16TH BIENNIAL SYMPOSIUM ON COMMUNICATIONS

CONFERENCE PROCEEDINGS

Edited by
Stafford E. Tavares

Co-Sponsored by:
Department of Electrical Engineering
Queen’s University at Kingston

Department of Communications
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May 27-29, 1992

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PROGRAMME

Wednesday, May, 27, 1992

8:45-9:00 Opening Remarks and Welcoming Address (WL 205)

9:00-10:00 Plenary Lecture: Dr. Ray Pickloltz, George Washington University
Title: Personal Communication Networks

10:00-10:20 Coffee Break

Session A.1: (Wednesday, 1020 h)

WIRELESS COMMUNICATIONS

Session Chair: P.J. McLane - Queen's University

1. Binary Communication on the Indoor Wireless Channel
   M. Alles and S. Pasupathy, University of Toronto, Toronto, Ontario

2. A SAW Based Carrier Recovery Scheme for a 915 MHz BPSK Wireless System
   P.J. Edmonson, P.M. Smith, C.K. Campbell, McMaster University, Hamilton, Ontario

3. Linearisation of RF Power Amplifiers for Digital Cellular Radio
   Y. den Otter, P. Goud, C. Englefield, TR LABS (Telecommunications Research Labs),
   Edmonton, Alberta

4. An Error Control Scheme with Two Frequency Hopping and Half Rate Code for
   Indoor Radio Systems
   K. Wu, E. Sousa, University of Toronto, Toronto, Ontario

Session B.1: (Wednesday, 1020 h)

SOURCE CODING

Session Chair: P. Kabal - McGill University, INRS-Telecommunications, University of Quebec

1. Block Adaptive Prediction of Still Images
   S. Aissa, E. Dubois, INRS - Telecommunications, University of Quebec, Verdun, Quebec
2. **A Systematic Approach to the Design of Structured Source Coders**  
   *W. Chan*, McGill University, Montreal, Quebec

3. **Wideband CELP Speech Coding at 12kbits/sec**  
   *K. Abboud*, P. *Kabal*[^1][^2], McGill University, Montreal, Quebec, [^2]University of Quebec, Verdun, Quebec

4. **Speech Coding Using an Enhanced Sinusoidal Model at Low Bit-Rate**  
   *Q. Yasheng*, L. *Jia*[^1], F. *Chongxi*[^1], P. *Kabal*[^2], Tsinghua University, Beijing, China, [^2]University of Quebec, Verdun, Quebec

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**Session C.1: (Wednesday, 1020 h)**

**SIGNAL PROCESSING**

**Session Chair: D. Falconer - Carleton University**

1. **Elimination of Bursting in Adaptive Hybrids**  
   *T. Aboulnasr*, L. *Wang*, University of Ottawa, Ottawa, Ontario

2. **A Study of the Delayed Leakage Least Mean Square Adaptive Algorithm**  
   *F. Laichi*, T. *Aboulnasr*, W. *Steenaart*, University of Ottawa, Ottawa, Ontario

3. **Principle of Least Change for Channel Equalization**  
   *W. McGee*, Nepean DSP Services, NEPEAN, Ontario

4. **Adaptive Beamforming in an Impulsive Signal Environment**  
   *G. Niezgoda*, Concordia University, Montreal, Quebec, *J. Krolik*, Scripps Institution of Oceanography, LaJolla, California

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**Session D.1: (Wednesday, 1020 h)**

**COMPUTER COMMUNICATIONS I**

**Session Chair: C. Siller, Jr. - AT & T Bell Laboratories**

1. **Synchronous Optical Network (SONET) Evolution and Its Implication for Data Communications**  
   *C. Siller*, I. *Haque*, K. *Lee*, T. *Aprille*, AT & T Bell Laboratories, North Andover, Massachusetts USA

2. **A Spectral Analysis Approach to Congestion Control in ATM Networks**  
   *J. Huard*, J. *Hayes*, Concordia University, Montreal, Quebec
3. High speed Data Service Definition and Traffic Controls  
   L. Orozco-Barbosa, University of Ottawa, Ottawa, Ontario

4. Source State Estimation: A Kalman Filtering Approach  
   J. Hayes, P. Tsingotjidis, Concordia University, Montreal, Quebec

Session A.2: (Wednesday, 1400 h)

MODULATION AND CODING

Session Chair: D.P. Taylor - McMaster University

1. Asynchronous Timing Recovery in DSP Based Mobile Satellite Modems  
   B. Koblents, W. Choy, P. McLane, Queen’s University, Kingston, Ontario

2. Transmitter/Receiver Architecture for Simplified Demodulation of Quadature-Modulated Signals  
   C. Siller, Jr., AT & T Laboratories, North Andover, Massachusetts USA

3. Huffman Codes for Shaping Gain  
   F. Kschischang, University of Toronto, Toronto, Ontario

4. Simulation of an 8-ary 32 Channel NCFSK Demodulator  
   D. Quick, M. Rahman, Royal Military College of Canada, Kingston, Ontario

5. On Trellis Coded CPFSK  
   R. Yang, D. Taylor, McMaster University, Hamilton, Ontario

6. Reed Solomon Signal Space Codes for Rayleigh Channels  
   N. Van Stralen, D. Taylor, McMaster University, Hamilton, Ontario

7. A Comparison of Three QPSK Type Modulation Schemes for Mobile Satellite SCPC Voice and Data Services  
   S. Crozier, Communications Research Centre, Ottawa, Ontario

Session B.2: (Wednesday, 1400 h)

OPTICAL COMMUNICATIONS

Session Chair: M. Kavehrad - University of Ottawa

1. Applications of Holography in Optical Communications and Network Systems  
   F. Khaleghi, M. Kavehrad, University of Ottawa, Ottawa, Ontario
2. Implications of Laser Spectrum Variations Due to Optical Reflections for Noncoherent and Coherent CPFSK Systems
   M. Nowell, J. Cartledge, Queen's University, Kingston, Ontario

3. Theoretical Performance of Coherent Optical CPFSK-DD with Intersymbol Interference, Noise Correlation and Laser Phase Noise
   R. Mckay, J. Cartledge, Queen's University, Kingston, Ontario

4. A Subcarrier Multiplexed CDM Fiber Local Area Network
   F. Khaleghi, M. Kavehrad, University of Ottawa, Ottawa, Ontario

5. An Experiment on a CDM Subcarrier Multiplexed Optical Fiber Local Area Network
   M. Kavehrad, F. Khaleghi, University of Ottawa, Ottawa, Ontario, G. Bodeep, AT & T Bell Laboratories, Holmdel, New Jersey

6. A Network Analyser for Optical Communication Components
   A. Freundorfer, Queen's University, Kingston, Ontario

Session C.2: (Wednesday, 1400 h)

COMMUNICATIONS SYSTEMS

Session Chair: P.H. Wittke - Queen's University

1. A Robust Rate-Adaptive Hybrid ARQ Scheme for Nonstationary Channels
   A. Bigloo, Q. Yang, Q. Wang, V. Bhargava, University of Victoria, Victoria, BC

2. A Digital Carrier System for Upgrading Rural Multi-Party-Line Telephone Service
   W. Misskey, S. Abouzgaia, University of Regina, Regina, Saskatchewan

   H. Huynh, P. Fortier, Laval University, Ste-Foy, Quebec

4. Communication System for an Array of Receivers
   A. Chamseddine, J. MacDougall, University of Western Ontario, London, Ontario

5. Simulation Study of A Diversity Combining Decision Feedback Equalizer in Digital Microwave Radio
   M. Despinic, D. Taylor, McMaster University, Hamilton, Ontario

6. An Examination of ATV Systems on a Unified Basis Using a Communication-Theoretic Model
   M. Sablataash, Communications Research Centre, Ottawa, Ontario
Session D.2: (Wednesday, 1400 h)

COMPUTER COMMUNICATIONS II

Session Chair: J.P. Hayes - Concordia University

1. Multimedia Integration on FDDI

2. Mean Delay Analysis of Distributed Queue Dual Bus (DQDB)
   F. Hasani, M. Mehmet-Ali, Concordia University, Montreal, Quebec

3. Multi-Value Zig-Zag Routing in the Manhattan Street Networks
   B. Khasnabish, M. Ahmadi, M. Shridhar, University of Windsor, Windsor, Ontario

4. Evaluation of an Intelligent Integrated Routing and Access Control Scheme Using the Equilibrium Point Analysis (EPA) Technique
   B. Khasnabish, M. Ahmadi, M. Shridhar, University of Windsor, Windsor, Ontario

5. A Graph-Theoretic Characterization of Product-Form Markov Processes
   M. Comeau, V. Koukoulidis, Concordia University, Montreal, Quebec

6. Supervisory Synthesis for Telecommunication Systems Modeled as Timed Discrete Event Processes
   S.D. O'Young, University of Toronto, Toronto, Ontario
Thursday May 28, 1992

9:00 - 10:00  Plenary Lecture: Dr. Howard Card, University of Manitoba
Title: Artificial Neural Networks and their VLSI Implementation

10:00 - 10:20  Coffee Break

Session A.3:  (Thursday, 1020 h)

NEURAL NETWORKS

Session Chair: S. Haykin - McMaster University

1. A Neural Predistortion Linearizer for High Power Amplifiers
   N. Tayebi, M. Kavehrad, University of Ottawa, Ottawa, Ontario

2. Neural Network M-ary FSK Receiver
   I. Ghareeb, A. Yongacoglu, University of Ottawa, Ottawa, Ontario

3. Modelling Digital Neural Networks with Petri Nets
   M. Nathan, S. Tavares, Queen’s University, Kingston, Ontario

4. A Comparison Between Neural Networks and Conventional Channel Equalizers
   N. Lo, H. Hafez, Carleton University, Ottawa, Ontario

Session B.3:  (Thursday, 1020 h)

ESTIMATION

Session Chair: J. Lodge - Communications Research Centre

1. Determination of Exact Phase of the Bispectrum
   F. Cheng, A. Venetsanopoulos, University of Toronto, Toronto, Ontario

2. A Comparison of the Weibull and K Distributions for Radar Clutter

3. Orthogonal Search Techniques for Bearing Estimation and Spectrum Estimation, with Comparisons to MUSIC and Root-MUSIC
   K. Adeney, M. Korenberg, Queen’s University, Kingston, Ontario
4. Parameter Estimation in the Case of Hidden Data  
W. Pieczynski, Institut National des Telecommunications, 91011 Evry, France

Session C.3: (Thursday, 1020 h)

SIGNAL PROCESSING II

Session Chair: N. Blachman - GTE Government Systems

1. The Application of Asymptotic Methods to SAR Image Simulation  
E. Buller, J. Tunaley, London Research and Development Corporation, London, Ontario

2. A Schur Algorithm for the Delta AR Model  
C. Zarowski, Queen’s University, Kingston, Ontario

3. Constrained Kalman Filtering for Images Degraded by Random Blurs  
A. Qureshi, H. Mouftah, R. Seegobin, Queen’s University, Kingston, Ontario

4. A Multi-Tiered Noise Reduction System for Hearing Aids  
R. Brennan, J. Hanson, University of Waterloo, Waterloo, Ontario

Session D.3: (Thursday, 1020 h)

COMMUNICATIONS SWITCHING

Session Chair: H.T. Mouftah - Queen’s University

1. Combinational Logic For Contention Resolution in an ATM Switch  
X. Chen, J. Hayes, Concordia University, Montreal, Quebec

2. Application of a Two-Stage Broadcast Architecture to Wavelength-Division Switching Networks  
A. Jajszczyk, H.T. Mouftah, Queen’s University, Kingston, Ontario

3. Performance Analysis of a Multicast Switch  
M. Mehmet-Ali, J. Fang, Concordia University, Montreal, Quebec
Session A.4: (Thursday, 1400 h)

REDUCED COMPLEXITY DECODING

Session Chair:  J.B. Anderson - Rensselaer Polytechnical Institute

1. Sub-Optimal Decoding of Trellis Coded 8-PSK and 16-QAM
   S. Aridhi, P. Fortier, Laval University, Ste-Foy, Quebec

2. On Reducing the Number of Matched Filters for Optimum Detection of LREC CPM
   G. Kramer, E. Shwedyk, University of Manitoba, Winnipeg, Manitoba

3. Soft-Decision Adaptive Decoding of Convolutional Codes
   F. Chan, D. Haccoun, Ecole Polytechnique, Montreal, Quebec

4. Reduced-State Sequence Detectors for Convolutional Codes - Do They Work or Not?
   J. Anderson, Rensselaer Polytechnical Institute, Troy, New York

5. Suboptimal Decoding of Convolutional codes over Fading Channels
   J. Belzile, D. Haccoun, S. Forest, Ecole Polytechnique, Montreal, Quebec

6. ACI Susceptibility of Reduced-State Decoding for CPM
   S.J. Simmons, Queen's University, Kingston, Ontario

Session B.4: (Thursday, 1400 h)

SPREAD SPECTRUM

Session Chair:  I.F. Blake - University of Waterloo

   N. Blachman, GTE Government Systems Corporation, Mountainview, California USA

2. Differential and pilot-symbol-aided detection of DS-CDMA in frequency selective Rayleigh channels
   C. D'Amours, J. Wang, A. Yongacoglu, University of Ottawa, Ottawa, Ontario, M. Moher, Communications Research Centre, Ottawa, Ontario

3. Multipath Induced Intersymbol Interference in Bandwidth Expanding Signaling
   K.M. Cheung, H. Leib, McGill University, Montreal, Quebec, S. Pasupathy, University of Toronto, Toronto, Ontario
4. **Error Analysis of FFH/NCFSK Receivers with Linear Combining**  
*R. Ezers¹, B. Felstead², A. Gulliver¹, J. Wight¹, ¹Carleton University, Ottawa, Ontario, ²Communications Research Centre, Ottawa, Ontario*

5. **Analysis of Non-Coherent Correlation in DS/BPSK Spread-Spectrum Acquisition**  
*V. Jovanovic, E. Sousa, University of Toronto, Toronto, Ontario*

6. **MFSK Modulated PSK Direct Sequence CDMA**  
*J. Wang, A. Yongacoglu, University of Ottawa, Ottawa, Ontario*

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**Session C.4: (Thursday, 1400 h)**

**DATA COMMUNICATIONS**

**Session Chair: L.L. Campbell - Queen’s University**

1. **Nonlinear Echo and Intersymbol Interference Cancellation for Full Duplex Subscriber Loop Baseband Data Transmission**  
*O. Sunay, M. Fahmy, Queen’s University, Kingston, Ontario*

2. **Optimized PAM transmission over a fading multipath channel**  
*A. Khandani, P. Kabal, McGill University, Montreal, Quebec*

3. **Signaling in multi-dimensional signal spaces**  
*A. Khandani, P. Kabal, McGill University, Montreal, Quebec*

4. **Adjacent Channel Interference Reduction by Decision Feedback Filters**  
*S. Golestaneh, H. Hafez, S. Mahmoud, Carleton University, Ottawa, Ontario*

5. **Error Performance Calculations for Multi-level Amplitude and Phase Modulated Systems with Intersymbol Interference**  
*L. Campbell, P. Wittke, A. McKellips, Queen’s University, Kingston, Ontario*

6. **New Bounds on the Error Probability of Decision Feedback Equalization**  
*S. Altekar, Bell Northern Research, Ottawa, Ontario, N. Beaulieu, Queen’s University, Kingston, Ontario*
Session D.4: (Thursday, 1400 h)

CRYPTOGRAPHY

Session Chair: H. Meijer - Queen's University

1. A Design Procedure for Private-Key Cryptosystems Based on Bent Sequences
   C.M. Adams, Bell Northern Research, Ottawa, Ontario, S. Tavares, Queen’s University, Kingston, Ontario

2. A New Public-Key Cryptosystem based on the Residue Number System
   G. Orton, Queen’s University, Kingston, Ontario

3. Optimal Bounds of the Crossing Number and the Bisection Width for Generalized Hypercube Graphs
   K. Wada, K. Kawaguchi, H. Suzuki, Nagoya Institute of Technology, Nagoya 466, Japan

Session D.5: (Thursday, 1550 h)

VLSI IN COMMUNICATIONS

Session Chair: V.K. Bhargava - University of Victoria

1. A Universal Reed-Solomon Decoder Chip
   B.K. Green, G. Drolet, Royal Military College of Canada, Kingston, Ontario

2. A VLSI Architecture for a Low Complexity Rate-Adaptive Reed-Solomon Encoder
   M. Hasan, V. Bhargava, University of Victoria, Victoria, BC

3. A Partitioning Technique for Multi-Circuit Winograd Fourier Transform Processors
   P. Lavoie, Defence Research Establishment Ottawa, Ottawa, Ontario

4. Analog-to-Digital Converters For Digital Radio
   A. Biman¹, D. Nairn¹, W.M. Snelgrove², ¹Queen’s University, Kingston, Ontario, ²University of Toronto, Toronto, Ontario
Friday, May 29, 1992

Session A.6: (Friday, 0830 h)

ERROR CONTROL CODING

Session Chair: G. Seguin - Royal Military College of Canada

1. The Decoding of Multidimensional Codes Using Separable MAP Filters
   J. Lodge¹, P. Hoeher², J. Hagenauer³, ¹Communications Research Centre, Ottawa, Ontario, ²AT & T Bell Laboratories, Murray Hill, New Jersey, ³German Aerospace Research Establishment (DLR), Operpfaffenhofen, Germany

2. On Gray Codes and Weight Distributions
   T.A. Gulliver¹, V. Bhargava², J. Stein, ¹Carleton University, Ottawa, Ontario, ²University of Victoria, Victoria, British Columbia

3. Soft-Decision Information Set Decoding
   M. Kimpe, R. Knopp, H. Leib, McGill University, Montreal, Quebec

4. Tables of Codes Which Can be Generated Using Forney’s Squaring and Cubing Constructions
   N. Secord¹, A. Gulliver², ¹Communications Research Centre, Ottawa, Ontario, ²Carleton University, Ottawa, Ontario

5. On the Enumeration and Generation of Perforation Patterns for Punctured Convolutional Codes
   G. Begin, University of Quebec at Montreal, Montreal, Quebec

6. The Q-Ary Image of a Q^M-Ary Cyclic Code
   G. Seguin, Royal Military College of Canada, Kingston, Ontario

7. On An Adaptive Coding Scheme and Its VLSI Implementation
   X. Peng, P. Farrell, University of Manchester, Manchester, U.K.
Session B.6: (Friday, 0830 h)

TECHNIQUES FOR FADING CHANNELS

Session Chair: L. Mason - Communications Research Centre

1. BER Performance of Digital Angle Modulation in Slow Rician Fading
   T. Tjhung\textsuperscript{1}, C. Loo\textsuperscript{2}, N. Secord\textsuperscript{2}, \textsuperscript{1}National University of Singapore, Singapore, \textsuperscript{2}Communications Research Centre, Ottawa, Ontario

   D. Boudreau, J. Lodge, Communications Research Centre, Ottawa, Ontario

3. Error Probability for FH/MDPSK in Multitone Jamming, Fast Rician Fading and Gaussian Noise
   L. Mason, Communications Research Centre, Ottawa, Ontario

4. Differential Detection of PSK Signals in a Frequency Selective Rayleigh Fading Channel
   W. Liu, P. Ho, Simon Fraser University, Burnaby, British Columbia

5. Analysis of Equal Gain Diversity on Ricean Fading Channels
   A. Abu-Dayya, N. Beaulieu, Queen’s University, Kingston, Ontario

6. Symbol Aided plus Decision-Directed Reception for PSK/TCM Modulation on Shadowed Mobile Satellite Fading Channels
   G.T. Irvine, P. McLane, Queen’s University, Kingston, Ontario

Session C.6: (Friday, 0830 h)

SIGNAL PROCESSING III

Session Chair: Y.T. Chan - Royal Military College of Canada

1. Emitter Signal Identification Using Frequency Deviations
   Y.T. Chan\textsuperscript{1}, R. Inkof\textsuperscript{2}, N. Chan\textsuperscript{3}, \textsuperscript{1}Royal Military College of Canada, Kingston, Ontario, \textsuperscript{2}Defence Research Establishment, Ottawa, Ontario, \textsuperscript{3}University of Toronto, Toronto, Ontario

2. Signal Processing for High Resolution ECG Signal Analysis
   A. Qureshi, R. Seegobin, H. Mouftah, Queen’s University, Kingston, Ontario
3. A Modified Bayesian Procedure for Quickest Signal Change Detection
Y. Liu, S. Blostein, Queen’s University, Kingston, Ontario

4. Selection of the Focusing Frequency in Wideband Array Processing - MUSIC and ESPRIT
S. Valaee, P. Kabal, McGill University, Montreal, Quebec

5. Performance Analysis of Signal Tracking Techniques in a Cluttered Environment
T. Quach, M. Farooq, Royal Military College of Canada, Kingston, Ontario

A. De, P. Kabal, McGill University, Montreal, Quebec

7. Edge Detection by Filtering and Non Supervised Bayesian Image Segmentation
A. Peng, W. Pieczynski, Institut National des Telecommunications, Evry, France

8. Evolution of the Wavelet Transforms and Applications to Signal Processing and Communications
M. Sablatash, Communications Research Centre, Ottawa, Ontario

Session D.6: (Friday, 0830 h)

SATELLITE COMMUNICATIONS

Session Chair: D. Haccoun - Ecole Polytechnique

1. Performance of a Multistage Transmultiplexer for the Group Demodulation of QPSK Signals
N. Secord, C. Loo, Communications Research Centre, Ottawa, Ontario

2. Proof-of-Concept 60 GHz Intersatellite Link for Space-Based Radar
I. Denny¹, G. Morin¹, B. Eatock¹, A. Bell², J. Bhagwan³, ¹Defence Research Establishment, National Defence, Ottawa, Ontario, ²SPAR Aerospace Limited, St. Anne-de-Bellevue, Quebec, ³COM DEV Limited, Cambridge, Ontario

3. Performance of Sloppy-Slotted Aloha Signaling for Very Wide Timing Error Distributions
S. Crozier, Communications Research Centre, Ottawa, Ontario

4. Optical Intersatellite Link for Canadian Applications
C. Belisle, B. Felstead, Communications Research Centre, Ottawa, Ontario
5. Optical Control of the Transmit Section of a Phased Array Antenna  
C. Belisle, B. Felstead, Communications Research Centre, Ottawa, Ontario

6. Multipath Effects on the GPS Observables  
W. Zhuang¹, J. Tranquilla², ¹University of Ottawa, Ottawa, Ontario, ²University of New Brunswick, Fredericton, New Brunswick