



CORNELL UNIVERSITY LIBRARY



\*3 1924 077 849 721\*

**Proceedings**

**THIRTY-SEVENTH ANNUAL ALLERTON CONFERENCE  
ON COMMUNICATION, CONTROL AND COMPUTING**

**September 22 - 24, 1999**

**Allerton House, Monticello, Illinois  
Sponsored by the  
Coordinated Science Laboratory and the  
Department of Electrical and Computer Engineering of the  
University of Illinois at Urbana-Champaign**

**Apple v. Caltech  
IPR2017-00423  
Replacement - Apple 1110**

**PROCEEDINGS**

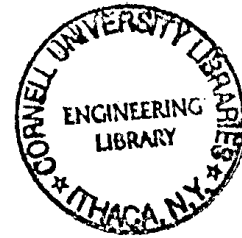
**THIRTY-SEVENTH ANNUAL ALLERTON CONFERENCE  
ON COMMUNICATION, CONTROL, AND COMPUTING**

CORNELL UNIVERSITY LIBRARY



3 1924 077 849 721

**Bruce Hajek  
R.S. Sreenivas  
Conference Co-Chairs**



**Conference held  
September 22, September 23, and September 24, 1999  
Allerton House  
Monticello, Illinois**

**Sponsored by  
The Coordinated Science Laboratory  
and  
The Department of Electrical and Computer Engineering  
of the  
UNIVERSITY OF ILLINOIS  
at  
Urbana-Champaign**

## TABLE OF CONTENTS

<b>FORWORD</b> .....	<i>i</i>
<b>I-A: STOCHASTIC NETWORKS I</b>	
Organizers: S.P. Meyn and R. Srikant (University of Illinois at Urbana-Champaign)	
Chair: S.P. Meyn (University of Illinois at Urbana-Champaign)	
REPRESENTATION AND EXPANSION OF (MAX, PLUS) LYAPUNOV EXPONENTS .....	1
F. Baccelli, S. Gaubert, and D. Hong	
MARTINGALE PROBLEMS AND LINEAR PROGRAMS FOR SINGULAR CONTROL .....	11
T.G. Kurtz and R.H. Stockbridge	
STATIONARY REFLECTED LÉVY PROCESSES IN STOCHASTIC NETWORKS .....	21
T. Konstantopoulos and G. Last	
ON THE IMPACT OF VARIABILITY ON THE BUFFER DYNAMICS IN IP NETWORKS .....	30
Y. Joo, V. Ribeiro, A. Feldmann, A.C. Gilbert, and W. Willinger	
QUEUEING NETWORKS WITH INTERACTING SERVICE RESOURCES .....	42
M. Armony and N. Bambos	
<b>I-B: CODING THEORY I: DECODING AND CHANNELS</b>	
Organizers: R. Koetter and R.E. Blahut (University of Illinois at Urbana-Champaign)	
Chair: A. Vardy (University of California, San Diego)	
A NEW UPPER BOUND ON THE RELIABILITY FUNCTION OF THE GAUSSIAN CHANNEL.....	52
A. Ashikhmin, A. Barg, and S. Litsyn	
RECURSIVE DECODING OF REED-MULLER CODES.....	61
I. Dumer	
LOSSLESS COMPRESSION IN CONSTRAINED CODING.....	70
J.L. Fan, B. Marcus, and R. Roth	
<b>I-C: HYBRID/DISCRETE-EVENT-DYNAMIC SYSTEMS</b>	
Chair: R.S. Sreenivas (University of Illinois at Urbana-Champaign)	
MODELLING OF TIMED DISCRETE EVENT SYSTEMS .....	75
R.S. Minhas and W.M. Wonham	
INTERACTING DISCRETE EVENT SYSTEMS .....	85
S. Abdelwahed and W.M. Wonham	
STABILITY ANALYSIS FOR INTERCONNECTED HYBRID SYSTEMS.....	93
S. Yamamoto and T. Ushio	

DECENTRALIZED SUPERVISORY CONTROL OF CONCURRENT DISCRETE EVENT SYSTEMS WITH PARTIAL OBSERVATIONS .....	103
S. Jiang and R. Kumar	
A NEW PROBABILISTIC APPROACH TO CONGESTION CONTROL IN COMMUNICATION NETWORKS....	113
H. Mortazavian and J. Mirkovic	
A BIGRAPH MATCHING THEOREM.....	124
S. Ayyorgun and R.L. Cruz	
<b>I-D: ACTIVE NETWORKS</b>	
Organizer/Chair: Y. Shavitt (Bell Labs, Lucent Technologies)	
CHUNKS IN PLAN: LANGUAGE SUPPORT FOR PROGRAMS AS PACKETS.....	127
J.T. Moore, M. Hicks, and S. Nettles	
ON THE INTERFACE OF PROGRAMMABLE NETWORK ELEMENTS .....	137
G. Hjálmtýsson	
BOWMAN AND CANES: IMPLEMENTATION OF AN ACTIVE NETWORK .....	147
S. Merugu, S. Bhattacharjee, Y. Chae, M. Sanders, K. Calvert, and E. Zegura	
DESIGN OF A FLEXIBLE OPEN PLATFORM FOR HIGH PERFORMANCE ACTIVE NETWORKS .....	157
S. Choi, D. Decasper, J. Dehart, R. Keller, J. Lockwood, J. Turner, and T. Wolf	
IMPLEMENTING A CONCAST SERVICE .....	166
K. Calvert, J. Griffioen, B. Mullins, A. Sehgal, and S. Wen	
ACTIVE DISTRIBUTED MANAGEMENT FOR IP NETWORKS.....	176
R. Kawamura and R. Stadler	
<b>I-F: SPACE-TIME METHODS FOR COMMUNICATION</b>	
Chair: D. Sarwate (University of Illinois at Urbana-Champaign)	
NEW APPROACH FOR SPACE-TIME TRANSMITTER/RECEIVER DESIGN .....	186
H. El Gamal and A.R. Hammons, Jr.	
INTERFERENCE SUPPRESSION FOR CDMA VIA A SPACE-TIME POWER MINIMIZATION BASED PREPROCESSOR WITH APPLICATIONS TO GPS.....	196
W.L. Myrick, M.D. Zoltowski, and J.S. Goldstein	
SOFT-WEIGHTED TRANSMIT DIVERSITY FOR WCDMA.....	204
A. Hottinen, R. Wichman, and D. Rajan	
MULTIUSER DETECTION TECHNIQUES FOR COMBINED ARRAY PROCESSING AND SPACE-TIME BLOCK CODING.....	214
B. Lu and X. Wang	
A TRANSMIT ADAPTIVE ANTENNA SCHEME WITH FEEDBACK FOR WIRELESS COMMUNICATIONS.....	216
Y. Le Pézennec, F. Boixadera, Y. Farmine, and N. Whinnett	



**II-A: CODING THEORY II: ITERATIVE DECODING AND TURBO CODES**

Organizers: R. Koetter and R.E. Blahut  
(University of Illinois at Urbana-Champaign)  
Chair: R. Koetter  
(University of Illinois at Urbana-Champaign)

CONCENTRATE ..... 221  
T. Richardson and R. Urbanke

EFFICIENT ENCODING OF LOW-DENSITY PARITY-CHECK CODES..... 231  
T. Richardson and R. Urbanke

IRREGULAR TURBOCODES..... 241  
B.J. Frey and D.J.C. MacKay

ON QUASI-CYCLIC REPEAT-ACCUMULATE CODES ..... 249  
R.M. Tanner

THE SERIAL CONCATENATION OF RATE-1 CODES THROUGH UNIFORM RANDOM INTERLEAVERS .... 260  
H.D. Pfister and P.H. Siegel

**II-B: STOCHASTIC NETWORKS II**

Organizers: S.P. Meyn and R. Srikant  
(University of Illinois at Urbana-Champaign)  
Chair: R. Srikant  
(University of Illinois at Urbana-Champaign)

QUEUE LENGTH ASYMPTOTICS FOR MARKOVIAN SERVICE NETWORKS ..... 270  
A. Mandelbaum, W.A. Massey, and M.I. Reiman

EXACT ASYMPTOTICS FOR 1-LIMITED EXPONENTIAL POLLING MODELS ..... 280  
W. Chang, D.G. Down, and R.D. Foley

INVARIANT RATE FUNCTIONS FOR DISCRETE TIME QUEUES ..... 288  
A.J. Ganesh, N. O'Connell, and B. Prabhakar

LARGE DEVIATIONS AND OPTIMALITY OF THE LARGEST WEIGHTED DELAY  
FIRST DISCIPLINE ..... 297  
A.L. Stolyar and K. Ramanan

ON ESTIMATING BUFFER OVERFLOW PROBABILITIES UNDER  
MARKOV-MODULATED INPUTS..... 306  
I.Ch. Paschalidis and S. Vassilaras

INDUCED BURSTINESS IN GENERALIZED PROCESSOR SHARING QUEUES WITH LONG-TAILED  
TRAFFIC FLOWS..... 316  
S. Borst, O. Boxma, and P. Jelenković

THE ASYMPTOTICS OF SELECTING THE SHORTEST OF TWO, IMPROVED..... 326  
M. Mitzenmacher and B. Vöcking

# 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.