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IEEE INTERNATIONAL CONFERENCE ON COMMUNICATIONS

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

1972

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JUNE 19, 20, 21, 1972

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CONFERENCE RECORD

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FOREWORD

"Communication—Versatile Servant of Mankind" is the theme of ICC '72—the eighth of this annual series of technical conferences and the first sponsored by the IEEE Communications Society.

In keeping with the tradition of quality and innovation, this year's program highlights revolutionary new technologies and applications to meet the world's ever-expanding communication needs—with particular emphasis in the areas of data communication systems, radio and wire communication systems, radio and wire communications, communication switching and systems disciplines and theory.

The conference theme is featured in three sessions designed to provide further insight into the impact of communications as a service to society. One explores environmental sensing, another, the field of urban communications and the third delves into telecommunications from the consumer's view.

ICC '72 introduces for the first time a one-day tutorial course in synchronous communications to acquaint participants with the theory and application of modern methods of technology in establishing and maintaining digital communications systems.

Recognizing ICC '72 as the crossroads meeting place for the world's communicators, the programmed 48 technical sessions and presentation of 237 in-depth papers provides the opportunity for the exchange of ideas and review of the latest developments in the rapidly changing art of global communications. It is hoped that the range of technical subjects will encourage open discussions on topics related to the program.

In addition to the technical sessions, an outstanding display of operational hardware features products of telecommunications' manufacturers from the United States and abroad.

S. Zebrowitz
Chairman ICC '72

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- 25C: Cable System Engineering ----- 25-8
J. O'Neill, The MITRE Corporation
- 25D: Political and Organizational Realities of Urban Communications ----- 25-13
K. D. Felperin, Stanford Research Institute

SESSION 26: TECHNOLOGY FOR FUTURE SATELLITE SYSTEMS

Organizer: D. W. Lipke, COMSAT
Chairman: J. P. Singh, Washington University
Sponsor: Aerospace and Electronic Systems Group

- 26A: Advanced Technology for High-Power Satellite Systems ----- 26-1
A. M. G. Andrus, NASA, Washington, D. C.
- 26B: The 20 and 30 GHz Communications System for the ATS-F Millimeter
Wave Experiment ----- 26-2
L. J. Ippolito, NASA, Goddard Space Flight Center
- 26C: Telemetry and Command, ATS-F's Vital Link With Earth ----- 26-8
B. J. Trudell, NASA, Goddard Space Flight Center
- 26D: Shaped Coverage Patterns with Satellite Array Antennas ----- 26-15
J. L. Hult, The Rand Corporation
- 26E: 12GHz Low-Noise Converter ----- 26-19
Y. Konishi and N. Hoshino, Japan Broadcasting Corp., Japan
- 26F: Low Noise Receiver for Satellite Broadcasting ----- 26-23
Y. Konishi and K. Konno, Japan Broadcasting Corp., Japan

SESSION 27: DIGITAL SIGNAL PROCESSING II

Organizer: M. R. Aaron
Chairman: M. R. Aaron, Bell Telephone Laboratories
Chairman: Wire Communication Committee, Communications Society

- 27A: Digital Coding of Speech Signals ----- 27-1
J. L. Flanagan, Bell Telephone Laboratories
- 27B: Digital Encoding of Television Signals ----- 27-2
D. J. Connor, Bell Telephone Laboratories

SESSION 28: MICROWAVE RADIO PERFORMANCE

Organizer: W. T. Barnett

Chairman: W. T. Barnett, Bell Telephone Laboratories

Sponsor: Radio Committee, Communications Society

- 28A: Observations of 4 GHz Obstruction Fading ----- 28-1
A. Vigants, Bell Telephone Laboratories
- 28B: New Approach to Reliability for Microwave Line-of-Sight Links ----- 28-3
C. K. H. Tsao, Raytheon Company
- 28C: Amplitude and Phase Dispersion During Selective Fading of
Line-of-Sight Radio Systems ----- 28-7
G. M. Babler, Bell Telephone Laboratories
- 28D: Reliability Aspects of Fading in Microwave Line-of-Sight Systems
Using Digital Transmission ----- 28-10
W. T. Ewton, Collins Radio Company
- 28E: Statistical Behavior of Rain Attenuation from Experimental Data ----- 28-11
S. H. Lin, Bell Telephone Laboratories
- 28F: On Path Diversity Communication Networks ----- 28-17
G. Tartara, Istituto di Elettrotecnica ed Elettronica, Italy

SESSION 29: DIGITAL DATA TRANSMISSION TECHNIQUES I

Organizer: A. Lender, GTE Lenkurt Inc.

Chairman: C. R. Fisher, DATRAN Corporation

Sponsor: Data Communication Systems Committee, Communications Society

- 29A: Digital Transmission Over Analog Microwave Radio Systems ----- 29-1
K. L. Seastrand and L. L. Sheets, Bell Telephone Laboratories
- 29B: Optimum Combination of Amplitude and Phase Modulation Scheme and
Its Application to Data Transmission MODEM ----- 29-6
K. Kawai, S. Shintani and H. Yanagidaira, Kokusai Denshin Denwa Co., Japan
- 29C: Error Probability for Multilevel PAM Transmission with Intersymbol
Interference, Gaussian and Impulsive Noise ----- 29-12
E. Biglieri and R. Dogliotti, Istituto di Elettronica, Italy
- 29D: High-Performance MOS/LSI Modems ----- 29-18
E. D. Gibson, North American Rockwell
- 29E: Transition-Coded Quadrature Modulation for Synchronous and
Asynchronous Binary Data Communication ----- 29-24
K. Brayer, The MITRE Corporation
- 29F: Simultaneous Two-Way Data Transmission Over a Two-Wire Circuit ----- 29-30
V. G. Koll and S. B. Weinstein, Bell Telephone Laboratories

SESSION 30: COMMUNICATION RECEIVER INTERFERENCE MODELING

Organizer: H. S. Babbitt III

Chairman: H. S. Babbitt III, MIT Lincoln Laboratory

Sponsor: Circuit Theory Group

- 30A: Communication Receivers Interference Modeling ----- 30-1
J. W. Graham and P. A. Bello, SIGNATRON, Inc.
- 30B: Nonlinear Canonic Models of Receivers ----- 30-2
P. A. Bello, SIGNATRON, Inc.
- 30C: Nonlinear Transfer Functions from Circuit Analysis; Mild Excitation ----- 30-10
L. Ehrman and S. A. Meer, SIGNATRON, Inc.
- 30D: Nonlinear Transfer Functions from Circuit Analysis; Strong Excitation ----- 30-16
J. O'Donnell, SIGNATRON, Inc.
- 30E: Experimental Validation of the Nonlinear Transfer Function Approach
to Receiver Modeling ----- 30-22
J. W. Graham and L. Ehrman, SIGNATRON, Inc.
- 30F: Computer Modeling of a Solid-State VHF Tuner Using the Nonlinear
Transfer Function Approach ----- 30-29
J. F. Spina and A. W. Fitch, Rome Air Development Center
D. D. Weiner, Syracuse University

SESSION 31: SOURCE ENCODING - THEORY AND PRACTICE

Organizer: T. Berger

Chairman: T. Berger, Cornell University

Sponsor: Information Theory Group

- 31A: Rate Distortion from Planet to Paper ----- 31-1
E. C. Posner, Jet Propulsion Laboratory
- 31B: Problems in Simultaneous Communication ----- 31-6
R. M. Gray and P. P. Bergmans, Stanford University
- 31C: Optimum Quantizers and Permutation Codes ----- 31-11
T. Berger, Cornell University
- 31D: Frame-to-Frame Predictive Coding of Videotelephone Signals ----- 31-15
B. G. Haskell, Bell Telephone Laboratories
- 31E: Differential PCM for Speech and Data Signals ----- 31-16
J. B. O'Neal, Jr. and R. W. Stroh, North Carolina State University

SESSION 32: CENTRALIZED MAINTENANCE/TRAFFIC SYSTEMS

Organizer: J. G. Pearce, Stromberg-Carlson Corp.

Chairman: W. V. Tyrlick, The MITRE Corp.

Sponsor: Communication Switching Committee, Communications Society

- 32A: No. 1 Crosspoint Tandem Maintenance Control Center ----- 32-1
J. G. Johnson, GTE Automatic Electric Laboratories
- 32B: No. 1 Crosspoint Tandem Traffic Considerations ----- 32-6
P. S. Harrington, General Telephone Co. of Michigan
- 32C: No. 1 Crosspoint Tandem Traffic Data Collections System and
Overload Controls ----- 32-12
F. R. Koller, D. W. McLaughlin and D. L. Zicky,
GTE Automatic Electric Laboratories
- 32D: A Traffic Simulator For Load Testing ESS ----- 32-15
H. L. Powers, Western Electric Co.
- 32E: Waiting-Time Distributions and Buffer Overflow in Priority Systems ----- 32-21
D. Gall and H. R. Mueller, IBM Zurich Research Laboratory, Switzerland
- 32F: On Economies of Scale and Integration of Services in Certain
Queued Information Transmission Systems ----- 32-27
H. R. Rudin, Jr., IBM Zurich Research Research Laboratory, Switzerland

SESSION 33: DIGITAL FILTERING APPLICATIONS

Organizer: L. Jackson
Chairman: L. Jackson, Rockland Systems Corp.
Sponsor: Audio and Electro-Acoustics Group

- 33A: An LSI Implementation of Recursive Digital Filters ----- 33-1
H. S. McDonald and W. C. Fischer, Jrs., Bell Telephone Laboratories
- 33B: Very High Order Frequency-Sampled Speech Processing ----- 33-2
D. A. Berkley and T. B. Bateman, Bell Telephone Laboratories
- 33C: A Nonlinear Digital Oscillator ----- 33-3
H. D. Montgomery, Massachusetts Institute of Technology
- 33D: An Experimental Study of Roundoff Effects in a Tenth Order
Recursive Digital Filter ----- 33-9
R. B. Kiebertz, Bell Telephone Laboratories
- 33E: Some Digital Filtering Operations with Application to
Data Communication Systems ----- 33-15
V. Cappellini, Istituto di Ricerca sulle Onde Elettromagnetiche, Italy

SESSION 34: SATELLITE COMMUNICATIONS - MODULATION TECHNOLOGY

Organizer: F. J. Altman, Computer Sciences Corporation
Chairman: D. F. Hoth, Bell Telephone Laboratories
Sponsor: Space Communication Committee, Communications Society

- 34A: Satellite Adjacent-Channel Interference Due to Multicarrier
Transponder Operation ----- 34-1
M. Horstein, Hughes Aircraft Company
- 34B: Convolution Noise and Distortion in FDM/FM Systems ----- 34-7
R. K. Khatri and J. E. Wilkes, Fairchild Industries
- 34C: Impulse Noise in FM Receivers in the Presence of Adjacent
Channel Interference and Thermal Noise ----- 34-13
T. Furuya, A. Fujii and K. Tezuka, Nippon Electric Co., Ltd., Japan
- 34D: Computer Simulation of a Digital Satellite Communications System
Utilizing TDMA and Coherent Quadriphase Signalling ----- 34-19
L. C. Palmer and S. A. Rhodes, Computer Sciences Corp.
- 34E: Phase Noise Specification for Digital Satellite Communications ----- 34-25
N. Brienza and P. Trafton, Computer Sciences Corp.

SESSION 35: PROTECTION OF ELECTRONIC EQUIPMENT I

Organizer: G. Y. R. Allen
G. Y. Mack, Illinois Bell Telephone Co.
Chairman: G. Y. R. Allen, Osborne Electric Company, Ltd., Canada
Sponsor: Wire Communication Committee, Communications Society

- 35A: Lightning Surges in Open Wires, Coaxial and Paired Cables ----- 35-1
E. Bennison and A. J. Ghazi, Bell-Northern Research, Canada
P. Ferland, Bell Canada
- 35B: Conductive Plastic Sheath on Buried Communications Cable for
Reduced Lightning Damage ----- 35-7
U. P. Ronald, Bell-Northern Research, Canada
- 35C: Surge Testing Electronic Equipment ----- 35-13
E. J. Cohen, J. B. Eppes, Jr., and E. L. Fisher,
Rural Electrification Administration
- 35D: Interim Report, Static Relay Surge Protection ----- 35-16
J. L. Koepfinger, Duquesne Light Co.