IEEE
Advancing Technology for Humanity

# DECLARATION OF GERARD P. GRENIER

I, Gerard P. Grenier, am over twenty-one (21) years of age. I have never been convicted of a felony, and I am fully competent to make this declaration. I declare the following to be true to the best of my knowledge, information and belief:

1. I am Senior Director of Publishing Technologies of the Institute of Electrical and Electronics Engineers, Inc. ("IEEE").

2. IEEE is a neutral third party in this dispute.

3. Neither I nor IEEE itself is being compensated for this declaration.

4. Among my responsibilities as Senior Director of Publishing Technologies, I act as a custodian of certain records for IEEE.

5. I make this declaration based on my personal knowledge and information contained in the business records of IEEE.

6. As part of its ordinary course of business IEEE publishes and makes available technical articles and standards. These publications are made available for public download through the IEEE digital library, IEEE Xplore.

7. It is the regular practice of IEEE to publish articles and other writings including article abstracts and make them available to the public through IEEE Xplore. IEEE maintains copies of publications in the ordinary course of its regularly conducted activities.

8. The article below has been attached as Exhibits A to this declaration:

| | |
|---|---|
| A. | Y. Nakamura, et al., "256 QAM Modem for Multicarrier 400 Mbit/s Digital Radio" IEEE Journal on Selected Areas in Communications, Vol. 5, Issue 3, April 1987. |

9. I obtained a copy of Exhibit A through IEEE Xplore, where it is maintained in the ordinary course of IEEE's business. Exhibit A is a true and correct copy of the Exhibit as it existed on or about January 5, 2017.

10. The article abstracts from IEEE Xplore shows the date of publication. IEEE Xplore populates this information using the metadata associated with the publication

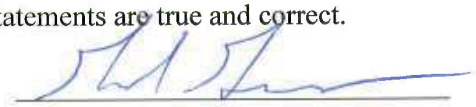
11. Y. Nakamura, et al., "256 QAM Modem for Multicarrier 400 Mbit/s Digital Radio" was published in IEEE Journal on Selected Areas in Communications, Vol. 5, Issue 3.

IEEE Journal on Selected Areas in Communications, Vol. 5, Issue 3 was published in April 1987. Copies of this publication were made available no later than the last day of the stated publication month. The article is currently available for public download from the IEEE digital library, IEEE Xplore.

12. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

I declare under penalty of perjury that the foregoing statements are true and correct.

Executed on: 9 Jan. 2017



# EXHIBIT A

# 256 QAM Modem for Multicarrier 400 Mbit/s Digital Radio



3 Author(s)

Y. Nakamura ; Y. Saito ; S. Aikawa

View All Authors



**Abstract:**
This paper describes the performance of a 256 QAM modem with 400 Mbit / s transmission capacity. A variety of novel techniques are introduced as ways to achieve good performance. Key techniques include 1) an accurate 256 QAM modulator employing a new monolithic multiplier IC, 2) a carrier recovery circuit which satisfies such requirements: good phase jitter performance and no false lock phenomenon, 3) a highly stable high-level decision circuit, and 4) a forward error correcting code. As an overall modem performance, BER characteristics and signatures are presented. The equivalent CNR degradations of 1 dB(at BER of $10^{-4}$) and 2 dB (at BER of $10^{-9}$)are obtained using a single Lee-error correcting code and a seven-tap baseband transversal equalizer. The residual bit errors are decreased below the order of $10^{-10}$. The performance of a 256 QAM multicarrier modem has given prospect for the development of 400 Mbit/s digital microwave radio system.

**Published in:** IEEE Journal on Selected Areas in Communications ( Volume: 5, Issue: 3, Apr 1987 )

**Page(s):** 329 - 335

**DOI:** 10.1109/JSAC.1987.1146555

**Date of Publication:** 06 January 2003

**Publisher:** IEEE

**Print ISSN:** 0733-8716



**Keywords**

**IEEE Keywords**
Quadrature amplitude modulation, Modems, Digital communication, Bit error rate, Phase modulation, Modulation coding, Monolithic integrated circuits, Jitter, Error correction codes, Degradation

**INSPEC: Non-Controlled Indexing**
Quadrature amplitude modulation, Digital modulation/demodulation

**Authors**

Y. Nakamura
Nippon Telegraph and Telephone Corp., Kanagawa, Japan

Y. Saito

S. Aikawa

**Related Articles**

Variable rate QAM for mobile radio
W.T. Webb; R. Steele

Effect of channel estimation error on M-QAM BER performance in Rayleigh fading
Xiaoyi Tang; M.-S. Alouini; A.J. Goldsmith

Systematic lossy source/channel coding
S. Shamai; S. Verdu; R. Zamir

Codes for digital recorders
K.E. Schouhamer Immink; P.H. Siegel; J.K. Wolf

Performance degradation of OFDM systems due to Doppler spreading
Tiejun Wang; J.G. Proakis; E. Masry; J.R. Zeidler

A hybrid analytical-simulation procedure for performance evaluation in M-QAM-OFDM schemes in presence of nonlinear distortions
G. Santella; F. Mazzenga

Prioritized transmission of data partitioned H.264 video with hierarchical QAM
B. Barmada; M.M. Ghandi; E.V. Jones; M. Ghanbari

Codes in Permutations and Error Correction for Rank Modulation
Alexander Barg; Arya Mazumdar

Signal constellations for bit-interleaved coded modulation
S.Y. Le Goff

Practical blind demodulators for high-order QAM signals
J.R. Treichler; M.G. Larimore; J.C. Harp

DOCKET ALARM

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

**LAW FIRMS**
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

**FINANCIAL INSTITUTIONS**
Litigation and bankruptcy checks for companies and debtors.

**E-DISCOVERY AND LEGAL VENDORS**
Sync your system to PACER to automate legal marketing.