("Myers")
Ex.1007	U.S. Patent No. 5,974,464 to Shin ("Shin")
Ex.1008	European Patent 0241014 B1 to Asai, ("Asai")
Ex.1009	U.S. Patent No. 7,356,051 to Pasqualino ("Pasqualino")
Ex.1010	U.S. Patent No. 7,143,328 to Altmann ("Altmann")
Ex.1011	The Authoritative Dictionary of IEEE Standards Terms" Seventh Edition, ("IEEE Dictionary")
Ex.1012	*General Video, LLC v. Dell Inc. et al.* 5:24-cv-00124, EDTX - Complaint - Appendix E
Ex.1013	*General Video, LLC v. Dell Inc. et al.* 5:24-cv-00124, EDTX - Complaint
Ex.1014	*General Video, LLC v. Dell Inc. et al.* 5:24-cv-00124, EDTX – Infringement Contentions
Ex.1015	*General Video, LLC v. Dell Inc. et al.* 5:24-cv-00124, EDTX – Scheduling Order

I. INTRODUCTION

The prior art presented in this Petition for *inter partes* review ("IPR") teaches the very limitations that resulted in allowance of U.S. Patent No. 7,359,437 ("the '437 patent"). The '437 patent relates to "transmission of encoded data (e.g., one or both of video data and auxiliary data such as audio data) over a serial link." Ex.1001, 1:15-19. The auxiliary data is encoded "using a subset (**a "robust" subset**) of a full set of code words." Ex.1001, 6:55-57. In the '437 patent, "bursts of encoded video data ... are transmitted during active video periods, and bursts of auxiliary data ... are transmitted **during blanking intervals** between the active video periods." Ex.1001, 8:42-48.

During prosecution, the Examiner rejected the independent claims reciting the "*robust subset*" as being anticipated by Myers (Ex.1006) but allowed several dependent claims related to transmitting audio data within the blanking intervals of the video stream. Ex.1002, 241. The applicant did not dispute that Myers teaches the claimed "*robust subset*" and amended the allowable claims to be in independent form. Ex.1002, 218-231.

It was also known to place audio auxiliary data in the blanking intervals. Kim (Ex.1005), for example, describes "mixing various multimedia data streams into the display refresh data (primary stream) using the unused bandwidth of horizontal and vertical **blanking periods**." Ex.1005, 5:19-24. The Petition below along with the declaration of Dr. Andrew Wolfe shows how Kim, Shin (Ex.1007), and Myers render obvious claims 1-6, 8, 10-17, 19-23, 26-31, 33, 37, and 39-40 (the "Challenged Claims") of the '437 patent.

Therefore, pursuant to 35 U.S.C. §§ 311, 314(a), and 37 C.F.R. § 42.100, Intel Corp. ("Intel"), Dell Inc., and Dell Technologies Inc. together as "Petitioner" respectfully request that the Board institute this IPR and cancel as unpatentable the Challenged Claims under (pre-AIA) 35 U.S.C. §103(a).

II. GROUNDS FOR STANDING

Petitioner certifies that the '437 patent is eligible for IPR and that Petitioner is not barred or estopped from requesting IPR challenging the patent claims. 37 C.F.R. § 42.104(a).

III. NOTE

Petitioner cites to exhibits' original page numbers whenever feasible. Emphasis in quoted material has been added.

IV. THE PETITION'S RELIANCE ON EXPERT TESTIMONY

A. Focused Expert Testimony

Dr. Wolfe's declaration provides focused expert testimony on the following topics: (i) the level of skill in the relevant art; (ii) technical background, (iii) overview of the '437 patent, (iv) claim construction, (v) key teachings of the prior art, and (vi) motivations to combine. Ex.1003, ¶¶26-54.

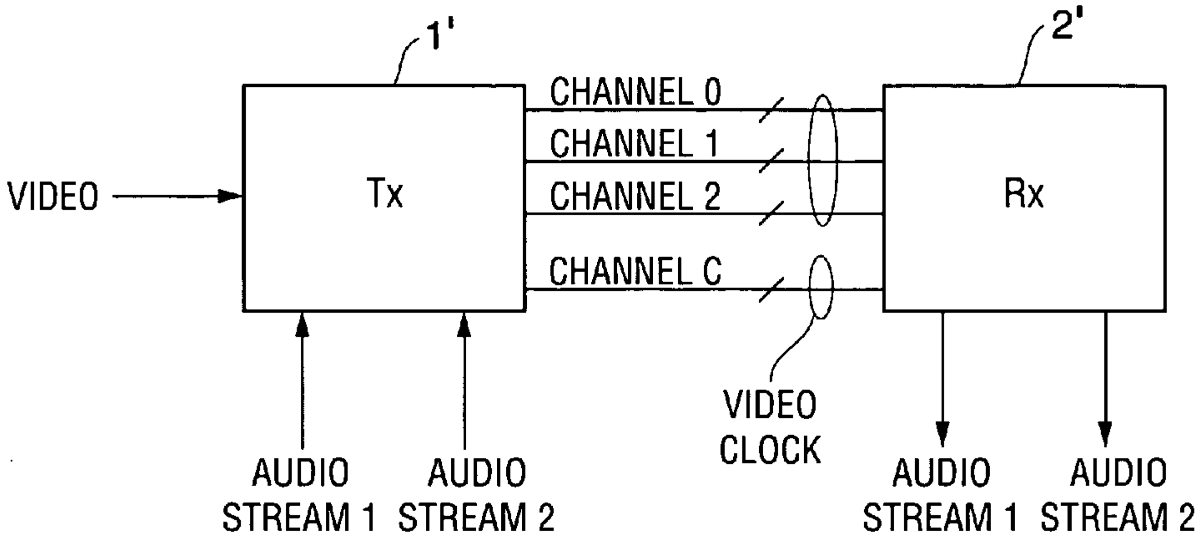
B. Detailed Expert Testimony

To the extent the Board requires more detailed analysis, Dr. Wolfe's declaration also includes a detailed claim-by-claim analysis of the prior art. Ex.1003, ¶¶55-459.

V. SUMMARY OF THE '437 PATENT

A. Overview of the '437 Patent

The '437 patent describes and claims nothing more than well-known techniques for encoding data for transmission over a serial link. The '437 patent "pertains to transmission of encoded data (e.g., one or both of video data and auxiliary data such as audio data) over a serial link." Ex.1001, 1:15-22. The '437 patent provides an example in which video and auxiliary data (e.g., audio data) are transmitted from a transmitter 1' to a receiver 2', as shown in Fig. 2 below.



Ex.1001, Fig. 2.

The ’437 patent describes that “bursts of encoded video data ... are transmitted during active video periods, and bursts of auxiliary data ... are transmitted **during blanking intervals** between the active video periods.” Ex.1001, 8:43-48. This is recited, for example, in claim 49 as “*transmitting over the link a first burst of the video code words followed by a burst of the selected code words followed by a second burst of the video code words*.”

The ’437 patent gives examples of “conventional” video encoding, including TMDS and “TMDS-like” 8b/10b encoding. “One conventional serial link, used primarily for high speed transmission of video data from a host processor (e.g., a personal computer) to a monitor, is known as a transition minimized differential signaling interface (“TMDS” link).” Ex.1001, 1:29-32; 4:61-63. “The characteristics of a TMDS link include the following: video data are encoded and then transmitted as encoded words (**each 8-bit word of digital video data is converted to an encoded 10-bit word before transmission**).” Ex.1001, 1:33-36. In these conventional encoding techniques, each of the 256 8-bit inputs is mapped to a 10-bit output of a “full code [] set.” Ex.1001, 7:51-59. The ’437 patent explains that “to encode 8-bit source data words, the full code word set can be the set of 10-bit code words employed in a conventional TMDS link (each such code word comprising one of 256, transition-minimized, 9-bit patterns whose most significant bit indicates that the pattern is transition-minimized, concatenated with a tenth bit indicating whether the eight least-significant bits have or have not been inverted in accordance with a DC balancing algorithm).” Ex.1001, 7:51-59.

The ’437 patent encodes auxiliary data (e.g., audio data) more robustly by using a subset of the code words used for video. “[T]he data to be transmitted are encoded using a subset (a ‘robust subset[’]) of a full set of code words.” Ex.1001, 6:55-57. In the ’437 patent, the “robust subset” is referred to as “‘selected’ (or ‘inventive’) set of code words.” Ex.1001, 6:58-62. “The robust subset is selected such that each stream of encoded data (comprising only inventive code words) transmitted over a serial link has a bit pattern that is less susceptible to inter-symbol interference (ISI) during transmission than is the bit pattern determined by a transmitted, conventionally encoded version of the same data.” Ex.1001, 6:62-7:2.

The ’437 patent explains how to select code words that reduce inter-symbol interference. Specifically, “the inventive code words are selected to be those whose serial patterns (during transmission) have **fewer contiguous zeros and ones** (e.g., on the average), and thus are less susceptible to ISI during transmission, than do those code words in the full set that are not selected.” Ex.1001, 7:18-28. “Also, when the bits of the inventive code words are transmitted over a serial link as sequences of rising and falling voltage transitions, the bit pattern of each transmitted stream of the inventive code words preferably implements **DC**

balancing (the voltage drift over time is limited).” Ex.1001, 7:28-33.

The ’437 patent uses the robust subset to encode auxiliary data (e.g., audio data). “[A]uxiliary data are encoded in accordance with the invention (for transmission over a TMDS link) using a subset of the transition-minimized TMDS code words that are conventionally used to encode video data for transmission over the link.” Ex.1001, 11:55-59. In contrast, the “transmitted video data [] is conventionally encoded as a transition-minimized, 10-bit TMDS code.” Ex.1001, 8:60-62.

As explained below, however, it was already known to transmit auxiliary data (e.g., audio data) within the blanking intervals between video data, and to encode data using a more robust subset of transmission codes as evidenced by Kim, Shin, and Myers. Ex.1003, ¶¶31-38.

B. Prosecution History of the ’437 Patent

The ’437 patent was filed on December 24, 2001 as a continuation-in-part of U.S. Application No. 09/954,663, which was filed September 12, 2001.

In a first Office Action, the Examiner rejected several claims as being anticipated or rendered obvious by U.S. Patent No. 5,625,644 to Myers (Myers). Ex.1002, 240-42. However, the Examiner indicated that several dependent claims contained allowable subject matter. Ex.1002, 241-242.

In response, the Applicant cancelled all rejected claims and added the original independent claim language to various allowable dependent claims. Ex.1002, 218-31. The Office then allowed the amended claims to issue. Ex.1002, 207-211.

VI. LEVEL OF ORDINARY SKILL IN THE ART

A Person of Ordinary Skill in The Art ("POSITA") on September 12, 2001, would have had a working knowledge of the digital transmission art that is pertinent to the '437 patent. Ex.1003, ¶¶26-28. That person would have a bachelor's degree in computer science, computer engineering, electrical engineering, or equivalent training, and approximately two years' experience working in the field of digital transmissions. Lack of work experience can substitute for additional education, and vice versa. Ex.1003, ¶¶26-28.

VII. CLAIM CONSTRUCTION

Claim terms in IPR are construed according to their "ordinary and customary meaning" to a POSITA. 37 C.F.R. § 42.100(b). *Phillips v. AWH Corp*., 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). For the purposes of this proceeding and the grounds presented herein, no claim term requires express construction. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Ex.1003, ¶39.

VIII. RELIEF REQUESTED AND REASONS FOR THE REQUESTED

RELIEF

Petitioner asks that the Board institute a trial for IPR and cancel the Challenged Claims in view of the analysis below.

IX. DISCRETIONARY DENIAL WOULD BE INAPPROPRIATE

This patent is involved in various district court proceedings, including *General Video, LLC v. Dell Inc. et al.* 1-24-cv-01530 (WDTX) against Petitioner Dell. As will be addressed in further detail in any discretionary briefing—the relevant considerations strongly favor institution.

To that end, Petitioner Dell stipulates, consistent with the stipulation made by the Petitioner in *Sotera* that, if the PTAB institutes this IPR, Petitioner Dell will not pursue in this litigation against the claims challenged in this IPR, (i) the specific grounds raised, or (ii) any other grounds that could have reasonably been raised before the PTAB in that instituted proceeding (*i.e.*, any ground that could have reasonably been raised under §§ 102 or 103 on the basis of prior art patents or printed publications).

X. IDENTIFICATION OF HOW THE CLAIMS RE UNPATENTABLE

A. Challenged Claims and Statutory Grounds for Challenges[1]

Grounds	Claims	Basis: 35 U.S.C. § 103 (Pre-AIA) over
#1	1-6, 8, 10-17, 19-23, 26-31, 33, 37, and 39-40	Kim, Myers, and Shin

U.S. Patent No. 5,835,498 to Kim et al. ("Kim," Ex.1005) was filed on June 14, 1996, and issued November 10, 1998. U.S. Patent No. 5,625,644 to Myers ("Myers," Ex.1006) was filed on December 20, 1991, and issued on April 29, 1997. U.S. Patent No. 5,974,464 to Shin ("Shin," Ex.1007) was filed on September 30, 1996, and issued on October 26, 1999. These references are prior art under at least (pre-AIA) 35 U.S.C. § 102(b).

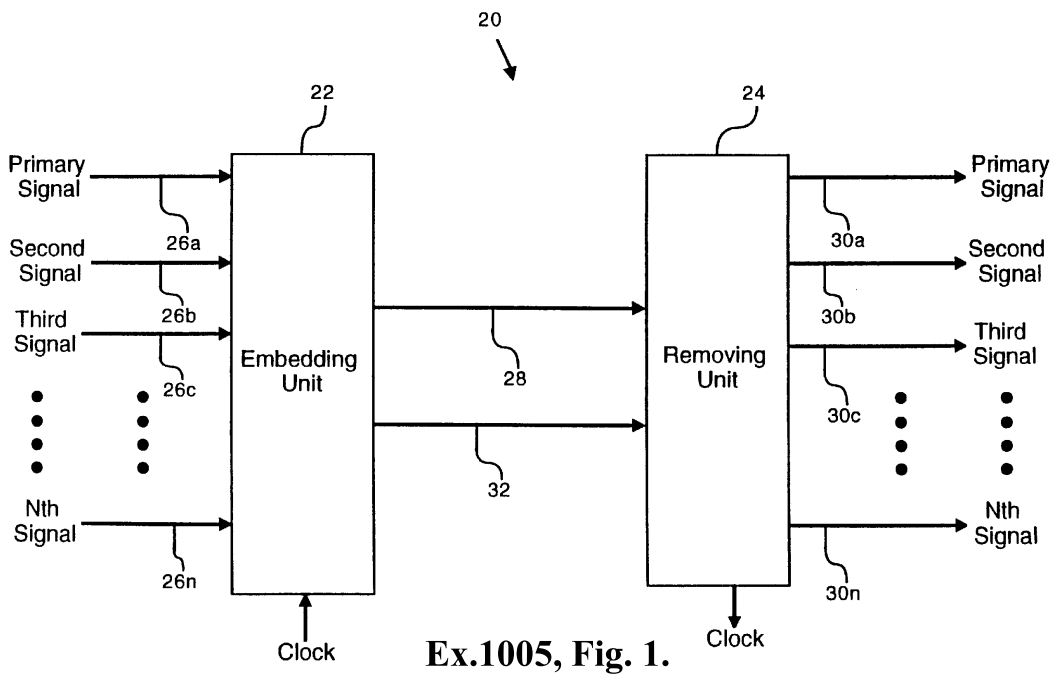
B. Ground 1: Claims 1-6, 8, 10-17, 19-23, 26-31, 33, 37, and 39-40 are obvious in view of Kim, Shin, and Myers.

1. Summary of Kim.

Kim shows that it was known to transmit encoded audio data within the blanking intervals of encoded video transmissions. *See generally* Ex.1005. Kim,

[1] Petitioner relies on the teachings, and not on a physical incorporation of elements. *See In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012); *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985); Ex.1003, ¶57.

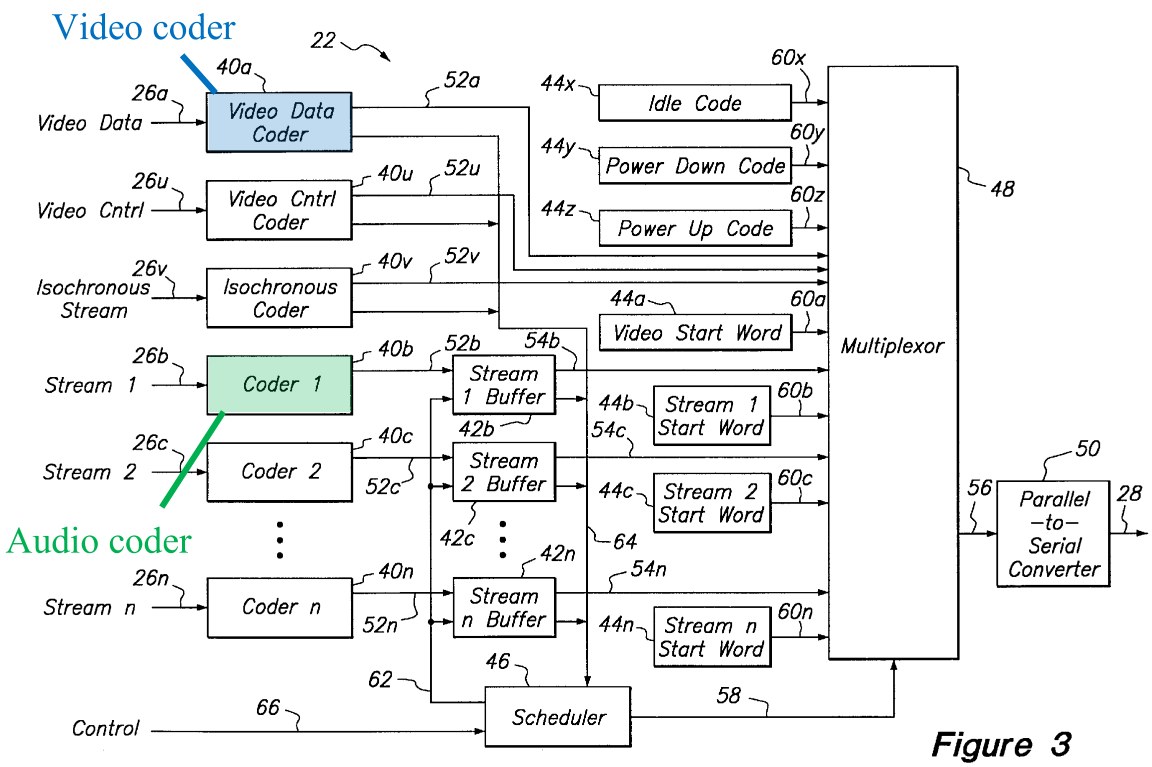
like the ’437 patent, “relates to a system and method for sending multiple data signals or streams over a serial line.” Ex.1005, 1:25-28. Kim describes sending a primary signal (e.g., video data) along with several streams of auxiliary data (e.g., audio data) over a serial transmission link, as shown in Fig. 1 below.



Ex.1005, Fig. 1.

Kim refers to the transmitter as an embedding unit 22. “The embedding unit 22 mixes various data streams into a single serial data stream,” and Kim specifically describes “mixing various multimedia data streams into the display refresh data (primary stream) using the unused bandwidth of horizontal and vertical blanking periods.” Ex.1005, 5:19-24. “Possible multimedia data streams that can be mixed include, but are not limited to **audio**...” Ex.1005, 5:24-28.

To encode video and audio separately, Kim describes an example in which the video data is processed by a first encoder 40a and the auxiliary data is processed by separate encoders 40b-40n, as shown in Fig. 2 below.

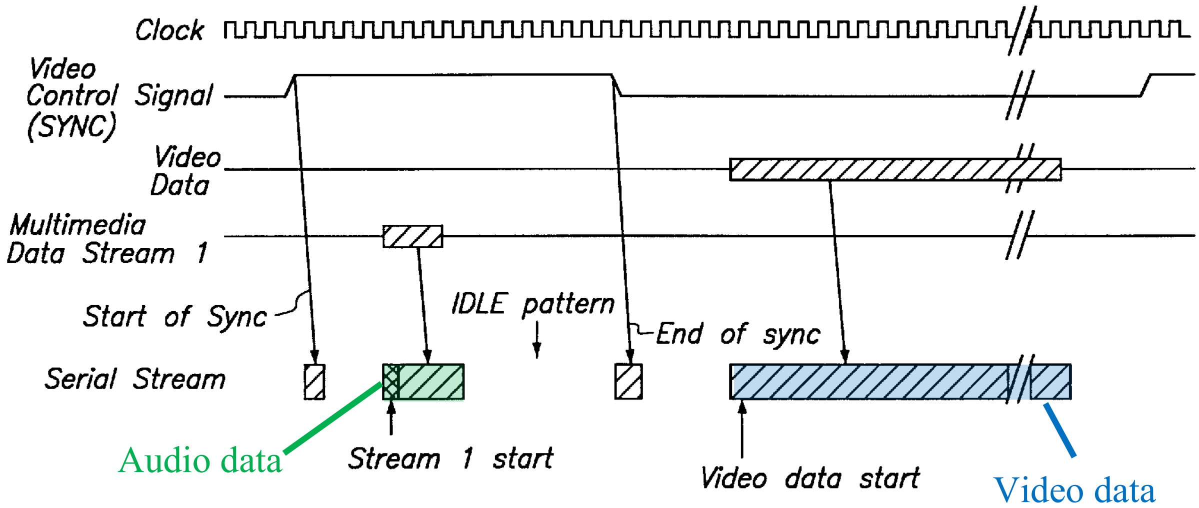


Ex.1005, Fig. 3 (annotated); Ex.1003, ¶60.

Kim's video data may be encoded using conventional 8b/10b encoding techniques. "[A] video data coder 40a is provided for encoding the video data signals to a 10-bit parallel output. Those skilled in the art will realize the video data coder 40*a* may be a plurality of 8-to-10 bit coders depending on the number of bits used to represent the video data." Ex.1005, 8:44-48. To provide an example of such an encoding scheme, Kim cites to and incorporates by reference U.S. Patent application No. 08/723,694, which ultimately issued as the Shin reference (discussed below, Ex.1007).

The auxiliary data is encoded using separate, dedicated coders. "[F]or stream 1 to n each stream has a dedicated coder 40*b* to 40*n*, respectively, to encode each particular data stream. The coders 40*b* to 40*n*, 40*u*, 40*v* are preferably identical, and each maps the eight bit values applied on the inputs of the coders 40*b* to 40*n* to a corresponding 10-bit word according to a predefined coding scheme." Ex.1005, 8:56-62. While Kim provides an example in which these coders use 8b/10b encoding, Kim explains that "the present invention may be used for various other coding rates." Ex.1005, 5:44-49.

Kim also teaches the feature that was deemed allowable by the Examiner—audio data placed within the video blanking intervals. As shown in Fig. 4A below, stream 1 (e.g., audio) is placed within a video blanking interval. "Data stream 1 is inserted during the horizontal blanking period and a start control word identifying the data stream 1 is used at the head of the data." Ex.1005, 10:2-10.



Ex.1005, Fig. 4A (annotated); Ex.1003, ¶63.

Accordingly, Kim provides evidence that the transmission sequence claimed by the '437 patent leading to its allowance was known. Ex.1003, ¶¶58-64.

2. Summary of Myers.

Myers describes a technique for selecting a subset of encoder output values that reduce data loss. Myers "relates generally to data transmission codes for use in data communication systems and, more specifically, to ... transmitting and receiving such a code for serial data communication." Ex.1006, 1:7-12. In particular, Myers discloses "a data transmission code for use in serial, digital, data communications, having predetermined desired transmission characteristics, such as DC balance [and] run-length limit." Ex.1006, 1:12-20. Myers' technique reduces "distortion of the signal and a **loss of information**." Ex.1006, 2:50-57.

Myers describes a technique for selecting a subset of transmission code words from a full code word set. “Each of the code words in FIG. 1 has certain bit relationships with respect to other bits within a given word, and with respect to certain bits in each of the other code words.” Ex.1006, 7:4-7. Myers describes the criteria along with the reasons for those criteria for selecting a subset of code words from the full code word set.

One criterion Myers uses, like the ’437 patent, is DC balance. “Firstly, each code word is inherently DC balanced in that each has four binary ‘1’s and four binary ‘0’s.” Ex.1006, 7:11-17. “This feature prevents a charge, and resulting capacitance or inductance, from building up on long transmission lines due to transmission of more bits having one value, such as a ‘1’, than those having the other binary value, such as a ‘0’.” Ex.1006, 7:17-20. “DC balance permits the use of driver circuits which have lower capacity to source or sink a current, which usually has a direct effect on system cost.” Ex.1006, 7:20-23. “Also, a DC balanced code permits use of AC coupling, which can be important when considering longer transmission lines, particularly wire transmission lines, because of the potential for the development of ground loops in DC coupled systems.” Ex.1006, 7:23-27.

Another criterion Myers uses, like the ’437 patent, is avoiding too many consecutive ones or zeroes. “Secondly, each code word has a (0,1) run-length limit as there are no more than two consecutive binary ‘1’s or ‘0’s within a code word.”

Ex.1006, 7:28-30. “Each code word also begins and ends with either a ‘01’ or ‘10’ bit grouping, to also provide for a (0,1) run-length limit across word boundaries. Together these bit relationships assure that a transmission of multiple code words will have a (0,1) run-length limit, regardless of how many and which combination of code words are actually transmitted.” Ex.1006, 7:30-36. “This feature limits the energy distribution of the transmitted signal into a minimum frequency band, which is narrower than codes having a longer run-length limit such as (0,3).” Ex.1006, 7:36-39. “A broader distribution of energy in the frequency band, such as results from a longer run-length limit, makes it difficult to implement AC coupling without the use of higher cost hardware to prevent the loss of the lower frequency components of the transmission.” Ex.1006, 7:43-47.

Accordingly, by using a subset of transmission code words that are (1) DC balanced, (2) have fewer contiguous ‘1’s and ‘0’s, and (3) have a ‘01’ or ‘10’ at each start and end, the transmission codes that are used will prevent a charge buildup and prevent loss of data. Ex.1003, ¶¶65-69.

3. Summary of Shin.

Shin—which Kim incorporates by reference—“relates to a DC-balanced, transition-controlled coding system in which rapid byte synchronization allows for prompt initiation of decoding.” Ex.1005, 8:58-67; Ex.1007, 1:13-16. In particular, Shin describes a specific encoding scheme in which a “data encoder converts 8 bits of data into 10 bits of transition controlled, DC balanced data." Ex.1007, 5:43-45. In particular, "8-bit bytes of parallel data 14 are provided to a DC-balanced encoder 18 operative to effect transition-controlled, DC-balanced 8B/10B coding." Ex.1007, 8:57-59. "The resultant 10B encoded characters 22 are provided to a serializer 26 disposed to convert the 10-bit characters into a serial data stream for transmission over a serial data link 30." Ex.1007, 8:60-63; Ex.1003, ¶70.

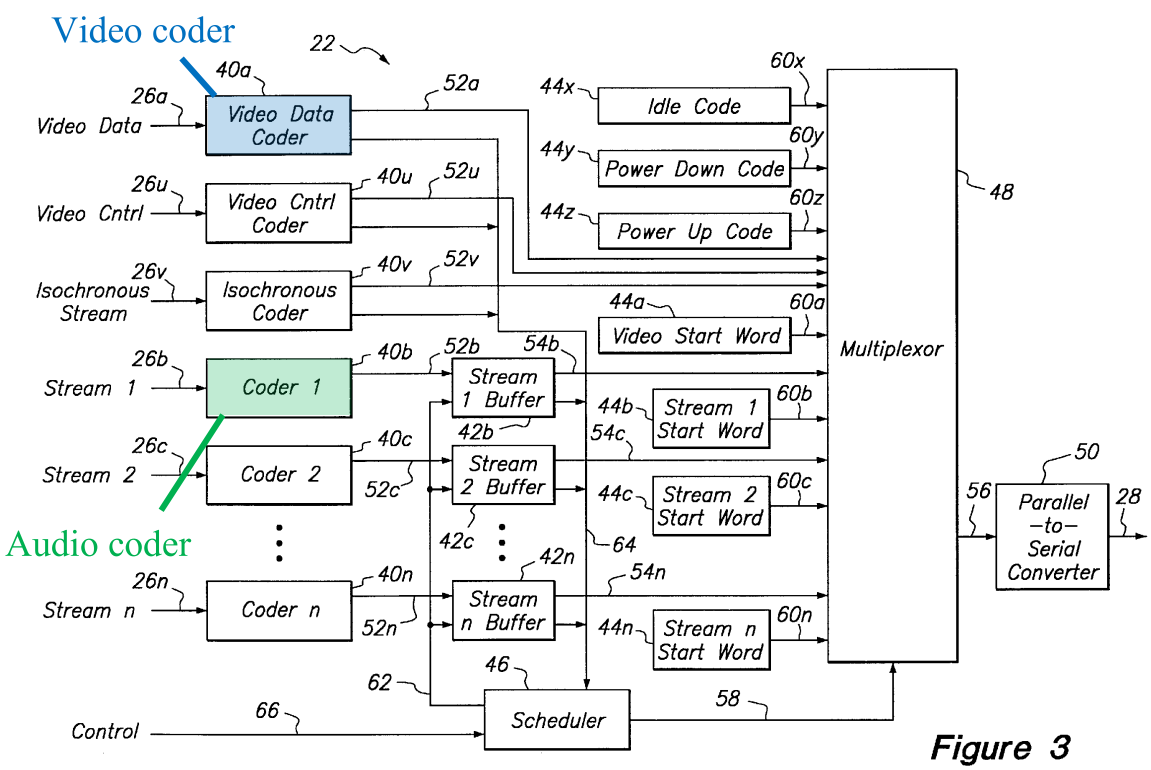
4. Reasons to Combine Shin with Kim.

A POSITA would have found it obvious to implement Kim's encoders—which implement 8b/10b encoding—to perform the specific 8b/10b encoding scheme taught by Shin because Kim explicitly cites to Shin and its encoding scheme. Ex.1003, ¶71. Kim states that "[a]n exemplary encoding scheme that can be used for coders 40*b* to 40*n* is detailed on pages 18-25 and FIG. 7 of U.S. patent application Ser. Nos. 60/004,907 and 08/732, 694, entitled "High-Speed Digital Video Signal Transmission System," filed on Oct. 6, 1995 and Sep. 30, 1996, which is incorporated herein by reference." Ex.1005, 8:58-67. Because Kim explicitly refers to Shin as an exemplary encoding scheme, a POSITA would have had a reasonable expectation of success implementing Kim's encoders with the capability of using Shin's 8b/10b encoding scheme. Ex.1003, ¶71.

5. Reasons to Combine Kim and Shin with Myers.

A POSITA would have found it obvious for Kim's audio encoders (e.g., 40b-40n) to implement techniques for reducing data loss such as Myers' subset-selection technique. Ex.1003, ¶72.

Kim describes encoders (e.g., 40a, 40b) that use conventional 8b/10b encoding schemes, such as those disclosed by Shin. These encoders receive input data such as video data and auxiliary data (e.g., audio) and produce output values for transmission, as shown in Fig. 3 below. Ex.1005, 5:67 - 6:16; Ex.1003, ¶73.



Ex.1005, Fig. 3 (annotated); Ex.1003, ¶73.

Kim, however, also teaches that "other coding rates" may be used. Ex.1005, 5:44-49. Accordingly, Kim leaves the selection of encoding schemes for both audio and video up to a POSITA. Ex.1003, ¶74.

When encoding audio data, a POSITA would have been motivated to look for encoding schemes that reduce data loss during transmission and thus provide better reliability. Ex.1003, ¶75. It was known that errors or defects in the audio transmission, e.g., due to data loss, are more noticeable than those in the video transmission. Ex.1003, ¶75. This is because "the human ear is more sensitive to errors or defects than the human eye." Ex.1008, 5:54-56. Indeed, it was known that when transmitting both video and audio, that audio data should be encoded more robustly. *See generally,* Ex.1010; Ex.1009, 10:67-11:25; Ex.1003, ¶75.

Accordingly, POSITAs would have looked to known techniques for more robustly encoding audio data when implementing Kim's teachings. Ex.1003, ¶76. Myers describes one known example of an encoding technique that reduces data loss and consequently increases transmission reliability. In particular, Myers describes selecting a subset of the available encoder output values that provide improved transmission reliability.

Myers' technique uses a subset of encoder output values, where the subset is selected based on the following criteria: (1) are DC balanced—an equal number of 1s and 0s, (2) contain no more than two 1's or 0's in sequence, and (3) have either an "01" or "10" on each end. *See* Ex.1006, 8:16-23. By selecting a subset of codes that meet these criteria, data can be transmitted with better reliability. Ex.1003, ¶77.

Myers' technique seeks to reduce "distortion of the signal and a loss of information." Ex.1006, 2:50-57. As Myers explains, using inherently DC balanced codes "prevents a charge, and resulting capacitance or inductance, from building up on long transmission lines" and "permits the use of driver circuits which have lower capacity to source or sink a current, which usually has a direct effect on system cost." Ex.1006, 7:17-27. Myers' technique further reduces data loss by avoiding too many contiguous ones or zeroes. Having fewer contiguous ones and zeroes "limits the energy distribution of the transmitted signal into a minimum frequency band." Ex.1006, 7:36-39. Having too many ones and zeroes "makes it difficult to implement AC coupling without the use of higher cost hardware to **prevent the loss** of the lower frequency components of the transmission." Ex.1006, 7:43-47; Ex.1003, ¶78.

Accordingly, because it was known that reducing data loss in audio transmission was more critical, and Myers' technique provides a way to reduce data loss in transmission, a POSITA would have been motivated to apply Myers' subset selection technique to Kim's transmission of audio data. For example, in the case where the data streams from encoders 40b-40n in Kim are used for audio, it would have been obvious to use Myers' subset-selection technique. Ex.1003, ¶79.

A POSITA would have found the results of the combination predictable because Myers provides step-by-step instructions as to how to select a subset.

Myers' first step is to find the values with "inherent DC balance." Ex.1006, 8:15-18. Myers' next step is to find the values that have "no more than two consecutive '1's or '0's." Ex.1006, 8:21. Myers then describes selecting the values "that begin and end with either a '01' or '10' bit grouping." Ex.1006, 8:21-23. Thus, because Myers provides specific steps that can be used to narrow down Kim's 10-bit values, a POSITA would have found the resulting subset predictable. Ex.1003, ¶80.

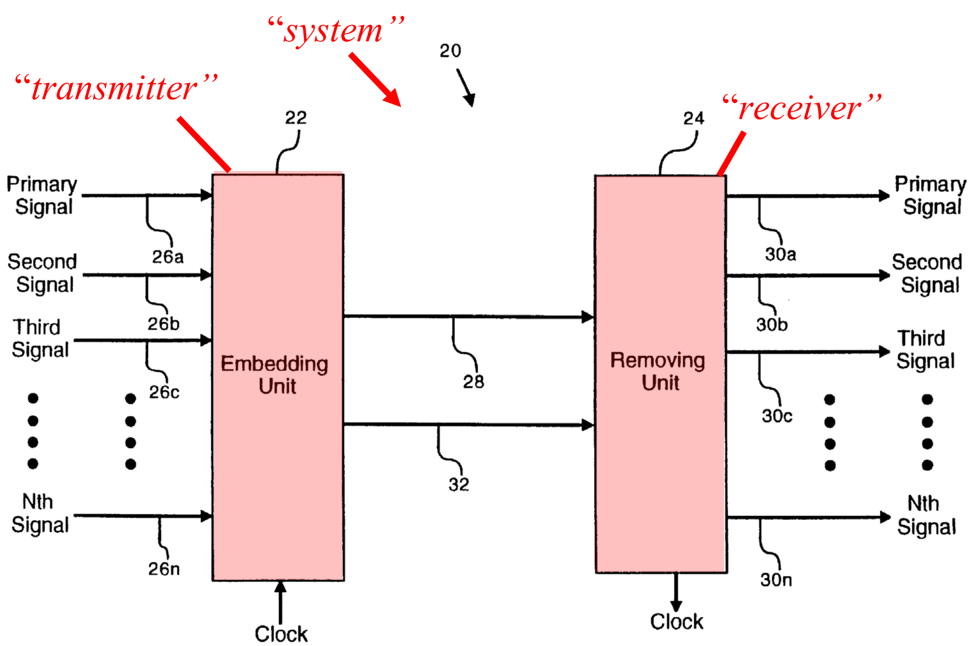
A POSITA would have had a reasonable expectation of success because both Myers and Kim relate to "serial" data transmission. Ex.1005, 1:24-27; Ex.1006, 1:7-12. A POSITA would have thus expected Myers' technique to work in Kim's serial transmission system as well. Additionally, a POSITA would have expected success when applying Myers' techniques to Kim's 10-bit words because "[e]ach of the methods of transmission mentioned has certain advantages and disadvantages, and the use of a particular form depends upon the requirements of the system in which it is to be utilized." Ex.1006, 1:29-33; Ex.1003, ¶81.

Accordingly, the proposed combination is merely applying a known technique (Myers' subset selection) to a known method (Kim's encoding of audio data) ready for improvement to yield predictable results (transmission of audio data with better error detection and reliability). Ex.1003, ¶82.

6. Claim 1

[1.0] ***A communication system, including: a receiver; a transmitter; and***

Kim describes a "serial link system 20" that includes an "embedding unit 22" ("*transmitter*") and a "removing unit 24" ("*receiver*"). Ex.1005, 4:6-13. The system 20 is illustrated in Fig. 1 below. Ex.1003, ¶¶83-84



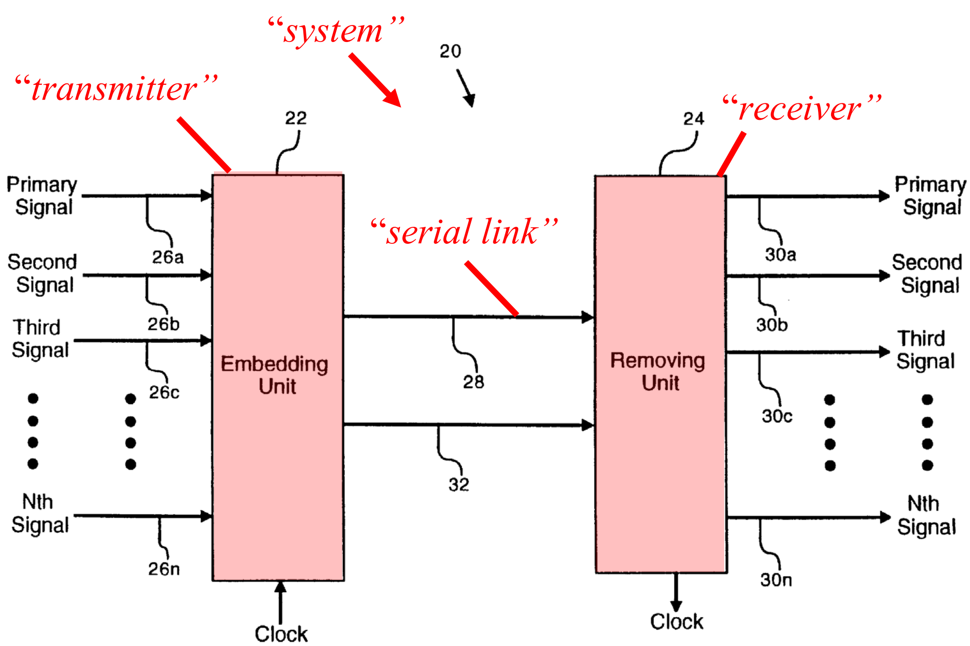
Ex.1005, Fig. 1 (annotated); Ex.1003, ¶84.

Kim's embedding unit 22 produces "an encoded serial sequence that is output on the first output for transmission over the serial line 28." Ex.1005, 4:28-53. The removing unit 24 ("*transmitter*") "is coupled to serial line 28 to receive the encoded serial sequence from the embedding unit 22." Ex.1005, 4:54-5:9.

Thus, because Kim describes a serial link system 20 with an embedding unit 22 for transmitting data and a removing unit 24 for receiving the data, Kim renders this limitation obvious. Ex.1003, ¶¶83-85.

[1.1] ***a serial link between the transmitter and the receiver, wherein the transmitter is coupled to receive input data,***

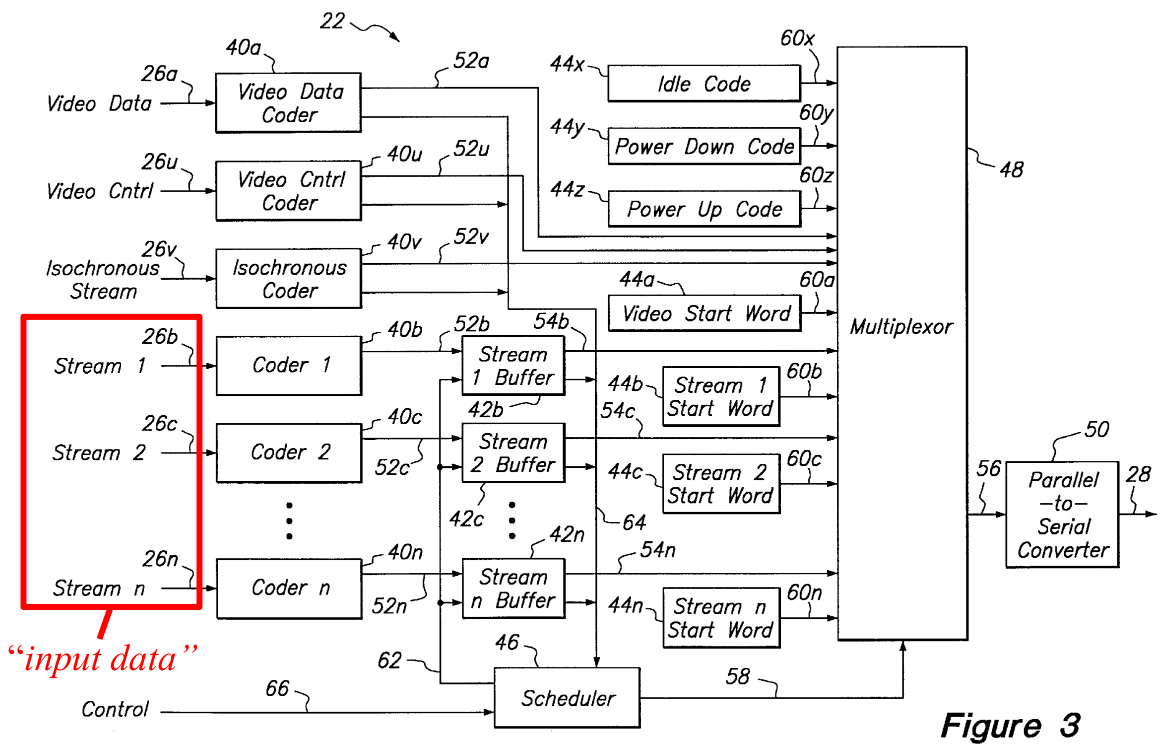
First, Kim's system includes a serial link between the transmitter and the receiver. As illustrated in Fig. 1 below, Kim's system illustrates a "single serial line 28" between the transmitter and receiver. Ex.1005, 4:6-13; Ex.1003, ¶¶86-87.



Ex.1005, Fig. 1 (annotated); Ex.1003, ¶87.

Second, Kim's embedding unit ("*transmitter*") is coupled to input lines to receive data. "The embedding unit 22 preferably has a plurality of inputs ... Each of the plurality of inputs is coupled to a respective input signal line 26*a*, 26*b*, 26*c*, 26*n* to receive a primary signal, preferably a video signal, a second signal, a third signal and a nth signal." Ex.1005, 4:28-53; Ex.1003, ¶88.

Third, Kim's embedding unit 22 includes an encoder 40 (comprising encoders 40b-40n) that "preferably has a plurality of inputs" for receiving data streams ("*input data*"). As shown in Kim's Fig. 3, each of the different encoders 40b-40n process streams 1-n, respectively, of input data. Ex.1005, 5:50-6:16. "[F]or stream 1 to n each stream has a dedicated coder 40*b* to 40*n*, respectively, to encode each particular data stream." Ex.1005, 8:56-58; Ex.1003, ¶89



Ex.1005, Fig. 3 (annotated); Ex.1003, ¶89.

Kim's encoders 40b to 40n "are preferably identical, and each maps the eight bit values applied on the inputs of the coders 40*b* to 40*n* to a corresponding 10-bit word according to a predefined coding scheme." Ex.1005, 8:44-67. Kim notes that the Shin reference provides "[a]n exemplary encoding scheme that can be used for coders 40*b* to 40*n* is detailed on pages 18-25 and FIG. 7." Ex.1005, 8:44-67. "Any number of conventional eight to 10 encoding schemes may be used in addition to the specific encoding scheme identified below..." Ex.1005, 5:50-6:16; Ex.1003, ¶90.

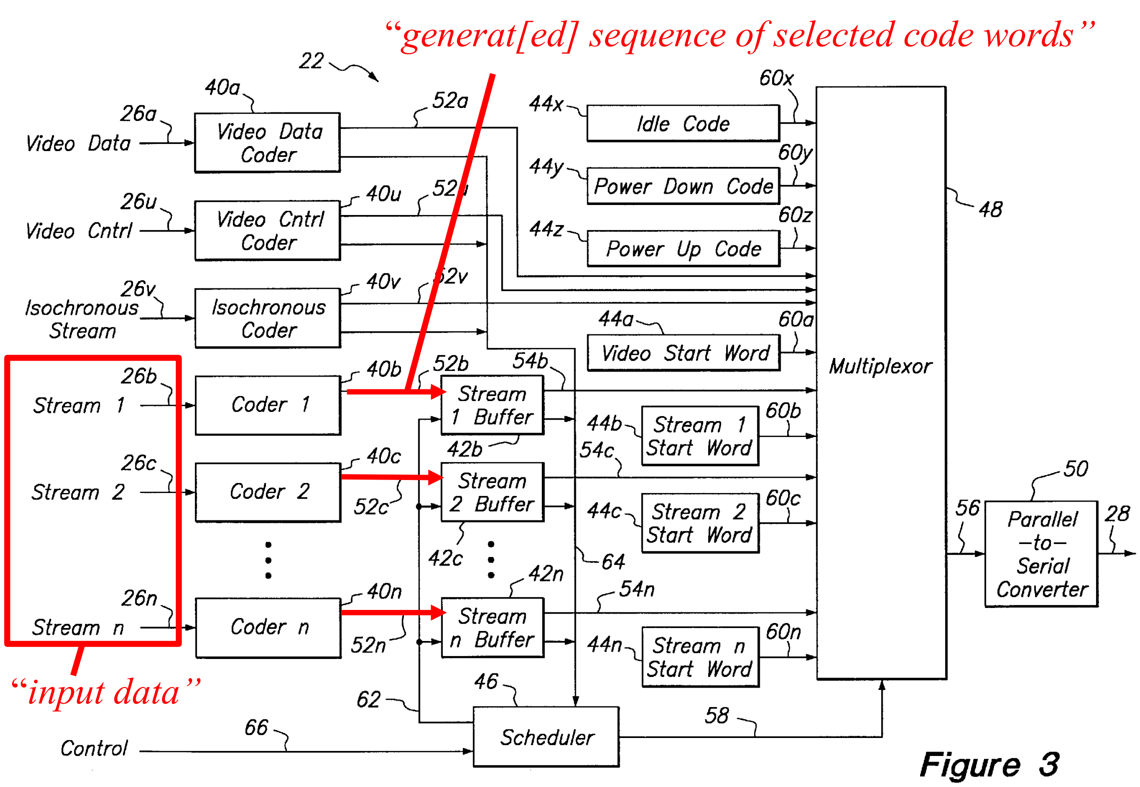
Kim explains that the input data streams may include, for example, audio data that is received as 8 bits of information: "Possible multimedia data streams that can be mixed include, but are not limited to audio..." Ex.1005, 5:21-49. This petition thus refers to Kim's multimedia data streams 1-n as "audio data streams" or "audio data." Ex.1003, ¶91.

Thus, Kim's system includes a serial line, and the transmitter is coupled to receive input signals, which renders this limitation obvious. Ex.1003, ¶92.

[1.2] ***configured to generate a sequence of selected code words by encoding the input data, and***

First, Kim's encoders 40b-40n encode the audio data streams ("*input data*") into encoded data ("*a sequence of selected code words*"). Kim explains that "for stream 1 to n each stream has a dedicated coder 40*b* to 40*n*, respectively, to encode each particular data stream." Ex.1005, 8:44-67. Thus, any of Kim's encoders generates a sequence of selected code words.

As illustrated at Fig. 3, Kim's coders 40b to 40n perform 8b/10b encoding to generate a sequence of "10-bit words" (illustrated with an arrow) that are output along lines 52b-52n, respectively. "For each of the input signal lines 26*a*, 26*b*, 26*c*, ... 26*n*, the encoder 40 preferably provides a corresponding output signal line 52*a*, 52*b*, 52*c*, ... 52*n*. Each of the output signals line 52*a*, 52*b*, 52*c*, ... 52*n* provides the encoded output of the signal applied to the corresponding input of the encoder 40." Ex.1005, 5:59-6:16. "The word output by the encoder 40 are preferably any 10-bit words." Ex.1005, 5:59-6:16. Because the output words are selected from a code word set, they are "*selected*" words as claimed. Ex.1003, ¶¶93-96.



Ex.1005, Fig. 3 (annotated); Ex.1003, ¶95.

Thus, Kim's disclosure of encoders 40b-40n generating a sequence of 10-bit words by encoding the 8-bit input data streams using conventional 8b/10b encoding renders this limitation obvious. Ex.1003, ¶¶93-97.

[1.3] ***configured to transmit the sequence of selected code words to the receiver over the serial link,***

First, as explained above at [1.0], Kim's embedding unit 22 ("*transmitter*") transmits encoded data over the serial line ("*serial link*"). Ex.1005, 4:28-53; Ex.1003, ¶98.

Second, for the reasons explained above at [1.2], the encoded data includes a "*sequence of selected code words*." Ex.1003, ¶99.

Thus, Kim's embedding unit encodes audio data streams as selected code words for transmission over a serial line, which renders this limitation obvious Ex.1003, ¶100.

[1.4] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

First, as discussed at limitation [1.2], Kim's encoders 40b-40n may receive 8-bit input audio data and "*generate a sequence of selected code words*." Ex.1003, ¶¶101-102.

Second, Kim in combination with Myers teaches that the "*selected code words*" are "*a robust subset of the full code word set*." A POSITA would have recognized that audio data is more vulnerable to perceived distortion. *See e.g.*, Ex.1008, 4:24-28; Ex.1009, 10:67-11:25. As such, it would have been obvious to a POSITA to use an encoding scheme for audio data that reduces data loss. Ex.1003,

¶103. While Kim states that the encoders 40b-40n may use 8b/10b encoding, Kim acknowledges that other coding schemes may be used. *See* Ex.1005, 5:44-49 ("For ease of understanding, the present invention will now be described in the context of encoding from eight bits to 10 bits, and decoding from 10 bits to eight bits although those skilled in the art will recognize that **the present invention may be used for various other coding rates**"). Ex.1003, ¶103.

Myers complements Kim's disclosure by generally teaching a coding technique that reduces distortions in audio transmission by reducing data loss. Ex.1006, 2:50-57 (seeking to reduce "distortion of the signal and a loss of information."); *see also* Ex.1006, 7:10-50. As detailed below, Myers teaches the selection of a subset of transmission codes such that they have DC balance (an equal number of '1's and '0's) and have fewer contiguous ones and zeros to obtain the data loss reduction. A POSITA would have been motivated to apply Myers' selection criteria to Kim's conventional encoding scheme for audio data to reduce distortion and data loss. Ex.1003, ¶104.

In more detail, Myers provides a technique for selecting a subset of code words. The subset is selected using three steps: selecting words that (1) are DC balanced—an equal number of 1s and 0s, (2) contain no more than two 1's or 0's in sequence, and (3) have either an "01" or "10" on each end.

> **The first step** 10 in this selection method is to select a first **subset** containing all of the code words from the 256 possibilities which have exactly four '1's and four '0's, to ensure inherent DC balance. From this subset, **a second step 12** is to select a second **subset** containing the code words having no more than two consecutive '1's or '0's is selected. The **third step 14** is to select a third **subset** of code words, from the second subset, that begin and end with either a '01' or '10' bit grouping.

Ex.1006, 8:15-23; Ex.1003, ¶105.

A POSITA would have found it obvious to apply Myers' subset-selection technique to Kim's encoders that encode the audio data for the reasons explained above at X.B.5. Ex.1003, ¶106. Applying Myers' subset-selection technique to Kim's 10-bit transmission words results in a subset of 10-bit values that have (1) DC balance, (2) no more than two consecutive 1's or 0's criteria, and (3) start and end values of "01" or "10." The result of this subset-selection technique is a "*subset of the full code word set*." Ex.1003, ¶106.

As an example, applying Myers' subset-selection technique to the full code word set described in Shin (*See* [1.2]) results in 42 different 10-bit values. Dr. Wolfe provides a table of these values in his declaration. Ex.1003, 107. These 42 10-bit values for data transmission correspond to a "*subset*" of Shin's conventional full code word set. Some of the 42 values correspond to some of Kim's control words that are listed in Kim's Appendix A, leaving 22 different 10-bit words available for sending data. As explained above at [1.1], Kim incorporates by reference Shin, which describes an example of a conventional 8b/10b encoding scheme and provides a list of the 10-bit output words. As shown in the figures below, each of the 42 10-bit values match up with one of Shin's output values. Ex.1003, ¶¶107-111.

00000000, 0 => 101010101, 7
00000001, 1 => 101010100, 6
00000010, 2 => 101010111, 5
00000011, 1 => 101010110, 6
00000100, 2 => 101010001, 5
00000101, 3 => 101010000, 4
00000110, 2 => 101010011, 5
00000111, 1 => 101010010, 6
00001000, 2 => 101011101, 5
00001001, 3 => 101011100, 4
00001010, 4 => 000001010, 4
00001011, 3 => 101011110, 4
00001100, 2 => 101011001, 5
00001101, 3 => 101011000, 4
00001110, 2 => 101011011, 5
00001111, 1 => 101011010, 6
00010000, 2 => 101000101, 5
00010001, 3 => 101000100, 4
00010010, 4 => 000010010, 4
00010011, 3 => 101000110, 4
00010100, 4 => 000010100, 4
00010101, 5 => 000010101, 5
00010110, 4 => 000010110, 4
00010111, 3 => 101000010, 4
00011000, 2 => 101001101, 5
00011001, 3 => 101001100, 4
00011010, 4 => 000011010, 4
00011011, 3 => 101001110, 4
00011100, 2 => 101001001, 5
00011101, 3 => 101001000, 4
00011110, 2 => 101001011, 5
00011111, 1 => 101001010, 6
00100000, 2 => 101110101, 5
00100001, 3 => 101110100, 4
00100010, 4 => 000100010, 4
00100011, 3 => 101110110, 4
00100100, 4 => 000100100, 4
00100101, 5 => 000100101, 5
00100110, 4 => 000100110, 4
00100111, 3 => 101110010, 4
00101000, 4 => 000101000, 4
00101001, 5 => 000101001, 5
00101010, 6 => 000101010, 6
00101011, 5 => 000101011, 5
00101100, 4 => 000101100, 4
00101101, 5 => 000101101, 5
00101110, 4 => 000101110, 4
00101111, 3 => 101111010, 4
00110000, 2 => 101100101, 5
00110001, 3 => 101100100, 4
00110010, 4 => 000110010, 4
01101011, 5 => 001101011, 5
01101100, 4 => 001101100, 4
01101101, 5 => 001101101, 5
01101110, 4 => 001101110, 4
01101111, 3 => 100111010, 4
01110000, 2 => 100100101, 5
01110001, 3 => 100100100, 4
01110010, 4 => 001110010, 4
01110011, 3 => 100100110, 4
01110100, 4 => 001110100, 4
01110101, 5 => 001110101, 5
01110110, 4 => 001110110, 4
01110111, 3 => 100100010, 4

00110011, 3 => 101100110, 4
00110100, 4 => 000110100, 4
00110101, 5 => 000110101, 5
00110110, 4 => 000110110, 4
00110111, 3 => 101100010, 4
00111000, 2 => 101101101, 5
00111001, 3 => 101101100, 4
00111010, 4 => 000111010, 4
00111011, 3 => 101101110, 4
00111100, 2 => 101101001, 5
00111101, 3 => 101101000, 4
00111110, 2 => 101101011, 5
00111111, 1 => 101101010, 6
01000000, 2 => 100010101, 5
01000001, 3 => 100010100, 4
01000010, 4 => 001000010, 4
01000011, 3 => 100010110, 4
01000100, 4 => 001000100, 4
01000101, 5 => 001000101, 5
01000110, 4 => 001000110, 4
01000111, 3 => 100010010, 4
01001000, 4 => 001001000, 4
01001001, 5 => 001001001, 5
01001010, 6 => 001001010, 6
01001011, 5 => 001001011, 5
01001100, 4 => 001001100, 4
01001101, 5 => 001001101, 5
01001110, 4 => 001001110, 4
01001111, 3 => 100011010, 4
01010000, 4 => 001010000, 4
01010001, 5 => 001010001, 5
01010010, 6 => 001010010, 6
01010011, 5 => 001010011, 5
01010100, 6 => 001010100, 6
01010101, 7 => 001010101, 7
01010110, 6 => 001010110, 6
01010111, 5 => 001010111, 5
01011000, 4 => 001011000, 4
01011001, 5 => 001011001, 5
01011010, 6 => 001011010, 6
01011011, 5 => 001011011, 5
01011100, 4 => 001011100, 4
01011101, 5 => 001011101, 5
01011110, 4 => 001011110, 4
01011111, 3 => 100001010, 4
01100000, 2 => 100110101, 5
01100001, 3 => 100110100, 4
01100010, 4 => 001100010, 4
01100011, 3 => 100110110, 4
01100100, 4 => 001100100, 4
01100101, 5 => 001100101, 5
01100110, 4 => 001100110, 4
01100111, 3 => 100110010, 4
01101000, 4 => 001101000, 4
01101001, 5 => 001101001, 5
01101010, 6 => 001101010, 6
10100011, 4 => 010100011, 4
10100100, 5 => 010100100, 5
10100101, 6 => 010100101, 6
10100110, 5 => 010100110, 5
10100111, 4 => 010100111, 4
10101000, 5 => 010101000, 5
10101001, 6 => 010101001, 6
10101010, 7 => 010101010, 7

01111000, 2 => 100101101, 5
01111001, 3 => 100101100, 4
01111010, 4 => 001111010, 4
01111011, 3 => 100101110, 4
01111100, 2 => 100101001, 5
01111101, 3 => 100101000, 4
01111110, 2 => 100101011, 5
01111111, 1 => 100101010, 6
10000000, 1 => 111010101, 6
10000001, 2 => 111010100, 5
10000010, 3 => 111010111, 4
10000011, 2 => 111010110, 5
10000100, 3 => 111010001, 4
10000101, 4 => 010000101, 4
10000110, 3 => 111010011, 4
10000111, 2 => 111010010, 5
10001000, 3 => 111011101, 4
10001001, 4 => 010001001, 4
10001010, 5 => 010001010, 5
10001011, 4 => 010001011, 4
10001100, 3 => 111011001, 4
10001101, 4 => 010001101, 4
10001110, 3 => 111011011, 4
10001111, 2 => 111011010, 5
10010000, 3 => 111000101, 4
10010001, 4 => 010010001, 4
10010010, 5 => 010010010, 5
10010011, 4 => 010010011, 4
10010100, 5 => 010010100, 5
10010101, 6 => 010010101, 6
10010110, 5 => 010010110, 5
10010111, 4 => 010010111, 4
10011000, 3 => 111001101, 4
10011001, 4 => 010011001, 4
10011010, 5 => 010011010, 5
10011011, 4 => 010011011, 4
10011100, 3 => 111001001, 4
10011101, 4 => 010011101, 4
10011110, 3 => 111001011, 4
10011111, 2 => 111001010, 5
10100000, 3 => 111110101, 4
10100001, 4 => 010100001, 4
10100010, 5 => 010100010, 5
11011011, 4 => 011011011, 4
11011100, 3 => 110001001, 4
11011101, 4 => 011011101, 4
11011110, 3 => 110001011, 4
11011111, 2 => 110001010, 5
11100000, 1 => 110110101, 6
11100001, 2 => 110110100, 5
11100010, 3 => 110110111, 4
11100011, 2 => 110110110, 5
11100100, 3 => 110110001, 4
11100101, 4 => 011100101, 4
11100110, 3 => 110110011, 4
11100111, 2 => 110110010, 5
11101000, 3 => 110111101, 4
11101001, 4 => 011101001, 4
11101010, 5 => 011101010, 5
11101011, 4 => 011101011, 4
11101100, 3 => 110111001, 4
11101101, 4 => 011101101, 4
11101110, 3 => 110111011, 4
11101111, 2 => 110111010, 5
11110000, 1 => 110100101, 6
11110001, 2 => 110100100, 5
11110010, 3 => 110100111, 4
11110011, 2 => 110100110, 5
11110100, 3 => 110100001, 4
11110101, 4 => 011110101, 4
11110110, 3 => 110100011, 4
11110111, 2 => 110100010, 5
11111000, 1 => 110101101, 6
11111001, 2 => 110101100, 5
11111010, 3 => 110101111, 4
11111011, 2 => 110101110, 5
11111100, 1 => 110101001, 6
11111101, 2 => 110101000, 5
11111111, 0 => 110101010, 7
Total Tr: 1176

10101011, 6 => 010101011, 6
10101100, 5 => 010101100, 5
10101101, 6 => 010101101, 6
10101110, 5 => 010101110, 5
10101111, 4 => 010101111, 4
10110000, 3 => 111110101, 4
10110001, 4 => 010110001, 4
10110010, 5 => 010110010, 5
10110011, 4 => 010110011, 4
10110100, 5 => 010110100, 5
10110101, 6 => 010110101, 6
10110110, 5 => 010110110, 5
10110111, 4 => 010110111, 4
10111000, 3 => 111101101, 4
10111001, 4 => 010111001, 4
10111010, 5 => 010111010, 5
10111011, 4 => 010111011, 4
10111100, 3 => 111101001, 4
10111101, 4 => 010111101, 4
10111110, 3 => 111101011, 4
10111111, 2 => 111101010, 5
11000000, 1 => 110010101, 6
11000001, 2 => 110010100, 5
11000010, 3 => 110010111, 4
11000011, 2 => 110010110, 5
11000100, 3 => 110010001, 4
11000101, 4 => 011000101, 4
11000110, 3 => 110010011, 4
11000111, 2 => 110010010, 5
11001000, 3 => 110011101, 4
11001001, 4 => 011001001, 4
11001010, 5 => 011001010, 5
11001011, 4 => 011001011, 4
11001100, 3 => 110011001, 4
11001101, 4 => 011001101, 4
11001110, 3 => 110011011, 4
11001111, 2 => 110011010, 5
11010000, 3 => 110000101, 4
11010001, 4 => 011010001, 4
11010010, 5 => 011010010, 5
11010011, 4 => 011010011, 4
11010100, 5 => 011010100, 5
11010001, 6 => 011010101, 6
11010110, 5 => 011010110, 5
11010111, 4 => 011010111, 4
11011000, 3 => 110001101, 4
11011001, 4 => 011011001, 4
11011010, 5 => 011011010, 5

Accordingly, whichever 10-bit values from the 42 selected values are used, each of them will be a "*subset of the full code word set*." Ex.1003, ¶112.

Second, the subset of code words resulting from Myers' subset-selection technique is a "*robust subset*" because the selected code words provide better protection against data loss. In particular, using Myers's subset selection technique results in a subset of code words that reduce data loss by setting a "run-length limit, which is the number of consecutive identical binary digits which may be found in a string of transmitted code words." Ex.1006, 2:58-62. By setting a run-length limit, Myers' subset eliminates a "cause [of] distortion of the signal and a loss of information," attributable to "[l]onger strings of consecutive binary digits." Ex.1006, 3:8-12; Ex.1003, ¶113.

Accordingly, by narrowing the conventional set of 8b/10b code words according to Myers' subset-selection technique, a more robust subset can be achieved. Ex.1003, ¶114.

Myers' subset-selection technique is similar to the subset-selection techniques described in the '437 patent. The '437 patent states that "the inventive code words are selected to be those whose serial patterns (during transmission) have fewer contiguous zeros and ones (e.g., on the average), and thus are less susceptible to ISI during transmission." Ex.1001, 7:18-34; Ex.1003, ¶115.

Thus, Kim's encoders 40b-40n for audio streams may encode input data using any known coding scheme, including Myers' subset-selection technique that utilizes a subset of more robust values to prevent data loss, which renders this limitation obvious. Ex.1003, ¶116.

Kim also teaches "*wherein each of the selected code words is a member of a robust subset of the full code word set*" under Patent Owner's interpretation of this term. Patent Owner interprets this term as follows: "A full code word set comprise 2^{10}=1024 codewords of 10 bits." Patent Owner further interprets the "*robust subset*" as the output of "ANSI standard 8B/10B" coding. *See* Ex.1012, 5-6. Under that interpretation of the phrase, Kim teaches the "*robust subset*" because the possible 10-bit outputs of Kim's conventional 8b/10b encoding techniques are a subset of 1024. *See* [1.5]; Ex.1005, 5:50-6:16; Ex.1007, 20:11-23:60; Ex.1003, ¶117.

[1.5] ***the input data can be encoded as a conventional sequence of code words of the full code word set, and***

First, Kim's input 8-bit audio data streams on lines 26b-26n are capable of being encoded using conventional sequence of "10-bit words" using eight-to-ten bit encoding schemes ("*can be encoded as a conventional sequence of code words*"): "Any number of conventional eight to 10 encoding schemes may be used." Ex.1005, 5:67-6:16; *see also* Ex.1005, 6:8-13 ("The word output by the encoder 40 are preferably any 10-bit words.") Kim's disclosed conventional eight-to-ten bit encoding may be referred to in the art as "8b/10b" encoding. Ex.1003, ¶118.

Kim also cites to an additional patent (Shin) which it incorporates by reference as an example of a conventional encoding scheme that can be used for encoders 40b to 40n. *See* Ex.1005, 8:58-67. Moreover, the '437 patent characterizes 8b/10b encoding as "conventional" in the background section. Ex.1001, 4:50-63; Ex.1003, ¶119.

Second, Kim's encoders—using conventional 8b/10b encoding techniques—produce 10-bit words that are part "*of a full code word set*." The range of possible outputs of a conventional 8b/10b is a "*full code word set*." An example of a full code word set is provided by Shin and shown in the table below. Ex.1003, ¶120.

New Coder Mapping - high Transition Control Mode
ASCII, Tr => New-Code, Tr

00000000, 0 => 101010101, 7	00110011, 3 => 101100110, 4
00000001, 1 => 101010100, 6	00110100, 4 => 000110100, 4
00000010, 2 => 101010111, 5	00110101, 5 => 000110101, 5
00000011, 1 => 101010110, 6	00110110, 4 => 000110110, 4
00000100, 2 => 101010001, 5	00110111, 3 => 101100010, 4
00000101, 3 => 101010000, 4	00111000, 2 => 101101101, 5
00000110, 2 => 101010011, 5	00111001, 3 => 101101100, 4
00000111, 1 => 101010010, 6	00111010, 4 => 000111010, 4
00001000, 2 => 101011101, 5	00111011, 3 => 101101110, 4
00001001, 3 => 101011100, 4	00111100, 2 => 101101001, 5
00001010, 4 => 000001010, 4	00111101, 3 => 101101000, 4
00001011, 3 => 101011110, 4	00111110, 2 => 101101011, 5
00001100, 2 => 101011001, 5	00111111, 1 => 101101010, 6
00001101, 3 => 101011000, 4	01000000, 2 => 100010101, 5
00001110, 2 => 101011011, 5	01000001, 3 => 100010100, 4
00001111, 1 => 101011010, 6	01000010, 4 => 001000010, 4
00010000, 2 => 101000101, 5	01000011, 3 => 100010110, 4
00010001, 3 => 101000100, 4	01000100, 4 => 001000100, 4
00010010, 4 => 000010010, 4	01000101, 5 => 001000101, 5
00010011, 3 => 101000110, 4	01000110, 4 => 001000110, 4
00010100, 4 => 000010100, 4	01000111, 3 => 100010010, 4
00010101, 5 => 000010101, 5	01001000, 4 => 001001000, 4
00010110, 4 => 000010110, 4	01001001, 5 => 001001001, 5
00010111, 3 => 101000010, 4	01001010, 6 => 001001010, 6
00011000, 2 => 101001101, 5	01001011, 5 => 001001011, 5
00011001, 3 => 101001100, 4	01001100, 4 => 001001100, 4
00011010, 4 => 000011010, 4	01001101, 5 => 001001101, 5
00011011, 3 => 101001110, 4	01001110, 4 => 001001110, 4
00011100, 2 => 101001001, 5	01001111, 3 => 100011010, 4
00011101, 3 => 101001000, 4	01010000, 4 => 001010000, 4
00011110, 2 => 101001011, 5	01010001, 5 => 001010001, 5
00011111, 1 => 101001010, 6	01010010, 6 => 001010010, 6
00100000, 2 => 101110101, 5	01010011, 5 => 001010011, 5
00100001, 3 => 101110100, 4	01010100, 6 => 001010100, 6
00100010, 4 => 000100010, 4	01010101, 7 => 001010101, 7
00100011, 3 => 101110110, 4	01010110, 6 => 001010110, 6
00100100, 4 => 000100100, 4	01010111, 5 => 001010111, 5
00100101, 5 => 000100101, 5	01011000, 4 => 001011000, 4
00100110, 4 => 000100110, 4	01011001, 5 => 001011001, 5
00100111, 3 => 101110010, 4	01011010, 6 => 001011010, 6
00101000, 4 => 000101000, 4	01011011, 5 => 001011011, 5
00101001, 5 => 000101001, 5	01011100, 4 => 001011100, 4
00101010, 6 => 000101010, 6	01011101, 5 => 001011101, 5
00101011, 5 => 000101011, 5	01011110, 4 => 001011110, 4
00101100, 4 => 000101100, 4	01011111, 3 => 100001010, 4
00101101, 5 => 000101101, 5	01100000, 2 => 100110101, 5
00101110, 4 => 000101110, 4	01100001, 3 => 100110100, 4
00101111, 3 => 101111010, 4	01100010, 4 => 001100010, 4
00110000, 2 => 101100101, 5	01100011, 3 => 100110110, 4
00110001, 3 => 101100100, 4	01100100, 4 => 001100100, 4
00110010, 4 => 000110010, 4	01100101, 5 => 001100101, 5
01101011, 5 => 001101011, 5	01100110, 4 => 001100110, 4
01101100, 4 => 001101100, 4	01100111, 3 => 100110010, 4
01101101, 5 => 001101101, 5	01101000, 4 => 001101000, 4
01101110, 4 => 001101110, 4	01101001, 5 => 001101001, 5
01101111, 3 => 100111010, 4	01101010, 6 => 001101010, 6
01110000, 2 => 100100101, 5	10100011, 4 => 010100011, 4
01110001, 3 => 100100100, 4	10100100, 5 => 010100100, 5
01110010, 4 => 001110010, 4	10100101, 6 => 010100101, 6
01110011, 3 => 100100110, 4	10100110, 5 => 010100110, 5
01110100, 4 => 001110100, 4	10100111, 4 => 010100111, 4
01110101, 5 => 001110101, 5	10101000, 5 => 010101000, 5
01110110, 4 => 001110110, 4	10101001, 6 => 010101001, 6
01110111, 3 => 100100010, 4	10101010, 7 => 010101010, 7

-continued

01111000, 2 => 100101101, 5	10101011, 6 => 010101011, 6
01111001, 3 => 100101100, 4	10101100, 5 => 010101100, 5
01111010, 4 => 001111010, 4	10101101, 6 => 010101101, 6
01111011, 3 => 100101110, 4	10101110, 5 => 010101110, 5
01111100, 2 => 100101001, 5	10101111, 4 => 010101111, 4
01111101, 3 => 100101000, 4	10110000, 3 => 111110101, 4
01111110, 2 => 100101011, 5	10110001, 4 => 010110001, 4
01111111, 1 => 100101010, 6	10110010, 5 => 010110010, 5
10000000, 1 => 111010101, 6	10110011, 4 => 010110011, 4
10000001, 2 => 111010100, 5	10110100, 5 => 010110100, 5
10000010, 3 => 111010111, 4	10110101, 6 => 010110101, 6
10000011, 2 => 111010110, 5	10110110, 5 => 010110110, 5
10000100, 3 => 111010001, 4	10110111, 4 => 010110111, 4
10000101, 4 => 010000101, 4	10111000, 3 => 111101101, 4
10000110, 3 => 111010011, 4	10111001, 4 => 010111001, 4
10000111, 2 => 111010010, 5	10111010, 5 => 010111010, 5
10001000, 3 => 111011101, 4	10111011, 4 => 010111011, 4
10001001, 4 => 010001001, 4	10111100, 3 => 111101001, 4
10001010, 5 => 010001010, 5	10111101, 4 => 010111101, 4
10001011, 4 => 010001011, 4	10111110, 3 => 111101011, 4
10001100, 3 => 111011001, 4	10111111, 2 => 111101010, 5
10001101, 4 => 010001101, 4	11000000, 1 => 110010101, 6
10001110, 3 => 111011011, 4	11000001, 2 => 110010100, 5
10001111, 2 => 111011010, 5	11000010, 3 => 110010111, 4
10010000, 3 => 111000101, 4	11000011, 2 => 110010110, 5
10010001, 4 => 010010001, 4	11000100, 3 => 110010001, 4
10010010, 5 => 010010010, 5	11000101, 4 => 011000101, 4
10010011, 4 => 010010011, 4	11000110, 3 => 110010011, 4
10010100, 5 => 010010100, 5	11000111, 2 => 110010010, 5
10010101, 6 => 010010101, 6	11001000, 3 => 110011101, 4
10010110, 5 => 010010110, 5	11001001, 4 => 011001001, 4
10010111, 4 => 010010111, 4	11001010, 5 => 011001010, 5
10011000, 3 => 111001101, 4	11001011, 4 => 011001011, 4
10011001, 4 => 010011001, 4	11001100, 3 => 110011001, 4
10011010, 5 => 010011010, 5	11001101, 4 => 011001101, 4
10011011, 4 => 010011011, 4	11001110, 3 => 110011011, 4
10011100, 3 => 111001001, 4	11001111, 2 => 110011010, 5
10011101, 4 => 010011101, 4	11010000, 3 => 110000101, 4
10011110, 3 => 111001011, 4	11010001, 4 => 011010001, 4
10011111, 2 => 111001010, 5	11010010, 5 => 011010010, 5
10100000, 3 => 111110101, 4	11010011, 4 => 011010011, 4
10100001, 4 => 010100001, 4	11010100, 5 => 011010100, 5
10100010, 5 => 010100010, 5	11010001, 6 => 011010101, 6
11011011, 4 => 011011011, 4	11010110, 5 => 011010110, 5
11011100, 3 => 110001001, 4	11010111, 4 => 011010111, 4
11011101, 4 => 011011101, 4	11011000, 3 => 110001101, 4
11011110, 3 => 110001011, 4	11011001, 4 => 011011001, 4
11011111, 2 => 110001010, 5	11011010, 5 => 011011010, 5
11100000, 1 => 110110101, 6	
11100001, 2 => 110110100, 5	
11100010, 3 => 110110111, 4	
11100011, 2 => 110110110, 5	
11100100, 3 => 110110001, 4	
11100101, 4 => 011100101, 4	
11100110, 3 => 110110011, 4	
11100111, 2 => 110110010, 5	
11101000, 3 => 110111101, 4	
11101001, 4 => 011101001, 4	
11101010, 5 => 011101010, 5	
11101011, 4 => 011101011, 4	
11101100, 3 => 110111001, 4	
11101101, 4 => 011101101, 4	
11101110, 3 => 110111011, 4	
11101111, 2 => 110111010, 5	
11110000, 1 => 110100101, 6	
11110001, 2 => 110100100, 5	
11110010, 3 => 110100111, 4	
11110011, 2 => 110100110, 5	
11110100, 3 => 110100001, 4	
11110101, 4 => 011110101, 4	
11110110, 3 => 110100011, 4	
11110111, 2 => 110100010, 5	
11111000, 1 => 110101101, 6	
11111001, 2 => 110101100, 5	
11111010, 3 => 110101111, 4	
11111011, 2 => 110101110, 5	
11111100, 1 => 110101001, 6	
11111101, 2 => 110101000, 5	
11111111, 0 => 110101010, 7	
Total Tr: 1176	

Mean Tr: 4.59

New Coder Mapping - Low Transition Control Mode
ASCII, Tr => New-Code, Tr

00000000, 0 => 000000000, 0
00000001, 1 => 000000001, 1
00000010, 2 => 000000010, 2
00000011, 1 => 000000011, 1
00000100, 2 => 000000100, 2
00000101, 3 => 000000101, 3
00000110, 2 => 000000110, 2
00000111, 1 => 000000111, 1
00001000, 2 => 000001000, 2
00001001, 3 => 000001001, 3
00001010, 4 => 101011111, 3
00001011, 3 => 000001011, 3
00001100, 2 => 000001100, 2
00001101, 3 => 000001101, 3
00001110, 2 => 000001110, 2
00001111, 1 => 000001111, 1
00010000, 2 => 000010000, 2
00010001, 3 => 100010001, 3
00010010, 4 => 101000111, 3
00010011, 3 => 000010011, 3
00010100, 4 => 101000001, 3
00010101, 5 => 101000000, 2
00010110, 4 => 101000011, 3
00010111, 3 => 000010111, 3
00011000, 2 => 000011000, 2
00011001, 3 => 000011001, 3
00011010, 4 => 101001111, 3
00011011, 3 => 000011011, 3
00011100, 2 => 000011100, 2
00011101, 3 => 000011101, 3
00011110, 2 => 000011110, 2
00011111, 1 => 000011111, 1
00100000, 2 => 000100000, 2
00100001, 3 => 000100001, 3
00100010, 4 => 101110111, 3
00100011, 3 => 000100011, 3
00100100, 4 => 101110001, 3
00100101, 5 => 101110000, 2
00100110, 4 => 101110011, 3
00100111, 3 => 000100111, 3
00101000, 4 => 101111101, 3
00101001, 5 => 101111100, 2
00101010, 6 => 101111111, 1
00101011, 5 => 101111110, 2
00101100, 4 => 101111001, 3
00101101, 5 => 101111000, 2
00101110, 4 => 101111011, 3
00101111, 3 => 000101111, 3
00110000, 2 => 000110000, 2
00110001, 3 => 000110001, 3
00110010, 4 => 101100111, 3
01101011, 5 => 100111110, 2
01101100, 4 => 100111001, 3
01101101, 5 => 100111000, 2
01101110, 4 => 100111011, 3
01101111, 3 => 100111010, 3
01110000, 2 => 001101111, 2
01110001, 3 => 001110000, 3
01110010, 4 => 001110001, 3
01101011, 3 => 100100111, 3
01110100, 4 => 001110011, 3
01110101, 5 => 100100001, 2
01110110, 4 => 100100000, 3
01110111, 3 => 100100011, 3
01111000, 2 => 001111000, 2
01111001, 3 => 001111001, 3
01111010, 4 => 100101111, 3
01111011, 3 => 001111011, 3
01111100, 2 => 001111100, 2
01111101, 3 => 011111101, 3
01111110, 2 => 001111110, 2
01111111, 1 => 001111111, 1
10000000, 1 => 010000000, 1
10000001, 2 => 010000001, 2
00110011, 3 => 000110011, 3
00110100, 4 => 101100001, 3
00110101, 5 => 101100000, 2
00110110, 4 => 101100011, 3
00110111, 3 => 000110111, 3
00111000, 2 => 000111000, 2
00111001, 3 => 000111001, 3
00111010, 4 => 101101111, 3
00111011, 3 => 000111011, 3
00111100, 2 => 000111100, 2
00111101, 3 => 000111101, 3
00111110, 2 => 000111110, 2
00111111, 1 => 000111111, 1
01000000, 2 => 001000000, 2
01000001, 3 => 001000091, 3
01000010, 4 => 100010111, 3
01000011, 3 => 001000011, 3
01000100, 4 => 100010001, 3
01000101, 5 => 100010000, 2
01000110, 4 => 100010011, 3
01000111, 3 => 001000111, 3
01001000, 4 => 100011101, 3
01001001, 5 => 100011100, 2
01001010, 6 => 100011111, 1
01001011, 5 => 100011110, 2
01001100, 4 => 100011001, 3
01001101, 5 => 100011000, 2
01001110, 4 => 100011011, 3
01001111, 3 => 001001111, 3
01010000, 4 => 100000101, 3
01010001, 5 => 100000100, 2
01010010, 6 => 100000111, 1
01010011, 5 => 100000110, 2
01010100, 6 => 100000001, 1
01010101, 7 => 100000000, 0
01010110, 6 => 100000011, 1
01010111, 5 => 100000010, 2
01011000, 4 => 100001101, 3
01011001, 5 => 100001100, 2
01011010, 6 => 100001111, 1
01011011, 5 => 100001110, 2
01011100, 4 => 100001001, 3
01011101, 5 => 100001000, 2
01011110, 4 => 100001011, 3
01011111, 3 => 001011111, 3
01100000, 2 => 001100000, 2
01100001, 3 => 001100001, 3
01100010, 4 => 100110111, 3
01100011, 3 => 001100011, 3
01100100, 4 => 100110001, 3
01100101, 5 => 100110000, 2
01100110, 4 => 100110011, 3
01100111, 3 => 001100111, 3
01101000, 4 => 100111101, 3
01101001, 5 => 100111100, 2
01101010, 6 => 100111111, 1
10100011, 4 => 111110110, 3
10100100, 5 => 111110001, 2
10100101, 6 => 111110000, 1
10100110, 5 => 111110011, 2
10100111, 4 => 111110010, 3
10101000, 5 => 111111101, 2
10101001, 6 => 111111100, 1
10101010, 7 => 111111111, 0
10101011, 6 => 111111110, 1
10101100, 5 => 111111001, 2
10101101, 6 => 111111000, 1
10101110, 5 => 111111011, 2
10101111, 4 => 111111010, 3
10110000, 3 => 010110000, 3
10110001, 4 => 111100100, 3
10110010, 5 => 111100111, 2
10110011, 4 => 111100110, 3
10110100, 5 => 111100001, 2
10000010, 3 => 010000010, 3
10000011, 2 => 010000011, 2
10000100, 3 => 010000100, 3
10000101, 4 => 111010000, 3
10000110, 3 => 010000110, 3
10000111, 2 => 010000111, 2
10001000, 3 => 010001000, 3
10001001, 4 => 111011100, 3
10001010, 5 => 111011111, 2
10001011, 4 => 110111110, 3
10001100, 3 => 010001100, 3
10001101, 4 => 111011000, 3
10001110, 3 => 010001110, 3
10001111, 2 => 010001111, 2
10010000, 3 => 010010000, 3
10010001, 4 => 111000100, 3
10010010, 5 => 111000111, 2
10010011, 4 => 111000110, 3
10010100, 5 => 111000001, 2
10010101, 6 => 111000000, 1
10010110, 5 => 111000011, 2
10010111, 4 => 111000010, 3
10011000, 3 => 010011000, 3
10011001, 4 => 111001100, 3
10011010, 5 => 111001111, 2
10011011, 4 => 111001110, 3
10011100, 3 => 010011100, 3
10011101, 4 => 111001000, 3
10011110, 3 => 010011110, 3
10011111, 2 => 010011111, 2
10100000, 3 => 010100000, 3
10100001, 4 => 111110100, 3
10100010, 5 => 111110111, 2
11011011, 4 => 110001110, 3
11011100, 3 => 011011100, 3
11011101, 4 => 110001000, 3
11011110, 3 => 011011110, 3
11011111, 2 => 011011111, 2
11100000, 1 => 011100000, 1
11100001, 2 => 011100001, 2
11100010, 3 => 011100010, 3
11100011, 2 => 011100011, 2
11100100, 3 => 011100100, 3
11100101, 4 => 110110000, 3
11100110, 3 => 011100110, 3
11100111, 2 => 011100111, 2
11101000, 3 => 011101000, 3
11101001, 4 => 110111100, 3
11101010, 5 => 110111111, 2
11101011, 4 => 110111110, 3
11101100, 3 => 011101100, 3
11101101, 4 => 110111000, 3
11101110, 3 => 011101110, 3
11101111, 2 => 011101111, 2
11110000, 1 => 011110000, 1
11110001, 2 => 011110001, 2
11110010, 3 => 011110010, 3
11110011, 2 => 011110011, 2
11110100, 3 => 011110100, 3
11110101, 4 => 110100000, 3
11110110, 3 => 011110110, 3
11110111, 2 => 011110111, 2
11111000, 1 => 011111000, 1
11111001, 2 => 011111001, 2
11111010, 3 => 011111010, 3
11111011, 2 => 011111011, 2
11111100, 1 => 011111100, 1
11111101, 2 => 011111101, 2
11111110, 1 => 011111110, 1
11111111, 0 => 011111111, 0
Total Tr: 616
Mean Tr: 2.41
10110101, 6 => 111100000, 1
10110110, 5 => 111100011, 2
10110111, 4 => 111100010, 3
10111000, 3 => 010111000, 3
10111001, 4 => 111101100, 3
10111010, 5 => 111101111, 2
10111011, 4 => 111101110, 3
10111100, 3 => 010111100, 3
10111101, 4 => 111101000, 3
10111110, 3 => 010111110, 3
10111111, 2 => 010111111, 2
11000000, 1 => 011000000, 1
11000001, 2 => 011000001, 2
11000010, 3 => 011000010, 3
11000011, 2 => 011000011, 2
11000100, 3 => 011000100, 3
11000101, 4 => 110010000, 3
11000110, 3 => 011000110, 3
11000111, 2 => 011000111, 2
11001000, 3 => 011001000, 3
11001001, 4 => 110011100, 3
11001010, 5 => 110011111, 2
11001011, 4 => 110011110, 3
11001100, 3 => 011001100, 3
11001101, 4 => 110011000, 3
11001110, 3 => 011001110, 3
11001111, 2 => 011001111, 2
11010000, 3 => 011010000, 3
11010001, 4 => 110000100, 3
11010010, 5 => 110000111, 2
11010011, 4 => 110000110, 3
11010100, 5 => 110000001, 2
11010101, 6 => 110000000, 1
11010110, 5 => 110000011, 2
11010111, 4 => 110000010, 3
11011000, 3 => 011011000, 3
11011001, 4 => 110001100, 3
11011010, 5 => 110001111, 2

Ex.1007, 20:11-23:60 (listing all input and output values for the low-transition and high-transition mode 8b/10b encoding schemes).

Thus, Kim in combination with Shin discloses providing 8-bit input audio data words capable of being encoded as conventional sequence (using 8b/10b encoding) of 10-bit code words of the available code word set renders this limitation obvious. Ex.1003, ¶¶118-122.

Kim also teaches a "*full code word set*" under Patent Owner's interpretation of this term. Patent Owner interprets this term as follows: "A full code word set comprise 2^{10}=1024 codewords of 10 bits." Ex.1012, 5. Under that interpretation of the phrase, Kim alone would disclose a "*full code word set*" because Kim's encoders generate 10-bit output words. *See* Ex.1005, 5:50-6:16; Ex.1003, ¶123.

[1.6] ***the sequence of selected code words is less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words,***

Kim's encoders 40b-40n, using Myers' more robust subset-selection technique, produce 10-bit words that are "*less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words*." For the reasons explained above, Myers' subset of codewords use fewer contiguous '1's and '0's, thus making them less susceptible to data loss attributable to "longer strings of consecutive binary digits." Ex.1006, 3:8-12. Additionally, "[e]ach code word also begins and ends with either a '01' or

'10' bit grouping, to also provide for a (0,1) run-length limit across word boundaries." Ex.1006, 7:30-32. Thus, the number of contiguous '1's and '0's across word/symbol[2] boundaries is limited as well. *See* Ex.1006, 2:40-57. Thus, by use of fewer contiguous '1's and '0's, Myers' technique reduces inter-symbol interference. Ex.1003, ¶¶124-125.

Myers' subset-selection technique reduces inter-symbol interference in the same way as the '437 patent. The '437 patent itself acknowledges that fewer contiguous 1's and 0's will reduce inter-symbol interference: "[T]he inventive code words are selected to be those whose serial patterns (during transmission) have fewer contiguous zeros and ones (e.g., on the average), and thus are less susceptible to ISI during transmission." Ex.1001, 7:18-34; Ex.1003, ¶126.

Accordingly, because Myers' subset-selection technique produces code words with fewer contiguous 1's and 0's, Myers' technique reduces inter-symbol interference in the manner claimed. Ex.1003, ¶127.

Thus, Kim's encoders 40b-40n—implementing Myers' subset-selection technique—reduce inter-symbol interference and thus render this limitation

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[2] A POSITA would have understood that a "symbol" simply refers to the 10-bit encoded word. Ex.1011, 1137 ("symbol ... (6) A 10-bit, 8B/10B encoded byte"); Ex.1003, ¶125.

obvious. Ex.1003, ¶¶124-28.

Kim also teaches "*wherein each of the selected code words is a member of a robust subset of the full code word set*" under Patent Owner's interpretation of this term. Patent Owner alleges that inter-symbol interference is met by "symbol-level DC balancing." *See* Ex.1012, 6. Under that interpretation of the phrase, Kim in combination with Myers teaches code words that are "*less susceptible to inter-symbol interference*" because Myers' subset is DC balanced. *See e.g.* Ex.1006, 8:15-23; Ex.1003, ¶129.

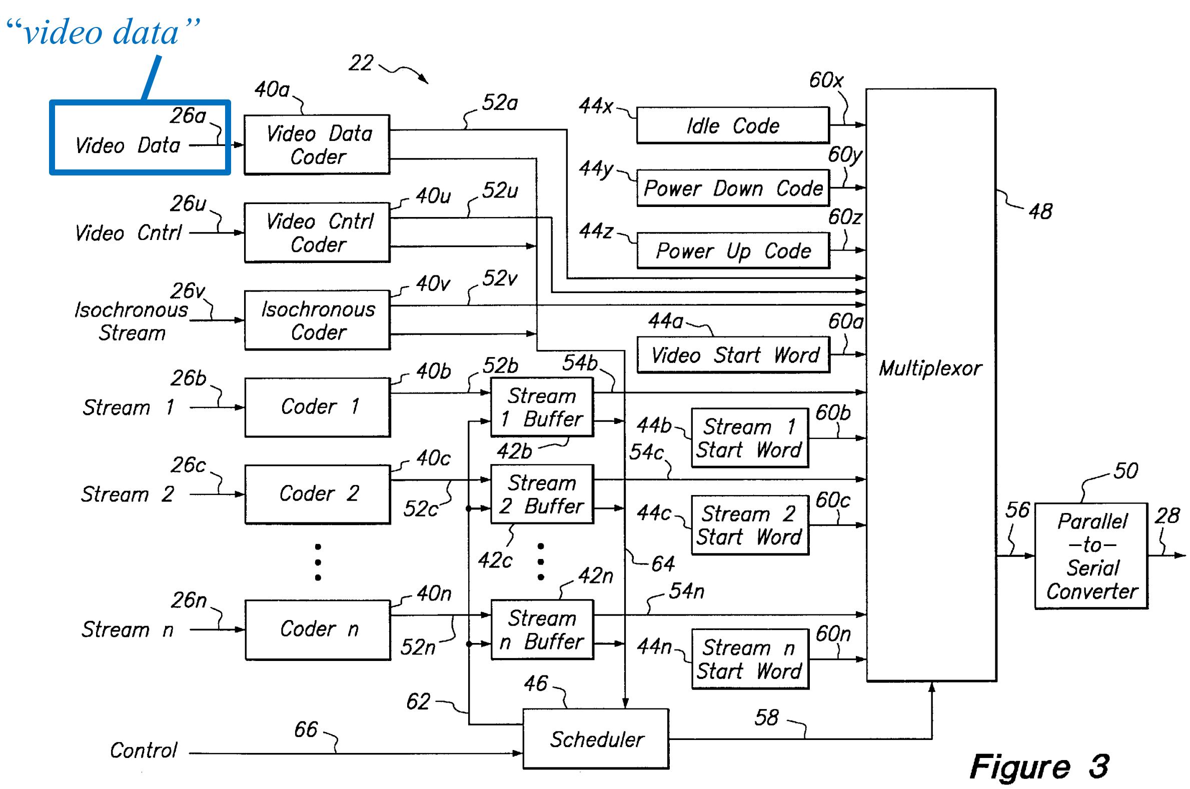
[1.7] ***wherein the input data are auxiliary data,***

Kim's "multimedia data streams" are "*auxiliary data*" as described in the '437 patent. The '437 patent explains that "[t]he expression 'auxiliary data' is used in a broad sense herein to denote digital audio data or any other type of data other than video data and timing information for video data (e.g., a video clock)." Ex.1001, 5:22-25. Kim similarly describes its invention "in the context of mixing various multimedia data streams into the display refresh data (primary stream) using the unused bandwidth of horizontal and vertical blanking periods." Ex.1005, 5:20-27. "Possible multimedia data streams that can be mixed include, but are not limited to **audio** I/O, keyboard and mouse, IC bus (serial bus for peripheral components)." Ex.1005, 5:20-28.

Thus, Kim's input multimedia data streams which may be audio data streams renders this limitation obvious. Ex.1003, ¶¶130-131.

[1.8] ***the transmitter is coupled to receive video data and configured to generate a sequence of video code words by encoding the video data, and***

First, Kim's embedding unit 22 is configured to receive video data on signal line 26a. "For example, the first primary stream is preferably a video stream including the data and control signals for display refresh." Ex.1005, 5:50-6:15; Ex.1003, ¶132.



Ex.1005, Fig. 3 (annotated); Ex.1003, ¶132.

Second, Kim teaches that video code words are generated by an encoder 40a that encodes video data. *See* Ex.1005, 8:44-67. Kim teaches encoding and transmitting video data ("*video code words*") as a video data stream. "For example, the first primary stream is preferably a video stream including the data and control signals for display refresh." Ex.1005, 5:50-6:15. A "video data coder 40*a* is provided for encoding the video data signals to a 10-bit parallel output." Ex.1005, 8:44-67. For example, the video data coder 40a may be three 8-to-10 bit coders if 24 bits of RGB data are used with 8 bits for a red channel, 8 bits for a green channel, 8 bits for a blue channel, or two 8-to-10 bit coders for 16 bits of YUV data." Ex.1005, 8:44-67.

Thus, Kim's encoding of video data as a sequence of video code words renders this limitation obvious. Ex.1003, ¶¶132-134.

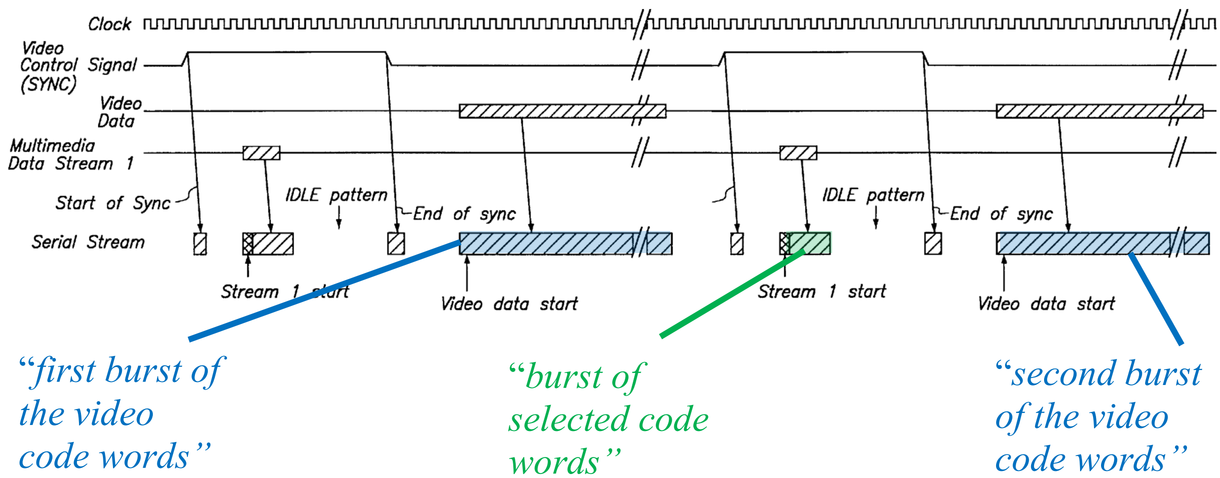
[1.9] ***the transmitter is configured to transmit to the receiver over the serial link a first burst of the video code words followed by a burst of the selected code words followed by a second burst of the video code words,***

First, as explained above at [1.0], Kim's system includes a transmitter. Ex.1003, ¶135.

Second, for the reasons explained above at [1.8], Kim teaches encoding and transmitting video data ("*video code words*") as a video data stream ("*burst[s] of video data*"). Ex.1005, 5:50-6:15; 8:44-67; Ex.1003, ¶136.

Third, for the reasons explained above at [1.2] and [1.3], Kim's encoders 40b-40n encode an audio data stream as "*selected code words*." Because the selected code words are transmitted as a stream, they are a "***burst** of selected code words*" as claimed. Ex.1003, ¶137.

Fourth, Kim teaches transmitting video data ("*a first burst of the video code words*"), audio data ("*the burst of the selected code words*"), and more video data ("*a second burst of the video control words*") in the order claimed. Fig. 4A is shown below in a repeated manner, given that the illustrated sequence is repeatedly transmitted over the serial link. *See* Ex.1005, 9:45-10:25 (describing Fig. 4A as part of a data **stream**); Ex.1003, ¶138.



Ex.1005, Fig. 4A (modified, annotated); Ex.1003, ¶138.

"FIG. 4A is a timing diagram showing the clock signal, the video control and data signals that form the primary stream, data signals that for a second stream, and the serial stream produced by the embedding unit 22 and output on line 28." Ex.1005, 9:46-10:10. "The timing diagrams of FIGS. 4A and 4B correspond to the embodiment of the embedding unit shown in FIG. 3." Ex.1005, 9:46-10:10. "Data stream 1 is inserted during the horizontal blanking period and a start control word identifying the data stream 1 is used at the head of the data stream 1." Ex.1005, 9:46-10:10; 10:56-59.

Thus, Kim's transmission of the audio data stream 1 in the blanking period between bursts of video code words renders this limitation obvious. Ex.1003, ¶¶135-140.

[1.10] ***wherein each of the video code words is a member of the full code word set and at least one of the video code words is not a member of the robust subset.***

First, for the reasons explained above at [1.2], Kim's encoders are capable of encoding data using conventional 8b/10b encoding. As explained above at X.B.5, a POSITA would have been motivated to apply Myers' subset-selection technique to the audio data. Ex.1003, ¶141. However, the video data encoder 40a in Kim may still use conventional 8b/10b encoding that utilizes the full code set. "Still more particularly, a video data coder 40*a* is provided for encoding the video data signals to a 10-bit parallel output." Ex.1005, 8:44-67.

Accordingly, because Kim's system separately encodes video data using conventional 8b/10b encoding techniques, "*each of the video code words is a member of the full code word set*" as claimed. Ex.1003, ¶142.

Second, there are some video code words from the full code word set that are not part of Kim's specialized subset using Myers' technique. For example, the code words shown below are an exemplary full code word set. The highlighted words below correspond to the 22 non-control words that meet Myers's subset criteria. As can be seen, most of the words are *not* a member of Myers' specialized subset ("*at least one of the video code words is not a member of the robust subset*"). Ex.1003, ¶143.

00000000, 0 => 101010101, 7
00000001, 1 => 101010100, 6
00000010, 2 => 101010111, 5
00000011, 1 => 101010110, 6
00000100, 2 => 101010001, 5
00000101, 3 => 101010000, 4
00000110, 2 => 101010011, 5
00000111, 1 => 101010010, 6
00001000, 2 => 101011101, 5
00001001, 3 => 101011100, 4
00001010, 4 => 000001010, 4
00001011, 3 => 101011110, 4
00001100, 2 => 101011001, 5
00001101, 3 => 101011000, 4
00001110, 2 => 101011011, 5
00001111, 1 => 101011010, 6
00010000, 2 => 101000101, 5
00010001, 3 => 101000100, 4
00010010, 4 => 000010010, 4
00010011, 3 => 101000110, 4
00010100, 4 => 000010100, 4
00010101, 5 => 000010101, 5
00010110, 4 => 000010110, 4
00010111, 3 => 101000010, 4
00011000, 2 => 101001101, 5
00011001, 3 => 101001100, 4
00011010, 4 => 000011010, 4
00011011, 3 => 101001110, 4
00011100, 2 => 101001001, 5
00011101, 3 => 101001000, 4
00011110, 2 => 101001011, 5
00011111, 1 => 101001010, 6
00100000, 2 => 101110101, 5
00100001, 3 => 101110100, 4
00100010, 4 => 000100010, 4
00100011, 3 => 101110110, 4
00100100, 4 => 000100100, 4
00100101, 5 => 000100101, 5
00100110, 4 => 000100110, 4
00100111, 3 => 101110010, 4
00101000, 4 => 000101000, 4
00101001, 5 => 000101001, 5
00101010, 6 => 000101010, 6
00101011, 5 => 000101011, 5
00101100, 4 => 000101100, 4
00101101, 5 => 000101101, 5
00101110, 4 => 000101110, 4
00101111, 3 => 101111010, 4
00110000, 2 => 101100101, 5
00110001, 3 => 101100100, 4
00110010, 4 => 000110010, 4
01101011, 5 => 001101011, 5
01101100, 4 => 001101100, 4
01101101, 5 => 001101101, 5
01101110, 4 => 001101110, 4
01101111, 3 => 100111010, 4
01110000, 2 => 100100101, 5
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01000011, 3 => 100010110, 4
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01011110, 4 => 001011110, 4
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01100100, 4 => 001100100, 4
01100101, 5 => 001100101, 5
01100110, 4 => 001100110, 4
01100111, 3 => 100110010, 4
01101000, 4 => 001101000, 4
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01111010, 4 => 001111010, 4
01111011, 3 => 100101110, 4
01111100, 2 => 100101001, 5
01111101, 3 => 100101000, 4
01111110, 2 => 100101011, 5
01111111, 1 => 100101010, 6
10000000, 1 => 111010101, 6
10000001, 2 => 111010100, 5
10000010, 3 => 111010111, 4
10000011, 2 => 111010110, 5
10000100, 3 => 111010001, 4
10000101, 4 => 010000101, 4
10000110, 3 => 111010011, 4
10000111, 2 => 111010010, 5
10001000, 3 => 111011101, 4
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10001010, 5 => 010001010, 5
10001011, 4 => 010001011, 4
10001100, 3 => 111011001, 4
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10011010, 5 => 010011010, 5
10011011, 4 => 010011011, 4
10011100, 3 => 111001001, 4
10011101, 4 => 010011101, 4
10011110, 3 => 111001011, 4
10011111, 2 => 111001010, 5
10100000, 3 => 111110101, 4
10100001, 4 => 010100001, 4
10100010, 5 => 010100010, 5
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11011100, 3 => 110001001, 4
11011101, 4 => 011011101, 4
11011110, 3 => 110001011, 4
11011111, 2 => 110001010, 5
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11100001, 2 => 110110100, 5
11100010, 3 => 110110111, 4
11100011, 2 => 110110110, 5
11100100, 3 => 110110001, 4
11100101, 4 => 011100101, 4
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11100111, 2 => 110110010, 5
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11101110, 3 => 110111011, 4
11101111, 2 => 110111010, 5
11110000, 1 => 110100101, 6
11110001, 2 => 110100100, 5
11110010, 3 => 110100111, 4
11110011, 2 => 110100110, 5
11110100, 3 => 110100001, 4
11110101, 4 => 011110101, 4
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11111100, 1 => 110101001, 6
11111101, 2 => 110101000, 5
11111111, 0 => 110101010, 7
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10110000, 3 => 111110101, 4
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10110010, 5 => 010110010, 5
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10110101, 6 => 010110101, 6
10110110, 5 => 010110110, 5
10110111, 4 => 010110111, 4
10111000, 3 => 111101101, 4
10111001, 4 => 010111001, 4
10111010, 5 => 010111010, 5
10111011, 4 => 010111011, 4
10111100, 3 => 111101001, 4
10111101, 4 => 010111101, 4
10111110, 3 => 111101011, 4
10111111, 2 => 111101010, 5
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11000011, 2 => 110010110, 5
11000100, 3 => 110010001, 4
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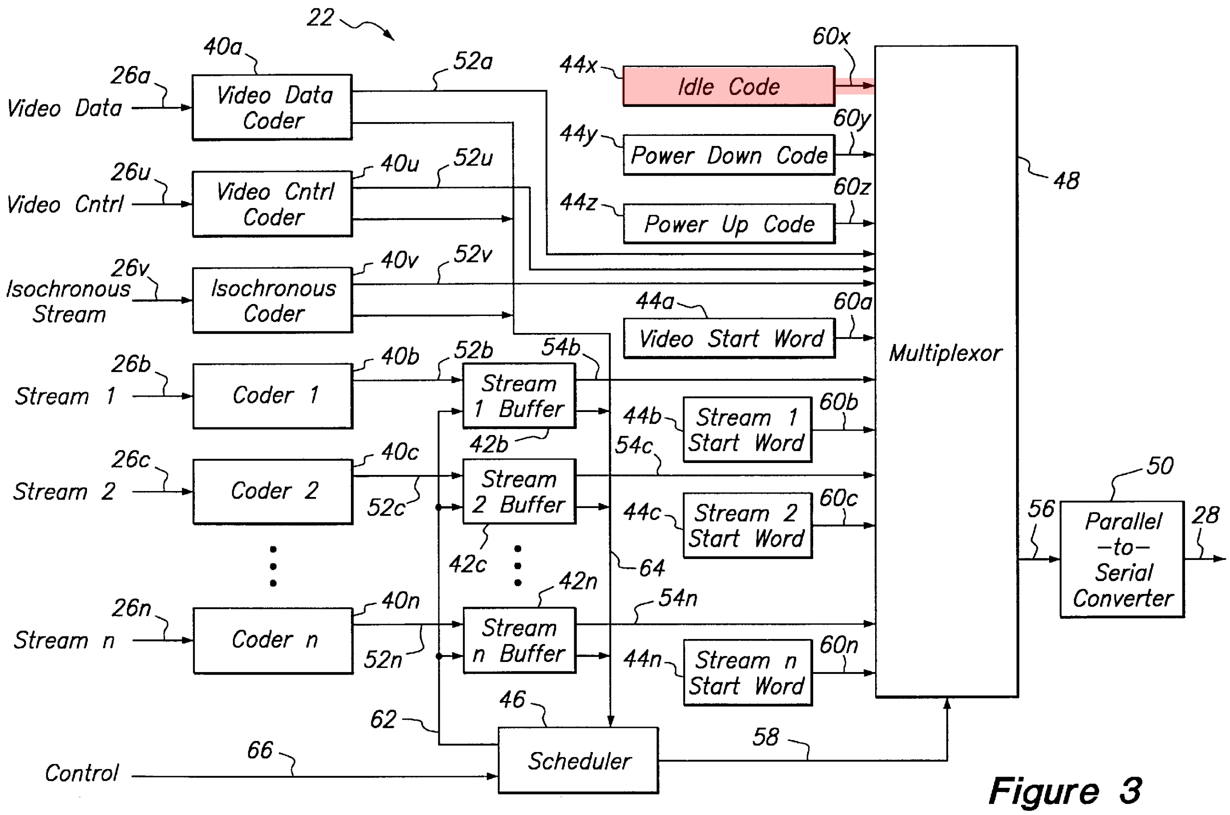
11000110, 3 => 110010011, 4
11000111, 2 => 110010010, 5
11001000, 3 => 110011101, 4
11001001, 4 => 011001001, 4
11001010, 5 => 011001010, 5
11001011, 4 => 011001011, 4
11001100, 3 => 110011001, 4
11001101, 4 => 011001101, 4
11001110, 3 => 110011011, 4
11001111, 2 => 110011010, 5
11010000, 3 => 110000101, 4
11010001, 4 => 011010001, 4
11010010, 5 => 011010010, 5
11010011, 4 => 011010011, 4
11010100, 5 => 011010100, 5
11010001, 6 => 011010101, 6
11010110, 5 => 011010110, 5
11010111, 4 => 011010111, 4
11011000, 3 => 110001101, 4
11011001, 4 => 011011001, 4
11011010, 5 => 011011010, 5

Thus, Kim's encoding of video data with code words that don't meet Myers' subset criteria renders this limitation obvious. Ex.1003, ¶¶141-144.

7. Claim 2

[2.1] *The system of claim 1, wherein the transmitter is also coupled to receive control bits,*

First, Kim's embedding unit receives "*control bits*" because it includes "signal lines for **a control signals** (horizontal sync, vertical sync **and other control signals**)." Ex.1005, 4:28-53. Kim also describes an IDLE code generator 44x: "The first control code generator 44*x* is coupled to an input of the multiplexor 48 via line 60*a* to provide the IDLE word." Ex.1005, 9:27-28; Ex.1003, ¶¶145-46.



Ex.1005, Fig. 3 (annotated); Ex.1003, ¶146.

While Kim describes the IDLE code generator generally, Kim is silent as to the mechanism by which the IDLE code generator selects a particular IDLE code word. Kim discloses that there are eight different IDLE words. Ex.1003, ¶147.

Sample Control Words
IDLE Words
0101010110
0101011010
0101101010
0110101010
1010101001
1010100101
1010010101
1001010101

Ex.1005, 19:37-48.

A POSITA would have found it obvious to generate one of the eight IDLE words by encoding a set of control signals (i.e., control bits), as taught by Shin. Ex.1003, ¶148. Shin discloses generating a particular control word by encoding a set of control bits: "As shown in FIG. 3, each encoder unit will encode ... 2-bit of control signals using the encoder described in the previous section." Ex.1007, 6:33-35. Shin thus describes encoding a 2-bit control signal to generate one of four different control words (2^2=4), shown below. Ex.1007, 10:33-40; Ex.1003, ¶148.

1100101010
1101001010
1101010010
1101010100

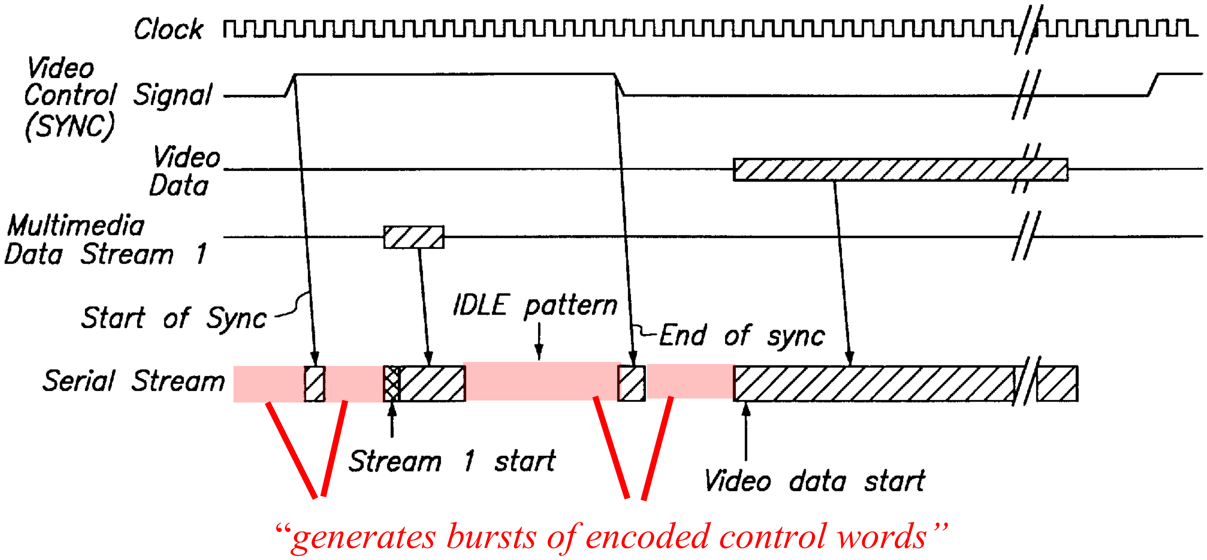
Accordingly, a POSITA would have found it obvious to generate control words using a set of control signals (i.e., control bits) to select a particular control word. Ex.1003, ¶149. Because Kim's IDLE words consist of eight different values, three control bits are used to generate one of the control words ($2^3=8$). Thus, by converting three control bits into a 10-bit IDLE word, Kim teaches generating encoded control words "*by encoding control bits*" as claimed. Ex.1003, ¶149.

Because Kim's IDLE words consist of eight different values, three control bits would be used to select one of the control words ($2^3=8$). By receiving control signals, Kim's encoder 44x receives "*control bits*" as evidenced by Shin. Ex.1003, ¶¶145-150.

[2.2] ***configured to generate bursts of encoded control words by encoding the control bits, and***

First, Kim's system "*generate[s] bursts*" of IDLE control words by repeatedly transmitting the IDLE control words between different types of data streams. "If there are no data words or isochronous data transfer words to be sent, the scheduler 46 sends controls the multiplexor 48 such that an IDLE word is transmitted." Ex.1005, 8:16-18; *see also* Ex.1005, 10:56-64. "The IDLE words are noted below in Appendix A. An idle pattern is a continuous sequence of one of the idle words and its inverse. An exemplary idle pattern is: 01101010101001010101O 1101010101001010101011010101010010101O1." Ex.1005, 14:32-44.

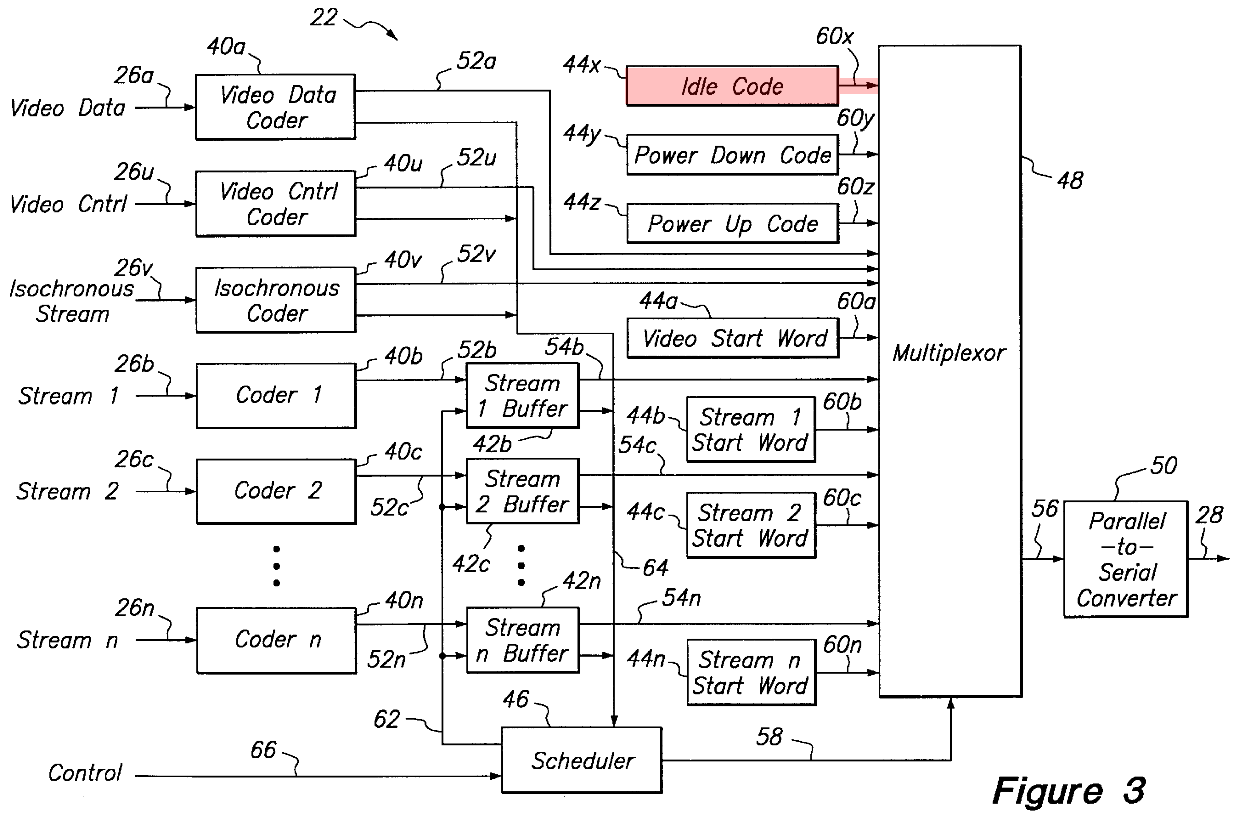
Accordingly, Kim generates multiple idle words between data transmissions, as shown below in annotated Fig. 4A. Each of these repeated idle words together teach "*generates bursts of encoded control words*" as claimed.



Ex.1005, Fig. 4A (annotated); Ex.1003, ¶152.

Second, Kim discloses that the bursts of control words are generated by "*encoding control bits*" because each IDLE control word is a set of bits encoded via 8b/10b encoding. Ex.1005, 7:15-16 ("Appendix A shows an example selection of special control words for an 8 bit/10 bit encoding."), 19:37-48 (Appendix A, identifying "IDLE Words" as 8bit/10bit encoded control words). In other words, Kim renders this limitation obvious because Kim's IDLE words are part of a "selection of special characters for the 8 bit/10 bit encoding scheme." Ex.1005, 6:67-7:46. Because the IDLE words are a product of Kim's 8b/10b encoding scheme, whatever inputs that dictate the placement of Kim's IDLE words are "*control bits*" as claimed. Thus, Kim's 8b/10b encoding scheme, which includes IDLE words, teaches generating encoded control words "*by encoding control bits*" as claimed. Ex.1003, ¶153.

To the extent that the "*control bits*" refer to the control signals used to select a particular control word, Kim and Shin render obvious encoding such control bits to generate control words, as well. As described above, Kim describes an IDLE code generator 44x: "The first control code generator 44*x* is coupled to an input of the multiplexor 48 via line 60*a* to provide the IDLE word." Ex.1005, 9:27-28; Ex.1003, ¶154.



Ex.1005, Fig. 3 (annotated); Ex.1003, ¶154.

As explained at [2.1], Kim discloses that there are eight different IDLE words and a POSITA would have found it obvious to generate one of the eight IDLE words by encoding a set of control signals (i.e., control bits), as taught by Shin. Ex.1003, ¶¶156-157. Thus, by converting three control bits into a 10-bit IDLE word, Kim teaches generating encoded control words "*by encoding control bits*" as claimed. Ex.1003, ¶158.

Thus, Kim's repeated transmission of 10-bit IDLE words, which may be generated by encoding control bits as described by Shin, renders obvious "*configured to generate bursts of encoded control words by encoding the control* *bits*" as claimed. Ex.1003, ¶¶151-159.

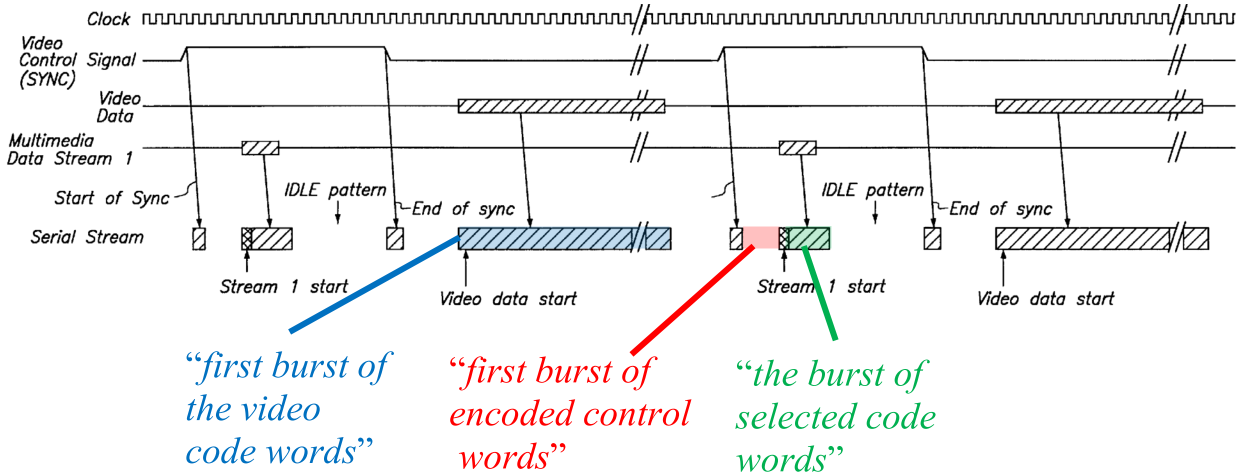
[2.3] ***configured to transmit to the receiver over the serial link a first burst of the encoded control words between the first burst of the video code words and the burst of the selected code words, and***

First, as explained above at [1.1], Kim's system transmits data over a serial link. Ex.1003, ¶160.

Second, for the reasons explained above at [2.2], Kim teaches "*bursts of encoded control words.*" Ex.1003, ¶161.

Third, for the reasons explained above at [1.8]-[1.10], Kim teaches "*the first burst of the video code words and the burst of the selected code words*." Ex.1003, ¶162.

Fourth, Kim teaches transmitting video data ("*a first burst of the video code words*"), control data ("*a first burst of the encoded control words*"), and audio data ("*the burst of the selected code words*") in the order claimed. Fig. 4A is shown below in a repeated manner, given that the illustrated sequence is repeatedly transmitted over the serial link. *See* Ex.1005, 9:45-10:25 (describing Fig. 4A as part of a data **stream**); Ex.1003, ¶163.



Ex.1005, Fig. 4A (modified, annotated); Ex.1003, ¶163.

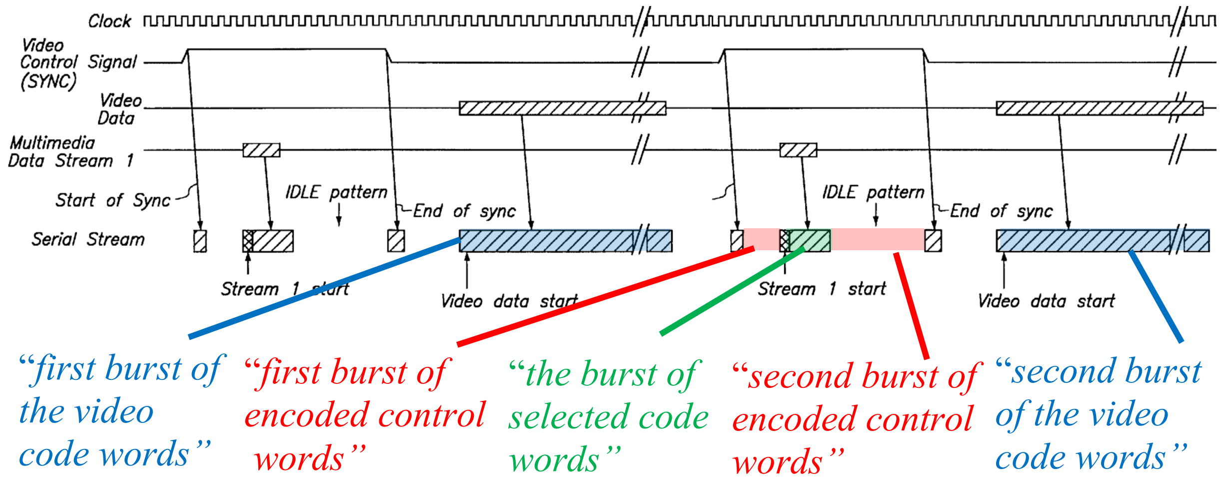
As shown in Fig. 4A above, there is an IDLE period ("*first burst of encoded control words*") positioned between a stream of video data ("*first burst of the video code words*") and the encoded stream 1 (e.g. audio data) ("*the burst of selected code words*"). Ex.1005, 9:46-10:10; Ex.1003, ¶¶160-65.

[2.4] *a second burst of the encoded control words between the burst of the selected code words and the second burst of the video code words.*

First, for the reasons explained above at [2.3], Kim teaches transmitting video data ("*burst of the video code words*"), control data ("*burst of the encoded control words*"), and a data stream ("*the burst of the selected code words*"). Ex.1003, ¶166.

Second, Kim teaches transmitting video data ("*a second burst of the video code words*"), control data ("*a second burst of the encoded control words*"), and audio data ("*the burst of the selected code words*") in the order claimed. Ex.1003,

¶167.



Ex.1005, Fig. 4A (modified, annotated); Ex.1003, ¶167.

As shown in Fig. 4A above, additional IDLE words ("*second burst of encoded control words*") are positioned between the encoded audio data ("*the burst of the selected code words*") and the subsequent stream of video data ("*second burst of the video code words*"). *See* Ex.1005, 9:46-10:10; Ex.1003, ¶¶166-169.

8. Claim 3

[3.1] ***The system of claim 2, wherein the selected code words include at least one guard band word, the burst of the selected code words has an initial word, and the initial word is the guard band word.***

First, as discussed at [1.3], Kim's device includes an encoder (e.g., 40b) for encoding audio data into "*a sequence of selected code words*." And as discussed at and [1.4], the "*selected code words*" may be part of a subset of code words according to Myers' subset-selection technique. Ex.1003, ¶¶170-171.

Second, some of words in Myers' subset as applied to Kim ("*selected code words*") correspond to Kim's data separation words ("*guard band word[s]*"). That is, consistent with the discussion above at [1.4], six of Kim's data stream separation words as highlighted below meet Myers' subset criteria. Ex.1003, ¶172.

Data Stream Separation Words
1000101011
1000101101
1000110101
1001001011
1001001101
1001010011
1001011001
1001100101
1001101001
1010001011
1010001101
1010010011
1010011001
1010100011
1010110001
1011000101
1011001001
1011010001
1100010101
1100100101
1100101001
1101000101
1101001001
1101010001

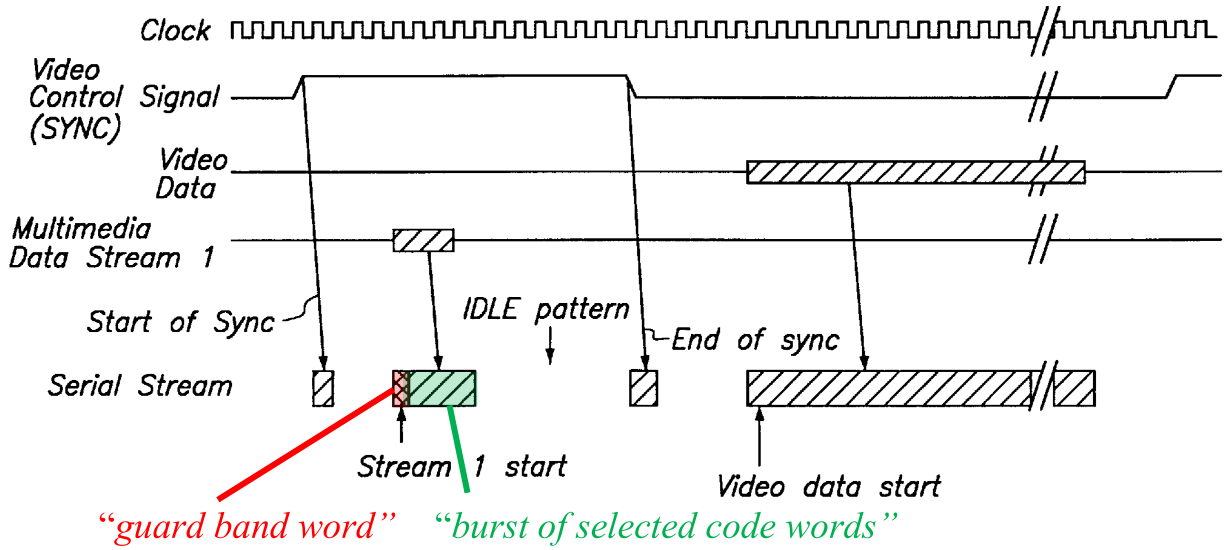
Because Kim in combination with Myers teaches using data separation words that are part of the specialized subset, Kim and Myers teach "*the selected code words include at least one guard band word*" as claimed. Ex.1003, ¶173.

Kim's data separation words are the same as the guard band words described and claimed in the '437 patent. The '437 patent explains that "a 'guard band' word

[] is transmitted at the start or end (or the start and end) of a burst of encoded data (to identify the leading and/or trailing edge of the burst) or at the start or end (or at the start and end) of each burst of encoded data of a specific type." Ex.1001, 8:21-27. Kim's data separation words perform the same function: "The third type of control word is a data stream separation word, which separates between multiple contexts of data streams and indicates the start or end of a certain type of data transfer." Ex.1005, 6:58-61. Accordingly, Kim's data separation word teaches a "*guard band word*" as claimed. Ex.1003, ¶174.

Third, in the combination of Kim and Myers, the audio data streams ("*selected code words*") include a data separation word ("*guard band word*") at the start ("*the burst of the selected code words has an initial word, and the initial word is the guard band word*"). "Data stream 1 is inserted during the horizontal blanking period and a start control word identifying the data stream 1 is used at the head of the data stream 1." Ex.1005, 10:2-8; Ex.1003, ¶175.

Kim also refers to the start control word as a data stream separation word: "The control words used to separate data streams and for other control functions are provided by the control code generator 44." Ex.1005, 6:39-7:2. "The third type of control word is a data stream separation word, which separates between multiple contexts of data streams and indicates the start or end of a certain type of data transfer." Ex.1005, 6:39-7:2; Ex.1003, ¶176-177.



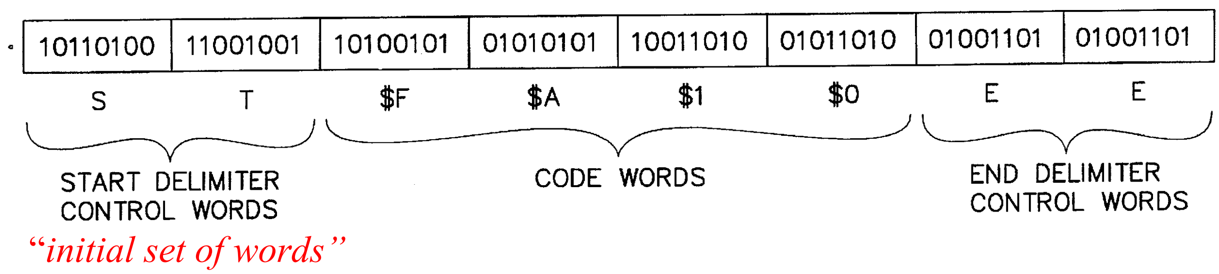
Ex.1005, Fig. 4A (annotated); Ex.1003, ¶176.

9. Claim 4

[4.1] ***The system of claim 2, wherein the selected code words include at least one guard band word, the burst of the selected code words has an initial set of words, and each word of the initial set of words is one said guard band word.***

First, as discussed at [3.1], Kim teaches using data separation words to indicate the start of a streaming sequence. Ex.1003, ¶178.

Second, it would have been obvious for the guard band words to be repeated, as evidenced by Myers. Myers describes using control words at the start and end of a message—similar to Kim's data stream separation words. Additionally, Myers explains that there may be multiple control words ("*an initial set of words*") at the start of a message. "A start delimiter control word, or plurality of code words, may be transmitted immediately prior to the transmission of a code word or words." Ex.1006, 11:13-30. "[T]he device first delimits the stream with the S and T, the first and second start delimiter control words." Ex.1006, 13:40-48; Ex.1003, ¶179



Ex.1007, Fig. 9 (annotated); Ex.1003, ¶179.

A POSITA would have found it obvious to use known options for transmitting data stream separation words—using one or more control words to indicate the start or end of a stream. Ex.1003, ¶180. Providing repeated guard band words helps to ensure that a guard band word is not missed by the receiver. Applying Myers' repeated start word technique to Kim's data separation start word is merely applying a known technique to a known method to yield predictable results. Ex.1003, ¶¶178-181.

10. Claim 5

[5.1] ***The system of claim 2, wherein the selected code words include at least one guard band word, the burst of the selected code words has a final word, and the final word is the guard band word.***

First, as explained above at [3.1], Kim and Myers teach "*wherein the selected code words include at least one guard band word.*" Ex.1003, ¶182.

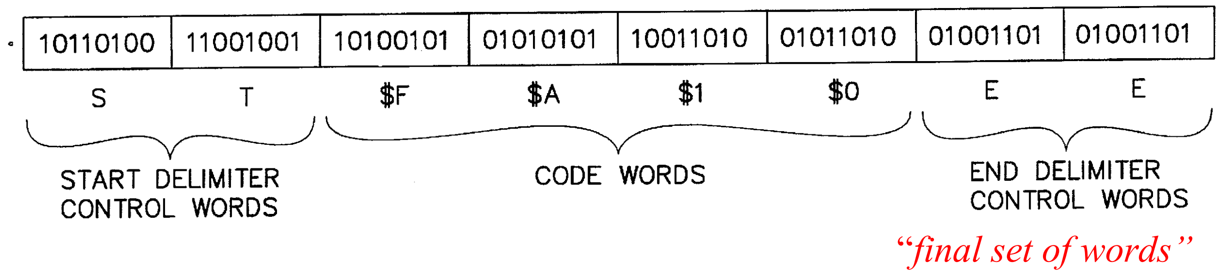
Second, while Kim illustrates the data separation word at the *start* of the data stream 1, Kim explains that the data stream separation word ("*guard band word*") is placed at the *end* of the data stream as well. "The third type of control word is a **data stream separation word**, which separates between multiple contexts of data streams and **indicates the** start or **end** of a certain type of data transfer." Ex.1005, 6:58-61; Ex.1003, ¶¶182-184.

11. Claim 6

[6.1] ***The system of claim 2, wherein the selected code words include at least one guard band word, the burst of the selected code words has a final set of words, and each word of the final set of words is one said guard band word.***

First, as described above at [5.1], Kim teaches using data separation words to indicate the start or end of a streaming sequence. Ex.1003, ¶185.

Second, it would have been obvious for the guard band words to be repeated, as evidenced by Myers. Myers describes using control words at the start and end of a message—similar to Kim's data stream separation words. Additionally, Myers explains that there may be multiple control words ("*a final set of words*") at the end of a message. "Similarly, an end delimiter control word, or plurality of code words, may be transmitted immediately after the transmission of a code word or words." Ex.1007, 11:13-30. "Finally, the transmission of EE, the end delimiter control word completes the transmission of the data stream." Ex.1006, 13:40-48; Ex.1003, ¶186.



Ex.1006, Fig. 9 (annotated); Ex.1003, ¶186.

A POSITA would have found it obvious to use known options for transmitting data stream separation words—using one or more control words to indicate the start or end of a stream. Ex.1003, ¶¶185-88.

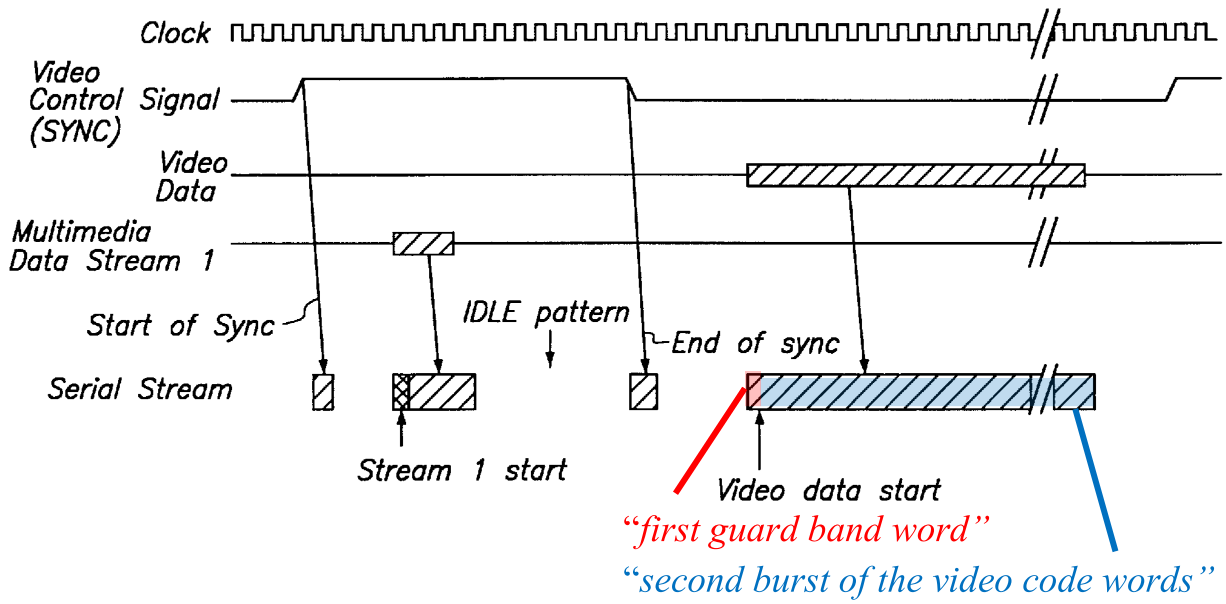
12. Claim 8

[8.1] ***The system of claim 2, wherein the selected code words include at least two guard band words, including a first guard band word and a second guard band word, the second burst of the video code words has an initial word, the initial word of the second burst of the video code words is the first guard band word, the burst of the selected code words has an initial word, and the initial word of the burst of the selected code words is the second guard band word.***

First, for the reasons explained above at [3.1], Kim and Myers teach that the "*selected code words*" include "*guard band words*." Ex.1003, ¶189.

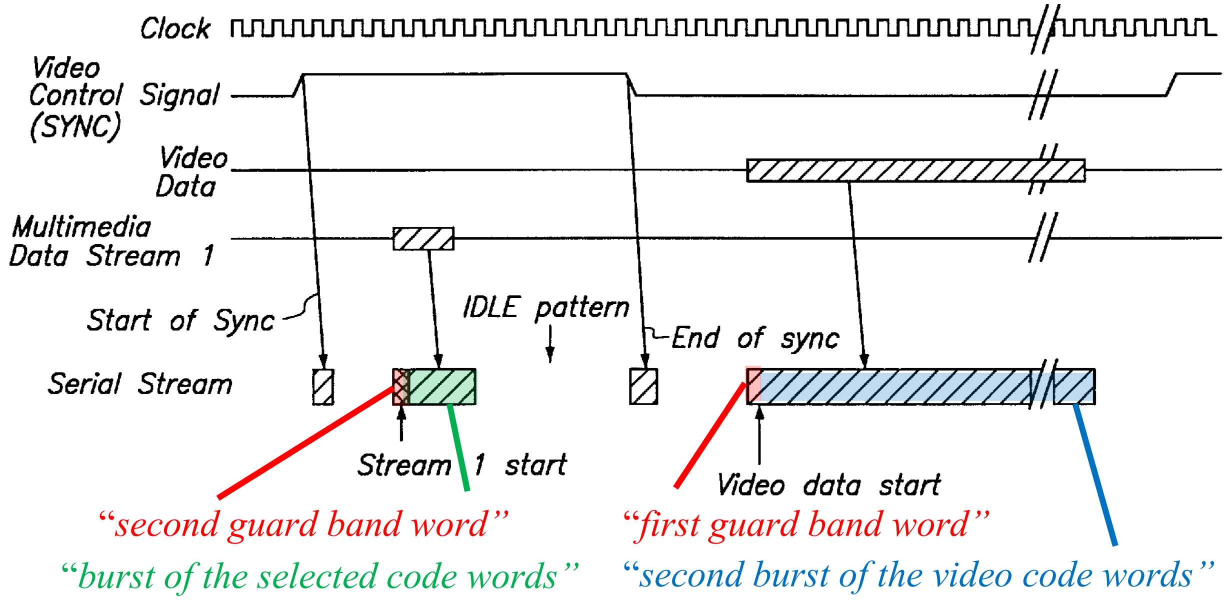
Second, Kim teaches that video streams include data stream separation words at the start as well. Thus, the data stream separation word at the start of the video stream teaches "*the initial word of the second burst of the video code words is the first guard band word*." "The remaining control code generators 44*a*, 44*b*, 44*c* . . . 44*n* provides respective data stream separation words, one for each stream.

Each of the control code generators 44a is preferably hard wired to provide the 10-bit words that are used for ... video start word." Ex.1005, 9:25-44. "For example, stream 1 has a different data start word than that used for video start word." Ex.1005, 10:5-12; Ex.1003, ¶190.



Ex.1005, Fig. 4A (annotated); Ex.1003, ¶190.

Third, for the reasons explained above at [3.1], Kim describes placing a data stream separation word ("*second guard band word*") at the start of stream 1 ("*burst of the selected code words*"). Ex.1003, ¶¶189-192.



Ex.1005, Fig. 4A (annotated); Ex.1003, ¶191.

13. Claim 10

[10.1] ***The system of claim 1, ... auxiliary data,***

See [1.7]. Ex.1003, ¶193.

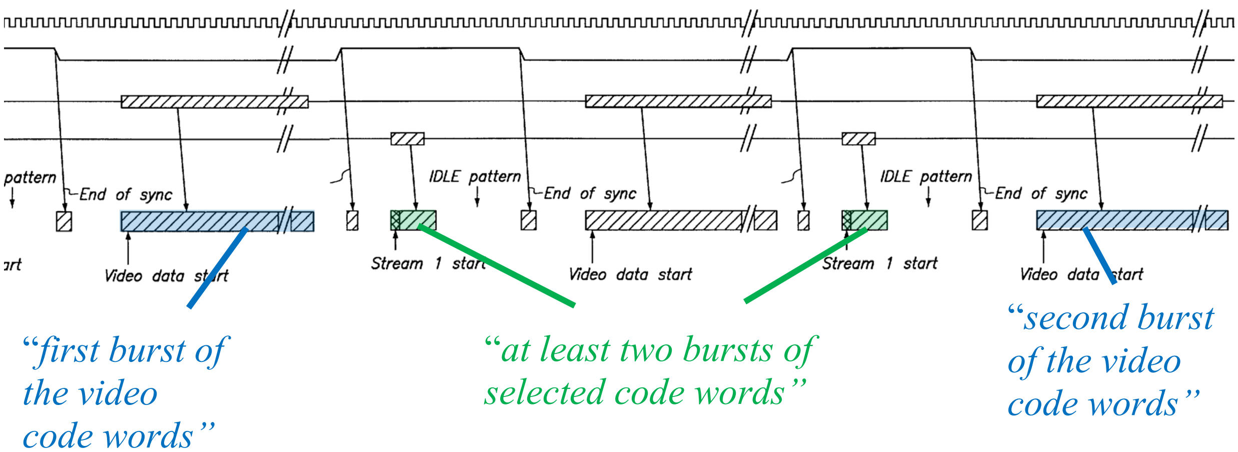
[10.2] ***the transmitter ... the video data, and***

See [1.8]. Ex.1003, ¶194.

[10.3] ***the transmitter is configured to transmit to the receiver over the serial link the first burst of the video code words followed by at least two bursts of the selected code words followed by the second burst of the video code words.***

First, for the reasons explained above at [8.1], Kim renders this limitation obvious. Ex.1003, ¶195.

Second, it would have been obvious for there to be "*at least two bursts*" of selected code words between two sets of video data. Given that the pattern shown in Fig. 4A is repeated multiple times, there may be several bursts of data stream 1 ("*selected code words*") between two sets of video streams, as shown in the modified Fig. 4A below. Ex.1003, ¶¶195-197.



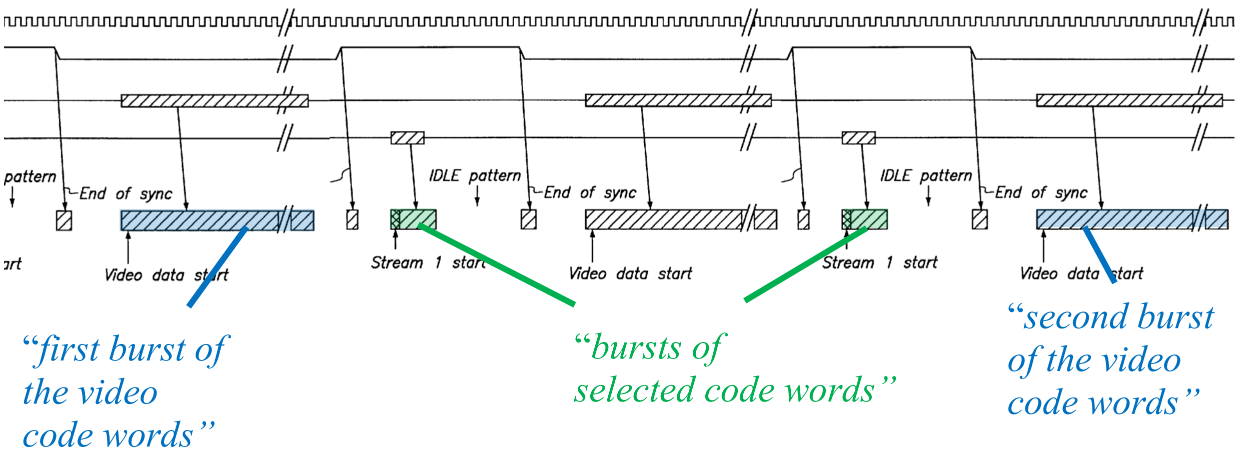
Ex.1005, Fig. 4A (modified, annotated); Ex.1003, ¶196.

14. Claim 11

[11.1] *The system of claim 10, wherein the transmitter is also coupled to receive control bits, configured to generate bursts of encoded control words by encoding the control bits, and configured to transmit to the receiver over the serial link a first burst of the encoded control words between the first burst of the video code words and the bursts of the selected code words, and a second burst of the encoded control words between the bursts of the selected code words and the second burst of the video code words.*

First, for the reasons explained above at [2.1]-[2.4], the prior art renders this limitation obvious. Ex.1003, ¶198.

Second, this limitation differs from claim 2 by receiving "*burst<u>s</u>*" of selected code words rather than a "*burst*" of the selected code words. It would have been obvious for there to be "*bursts*" of selected code words between two sets of video data. *See* Ex.1005, 8:9-15. Given that the pattern shown in Fig. 4A is repeated multiple times, there may be several bursts of data stream 1 ("*selected code words*") between two sets of video streams, as shown in the modified Fig. 4A below. Ex.1003, ¶¶199-200.



Ex.1005, Fig. 4A (modified, annotated); Ex.1003, ¶199.

15. Claim 12

[12.1] ***The system of claim 11, wherein the selected code words include at least one guard band word, a first one of the bursts of the selected code words has an initial word, and the initial word is the guard band word.***

See [3.1] and [11.1]. Ex.1003, ¶201.

16. Claim 13

[13.1] ***The system of claim 11, wherein the selected code words include at least one guard band word, a first one of the bursts of the selected code words has an initial set of words, and each word of the initial set of words is one said guard band word.***

See [4.1] and [11.1]. Ex.1003, ¶202.

17. Claim 14

[14.0]-[14.8] ***A communication system ... video data, and***

See [1.0]-[1.8]. Ex.1003, ¶¶203-211.

[14.9] ***the transmitter is configured to transmit to the receiver over the serial link a burst of the selected code words followed by a burst of the video code words,***

For the reasons explained above at [1.9], Kim renders obvious "*the transmitter is configured to transmit to the receiver over the serial link a burst of the selected code words followed by a burst of the video code words*." Ex.1003, ¶212.

[14.10] ***wherein each of the video code words is a member of the full code word set and at least one of the video code words is not a member of the robust subset.***

See [1.10]. Ex.1003, ¶213

18. Claim 15

[15.1] ***The system of claim 14, wherein ... code words.***

See [2.1]-[2.2]. Ex.1003, ¶214.

19. Claim 16

[16.1] ***The system of claim 15, wherein ... band word.***

See [3.1]. Ex.1003, ¶215.

20. Claim 17

[15.1] ***The system of claim 15, wherein ... band word.***

See [4.1]. Ex.1003, ¶216.

21. Claim 19

[19.0]-[19.6] ***A communication system, ... code words,***

See [1.0]-[1.6]. Ex.1003, ¶¶217-223.

[19.7] ***wherein each of the selected code words is indicative of L binary bits, and***

As explained above at [18.9], Kim and Myers teach "*wherein each of the selected code words is indicative of [a sequence] of L binary bits*" as claimed. For similar reasons, Kim's 10-bit code words are "*a sequence of L binary bits*." Ex.1003, ¶224.

[19.8] ***the selected code words have fewer contiguous zero bits and contiguous one bits per code word on the average than do the code words of the full code word set excluding the selected code words.***

The code words that meet Myers' selection criteria have fewer contiguous 1's and 0's than the full code word set: "[A] second step 12 is to select a second subset containing the code words having no more than two consecutive '1's or '0's is selected." Ex.1006, 8:18-21. "[E]ach code word has a (0,1) run-length limit as there are no more than two consecutive binary '1's or '0's within a code word." Ex.1006, 7:10-50.

Thus, Kim's encoders 40b-40n implementing Myers' subset-selection technique produce code words with fewer contiguous 1's and 0's than the full code word set, which render this limitation obvious. Ex.1003, ¶¶225-226.

22. Claim 20

[20.0]-[20.6] ***A communication system ... code words,***

See [1.0]-[1.6]. Ex.1003, ¶¶227-233.

[20.7] ***wherein each of the selected code words is indicative of a different sequence of binary bits,***

As described above at [1.4], application of Myers' subset-selection technique to a 10-bit code set results in 42 different sequences of 10-bit numbers, each of which corresponds to a different value. Accordingly, Kim and Myers render this limitation obvious. Ex.1003, ¶234.

[20.8] ***the transmitter is configured to transmit the sequence of selected code words to the receiver over the serial link as a sequence of rising and falling voltage transitions, and***

First, Kim describes transmitting encoded words over a serial link ("*transmit[ting] the sequence of selected code words… over the serial link*"). "The combination results in an encoded serial sequence that is output on the first output for transmission over the serial line 28." Ex.1005, 4:45-53; Ex.1003, ¶235.

Second, Myers explains that when transmitting binary data over a serial link such as Kim's serial link, the data is transmitted such that "logic '1' values may be represented by a positive voltage, and logic '0' values are represented by a negative or zero voltage, transmitted along on a transmission line." Ex.1006, 7:12-17. Accordingly, as the sequence of bits transitions from 0 to 1, the voltage rises.

Conversely, when the sequence of bits transitions from 1 to 0, the voltage falls ("*as a sequence of rising and falling voltage transitions*"). Ex.1003, ¶236.

Thus, Kim transmits data over a serial line, which involves rising and falling voltage levels as evidenced by Myers and thus renders this limitation obvious. Ex.1003, ¶237.

[20.9] ***the selected code words have bit patterns that implement DC balancing by limiting voltage drift of the serial link during transmission of said sequence of selected code words to a predetermined amount.***

First, the subset of code words that meet Myers' criteria are inherently DC balanced ("*the selected code words have bit patterns that implement DC balancing*"). "Firstly, each code word is inherently DC balanced in that each has four binary '1's and four binary '0's." Ex.1006, 7:10-27; Ex.1003, ¶238

Second, by implementing DC balance, the system prevents a charge from building up ("*by limiting voltage drift of the serial link during transmission of said sequence of selected code words to a predetermined amount*"). "This feature prevents a charge, and resulting capacitance or inductance, from building up on long transmission lines due to transmission of more bits having one value, such as a '1' than those having the other binary value, such as a '0'." Ex.1006, 7:10-27; Ex.1003, ¶239.

Myers explains that "if a transmitted signal has a large '1'/'0' imbalance, and thus a large DC or low frequency component, this component will get filtered out, resulting in a distortion of the signal and a loss of information." Ex.1006, 2:50-53. By limiting the charge build-up with DC balance, and preventing loss of information, Myers's technique limits voltage drift to "*a predetermined amount*." Ex.1003, ¶240.

Thus, the subset of code words that meet Myers' criteria are inherently DC balanced to prevent charge build-up and loss of information, which renders this limitation obvious. Ex.1003, ¶¶238-241.

23. Claim 21

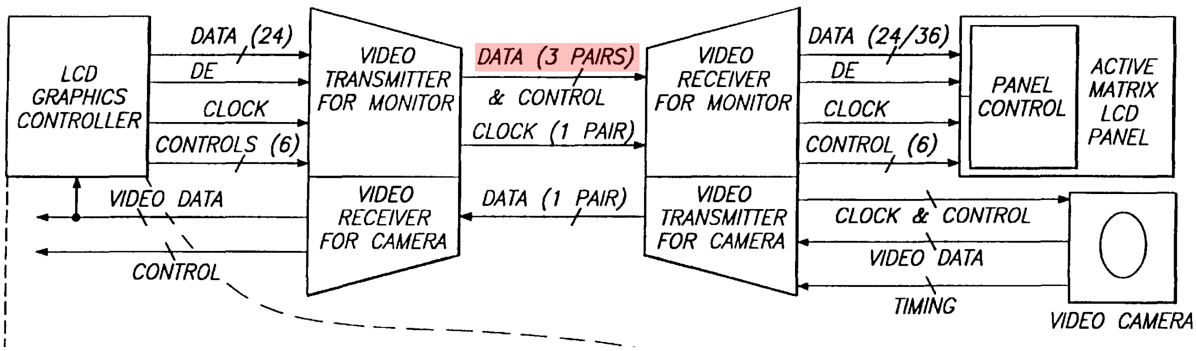
[21.0] ***A communication system, including: a receiver; a transmitter; and***

See [1.0]. Ex.1003, ¶242.

[21.1] ***a serial link, a second serial link, and a third serial link between the transmitter and the receiver,***

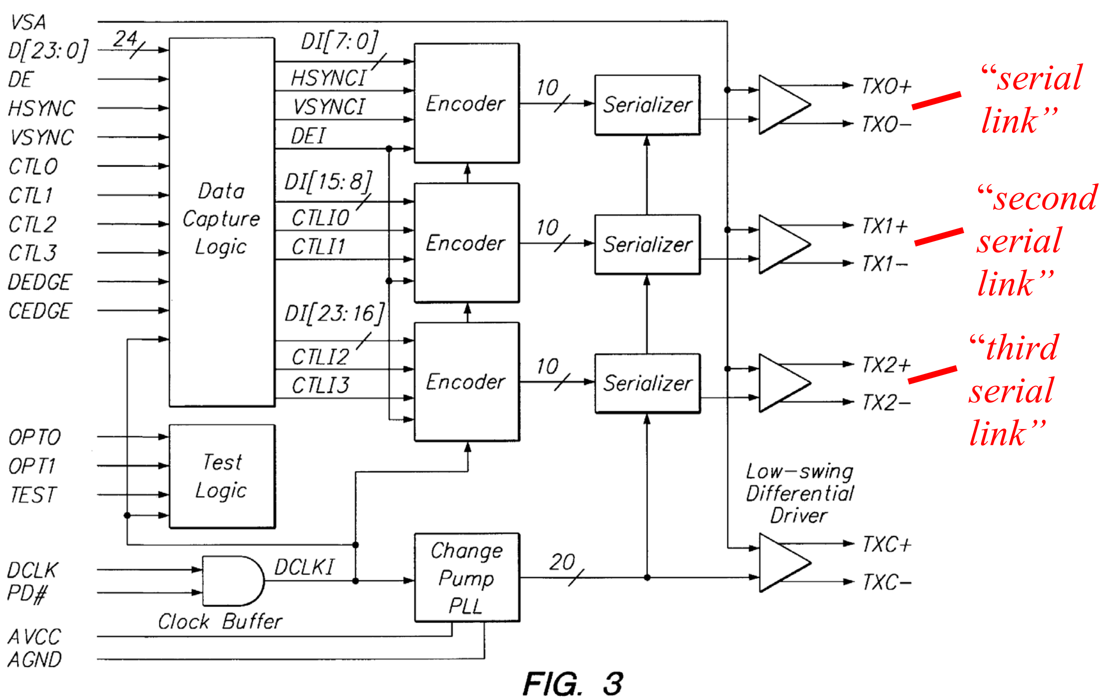
First, as described above at [1.1], Kim teaches a serial link for transmitting data between the transmitter and the receiver. Ex.1003, ¶243.

Second, it would have been obvious for Kim's serial link to be implemented as three serial links, as evidenced by Shin. Shin provides an example in which video data is transmitted over 3 separate serial links: "A digital video link is composed of 3 data lines and an accompanying clock line with a reduced, differential logic swing with a DC-balanced coding for transformer or capacitor coupling." Ex.1007, 7:40-43; Ex.1003, ¶244.



Ex.1007, Fig. 2 (partial, annotated); Ex.1003, ¶244.

Shin's three different serial links are shown in Fig. 3 below.



Ex.1007, Fig. 3 (annotated); Ex.1003, ¶245.

Kim explains that video data may be composed of three separate signals (red, green, and blue): "For example, the primary signal line may be a video signal that has 8 signal lines for data (8 bits of Red, 8 bits of Green, 8 bits of Blue in sequence). Ex.1005, 4:28-53. Shin explains that three serial links may be used, one for each of the red, green, and blue data signals: "Video signals are composed of three separate signals, typically RGB, along with two synchronization signals called HSYNC and VSYNC. Instead of having extra lines, those two SYNC signals are mixed with the RGB data in the coder, thereby limiting the number of data wires to three." Ex.1007, 8:1-5; Ex.1003, ¶246.

Accordingly, it would have been obvious for Kim's serial link to be implemented as three separate serial links, one for each of red, green, and blue data signals. A POSITA would have found it beneficial to use three separate links to achieve faster data transfer rates. Shin explains that "the requisite bandwidth of such interconnection systems has increased as a consequence of increased display resolution." Ex.1007, 1:43-45. "This invention provides **a high-speed video data transmission system** capable of converting parallel video data stream and video display timing and control signals to three high-speed serial data channels at speeds capable of supporting high-resolution displays." Ex.1007, 2:60-66; Ex.1003, ¶247.

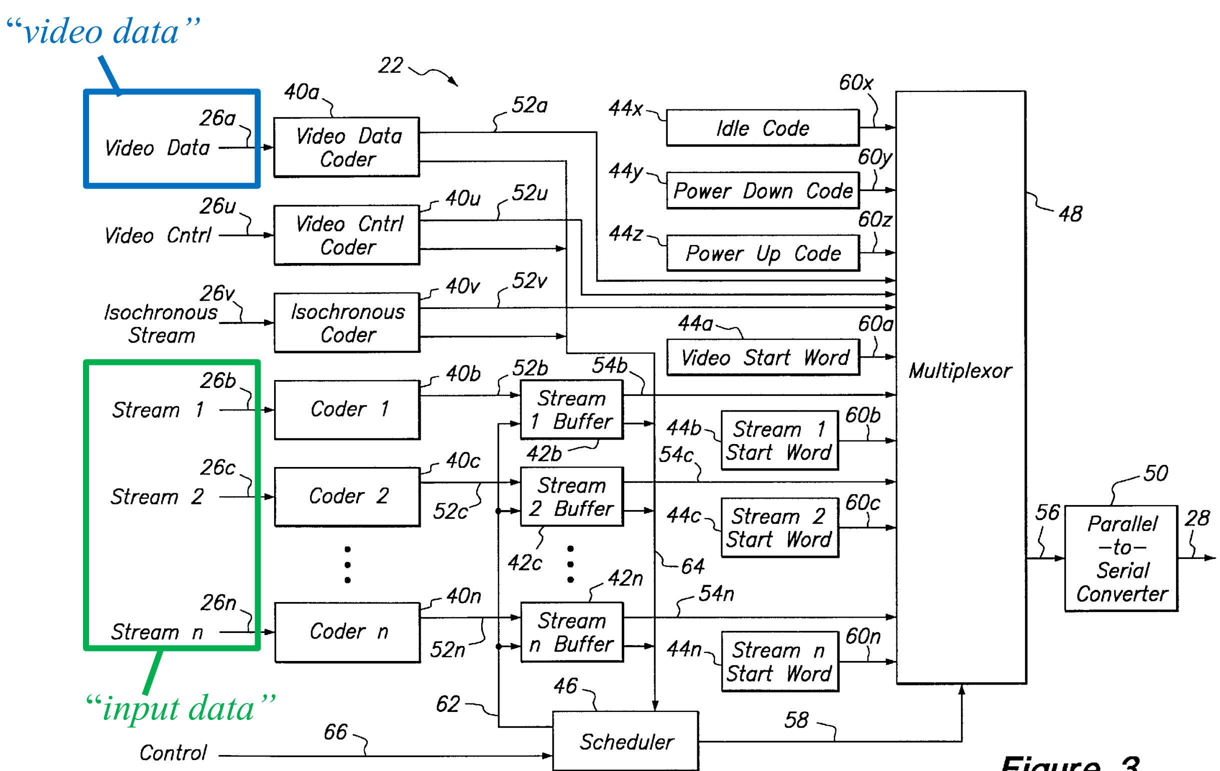
Thus, because Kim describes a serial link, and Shin shows that it was known to implement serial links for video as three separate links, Kim and Shin render this limitation obvious. Ex.1003, ¶¶243-49.

[21.2] ***wherein the transmitter is coupled to receive input data and video data,***

First, as described above at [1.1], Kim's transmitter is coupled to receive input data. Ex.1003, ¶250.

Second, Kim's transmitter is also coupled to receive video data. "The encoder 40 preferably has a plurality of inputs and a plurality of outputs ... For example, the first primary stream is preferably a video stream." Ex.1005, 5:50-6:16; Ex.1003, ¶251.

As shown in Kim's Fig. 3, each of the different encoders 40b-40n process a different stream of input data. Ex.1005, 8:44-67.



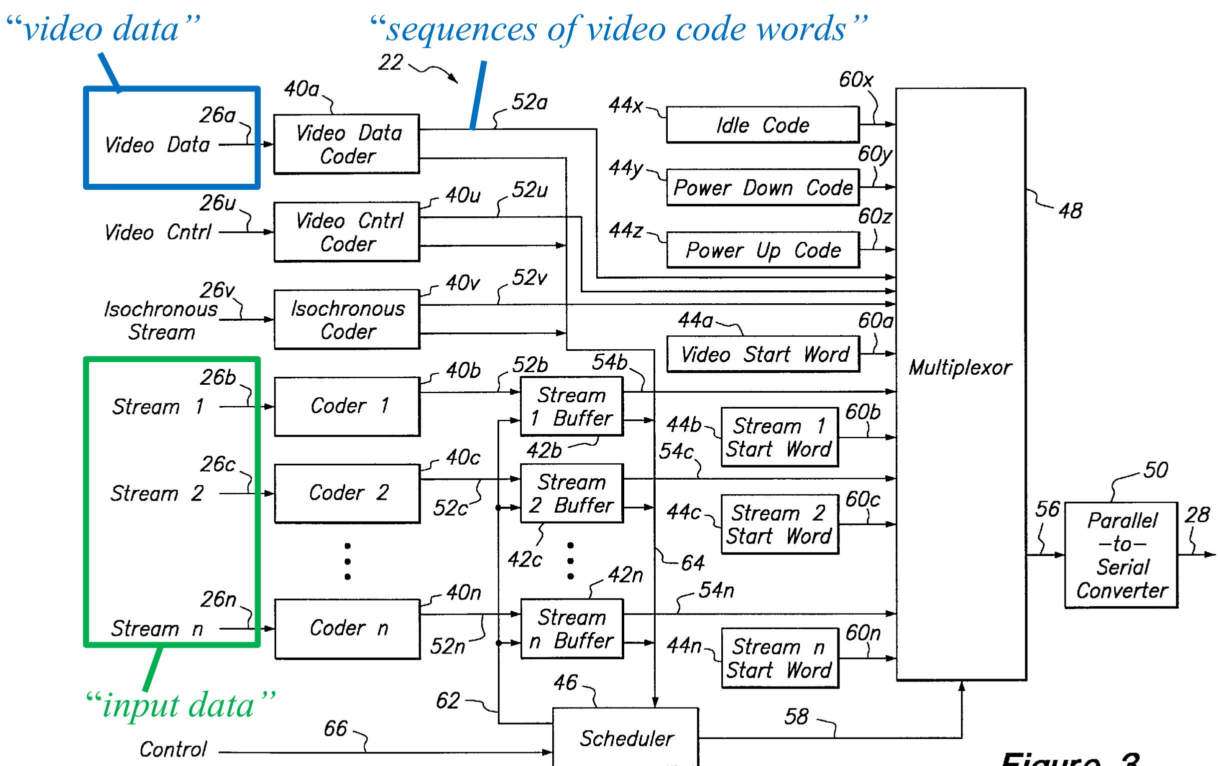
Ex.1005, Fig. 3 (annotated); Ex.1003, ¶252.

Thus, because Kim's embedding unit 22 receives video data and additional stream data, Kim renders this limitation obvious. Ex.1003, ¶253.

[21.3] ***configured to generate sequences of selected code words by encoding the input data and to generate sequences of video code words by encoding the video data, and***

First, as explained above at [1.2], Kim teaches "*configured to generate sequences of selected code words by encoding the input data*." Ex.1003, ¶254.

Second, Kim's embedding unit includes an encoder 40a that generates sequences of video code words by encoding the video data. "For example, the first primary stream is preferably a video stream." Ex.1005, 5:50-6:16. "In the exemplary embodiment, the present invention uses an encoding scheme that encodes eight bits of data into a corresponding encoded 10-bit word." Ex.1005, 5:50-6:16; Ex.1003, ¶255.



Ex.1005, Fig. 3 (annotated); Ex.1003, ¶255.

Thus, Kim generates encoded data from both the audio data streams and the video stream, which renders this limitation obvious. Ex.1003, ¶¶254-256.

[21.4] ***configured to transmit to the receiver over the serial link a burst of the selected code words followed by a burst of the video code words,***

For the reasons explained above at [1.9], Kim renders this limitation obvious. Ex.1003, ¶257.

[21.5] ***to transmit to the receiver over the second serial link a second burst of the selected code words followed by a second burst of the video code words, and***

First, as explained above at [21.1], it would have been obvious for Kim's serial line 28 to use three separate serial links—one for each of red, green, and blue video data. Ex.1003, ¶258.

Second, because Kim describes placing additional data streams into the video blanking intervals (described above at [1.9], it would have been obvious for the encoded additional data streams ("*selected code words*") to be transmitted over the blanking intervals on any of the three serial links. Ex.1003, ¶259.

Thus, Kim's placement of encoded audio data within video blanking intervals of three serial links as taught by Shin renders this limitation obvious. Ex.1003, ¶¶258-260.

[21.6] ***to transmit to the receiver over the third serial link a third burst of the selected code words followed by a third burst of the video code words,***

First, as explained above at [21.1], it would have been obvious for Kim's serial line 28 to use three separate serial links—one for each of red, green, and blue video data. Ex.1003, ¶261

Second, because Kim describes placing additional data streams into the video blanking intervals (described above at [1.9], it would have been obvious for the encoded additional data streams ("*selected code words*") to be transmitted over the blanking intervals on any of the three serial links. Ex.1003, ¶262.

Thus, Kim's placement of encoded audio data within video blanking intervals of three serial links as taught by Shin renders this limitation obvious. Ex.1003, ¶¶261-263.

[21.7] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

See [1.4]. Ex.1003, ¶264.

[21.8] ***each of the video code words is a member of the full code word set, and at least one of the video code words is not a member of the robust subset, and***

See [1.10]. Ex.1003, ¶265.

[21.9] ***wherein the input data determined by the burst of the selected code words can be encoded as a first conventional sequence of the code words of the full code word set,***

For the reasons described above at [1.5], Kim renders this limitation obvious. Ex.1003, ¶266.

[21.10] ***the input data determined by the second burst of the selected code words can be encoded as a second conventional sequence of the code words of the full code word set, and***

For the reasons described above at [1.5], Kim renders this limitation obvious. Regardless of which serial link the encoded additional data ("selected code words") are sent on, Kim's encoders are capable of encoding that data using conventional 8b/10b encoding techniques. Ex.1003, ¶267.

[21.11] ***the input data determined by the third burst of the selected code words can be encoded as a third conventional sequence of the code words of the full code word set, and***

For the reasons described above at [1.5], Kim renders this limitation obvious. Regardless of which serial link the encoded audio data ("*selected code words*") is sent on, Kim's encoders are capable of encoding that data using conventional 8b/10b encoding techniques. Ex.1003, ¶268.

[21.12] ***wherein said burst of the selected code words is less susceptible to inter-symbol interference during transmission over the serial link than would be the first conventional sequence,***

For the reasons explained above at [1.6], Kim renders this limitation obvious. Ex.1003, ¶269.

[21.13] ***said second burst of the selected code words is less susceptible to inter-symbol interference during transmission over the second serial link than would be the second conventional sequence, and***

For the reasons explained above at [1.6], Kim renders this limitation obvious. This is so regardless of which serial link transmits the data. Ex.1003, ¶270.

[21.14] ***said third burst of the selected code words is less susceptible to inter-symbol interference during transmission over the third serial link than would be the third conventional sequence.***

For the reasons explained above at [1.6], Kim renders this limitation obvious. This is so regardless of which serial link transmits the data. Ex.1003, ¶271.

24. Claim 22

[22.1]-[22.5] ***The system of claim 21, wherein ... code words.***

See [2.1]-[2.5]. Ex.1003, ¶¶272-276.

25. Claim 23

[23.1] ***The system of claim 21, wherein the serial link is a first video channel of a TMDS link, the second serial link is a second video channel of the TMDS link, and the third serial link is a third video channel of the TMDS link.***

First, as explained above at [21.1]-[21.2], Kim and Shin teach a serial link, a second serial link, and a third serial link that transmit video data and are thus "*video channel[s]*." Ex.1003, ¶277.

Second, Shin is directed to "**<u>transition-controlled</u>** coding system in which rapid byte synchronization allows for prompt initiation of decoding." Ex.1007, 1:13-16. For example, in Shin's encoding technique, "the bits within those of the data blocks including less than a **<u>minimum</u>** number of logical **<u>transitions</u>** are selectively complemented in order that each such selectively complemented data block include in excess of the **<u>minimum</u>** number of logical **<u>transitions</u>**." Ex.1007, 3:40-45; *see also* 3:45-54. The transmitted data is received by "three **<u>differential</u>** receiver circuits." Ex.1007, 5:47-50. Accordingly, because Kim and Shin teach encoding techniques that are transition controlled, and as such the serial links that transmit the encoded the encoded data are transition minimized differential signaling ("*TMDS*") links. Ex.1003, ¶278.

Thus, Kim's encoders, using transition controlled techniques to transmit video data on three separate lines to differential receivers as taught by Shin, render this limitation obvious. Ex.1003, ¶279.

26. Claim 26

[26.0] ***A transmitter for use in data transmission over a serial link, said transmitter including:***

See [1.0]. Ex.1003, ¶280.

[26.1] ***at least one input for receiving input data;***

As explained above at [1.1], Kim renders obvious "*at least one input for receiving input data*." Because Kim's transmitter receives "*input data*," it has "*at least one input*" for receiving that "*input data*." Ex.1003, ¶281.

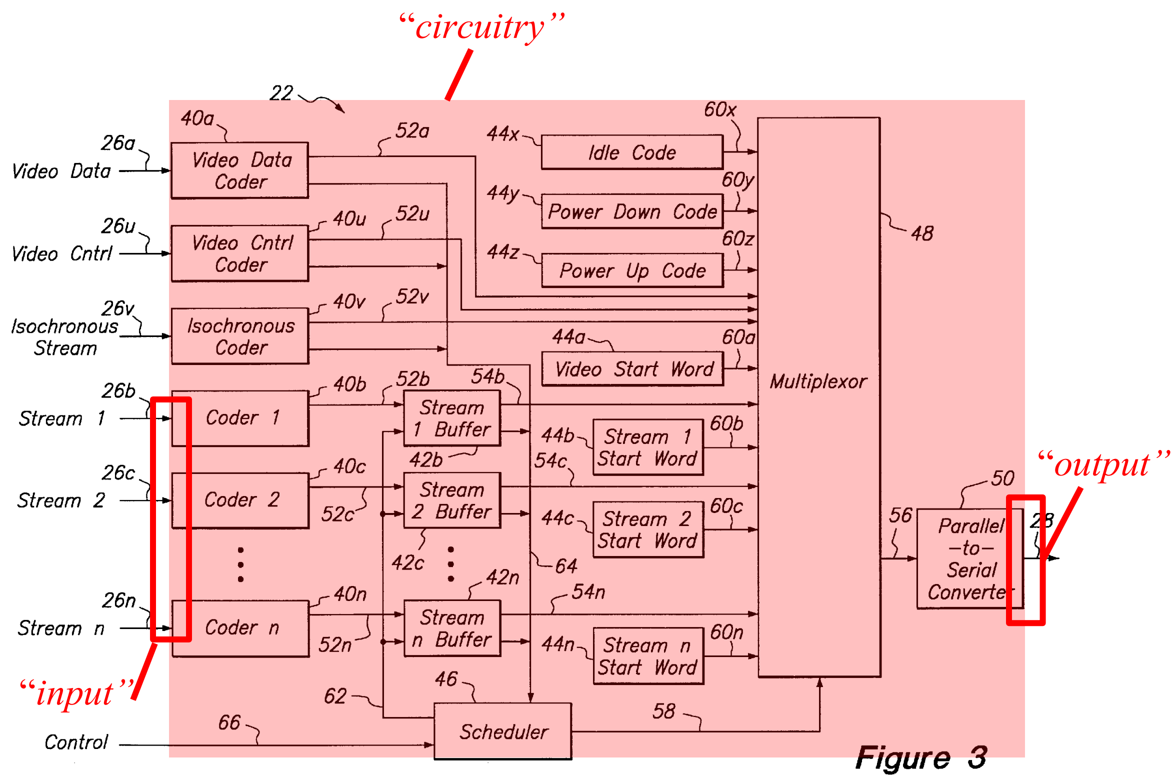
[26.2] ***an output configured to be coupled to a channel of the link; and***

First, as explained above at [1.0] and [1.1], Kim's embedding unit 22 ("*transmitter*") is coupled to a serial link 28. Ex.1003, ¶282.

Second, Kim transmits data through "channels." "However, in the present invention, multiple content of data Streams as well as all video control signals, such as HSYNC, VSYNC, DE, are also **<u>sent through display data channels</u>** by employing line coding." Ex.1005, 4:18-22. Accordingly, by coupling the encoded data to the serial link, the data is coupled to "*a channel of the link*." Ex.1003, ¶283.

[26.3] ***circuitry, coupled to each said input and to the output, and***

First, Kim's embedding unit comprises circuitry that is coupled to the input and the output, as illustrated in Fig. 3 below. Ex.1003, ¶284.



Ex.1005, Fig. 3 (annotated); Ex.1003, ¶284.

Kim describes its embedding unit as comprising circuits: "The scheduler 46 may be implemented as combinational logic, a state machine, or a programmed processor such as in an application specific integrated **circuit**." Ex.1005, 10:36-40; *see also* 7:3-19; Ex.1003, ¶285.

Second, consistent with the discussion at [26.1] and [26.2], Kim's embedding unit receives data and then transmits that data over the serial line—and thus includes an input and an output. Ex.1003, ¶286.

Thus, because Kim's embedding unit comprises circuits, receives data through an input, and transmits data over a serial link, Kim renders this limitation obvious. Ex.1003, ¶¶284-287.

[26.4] ***configured to generate a sequence of selected code words by encoding the input data and to assert the sequence of selected code words to the output in response to the input data,***

First, for the reasons explained above at [1.2], Kim renders obvious "*configured to generate a sequence of selected code words by encoding the input data.*" Ex.1003, ¶288.

Second, as explained at [1.3], Kim teaches transmitting the encoded data over the serial link. Because the data is encoded from input data. "The embedding unit preferably receives a plurality of data streams, encodes the data streams and then merges the encoded data into a serial stream that is output across a serial line to the removing unit." Ex.1005, 2:13-31; Ex.1003, ¶289.

Thus, Kim's encoder generates encoded audio data for transmission across the serial line, which renders this limitation obvious. Ex.1003, ¶290.

[26.5] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

See [1.4]. Ex.1003, ¶291.

[26.6] ***the input data can be encoded as a conventional sequence of code words of the full code word set, and***

See [1.5]. Ex.1003, ¶292.

[26.7] ***the sequence of selected code words is less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words,***

See [1.6]. Ex.1003, ¶293.

[26.8] ***wherein the input data include auxiliary data and video data, and***

First, as described above at [1.7], the input data includes auxiliary data.

Second, as described above at [1.9], the embedding unit 22 additionally receives video data as input data. Ex.1003, ¶¶294-295.

[26.9] ***the circuitry is configured to generate a sequence of video code words by encoding the video data, and***

For the reasons described above at [1.8], Kim renders this limitation obvious. Ex.1003, ¶296.

[26.10] ***to assert … code words,***

For the reasons described above at [1.9], Kim renders this limitation obvious. Ex.1003, ¶297.

[26.11] ***wherein each … of the robust subset.***

See [1.10]. Ex.1003, ¶298.

27. Claim 27

[27.1] ***The transmitter of claim 26, wherein ... code words.***

See [2.1]-[2.4]. Ex.1003, ¶299.

28. Claim 28

[28.1] ***The transmitter of claim 27, wherein ... band word.***

See [3.1]. Ex.1003, ¶300.

29. Claim 29

[29.1] ***The transmitter of claim 27, wherein ... band word.***

See [4.1]. Ex.1003, ¶301.

30. Claim 30

[30.1] ***The transmitter of claim 27, wherein ... band word.***

See [5.1]. Ex.1003, ¶302.

31. Claim 31

[31.1] ***The transmitter of claim 27, wherein ... band word.***

See [6.1]. Ex.1003, ¶303.

32. Claim 33

[33.1] ***The transmitter of claim 27, wherein ... band word.***

See [8.1]. Ex.1003, ¶304.

33. Claim 37

[37.1] ***The transmitter of claim 26, wherein ... code words.***

See [10.3]. Ex.1003, ¶305.

34. Claim 39

[39.0]-[39.4] ***A transmitter ... input data,***

See [26.0]-[26.4]. Ex.1003, ¶¶306-310.

[39.5]-[39.7] ***wherein ... code words,***

See [1.4]-[1.6]. Ex.1003, ¶¶311-313.

[39.8]-[39.9] ***wherein ... code words.***

See [19.7]-[19.8]. Ex.1003, ¶¶314-315.

35. Claim 40

[40.0]-[40.4] ***A transmitter ... input data,***

See [26.0]-[26.4]. Ex.1003, ¶¶316-320.

[40.5]-[40.7] ***wherein each of the selected code words is a member of a robust subset of a full code ... code words,***

See [1.4]-[1.6]. Ex.1003, ¶¶321-323.

[40.8]-[40.10] ***the sequence ... predetermined amount.***

See [20.7]-[20.9]. Ex.1003, ¶¶324-326.

XI. CONCLUSION

Petitioner has established a reasonable likelihood that the Challenged Claims are unpatentable.

Respectfully submitted,

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Dated: May 27, 2025
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XII. MANDATORY NOTICES

A. Real Party-in-Interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner certifies that the real parties-in-interest are Intel Corp., Dell Inc., and Dell Technologies Inc.

B. Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), to the best knowledge of the Petitioner, the '437 patent is involved in the following cases:

Case Heading	Number	Court	Date
General Video, LLC v. Dell Inc. et al.	1-24-cv-01530	WDTX	Dec 13, 2024
General Video, LLC v. Lenovo Group Limited	5-24-cv-00122	EDTX	August 30, 2024
General Video, LLC v. HP Inc.	5-24-cv-00123	EDTX	August 30, 2024
General Video, LLC v. Dell Inc. et al. (transferred)	5-24-cv-00124	EDTX	August 30, 2024
General Video, LLC v. Acer Inc.	5-24-cv-00125	EDTX	August 30, 2024
General Video, LLC v. ASUSTeK Computer, Inc. et al.	5-24-cv-00126	EDTX	August 30, 2024
Lattice Semiconductor Corporation v. Technicolor SA et al.	4-16-cv-00668	NDCA	February 9, 2016

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner hereby certifies, in accordance with and in reliance on the word count provided by the word-processing system used to prepare this Petition, that the number of words in this paper is 13,956. Pursuant to 37 C.F.R. § 42.24(d), this word count excludes the table of contents, table of authorities, mandatory notices under § 42.8, certificate of service, certificate of word count, appendix of exhibits, and any claim listing.

Dated: May, 27, 2025

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CERTIFICATE OF SERVICE

The undersigned certifies that, in accordance with 37 C.F.R. § 42.6(e) and 37 C.F.R. § 42.105, service was made on Patent Owner as detailed below.

Date of service	May 27, 2025
Manner of service	FEDERAL EXPRESS
Documents served	Petition for *Inter Partes* Review Under 35 U.S.C. § 312 and 37 C.F.R. § 42.104 of U.S. 7,359,437; Petitioner's Exhibit List; All Exhibits; Petitioner's Power of Attorney.
Persons served	Philips Intellectual Property & Standards 1055 Washington Blvd, 9th Floor Stamford, CT 06901

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XIII. CLAIM APPENDIX

1. Claim 1

[1.0] ***A communication system, including: a receiver; a transmitter; and***

[1.1] ***a serial link between the transmitter and the receiver, wherein the transmitter is coupled to receive input data,***

[1.2] ***configured to generate a sequence of selected code words by encoding the input data, and***

[1.3] ***configured to transmit the sequence of selected code words to the receiver over the serial link,***

[1.4] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

[1.5] ***the input data can be encoded as a conventional sequence of code words of the full code word set, and***

[1.6] ***the sequence of selected code words is less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words,***

[1.7] ***the transmitter is coupled to receive video data and configured to generate a sequence of video code words by encoding the video data, and***

[1.8] ***the transmitter is configured to transmit to the receiver over the serial link a first burst of the video code words followed by a burst of the selected code words followed by a second burst of the video code words,***

[1.9] ***wherein each of the video code words is a member of the full code word set and at least one of the video code words is not a member of the robust subset.***

2. Claim 2

[2.1] ***The system of claim 1, wherein the transmitter is also coupled to receive control bits,***

[2.2] ***configured to generate bursts of encoded control words by encoding the control bits, and***

[2.3] ***configured to transmit to the receiver over the serial link a first burst of the encoded control words between the first burst of the video code words and the burst of the selected code words, and***

[2.4] ***a second burst of the encoded control words between the burst of the selected code words and the second burst of the video code words.***

3. Claim 3

[3.1] ***The system of claim 2, wherein the selected code words include at least one guard band word, the burst of the selected code words has an initial word, and the initial word is the guard band word.***

4. Claim 4

[4.1] ***The system of claim 2, wherein the selected code words include at least one guard band word, the burst of the selected code words has an initial set of words, and each word of the initial set of words is one said guard band word.***

5. Claim 5

[5.1] ***The system of claim 2, wherein the selected code words include at least one guard band word, the burst of the selected code words has a final word, and the final word is the guard band word.***

6. Claim 6

[6.1] ***The system of claim 2, wherein the selected code words include at least one guard band word, the burst of the selected code words has a final set of words, and each word of the final set of words is one said guard band word.***

7. Claim 8

[8.1] ***The system of claim 2, wherein the selected code words include at least two guard band words, including a first guard band word and a second guard band word, the second burst of the video code words has an initial word, the initial word of the second burst of the video code words is the first guard band word, the***

burst of the selected code words has an initial word, and the initial word of the burst of the selected code words is the second guard band word.

8. Claim 10

[10.1] ***The system of claim 1, wherein the input data are auxiliary data,***

[10.2] ***the transmitter is coupled to receive video data and configured to generate a sequence of video code words by encoding the video data, and***

[10.3] ***the transmitter is configured to transmit to the receiver over the serial link the first burst of the video code words followed by at least two bursts of the selected code words followed by the second burst of the video code words.***

9. Claim 11

[11.1] ***The system of claim 10, wherein the transmitter is also coupled to receive control bits, configured to generate bursts of encoded control words by encoding the control bits, and configured to transmit to the receiver over the serial link a first burst of the encoded control words between the first burst of the video code words and the bursts of the selected code words, and a second burst of the encoded control words between the bursts of the selected code words and the second burst of the video code words.***

10. Claim 12

[12.1] ***The system of claim 11, wherein the selected code words include at least one guard band word, a first one of the bursts of the selected code words has an initial word, and the initial word is the guard band word.***

11. Claim 13

[13.1] ***The system of claim 11, wherein the selected code words include at least one guard band word, a first one of the bursts of the selected code words has an initial set of words, and each word of the initial set of words is one said guard band word.***

12. Claim 14

[14.0] ***A communication system, including: a receiver; a transmitter; and***

[14.1] ***a serial link between the transmitter and the receiver, wherein the transmitter is coupled to receive input data,***

[14.2] ***configured to generate a sequence of selected code words by encoding the input data, and***

[14.3] ***configured to transmit the sequence of selected code words to the receiver over the serial link,***

[14.4] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

[14.5] ***the input data can be encoded as a conventional sequence of code words of the full code word set, and***

[14.6] ***the sequence of selected code words is less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words,***

[14.7] ***wherein the input data are auxiliary data,***

[14.8] ***the transmitter is coupled to receive video data and configured to generate a sequence of video code words by encoding the video data, and***

[14.9] ***the transmitter is configured to transmit to the receiver over the serial link a burst of the selected code words followed by a burst of the video code words,***

[14.10] ***wherein each of the video code words is a member of the full code word set and at least one of the video code words is not a member of the robust subset.***

13. Claim 15

[15.1] ***The system of claim 14, wherein the transmitter is also coupled to receive control bits, configured to generate bursts of encoded control words by encoding the control bits, and configured to transmit to the receiver over the serial link a burst of the encoded control words between the burst of the selected code words and the burst of the video code words.***

14. Claim 16

[16.1] ***The system of claim 15, wherein the selected code words include at least***

one guard band word, the burst of the video code words has an initial word, and the initial word is the guard band word.

15. Claim 17

[15.1] ***The system of claim 15, wherein the selected code words include at least one guard band word, the burst of the video code words has an initial set of words, and each word of the initial set of words is one said guard band word.***

16. Claim 19

[19.0] ***A communication system, including: a receiver; a transmitter; and***

[19.1] ***a serial link between the transmitter and the receiver, wherein the transmitter is coupled to receive input data,***

[19.2] ***configured to generate a sequence of selected code words by encoding the input data, and***

[19.3] ***configured to transmit the sequence of selected code words to the receiver over the serial link,***

[19.4] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

[19.5] ***the input data can be encoded as a conventional sequence of code words of the full code word set, and***

[19.6] ***the sequence of selected code words is less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words,***

[19.7] ***wherein each of the selected code words is indicative of L binary bits, and***

[19.8] ***the selected code words have fewer contiguous zero bits and contiguous one bits per code word on the average than do the code words of the full code word set excluding the selected code words.***

17. Claim 20

[20.0] ***A communication system, including: a receiver; a transmitter; and***

[20.1] ***a serial link between the transmitter and the receiver, wherein the transmitter is coupled to receive input data,***

[20.2] ***configured to generate a sequence of selected code words by encoding the input data, and***

[20.3] ***configured to transmit the sequence of selected code words to the receiver over the serial link,***

[20.4] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

[20.5] ***the input data can be encoded as a conventional sequence of code words of the full code word set, and***

[20.6] ***the sequence of selected code words is less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words,***

[20.7] ***wherein each of the selected code words is indicative of a different sequence of binary bits,***

[20.8] ***the transmitter is configured to transmit the sequence of selected code words to the receiver over the serial link as a sequence of rising and falling voltage transitions, and***

[20.9] ***the selected code words have bit patterns that implement DC balancing by limiting voltage drift of the serial link during transmission of said sequence of selected code words to a predetermined amount.***

18. Claim 21

[21.0] ***A communication system, including: a receiver; a transmitter; and***

[21.1] ***a serial link, a second serial link, and a third serial link between the transmitter and the receiver,***

[21.2] ***wherein the transmitter is coupled to receive input data and video data,***

[21.3] ***configured to generate sequences of selected code words by encoding the input data and to generate sequences of video code words by encoding the video***

data, and

[21.4] ***configured to transmit to the receiver over the serial link a burst of the selected code words followed by a burst of the video code words,***

[21.5] ***to transmit to the receiver over the second serial link a second burst of the selected code words followed by a second burst of the video code words, and***

[21.6] ***to transmit to the receiver over the third serial link a third burst of the selected code words followed by a third burst of the video code words,***

[21.7] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

[21.8] ***each of the video code words is a member of the full code word set, and at least one of the video code words is not a member of the robust subset, and***

[21.9] ***wherein the input data determined by the burst of the selected code words can be encoded as a first conventional sequence of the code words of the full code word set,***

[21.10] ***the input data determined by the second burst of the selected code words can be encoded as a second conventional sequence of the code words of the full code word set, and***

[21.11] ***the input data determined by the third burst of the selected code words can be encoded as a third conventional sequence of the code words of the full code word set, and***

[21.12] ***wherein said burst of the selected code words is less susceptible to inter-symbol interference during transmission over the serial link than would be the first conventional sequence,***

[21.13] ***said second burst of the selected code words is less susceptible to inter-symbol interference during transmission over the second serial link than would be the second conventional sequence, and***

[21.14] ***said third burst of the selected code words is less susceptible to inter-symbol interference during transmission over the third serial link than would be the third conventional sequence.***

19. Claim 22

[22.1] ***The system of claim 21, wherein the transmitter is also coupled to receive control bits,***

[22.2] ***configured to generate sequences of encoded control words by encoding the control bits, and***

[22.3] ***configured to transmit to the receiver over the serial link a burst of the encoded control words between the burst of the selected code words and the burst of the video code words,***

[22.4] ***to transmit to the receiver over the second serial link a second burst of the encoded control words between the second burst of the selected code words and the second burst of the video code words, and***

[22.5] ***to transmit to the receiver over the third serial link a third burst of the encoded control words between the third burst of the selected code words and the third burst of the video code words.***

20. Claim 23

[23.1] ***The system of claim 21, wherein the serial link is a first video channel of a TMDS link, the second serial link is a second video channel of the TMDS link, and the third serial link is a third video channel of the TMDS link.***

21. Claim 26

[26.0] ***A transmitter for use in data transmission over a serial link, said transmitter including:***

[26.1] ***at least one input for receiving input data;***

[26.2] ***an output configured to be coupled to a channel of the link; and***

[26.3] ***circuitry, coupled to each said input and to the output, and***

[26.4] ***configured to generate a sequence of selected code words by encoding the input data and to assert the sequence of selected code words to the output in response to the input data,***

[26.5] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

[26.6] ***the input data can be encoded as a conventional sequence of code words of the full code word set, and***

[26.7] ***the sequence of selected code words is less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words,***

[26.8] ***wherein the input data include auxiliary data and video data, and***

[26.9] ***the circuitry is configured to generate a sequence of video code words by encoding the video data, and***

[26.10] ***to assert to the output a first burst of the video code words followed by a burst of the selected code words followed by a second burst of the video code words,***

[26.11] ***wherein each of the video code words is a member of the full code word set and at least one of the video code words is not a member of the robust subset.***

22. Claim 27

[27.1] ***The transmitter of claim 26, wherein the circuitry is also coupled to receive control bits, configured to generate bursts of encoded control words by encoding the control bits, and to assert to the output a first burst of the encoded control words between the first burst of the video code words and the burst of the selected code words, and a second burst of the encoded control words between the burst of the selected code words and the second burst of the video code words.***

23. Claim 28

[28.1] ***The transmitter of claim 27, wherein the selected code words include at least one guard band word, the burst of the selected code words has an initial word, and the initial word is the guard band word.***

24. Claim 29

[29.1] ***The transmitter of claim 27, wherein the selected code words include at least one guard band word, the burst of the selected code words has an initial set of words, and each word of the initial set of words is one said guard band word.***

25. Claim 30

[30.1] ***The transmitter of claim 27, wherein the selected code words include at least one guard band word, the burst of the selected code words has a final word, and the final word is the guard band word.***

26. Claim 31

[31.1] ***The transmitter of claim 27, wherein the selected code words include at least one guard band word, the burst of the selected code words has a final set of words, and each word of the final set of words is one said guard band word.***

27. Claim 33

[33.1] ***The transmitter of claim 27, wherein the selected code words include at least two guard band words, including a first guard band word and a second guard band word, the second burst of the video code words has an initial word, the initial word of the second burst of the video code words is the first guard band word, the burst of the selected code words has an initial word, and the initial word of the burst of the selected code words is the second guard band word.***

28. Claim 37

[37.1] ***The transmitter of claim 26, wherein the circuitry is configured to assert to the output the first burst of the video code words followed by at least two bursts of the selected code words followed by the second burst of the video code words.***

29. Claim 39

[39.0] ***A transmitter for use in data transmission over a serial link, said transmitter including:***

[39.1] ***at least one input for receiving input data;***

[39.2] ***an output configured to be coupled to a channel of the link; and***

[39.3] ***circuitry, coupled to each said input and to the output, and***

[39.4] ***configured to generate a sequence of selected code words by encoding the input data and to assert the sequence of selected code words to the output in response to the input data,***

[39.5] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

[39.6] ***the input data can be encoded as a conventional sequence of code words of the full code word set, and***

[39.7] ***the sequence of selected code words is less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words,***

[39.8] ***wherein each of the selected code words is indicative of a sequence of L binary bits, and***

[39.9] ***the selected code words have fewer contiguous zero bits and contiguous one bits per code word on the average than do the code words of the full code word set excluding the selected code words.***

30. Claim 40

[40.0] ***A transmitter for use in data transmission over a serial link, said transmitter including:***

[40.1] ***at least one input for receiving input data;***

[40.2] ***an output configured to be coupled to a channel of the link; and***

[40.3] ***circuitry, coupled to each said input and to the output, and***

[40.4] ***configured to generate a sequence of selected code words by encoding the input data and to assert the sequence of selected code words to the output in response to the input data,***

[40.5] ***wherein each of the selected code words is a member of a robust subset of a full code word set,***

[40.6] ***the input data can be encoded as a conventional sequence of code words of the full code word set, and***

[40.7] ***the sequence of selected code words is less susceptible to inter-symbol interference during transmission over the link than would be the conventional sequence of code words,***

[40.8] ***wherein each of the selected code words is indicative of a different sequence of binary bits,***

[40.9] ***the circuitry is configured to assert the sequence of selected code words as a sequence of rising and falling voltage transitions, and***

[40.10] ***the selected code words have bit patterns that implement DC balancing by limiting voltage drift of the serial link during transmission of said sequence of selected code words to a predetermined amount.***