



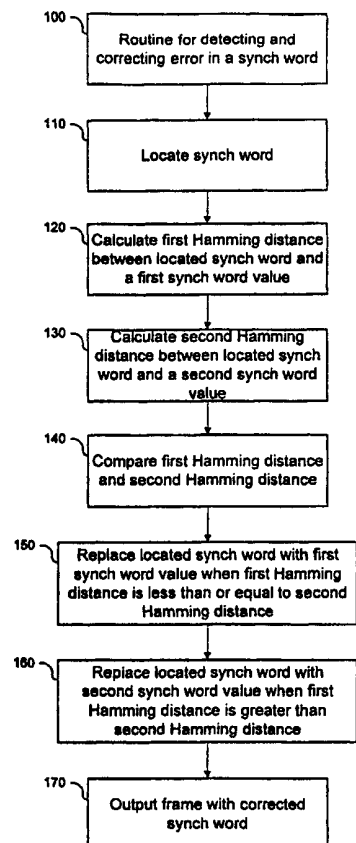
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(21) International Application Number: PCT/US99/29445 (22) International Filing Date: 13 December 1999 (13.12.99) (30) Priority Data: 09/209,292 11 December 1998 (11.12.98) US (71) Applicant: ADVANCED WIRELESS TECHNOLOGIES, INC. [US/US]; 4151 Burton Drive, Santa Clara, CA 95054 (US). (72) Inventors: LWIN, Moe, A.; 4661 Albany Circle #133, San Jose, CA 95129 (US). CHOI, Sunghun; 400 East Remington Drive #B114, Sunnyvale, CA 94087 (US). (74) Agents: STERNE, Robert, G. et al.; Sterne, Kessler, Goldstein & Fox P.L.L.C., Suite 600, 1100 New York Avenue N.W., Washington, DC 20005-3934 (US).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> (88) Date of publication of the international search report: 23 November 2000 (23.11.00)

(54) Title: METHOD, SYSTEM, AND COMPUTER PROGRAM PRODUCT FOR ERROR DETECTION AND CORRECTION IN A SYNCHRONIZATION WORD

(57) Abstract

A method, system, and computer product (100) detects and corrects error in a synchronization (synch) word. At least one bit error in a synch word is detected and corrected prior to correcting bit errors in a frame. In one embodiment, bit errors in a synch word are detected by locating (110) a synch word in data. A first Hamming distance between the located synch word and a first synch word value is calculated (120). A second Hamming distance between the located synch word and a second synch word value is also calculated (130). Next, the calculated first and second Hamming distances are compared (140) to detect which of the first and second synch word values is the correct synch word value. In one example, the first and second Hamming distances represent counts of the number of bit errors between the located synch word and the first and second synch word values, respectively. The first and second synch word values are binary complements to maximize accuracy. Detected synch word error is corrected (170) by replacing the located synch word with the first synch word value (150) in the received frame when the first Hamming distance is less than or equal to the second Hamming distance. Otherwise, the located synch word is replaced with the second synch word value (160) when the first Hamming distance is greater than the second Hamming distance. In one example implementation, the present invention is included in a receiver including, but not limited to, a Digital Video Broadcast (DVB) receiver that receives data from a satellite or cable.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/29445

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H03M 13/00

US CL : 714/784

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 714/784, 789, 701; 360/48; 341/59

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Please See Extra Sheet.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

IEEE, WEST

Search terms: synchronization field, frame, packet, Hamming distance, error correction

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US 5,987,630 A (YAMAWAKI) 16 November 1999, col. 3 lines 5-64	1-19
Y, P	US 5,856,979 A (VOGEL, et al.) 05 January 1999, Fig. 2, col. 3 line 6 - col. 5 line 26.	1-19
Y, P	US 5,889,793 A (SHARMA) 30 March 1999, Fig. 3, col. 7 line 5 - col. 10 line 44.	1-19
Y, P	US 5,999,110 A (BLAUM et al.) 07 December 1999, Fig. 3, col. 2 line 63 - col. 7 line 22.	1-19
Y, P	US 5,920,439 A (GILLINGHAM et al.) 06 July 1999, col. 3 line 3 - col. 5 line 61.	1-19

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	* T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search

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08 JUN 2000

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 International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,646,303 A (NARUSAWA et al.) 24 February 1987, Fig. 1, col. 5 line 41 - col. 6 line 43	1-19
A	US 5,309,450 A (KIM) 03 May 1994, col. 2 lines 23-62.	1-19
A	US 5,031,218 A (GALAND et al.) 09 July 1991, col. 2 lines 47-67	1-19
Y	CHRISTOPHER. L. et al. A Fully Integrated Digital Demodulation and Forward Error Correction IC for Digital Satellite Television. IEEE Feb. 1995. Pages 281-284.	1-19
Y	MIYAZAWA. S. et al. A BiCMOS PLL-Based Data Separator Circuit with High Stability and Accuracy. IEEE 1991. Pages 116-121, especially pages 191-120.	1-19
Y	HAMMONS, Jr. CRC-Based Techniques for Combined Burst Synchronization and Error Detection in TDMA PCS Systems. IEEE 1996. Pages 472-476.	1-19
Y	SOBEY. C. Probability of Error for Fault-Tolerant Byte Synchronization Detectors. IEEE June 1996. Pages 1528-1532.	1-19
Y	HESHAMI. M. et al. A 250-MHz Skewed-Clock Pipelined Data Buffer. IEEE 1996. Pages 376-383.	1-19
Y	CASTILLO. F. et al. A Neural Inspired Associative Memory. IEEE 1991. Pages 1753-1757.	1-19
Y	AL-SUBBAGH.M. et al. Optimum Patterns for Frame Alignment. IEEE December 1988. Pages 594-603, especially Fig. 8.	1-19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/29445

B. FIELDS SEARCHED

Documentation other than minimum documentation that are included in the fields searched:

Introduction to the Theory of Error-Correcting Codes. PLESS, 2d. Edition, pages 10-11.