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Paper No. 25
Entered: March 9, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SIRIUS XM RADIO INC.,
Petitioner,

v.

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

Case IPR2018-00681
Patent 7,061,997 B1

Before JEFFREY S. SMITH, STACEY G. WHITE, and GARTH D. BAER, *Administrative Patent Judges*.

BAER, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

Sirius XM Radio Inc. ("Petitioner") filed a Petition (Paper 1, "Petition" or "Pet.") requesting *inter partes* review of claims 1–3 (the "challenged claims") of U.S. Patent No. 7,061,997 B1 (Ex. 1007, "the '997 patent"). Patent Owner Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. ("Patent Owner") filed a Preliminary Response (Paper 8, "Prelim. Resp."). In our Institution Decision, we denied institution based on Petitioner's failure to identify Sirius XM Holdings Inc. ("Holdings") as an RPI in this proceeding. Paper 12, 7. We also denied Petitioner authorization to amend its mandatory notice to add Holdings without changing the Petition's filing date. *Id.* Petitioner requested Rehearing (Paper 13), which we granted (Paper 24), finding Petitioner could add Holdings as an RPI without changing the Petition's filing date.

We now turn to the merits of the Petition. Pursuant to 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless "the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least one of the claims challenged in the petition." Having considered the Petition and the Preliminary Response, we determine that there is not a reasonable likelihood that Petitioner would prevail in establishing that claims 1–3 of the '997 patent are unpatentable. Therefore, we decline to institute *inter partes* review.

I. BACKGROUND

A. RELATED PROCEEDINGS

The parties assert that the '997 patent is involved in *Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. v. Sirius XM Radio Inc.*, 1:17-cv-00184 (D. Del. Feb. 22 2017).

B. THE '997 PATENT

The '997 patent relates to fine frequency synchronization in a multi-carrier demodulating system. Ex. 1007, code (57), Claim 1. A multi-carrier system is useful for broadcasting and receiving digital signals. *Id.* at 8:24–26. The broadcast may be performed over a radio frequency (RF) signal, or modulated on a carrier frequency. Pet. 10.

In a multi-carrier modulation (MCM) differential phase keying coding system, the multiple symbols from a variety of sources are compared at a receiver to determine the difference between their phases. In a time domain approach as shown in Figure 2A of the '997 patent, the symbols may be presented sequentially in time on one carrier frequency, with each of the k sub-carriers coding an independent symbol simultaneously. Ex. 1007, 6:32–45. The phase shift upon which the bits are encoded is measured according to the shift between two temporally adjacent sub-carrier symbols at the same frequency. *Id*. An alternative approach to time domain coding is frequency domain coding. In a frequency domain MCM embodiment as shown in Figure 2B of the '997 patent, different symbols are transmitted simultaneously on different subcarriers having different frequencies. *Id*. at 6:46–7:4. In this embodiment, the difference between two symbols that makes up the coding of two bits occurs between simultaneous symbols on the different subcarriers having different frequencies. *Id*.

The claimed method addresses the problem of desynchronization of sub-carrier channels across which a symbol is differentially coded in the frequency axis, as in Figure 2B. As Petitioner explains, "a correction of the frequency offsets by using a phase rotation with differential decoding and

de-mapping in the time axis can be used." Pet. 16 (quoting Ex. 1007, 3:42–59). Figures 6 and 7 of the '997 patent are reproduced below.

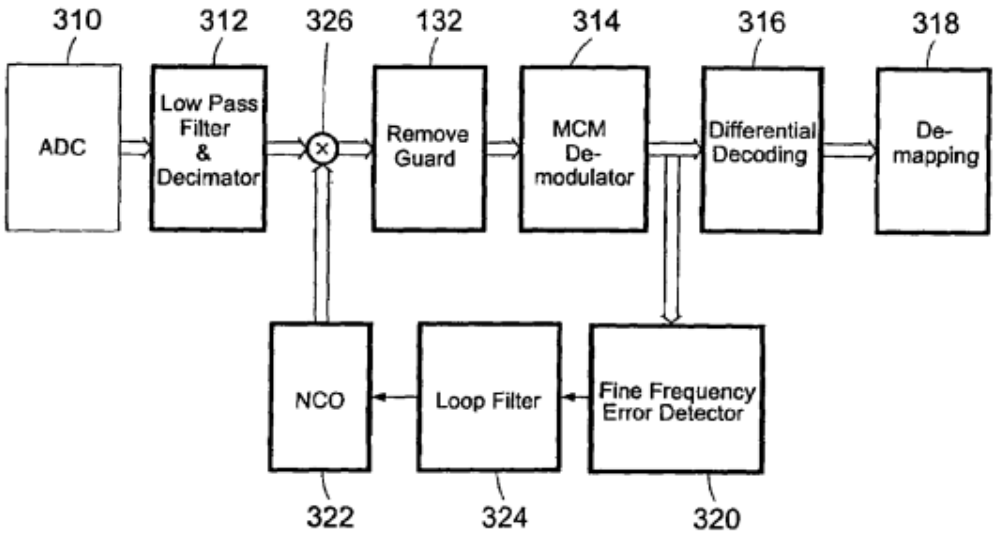

FIG.6

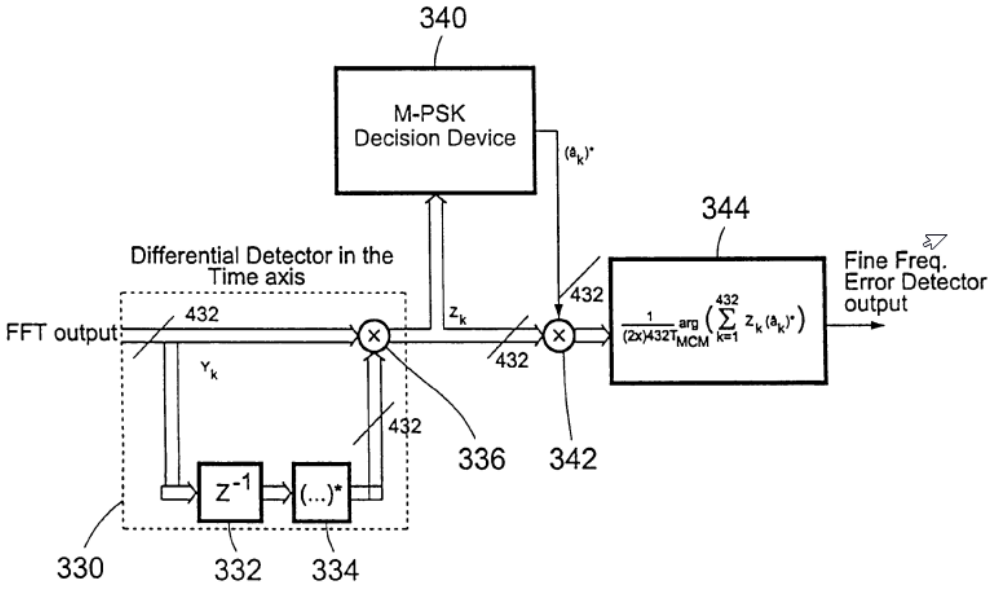

FIG.7

Figure 7 "shows a block diagram of [a] fine frequency error detector" (4:31–32, 10:14–16), and Figure 6 shows the Figure 7 fine frequency error detector *in situ* as fine frequency error detector 320 in a feedback loop in an MCM receiver preceding differential decoding unit 316. Ex. 1007, 9:55–10:14.

C. ILLUSTRATIVE CLAIM

Of the challenged claims, only claim 1 (reproduced below) is independent.

1. A method of performing a fine frequency synchronization compensating for a carrier frequency in a multi-carrier demodulation system capable of carrying out a differential phase decoding of multi-carrier modulated signals, said signals comprising a plurality of symbols, each symbol being differentially coded in the direction of the frequency axis, said method comprising the steps of:

a) determining a phase difference between phases of the same carrier in different symbols;

b) determining a frequency offset by eliminating phase shift uncertainties related to the transmitted information from said phase difference making use of a M-PSK decision device; and

c) performing a feedback correction of said carrier frequency deviation based on said determined frequency offset, wherein

said steps a) and b) are performed for a plurality of carriers in said symbols,

an averaged frequency offset is determined by averaging said determined frequency offsets of said plurality of carriers, and

said feedback correction of said frequency deviation is performed based on said averaged frequency offset.

Ex. 1007, 21:41–22:7.

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