

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
29 December 2004 (29.12.2004)

PCT

(10) International Publication Number  
WO 2004/114576 A3

- (51) International Patent Classification<sup>7</sup>: **H04J 1/12**
- (21) International Application Number:  
PCT/US2004/019501
- (22) International Filing Date: 18 June 2004 (18.06.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/479,702 19 June 2003 (19.06.2003) US
- (71) Applicant (for all designated States except US): **THUNDER CREATIVE TECHNOLOGIES, INC.** [US/US];  
18425 Kingsport Drive, Malibu, CA 90265 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **WASHBURN, Robert, D.** [US/US]; 18425 Kingsport Drive, Malibu, CA 90265 (US). **MCCLANAHAN, Robert, F.** [US/US];  
27781 Sequoia Glen Drive, Valencia, CA 91354 (US).
- (74) Agents: **HARRIMAN, J., D., II** et al.; Coudert Brothers LLP, 333 South Hope Street, Suite 2300, Los Angeles, CA 90071 (US).

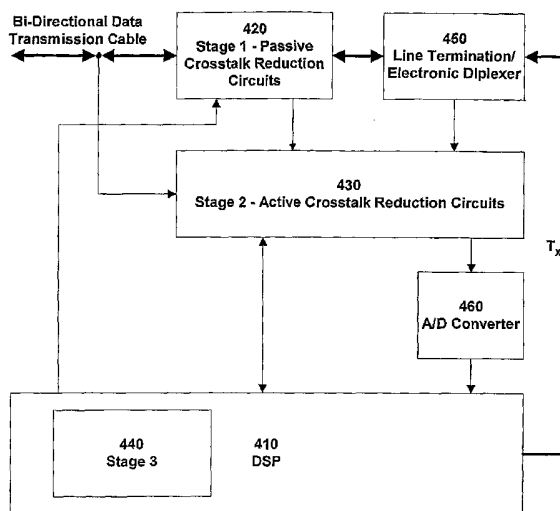
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, 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.
- (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).

**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

[Continued on next page]

(54) Title: SYSTEM FOR CROSSTALK NOISE REDUCTION ON TWISTED PAIR



(57) Abstract: The present invention is an electronic circuit that reduces crosstalk in a communications systems employing twisted pair, Ethernet, polyphase or shielded wire transmission media. The present invention includes three stages of crosstalk noise reduction (fig. 3). Stage 1 filters common mode noise from the transmission media and balances the resistive and reactive parasitic characteristics of the media. The second Stage performs differential crosstalk noise reduction in real time using multiple feedback loops. It can dynamically locate and set optimal system operating conditions for minimal differential crosstalk coupling for the specific environmental and interfering channel utilization conditions. The third stage utilizes digital signal processing techniques to further reduce any residual crosstalk after analog-to-digital conversion. The third Stage also functions as a digital controller for the entire system as well as portions of subsystems including the feedback loops of stage 2.

WO 2004/114576 A3



---

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

14 April 2005

*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.*

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US04/19501

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC(7) : H04J 1/12  
 US CL : 370/201; 379/417; 324/268  
 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. : 370/201; 379/417; 324/268

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,995,104 (GITLIN) 19 June 1991 (19.06.1991), column 1 line 9 column 6 line 12	1-6

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
"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 30 November 2004 (30.11.2004)	Date of mailing of the international search report <b>14 FEB 2005</b>
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Kenneth Vanderpuye <i>Ruegenia Zogian</i> Telephone No. (703) 305-4700