## Wireless Local Area Networks

Technology, Issues, and Strategies

Peter T. Davis
Craig R. McGuffin

## **Contents**

Preface xi Acknowledgments xv

## Part 1 The Concepts

L	napter 1. Changing the Network Paradigm	3
	What Is the Wireless Data Marketplace?	4
	A Wave Shift	8
	Why Wireless Communications?	11
	Wireless Data Technologies	14
	Spread-spectrum radio	15
	Infrared communications	16
	Cellular telephone modems and adapters	16
	Mobile radio	17
	Meteor burst communications	18
	Microwave	18
	Mobile satellite communications and	
	Very Small Aperture Terminal (VSAT) technology	19
	FM squared	21
	FM sideband	22
	Wireless Local Area Network Applications	22
	Future Trends and Issues	23
	What about standards?	23
	Health and safety	24
	Security	24
С	Chapter 2. Introduction to Local Area Networks	25
	What Is a Local Area Network?	26
	Local Area Network Nodes	27
	The network interface card	28
	Network roles	28
	Services offered by nodes	29
	Client nodes	32

Connecting Media	32
Network topologies	32
Controlling access to the medium	34
Network Communication Protocols	36
Internetworking Devices	38
How Does Wireless Fit In?	39
Chapter 3. Wireless Technology—Its Application to LANs	41
Basics of Wireless Communication	41
Key components	43
More on Electromagnetic Radiation	44
Range of transmission	46
Information-carrying capacity The need for regulation	47
Equipment costs	48
Adding the information—modulation	49
Sharing the spectrum	49
Common Frequencies Used for Wireless LANs	51
Wireless Architectures	52
Replacement of a point-to-point link	53
Connection of wireless nodes to a wired LAN	54
Stand-alone wireless LAN	55
Chapter 4. Standards for Wireless LANs	59
The Need for Standards	60
Where the Standards Apply	61
The affected OSI layers	62
Effect on upper layers of OSI Model	63
The Current Standards	64
IEEE 802.11 standard for wireless LANs	65
The European Telecommunication Standards Institute	67
Future Standards Development	67
The Impact of Standards on Current Wireless LANs	68
Part 2 The Needs	
Chapter 5. Uses for Wireless LANs	73
Comparing Wires with Wireless	73
Performance	74
Cost	74
Integrating the Technologies	75
Where wireless LANs make sense	77
Where wiring cannot be used	77
Where wireless is superior	79
Temporary Locations	80
Greater Mobility	81

## Part 3 The Applications

Chapter 6. Wireless Applications	85
Industrial Applications	88
Petroleum industry	89
Agriculture and food	89
Factory control	89
Transportation Industry	92
Office and Similar Applications	93
Wireless Disaster Recovery Applications	98
Wireless Considerations	99
Chapter 7. Industry Applications	101
Health Care Industry	101
Health care wireless techniques	102
Wireless benefits in health care	106
Wireless issues in health care	106
Financial Services Industry	107
Financial services wireless techniques	108
Wireless benefits in the financial services industry	108
Wireless issues in financial services	109
Services Industry	110
Food services industry Food services wireless techniques	110
Wireless benefits in food services	111
Wireless issues in the food service industry	111
Retail Industry	112
Retail wireless techniques	112
Wireless benefits in retailing	114
Wireless issues in the retail industry	114
Wireless techniques in warehousing	115
Wireless benefits in warehousing	115
Wireless issues in warehousing	115
Part 4 The Problems	
Chapter 8. Health and Safety	121
Our Electrical Environment	121
Imagine a World without electricity	122
The Invisible World	122
Measuring Electricity—Volts, Amps and Watts	123
EMF Emitters	123
Electromagnetic Fields = Electrical Fields + Magnetic Fields	124
The Electromagnetic Spectrum	124
Your Body Is an Antenna	125
Be Proactive, Not Reactive	126

Chapter 9. The Security of Wireless LANs	127
The Need for Security	129
Information assets	130
Security goals	130
Threats or risks	131
Security measures	132
Are Wireless LANs Secure?	132
Wireless LAN Security Exposures	134
Theft of equipment	135
Eavesdropping/interception of messages	135 136
Modification/substitution of data Masquerade	138
Interference/jamming	139
Security Measures	140
Shielding radiation	140
Security features in network operating systems	141
Encryption	142
Chapter 10. Implementing and Managing Wireless LANs	147
Implementation	147
Pilot projects	148
Performing the full implementation	150
Ongoing Management	153
Fault management	153
Performance management	154
Asset management	155
Part 5 The Future	
Chapter 11. Future Wireless Networks	159
The Feither of Window Technology	160
The Failure of Wireless Technology	
The Promise of Wireless Technology	160
Think Creatively	162
Appendices	
A. The Vendors	167
B. Wireless Vendors	207
C. Frequency Bands	215
D. Organizations	217
E. Where to Get Information Updates	221
Glossary	229
Selected Bibliography	239
Index	247
About the Authors	251