UNITED STATES PATENT AND TRADEMARK OFFICE
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BEFORE THE PATENT TRIAL AND APPEAL BOARD
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SIRIUS XM RADIO, INC.,
Petitioner,

v.

FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG DER
ANGEWANDTEN FORSCHUNG E.V.,
Patent Owner.

_____

Case IPR2018-00689
Patent 6,993,084 B1

_____

Before JEFFREY S. SMITH, STACEY G. WHITE, and
MICHELLE N. WORMMEESTER, *Administrative Patent Judges*.

WORMMEESTER, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Sirius XM Radio, Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 1–3, 6–12, 14–21, and 23 of U.S. Patent No. 6,993,084 B1 (Ex. 1001, "the '3084 patent"). Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V ("Patent Owner") filed a Preliminary Response (Paper 7, "Prelim. Resp."). With our authorization, Petitioner filed a Reply to Patent Owner's Preliminary Response (Paper 8), and Patent Owner filed a Sur-Reply (Paper 10). We initially denied institution of *inter partes* review based on our findings as to whether Petitioner identified all real parties in interest. Paper 11. Petitioner filed a Request for Rehearing (Paper 12), and Patent Owner responded (Paper 16). We granted Petitioner's Request for Rehearing. Paper 24.

In this Decision, we determine whether to institute *inter partes* review on the merits. We have jurisdiction under 35 U.S.C. § 314 and 37 C.F.R. § 42.4(a). Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." For the reasons that follow, we decline to institute an *inter partes* review of the challenged claims.

II. BACKGROUND

A. *Related Proceedings*

The parties identify a federal district court case in which Patent Owner asserted the '3084 patent against Petitioner. Pet. 4; Paper 4, 1. Petitioner additionally notes that it also has filed petitions for *inter partes*

review of other patents that Patent Owner asserted against Petitioner in the district court case. Pet. 4.

B. The '3084 Patent

The '3084 patent describes a multicarrier modulation (MCM) system, which includes a transmitter that generates signals and a receiver that performs frame synchronization of those signals. Ex. 1001, 1:13–16, 2:3–8, 9:9–34, Fig. 2. Frame synchronization refers to the process of determining the start of a frame of a signal. *See id.* at 1:59–62, 2:6–8, 4:62–5:37, 6:55–59; *see also* Pet. 10 (citing Ex. 1002 ¶ 66). The transmitter generates signals that have a frame structure, where each frame of the frame structure includes useful symbols, a guard interval associated with each useful symbol, and one reference symbol. Ex. 1001, 1:6–10, 9:18–34, Fig. 2. To illustrate, Figure 1 of the '3084 patent is reproduced below.
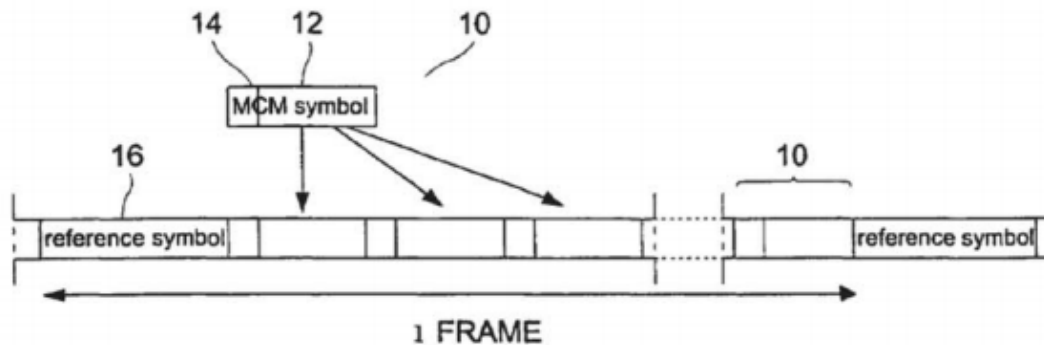

FIG.1

Figure 1 shows the frame structure of an MCM signal. *Id.* at 1:64–65, 8:57–58. One frame of the MCM signal includes multiple MCM symbols 10, each MCM symbol 10 having a useful symbol 12 and an associated guard interval 14. *Id.* at 1:65–2:1. The frame also includes one reference

symbol 16, which the receiver uses to perform frame synchronization (i.e., determine the start of a frame) of the MCM signal in order to extract the guard interval and thus the useful information bits. *Id.* at 1:37–62, 2:2–8.

The '3084 patent states that frame synchronization may "become very complex when the signal in the receiver is corrupted by a large frequency offset." *Id.* at 3:48–51. To address this problem, the '3084 patent provides its reference symbol in the form of an amplitude modulated sequence in the complex baseband, where the information contained in the reference symbol is information given in the amplitude, not information given in the phase. *Id.* at 7:6–11; *see id.* at 6:55–59 ("The present invention provides a novel structure of the reference symbol."); *id.* at 9:10–14 ("At 100 a MCM transmitter is shown that substantially corresponds to a prior art MCM transmitter except for the kind of the reference symbol being added to each frame of a MCM signal."). The '3084 patent states that information given in the phase will be corrupted by any frequency offset. *Id.* at 7:11–12. Accordingly, to extract the useful information bits, the receiver performs an amplitude demodulation of the MCM signal "in order to generate an envelope, i.e. in order to determine the amplitude of the signal," which "is correlated with a replica reference pattern in order to detect the signal reference pattern of the reference symbol in the signal" and thus the start of a frame. *Id.* at 6:55–59, 8:15–21.

C. Challenged Claims

Petitioner challenges claims 1–3, 6–12, 14–21, and 23 of the '3084 patent. Claims 1, 6, 9, and 18 are independent. Claims 1 and 9 are illustrative of the claims under challenge:

1. A method for generating a signal having a frame structure, each frame of said frame structure comprising at least one useful symbol, a guard interval associated to said at least one useful symbol and a reference symbol, said method comprising the step of

performing an amplitude modulation of a bit sequence, an envelope of the amplitude modulated bit sequence defining a reference pattern of said reference symbol; and

inserting, in time domain, the reference symbol into said signal, wherein said reference symbol comprises a real part and an imaginary part, said real part and said imaginary part being equal and being formed by said amplitude modulated bit sequence.

9. A method for frame synchronization of a signal having a frame structure, each frame of said frame structure comprising at least one useful symbol, a guard interval associated with said at least one useful symbol and a reference symbol, said reference symbol comprising a real part and an imaginary part, said real part and said imaginary part being equal and being formed by an amplitude modulated bit sequence, said method comprising the steps of

receiving said signal;

down-converting said received signal;

in time domain, performing an amplitude-demodulation of said down-converted signal in order to generate an envelope;

in time domain, correlating said envelope with a predetermined reference pattern in order to detect a signal reference pattern of said reference symbol in said signal; and

performing said frame synchronization based on the detection of said signal reference pattern.

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