

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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CISCO SYSTEMS, INC., DISH NETWORK, LLC,  
COMCAST CABLE COMMUNICATIONS, LLC,  
COX COMMUNICATIONS, INC.,  
TIME WARNER CABLE ENTERPRISES LLC,  
VERIZON SERVICES CORP., and ARRIS GROUP, INC.,  
Petitioner,

v.

TQ DELTA, LLC,  
Patent Owner.

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Case IPR2016-01021<sup>1</sup>  
Patent 8,718,158 B2

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Before SALLY C. MEDLEY, TREVOR M. JEFFERSON, and,  
MATTHEW R. CLEMENTS, *Administrative Patent Judges*.

MEDLEY, *Administrative Patent Judge*.

FINAL WRITTEN DECISION  
*35 U.S.C. § 318(a) and 37 C.F.R. § 42.73*

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<sup>1</sup> DISH Network, L.L.C., who filed a Petition in IPR2017-00255, and Comcast Cable Communications, L.L.C., Cox Communications, Inc., Time Warner Cable Enterprises L.L.C., Verizon Services Corp., and ARRIS Group, Inc., who filed a Petition in IPR2017-00417, have been joined in this proceeding.

## I. INTRODUCTION

In this *inter partes* review, instituted pursuant to 35 U.S.C. § 314, Cisco Systems, Inc. (“Petitioner”) challenges claims 1–30 (“the challenged claims”) of U.S. Patent No. 8,718,158 B2 (Ex. 1001, “the ’158 patent”), owned by TQ Delta, LLC (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable. Patent Owner’s Motion to Exclude is *dismissed*.

### A. Procedural History

Petitioner filed a Petition for *inter partes* review of claims 1–30 of the ’158 patent. Paper 2 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). On November 4, 2016, we instituted an *inter partes* review of claims 1–30 of the ’158 patent on the following grounds (Paper 7 (“Dec.”)):

References	Basis	Claims Challenged
Shively, <sup>2</sup> and Stopler <sup>3</sup>	§ 103(a)	1, 2, 4, 15, 16, and 18
Shively, Stopler, and Gerszberg <sup>4</sup>	§ 103(a)	3, 5, 14, 17, 19, and 28–30
Shively, Stopler, and Bremer <sup>5</sup>	§ 103(a)	6, 9, 10, 12, 20, 23, 24, and 26
Shively, Stopler,	§ 103(a)	8, 11, 13, 22, 25, and 27

<sup>2</sup> U.S. Patent No. 6,144,696; issued Nov. 7, 2000 (Ex. 1011) (“Shively”).

<sup>3</sup> U.S. Patent No. 6,625,219 B1; issued Sept. 23, 2003 (Ex. 1012) (“Stopler”).

<sup>4</sup> U.S. Patent No. 6,424,646 B1; issued July 23, 2002 (Ex. 1013) (“Gerszberg”).

<sup>5</sup> U.S. Patent No. 4,924,516; issued May 8, 1990 (Ex. 1017) (“Bremer”).

References	Basis	Claims Challenged
Bremer, and Gerszberg		
Shively, Stopler, Bremer, and Flammer <sup>6</sup>	§ 103(a)	7 and 21

Thereafter, Patent Owner filed a Patent Owner Response (“PO Resp.”). Paper 15. Petitioner filed a Reply to the Patent Owner Response (“Pet. Reply”). Paper 20. Pursuant to an Order (Paper 24), Patent Owner filed a listing of alleged statements and evidence in connection with Petitioner’s Reply deemed to be beyond the proper scope of a reply. Paper 25. Petitioner filed a response to Patent Owner’s listing. Paper 32.

Patent Owner filed a Motion to Exclude, Paper 31 (“PO Mot. Exc.”), Petitioner filed an Opposition, Paper 36 (“Pet. Opp. Mot. Exc.”), and Patent Owner filed a Reply, Paper 40. Patent Owner filed a Motion for Observation, Paper 30 (“PO Mot. Obs.”) and Petitioner filed a Response to the Motion for Observation, Paper 37 (“Pet. Resp.”).

We held a consolidated hearing on August 3, 2017, for this case and related Case IPR2016-01020, and a transcript of the hearing is included in the record. Paper 42 (“Tr.”).

#### *B. Related Proceedings*

The parties indicate that the ’158 patent is the subject of several pending judicial matters. Pet. 1; Paper 5, 2–3.

#### *C. The ’158 Patent (Ex. 1001)*

The ’158 patent relates to multicarrier communications systems that lower the peak-to-average power ratio (PAR) of transmitted signals.

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<sup>6</sup> U.S. Patent No. 5,515,369; issued May 7, 1996 (Ex. 1019) (“Flammer”).

Ex. 1001, 1:28–31. A value is associated with each carrier signal, and a phase shift is computed for each carrier signal based on the value associated with that carrier signal. *Id.* at 2:38–41. The value is determined independent of the input bit value carried by the carrier signal. The computed phase shift value is combined with the phase characteristic of that carrier signal to substantially scramble the phase characteristics of the carrier signals. *Id.* at 2:38–45. Figure 1 illustrates the multicarrier communication system and is reproduced below:

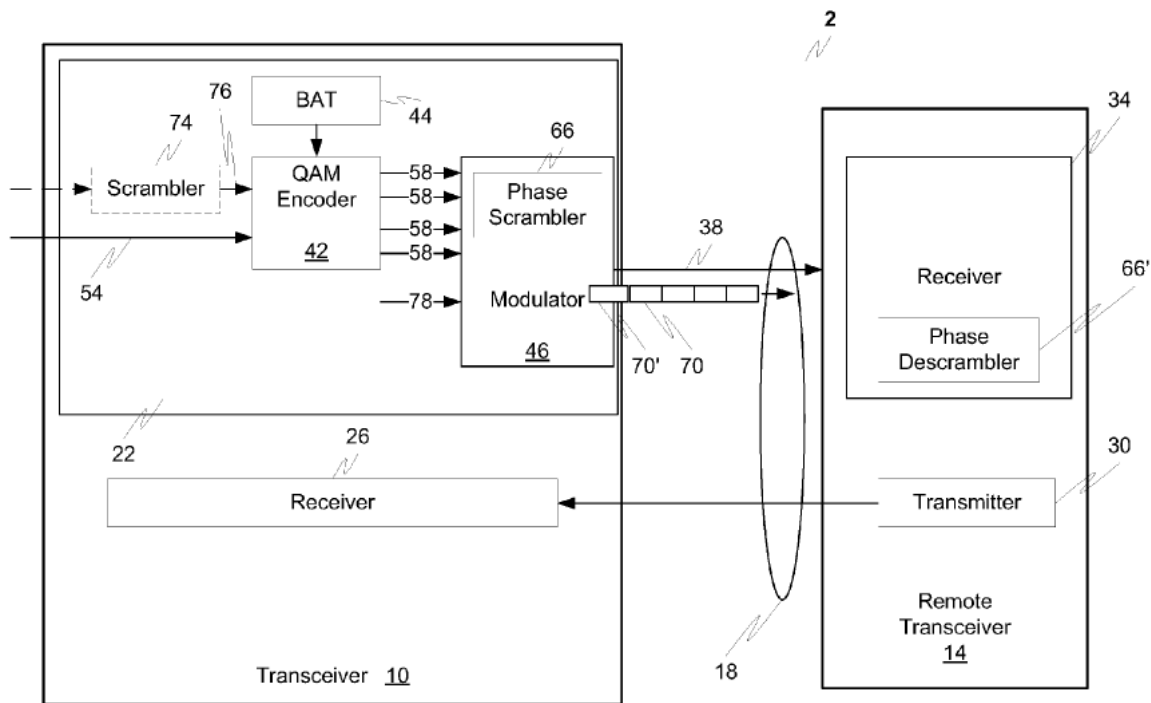


FIG. 1

Figure 1 illustrates the multicarrier communication system, digital subscriber line (DSL) communication system 2, which includes discrete multitone (DMT) transceiver 10 communicating with remote transceiver 14 over communication channel 18 using transmission signal 38 having a plurality of carrier signals. *Id.* at 3:27–31. DMT transceiver 10 includes

DMT transmitter 22 and DMT receiver 26. *Id.* at 3:31–32. Remote transceiver also includes transmitter 30 and receiver 34. *Id.* at 3:32–34. DMT transmitter 22 transmits signals over communication channel 18 to receiver 34. *Id.* at 3:40–42.

DMT transmitter 22 includes a quadrature amplitude modulation (QAM) encoder 42, modulator 46, bit allocation table (BAT) 44, and phase scrambler 66. *Id.* at 3:53–56. QAM encoder 42 has a single input for receiving serial data bit stream 54 and multiple parallel outputs to transmit QAM symbols 58 generated by QAM encoder 42 from bit stream 54. *Id.* at 3:65–4:1. Modulator 46 provides DMT modulation functionality and transforms QAM symbols 58 into DMT symbols 70. *Id.* at 4:12–14. Modulator 46 modulates each carrier signal with a different QAM symbol 58, and, therefore, this modulation results in carrier signals having phase and amplitude characteristics based on QAM symbol 58. *Id.* at 4:15–18. Modulator 46 also includes phase scrambler 66 that combines a phase shift computed for each QAM-modulated carrier signal with the phase characteristics of that carrier signal. *Id.* at 4:31–34.

#### *D. Illustrative Claim*

Petitioner challenges claims 1–30 of the '158 patent. Claims 1 and 15 are independent claims. Claims 2–14 and 29 depend, either directly or indirectly, from claim 1, and claims 16–28 and 30 depend, either directly or indirectly, from claim 15. Claim 1 is reproduced below.

1. In a multicarrier modulation system including a first transceiver in communication with a second transceiver using a transmission signal having a plurality of carrier signals for modulating a plurality of data bits, each carrier signal having a phase characteristic associated with at least one bit of the

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