

# **Networks and Grids**

## **Technology and Theory**

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# **Networks and Grids**

## **Technology and Theory**

Thomas G. Robertazzi

*Stony Brook University*

*Stony Brook, NY, USA*

 Springer

Thomas G. Robertazzi  
Department of Electrical and Computer Engineering  
Stony Brook University  
Stony Brook, NY 11794-2350  
tom@ece.sunysb.edu

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*To My Wonderful Parents  
Frank and Marie*

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## Preface

Computer networks have assumed an increasing amount of importance in today's world. Grid technology has great potential, although it is more recent and quite a technical challenge. Networking courses in particular are popular with students who, even in college, sense the field's importance and excitement.

The purpose of this book is to provide an undergraduate/first-year graduate text suitable for a computer networks and grid course with a mathematical flavor. Although many books on networking exist, most have little mathematical content.

To some extent this book is based on undergraduate and graduate computer networks courses I have taught since 1983. The book starts with an introductory networking technology chapter. Chapter 2 covers fundamental stochastic (i.e., random) models for networking. Chapter 3 provides an introduction to queueing theory, a widely used tool for modeling and predicting the performance of networked systems. In chapter 4, some fundamental deterministic algorithms for networking are studied. These algorithms include shortest path routing, protocol verification, and error checking codes. Finally, chapter 5 provides an extensive tutorial on divisible load scheduling theory, a relatively new performance evaluation methodology that has applications to grid computing.

At the undergraduate level, I teach the quantitative material (say, chapters 2 and 4 and parts of 3) first while students are fresh and more receptive and save the qualitative technology description for the second half of the course. At the graduate level, one can focus more on the quantitative material (including chapter 5), while allowing students more independence in learning the technology.

In terms of acknowledgments, some edited text and/or original or redrawn figures from ACTA Press, IEEE Publications, and Foundations of Computing and Decision Sciences have been incorporated into this book. I would like to acknowledge the assistance of Profs. Scott Smolka and Wendy Tang in reading certain sections of the manuscript. This work has benefited from its use by

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Stony Brook, NY

*Thomas Robertazzi*  
January 2007

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# Contents

<b>Preface</b> .....	vii
<b>1 A Tour through Networking and Grids</b> .....	1
1.1 Achieving Connectivity.....	2
1.1.1 Coaxial Cable.....	2
1.1.2 Twisted Pair Wiring .....	3
1.1.3 Fiber Optics .....	3
1.1.4 Microwave Line of Sight .....	4
1.1.5 Satellites .....	4
1.1.6 Cellular Systems .....	5
1.1.7 Ad Hoc Networks .....	7
1.1.8 Wireless Sensor Networks .....	8
1.2 Multiplexing .....	9
1.2.1 Frequency Division Multiplexing (FDM) .....	9
1.2.2 Time Division Multiplexing (TDM).....	9
1.2.3 Frequency Hopping .....	10
1.2.4 Direct Sequence Spread Spectrum .....	10
1.3 Circuit Switching Versus Packet Switching.....	11
1.4 Layered Protocols .....	13
1.5 Ethernet .....	15
1.5.1 10 Mbps Ethernet .....	15
1.5.2 Fast Ethernet .....	18
1.5.3 Gigabit Ethernet .....	19
1.5.4 10 Gigabit Ethernet .....	21
1.6 Wireless Networks .....	22
1.6.1 802.11 WiFi .....	22
1.6.2 802.15 Bluetooth .....	26
1.6.3 802.16 Wireless MAN .....	28
1.7 ATM .....	30
1.7.1 Limitations of STM.....	30
1.7.2 ATM Features .....	31



1.7.3	ATM Switching .....	34
1.8	SONET .....	36
1.8.1	SONET Architecture .....	37
1.8.2	Self-Healing Rings .....	39
1.9	Wavelength Division Multiplexing (WDM).....	40
1.10	Grids .....	41
1.11	Problems .....	43
<b>2</b>	<b>Fundamental Stochastic Models .....</b>	<b>45</b>
2.1	Introduction .....	45
2.2	Bernoulli and Poisson Processes .....	46
2.3	Bernoulli Process Statistics .....	52
2.4	Multiple Access Performance.....	57
2.4.1	Introduction .....	57
2.4.2	Discrete Time Ethernet Model .....	57
2.4.3	Ethernet Design Equation .....	60
2.4.4	Aloha Multiple Access Throughput Analysis .....	62
2.4.5	Aloha Multiple Access Delay Analysis.....	66
2.5	Teletraffic Modeling for Specific Topologies .....	69
2.5.1	Introduction .....	69
2.5.2	Linear Network .....	69
2.5.3	Tree Networks .....	71
2.5.4	Two-dimensional Circular Network .....	75
2.6	Switching Elements and Fabrics .....	78
2.6.1	Introduction .....	78
2.6.2	Switching Elements .....	79
2.6.3	Networks.....	84
2.7	Conclusion .....	92
2.8	Problems .....	92
<b>3</b>	<b>Queueing Models .....</b>	<b>99</b>
3.1	Introduction .....	99
3.2	Single Queue Models.....	100
3.2.1	M/M/1 Queue .....	100
3.2.2	Geom/Geom/1 Queue .....	108
3.3	Some Important Single Queue Models.....	113
3.3.1	The Finite Buffer M/M/1 Queueing System .....	113
3.3.2	The M/M/m/m Loss Queueing System .....	114
3.3.3	M/M/m Queueing System .....	117
3.3.4	A Queueing-Based Memory Model.....	120
3.3.5	M/G/1 Queueing System .....	122
3.4	Common Performance Measures .....	126
3.5	Markovian Queueing Networks .....	127
3.5.1	Open Networks .....	128
3.5.2	Closed Networks .....	132

3.6	Mean Value Analysis for Closed Networks	134
3.6.1	MVA for Cyclic Networks	135
3.6.2	MVA for Random Routing Networks	138
3.7	Negative Customer Queuing Networks	140
3.7.1	Negative Customer Product Form Solution	141
3.8	Recursive Solutions for State Probabilities	144
3.9	Stochastic Petri Nets	148
3.9.1	Petri Net Schematics	148
3.9.2	Petri Net Markov Chains	149
3.10	Solution Techniques	152
3.10.1	Analytical Solutions	152
3.10.2	Numerical Computation	152
3.10.3	Simulation	153
3.11	Conclusion	154
3.12	Problems	155
<b>4</b>	<b>Fundamental Deterministic Algorithms</b>	<b>161</b>
4.1	Introduction	161
4.2	Routing	161
4.2.1	Introduction	161
4.2.2	Dijkstra's Algorithm	163
4.2.3	Ford Fulkerson Algorithm	166
4.2.4	Table Driven Routing	167
4.2.5	Source Routing	168
4.2.6	Flooding	169
4.2.7	Hierarchical Routing	169
4.2.8	Self-Routing	170
4.2.9	Multicasting	173
4.2.10	Ad Hoc Network Routing	173
4.3	Protocol Verification	174
4.4	Error Codes	178
4.4.1	Introduction	178
4.4.2	Parity Codes	180
4.4.3	Hamming Error Correction	181
4.4.4	The CRC Code	184
4.5	Conclusion	188
4.6	Problems	189
<b>5</b>	<b>Divisible Load Modeling for Grids</b>	<b>193</b>
5.1	Introduction	193
5.2	Some Single Level Tree (Star) Networks	200
5.2.1	Sequential Load Distribution	201
5.2.2	Simultaneous Distribution, Staggered Start	205
5.2.3	Simultaneous Distribution, Simultaneous Start	210
5.2.4	Nonlinear Load Processing Complexity	215

5.3	Equivalent Processors . . . . .	221
5.3.1	The Tree Network Without Front-End Processors . . . . .	222
5.3.2	The Tree Network With Front-End Processors . . . . .	230
5.4	Infinite-Sized Network Performance . . . . .	236
5.4.1	Linear Daisy Chains . . . . .	236
5.4.2	Tree Networks . . . . .	245
5.5	Time-Varying Environments . . . . .	248
5.6	Linear Programming and Divisible Load Modeling . . . . .	255
5.7	Experimental Work . . . . .	257
5.8	Conclusion . . . . .	259
5.9	Problems . . . . .	259
<b>A</b>	<b>Summation Formulas</b> . . . . .	<b>263</b>
	<b>References</b> . . . . .	<b>265</b>
	<b>Index</b> . . . . .	<b>275</b>