

DOCKET NO.: 1033300-00287

**UNITED STATES PATENT AND TRADEMARK OFFICE**

PATENT: 7,916,781  
INVENTORS: HUI JIN, AAMOD KHANDEKAR, ROBERT J. McELIECE  
FILED: JUNE 30, 2008  
ISSUED: MARCH 29, 2011  
TITLE: SERIAL CONCATENATION OF INTERLEAVED  
CONVOLUTIONAL CODES FORMING TURBO-LIKE  
CODES

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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Apple Inc.  
Petitioner

v.

California Institute of Technology  
Patent Owner

Case IPR2017-00297<sup>1</sup>

**PETITIONERS' UPDATED EXHIBIT LIST PURSUANT TO  
CONSOLIDATION ORDER (IPR2017-00297, PAPER 18)**

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<sup>1</sup> Case IPR2017-00423 has been consolidated with this proceeding.

**EXHIBITS**

<b>Exhibit</b>	<b>Description</b>
1001	U.S. Patent No. 7,916,781 (Also Exhibit 1101 in IPR2017-00423)
1002	D. J. C. MacKay, S. T. Wilson, and M. C. Davey, "Comparison of constructions of irregular Gallager codes," <i>IEEE Trans. Commun.</i> , Vol. 47, No. 10, pp. 1449-54, 1999 (Also Exhibit 1102 in IPR2017-00423)
1003	L. Ping, W. K. Leung, N. Phamdo, "Low Density Parity Check Codes with Semi-random Parity Check Matrix." <i>Electron. Letters</i> , Vol. 35, No. 1, pp. 38-39, 1999 (Also Exhibit 1103 in IPR2017-00423)
1004	Declaration of Professor James Davis, Ph.D. ("Davis Declaration")
1005	Gallager, R., <i>Low-Density Parity-Check Codes</i> , Monograph, M.I.T. Press, 1963 (Also Exhibit 1105 in IPR2017-00423)
1006	Berrou <i>et al.</i> , "Near Shannon Limit Error-Correcting Coding and Decoding: Turbo Codes," <i>ICC '93</i> , Technical Program, Conference Record 1064, Geneva 1993 (Also Exhibit 1106 in IPR2017-00423)
1007	Benedetto, S. et al., <i>Serial Concatenation of Block and Convolutional Codes</i> , 32.10 <i>Electronics Letters</i> 887-8, 1996 (Also Exhibit 1107 in IPR2017-00423)
1008	Luby, M. <i>et al.</i> , "Practical Loss-Resilient Codes," <i>STOC '97</i> , 1997 (Also Exhibit 1108 in IPR2017-00423)
1009	Luby, M. <i>et al.</i> , "Analysis of Low Density Codes and Improved Designs Using Irregular Graphs," <i>STOC '98</i> , pp. 249-59, published in 1998 (Also Exhibit 1109 in IPR2017-00423)
1010	Replacement copy of Frey, B. J. and MacKay, D. J. C., "Irregular Turbocodes," <i>Proc. 37th Allerton Conf. on Comm., Control and Computing</i> , Monticello, Illinois, published on or before March 20, 2000 (Also Exhibit 1110 in IPR2017-00423)
1011	Final Written Decision, <i>Hughes Network Systems, LLC et al. v. Cal. Institute of Tech.</i> , IPR2015-00059, Paper 42 (PTAB Apr. 21, 2016) (Also Exhibit 1111 in IPR2017-00423)

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Exhibit	Description
1012	Prosecution History of the '781 Patent, Response Dated Jan. 27, 2011 (Also Exhibit 1112 in IPR2017-00423)
1013	Claim Construction Order, <i>California Institute of Technology v. Hughes Communications Inc.</i> , No. 13-cv-7245 (C.D. Cal.) (Also Exhibit 1113 in IPR2017-00423)
1014	Decision on Institution, <i>Hughes Network Systems, LLC et al. v. Cal. Institute of Tech.</i> , IPR2015-00059, Paper 18 (PTAB Apr. 27, 2015) (Also Exhibit 1114 in IPR2017-00423)
1015	Expert Report of Dr. Brendan Frey (Case No. 2:13-cv-07245) (Also Exhibit 1115 in IPR2017-00423)
1016	MacKay, D. J. C, and Neal, R. M. "Near Shannon Limit Performance of Low Density Parity Check Codes," <i>Electronics Letters</i> , vol. 32, pp. 1645-46, 1996 (Also Exhibit 1116 in IPR2017-00423)
1017	Replacement copy of D. Divsalar, H. Jin, and R. J. McEliece, "Coding theorems for "turbo-like" codes," <i>Proc. 36th Allerton Conf. on Comm., Control and Computing</i> , Allerton, Illinois, pp. 201-09, September, 1998 (Also Exhibit 1117 in IPR2017-00423)
1018	U.S. Patent No. 4,271,520 (1981) (Also Exhibit 1118 in IPR2017-00423)
1019	Declaration of Robin Fradenburgh Concerning the "Proceedings, 36th Allerton Conference on Communications, Control, and Computing" Reference (Also Exhibit 1119 in IPR2017-00423)
1020	Chris Heegard and Stephen B. Wicker, <i>Turbo Coding</i> , pp. 12-14, 1999 (Also Exhibit 1120 in IPR2017-00423)
1021	George C. Clark, Jr. and J. Bibb Cain, <i>Error-Correction Coding for Digital Communications</i> , pp. 6, 229, 1938 (Also Exhibit 1121 in IPR2017-00423)
1022	Declaration Of Richard Goldenberg In Support Of Unopposed Motions To Submit Replacement Exhibits Pursuant To 37 C.F.R. § 42.104(c) (Also Exhibit 1122 in IPR2017-00423)

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<b>Exhibit</b>	<b>Description</b>
1023	Declaration Of Jonathan Barbee In Support Of Unopposed Motions To Submit Replacement Exhibits Pursuant To 37 C.F.R. § 42.104(c) (Also Exhibit 1123 in IPR2017-00423)
1024	Declaration of Professor James Davis, Ph.D. Regarding U.S. Patent No. 7,916,781 Claims 13-22 (Originally Filed in IPR2017-00423 as Exhibit 1104)

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Dated: July 11, 2017

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