UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Cisco Systems, Inc.,
Petitioner

IPR2016-01020
U.S. Patent No. 9,014,243

IPR2016-01021
U.S. Patent No. 8,718,158

SECOND DECLARATION OF DR. JOSE TELLADO UNDER 37 C.F.R. § 1.68

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I, Dr. Jose Tellado, do hereby declare as follows:

I. Background

1. I have been retained as an independent expert declarant on behalf of Cisco Systems, Inc. ("Cisco") for the above captioned Inter Partes Reviews of U.S. Patent No. 9,014,243 ("the '243 Patent") and U.S. Patent No. 8,718,158 ("the '158 Patent"). I am being compensated at my usual and customary rate for the time I spend in connection with these matters. My compensation is not affected by the outcome of either matter.

2. I have been asked to provide a supplemental declaration regarding certain arguments and statements made by the Patent Owner, TQ Delta, and its expert declarant, Dr. Robert T. Short.

II. Clipping is just one example of a "PAR problem"

3. Dr. Short appears to suggest that a "PAR problem" exists only when a system encounters an unacceptable level of transmission errors due to signal clipping. *See, e.g.*, Ex. 2003, ¶30 ("A PAR "problem" exists when the actual clipping rate exceeds the maximum allowable rate."). I disagree because Dr. Short's conception of a "PAR problem" is too narrow. A person of ordinary skill in the art (POSITA) would have understood that in addition to causing problems during a transceiver's *operation* (such as clipping), a high PAR is associated with problems and disadvantages that arise during the transceiver's *design*. For

example, while a transmitter can be designed to handle a high PAR signal without clipping, the resulting transmitter will generally be more expensive, less efficient, and larger. From both an engineering and a practical standpoint, the size, cost, and efficiency of a high-PAR transmitter are disadvantages and potential problems. For example, the low efficiency of such a transmitter will cause it to consume a large amount of electrical power, raising its operating expense and generating significant waste heat. At a telephone company's central offices, many such transmitters would be used in close proximity to one another, and their waste heat would have to be removed through additional cooling equipment—at still further operational cost—to prevent them from overheating and destroying themselves. A POSITA would have considered that to be a problem, and therefore a POSITA would have been motivated to look for ways to reduce the need for high-cost, high-power, low-efficiency transmitters by reducing the PAR of the signals to be transmitted.

4. Indeed, PAR reduction was an active area of research in the 1990s. It was well-known to use a bit-scrambler (or, equivalently, a phase scrambler) to produce a pseudorandomly phase-aligned multicarrier signal, which (as discussed above) has an amplitude with a Gaussian distribution. The active research areas focused on trying to achieve *better than Gaussian* performance, that is, to achieve PAR values that are even lower than would occur in a random system. Simply

achieving Gaussian-level performance—which is all that the simple randomization techniques of the ’243 and ’158 patents achieve—was trivial and well-known.

III. Because Shively’s bit spreading technique employs multiple carriers to carry the same data, Shively’s technique increases PAR

5. Shively describes a bit spreading technique that “replicates (‘spreads’) a *k*-bit symbol over multiple adjacent bands.” Ex. 1011, 11:17-18. This causes the bands (which are also called carriers) to carry the same bit or bits, and more specifically, to be modulated using the same QAM symbol. Because these carriers carry the same data and are modulated with the same QAM symbol, the phases of these carriers align. I agree with Dr. Short’s statement that phases of the phase-aligned carriers will add coherently and create a transmission signal with a spike in power. Ex. 2003, ¶ 22; Ex. 1027, 97:21-23.

6. In a system that does not implement Shively’s technique, this spike in power would not occur because these carriers would be deemed impaired and would not carry data. Because Shively’s technique causes the impaired carriers to carry the same data, Shively’s technique increases probability of new spikes in the amplitude. And, because of these spikes, Shively’s technique increases PAR.

IV. Shively’s bit spreading technique is not limited to 18,000 foot cables

7. Dr. Short considered the application of Shively’s bit-spreading technique to a line of 18,000 feet with narrow gauge (AWG 26) and therefore very high attenuation. *See* Ex. 2003, ¶¶58-68. However, Shively’s technique is not

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