

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
10 March 2005 (10.03.2005)

PCT

(10) International Publication Number
WO 2005/022758 A3

(51) International Patent Classification⁷: **H04L 27/36**

(US). **SANTORU, Joseph** [US/US]; 5425 Meadow Vista Way, Agoura Hills, CA 91301 (US). **ZHOU, Guangcai** [CN/US]; 6219 Reseda Boulevard, #23, Reseda, CA 91335 (US).

(21) International Application Number:
PCT/US2004/027981

(22) International Filing Date: 27 August 2004 (27.08.2004)

(74) **Agent: CROOK, John, A.**; Hughes Electronics Corporation, Patent Docket Department, RE/R11/A109, P.O. Box 956, El Segundo, CA 90245-0956 (US).

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/498,824 29 August 2003 (29.08.2003) US

(71) Applicant (for all designated States except US): **THE DIRECTV GROUP, INC.** [US/US]; RE/R11/A109, P.O. Box 956, El Segundo, CA 90245-0956 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, 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, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

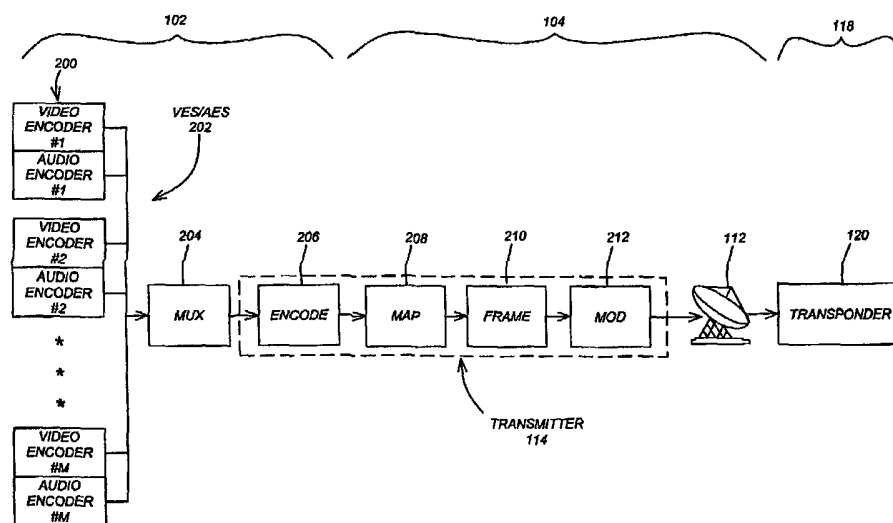
(72) Inventors; and

(75) Inventors/Applicants (for US only): **CHEN, Ernest, C.** [US/US]; 1025 Via Cordova, San Pedro, CA 90732 (US). **LAI, Dennis** [US/US]; 13227 Acoro Place, Cerritos, CA 90703 (US). **LIN, Tung-Sheng** [—/US]; 930 N. Monterey Street, #208, Alhambra, CA 91801 (US). **LINDSEY, William, C.** [US/US]; 1430 Marianna Road, Pasadena, CA 91105 (US). **MAITRA, Shamik** [US/US]; 1911 Camino de la Costa, #413, Redondo Beach, CA 90277

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: SIMPLIFIED SCRAMBLING SCHEME FOR SATELLITE BROADCASTING SYSTEMS



(57) Abstract: A simplified scrambling scheme that unifies all signals of a satellite broadcasting system, including frame header (404), frame body (402) and pilot symbols (408) with a common reference phase. This results in the simplification and increased flexibility of the receiver front-end design without affecting the overall system performance. In many current communications systems with frame headers and pilot symbols, the phases of frame headers and pilot symbols are not designed to be aligned with any constellation points of the modulated data from the frame body. This scrambling scheme takes into account possible impact due to irregular phase changes between frame headers/pilot symbols and modulated data.



Declaration under Rule 4.17:

- *of inventorship (Rule 4.17(iv)) for US only*

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(88) Date of publication of the international search report:

27 October 2005

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/27981

A. CLASSIFICATION OF SUBJECT MATTER																										
IPC(7) : HO4L 27/36																										
US CL : 375/298																										
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. : Please See Continuation Sheet																										
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched none																										
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Continuation Sheet																										
C. DOCUMENTS CONSIDERED TO BE RELEVANT																										
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																								
X	US 5,144,669 A (FAULKNER et al) 01 September 1992, col.5, lines 37-55 and claims 5,15-16.	2-4,7-9																								
X, P	US 2004/0095904 A1 (LAROIA et al) 20 May 2004, claims 4,7, paragraph{0035}.	2-4,7-9																								
A	US 4,700,387 A (HIRATA) 13 October 1987, col.1, line 65 to col.2, line 26.	1-11																								
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.																										
<table border="0"> <tr> <td colspan="2">* Special categories of cited documents:</td> <td>"T"</td> <td>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</td> </tr> <tr> <td>"A"</td> <td>document defining the general state of the art which is not considered to be of particular relevance</td> <td>"X"</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"E"</td> <td>earlier application or patent published on or after the international filing date</td> <td>"Y"</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"L"</td> <td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"&"</td> <td>document member of the same patent family</td> </tr> <tr> <td>"O"</td> <td>document referring to an oral disclosure, use, exhibition or other means</td> <td></td> <td></td> </tr> <tr> <td>"P"</td> <td>document published prior to the international filing date but later than the priority date claimed</td> <td></td> <td></td> </tr> </table>			* 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	"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"E"	earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family	"O"	document referring to an oral disclosure, use, exhibition or other means			"P"	document published prior to the international filing date but later than the priority date claimed		
* 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																							
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone																							
"E"	earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art																							
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family																							
"O"	document referring to an oral disclosure, use, exhibition or other means																									
"P"	document published prior to the international filing date but later than the priority date claimed																									
Date of the actual completion of the international search 22 July 2005 (22.07.2005)		Date of mailing of the international search report 24 AUG 2005																								
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner of Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230		Authorized officer Yermesghen Ghebretinsae Telephone No. 571-272-23017																								

INTERNATIONAL SEARCH REPORT

PCT/US04/27981

Continuation of B. FIELDS SEARCHED Item 1:
375/298, 261

Continuation of B. FIELDS SEARCHED Item 3:
EAST
scramble, pilot, frame, imaginary, real, header frame