



**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.	J.C. Rault, et al. “The coded orthogonal frequency division multiplexing (COFDM) technique, and its application to digital radio broadcasting towards mobile receivers” IEEE Global Telecommunications Conference and Exhibition ‘Communications Technology for the 1990s and Beyond (GLOBECOM), November 27-30, 1989.
----	--

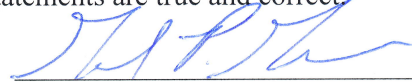
9. I obtained a copy of Exhibit A through IEEE Xplore, where it is maintained in the ordinary course of IEEE’s business. Exhibit A is a true and correct copy of the Exhibit as it existed on or about December 10, 2016.
10. The article abstracts from IEEE Xplore shows the date of publication. IEEE Xplore populates this information using the metadata associated with the publication

11. J.C. Rault, et al. "The coded orthogonal frequency division multiplexing (COFDM) technique, and its application to digital radio broadcasting towards mobile receivers" was published in IEEE Global Telecommunications Conference and Exhibition 'Communications Technology for the 1990s and Beyond (GLOBECOM). IEEE Global Telecommunications Conference and Exhibition 'Communications Technology for the 1990s and Beyond (GLOBECOM) was held from November 27-30, 1989. Attendees of the conference were provided copies of the publication no later than the last day of the conference. 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: 12-Dec-2016

  
\_\_\_\_\_

# EXHIBIT A

Institutional Sign In

BROWSE

MY SETTINGS

GET HELP

WHAT CAN I ACCESS?

SUBSCRIBE

Browse Conferences > Global Telecommunications Con...

# The coded orthogonal frequency division multiplexing (COFDM) technique, and its application to digital radio broadcasting towards mobile receivers

Sign In or Purchase  
to View Full Text

**16**  
Paper Citations

**7**  
Patent Citations

**205**  
Full Text Views

## Related Articles

Frequency-domain equalization of mobile radio and terrestrial broadcast channels

Interpolation-based QR decomposition in MIMO-OFDM systems

High performance Viterbi decoder for OFDM systems

[View All](#)

**3**

Author(s)

J.C. Rault ; D. Castelain ; B.L. Le Floch

[View All Authors](#)

**Abstract**

Authors

Figures

References

Citations

Keywords

Metrics

Media

### Abstract:

A system which is able to broadcast at high data rates in a selective Rayleigh channel is presented. This technique combines an orthogonal frequency division multiplexing technique and a convolutional coding scheme associated with a Viterbi decoding algorithm. This system is able to benefit from wideband transmission by employing the information contained in all the echoes of the multipath channel while having a very good spectral efficiency and a low computational complexity. The authors present the theoretical principles of the system. They describe the realization of a complete COFDM (coded orthogonal frequency division multiplexing) system, designed within the framework of the DAB (digital audio broadcasting) EUREKA 147 project, which is able to broadcast at 5.6 Mb/s in a bandwidth of 7 MHz. At present, this rate corresponds to 16 high-quality stereophonic programs. Network aspects are pointed out as far as the introduction of a new radio broadcasting service is concerned.

**Published in:** Global Telecommunications Conference and Exhibition 'Communications Technology for the 1990s and Beyond' (GLOBECOM), 1989. IEEE

**Date of Conference:** 27-30 Nov. 1989

**INSPEC Accession Number:** 3719102

**Date Added to IEEE Xplore:** 06 August 2002

**DOI:** 10.1109/GLOCOM.1989.64008

**Publisher:** IEEE

Download PDF

**This article is only available in PDF.**

[Read document](#)

Download Citations

[Abstract](#)

View References

### Keywords

[Authors](#)

Email

### IEEE Keywords

OFDM, Digital audio broadcasting, Radio broadcasting, Rayleigh channels, Convolutional codes, Viterbi algorithm, Decoding, Wideband, Multipath channels, Computational complexity

[Figures](#)

Print

[References](#)

Request Permissions

### INSPEC: Controlled Indexing

telecommunication channels, digital radio systems, frequency division multiplexing, mobile radio systems, radio broadcasting, radio receivers

[Citations](#)

Export to Collabratec

### INSPEC: Non-Controlled Indexing

7 MHz, coded orthogonal frequency division multiplexing, digital radio broadcasting, mobile receivers,

[Keywords](#)

Alerts

[Back to Top](#)

12/10/2016 The coded orthogonal frequency division multiplexing (COFDM) technique, and its application to digital radio broadcasting towards mobile receivers - I...  
selective Rayleigh channel, convolutional coding scheme, wideband transmission, EUREKA 147  
project, 5.6 Mbit/s

#### Authors

J.C. Rault  
CCETT, Cesson Sevigne, France

---

D. Castelain  
CCETT, Cesson Sevigne, France

---

B.L. Le Floch  
CCETT, Cesson Sevigne, France

---

#### Related Articles

Frequency-domain equalization of mobile radio and terrestrial broadcast channels  
H. Sari; G. Karam; I. Jeanclaude

---

Interpolation-based QR decomposition in MIMO-OFDM systems  
D. Cescato; M. Borgmann; H. Bolcskei; J. Hansen; A. Burg

---

High performance Viterbi decoder for OFDM systems  
E. Akay; E. Ayanoglu

---

Joint coding and decision feedback equalization for broadband wireless channels  
S. Ariyavisitakul; Ye Li

---

Theoretical bit error rate for uncoded and coded data transmission in digital audio broadcasting  
G. Zimmermann; M. Rosenberger; S. Dostert

---

Optimal detection when combining OFDM-CDMA with convolutional and turbo channel coding  
S. Kaiser; L. Papke

---

Low complexity implementation of a downlink CDMA generalized RAKE receiver  
G. Kutz; A. Chass

---

An adaptive diversity receiver for OFDM in fading channels  
S.B. Bulumulla; S.A. Kassam; S.S. Venkatesh

---

Iterative interference cancellation and decoding for a coded UWB-TH-CDMA system in multipath  
channels using MMSE filters  
A. Bayesteh; M. Nasiri-Kenari

---

Different channel coding strategies for OFDM-CDMA  
R.A. Stirling-Gallacher; G.J.R. Povey

---

[Personal Sign In](#) | [Create Account](#)

# 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.