CONTENTS

Foreword xi
Acknowledgments xvii
List of Figures xxi

INTRODUCTION 1

1 WHERE WE ARE—WIRELESS MEETS THE BROADBAND INTERNET 5

Where We Are 5
How We Got Here: Reintegration of the Telecom Oligopoly and Cracks in the Walled Gardens 6
Flexibility Comes to Wireless Spectrum 22
The Wireless Technology Diaspora 23
Cellular Carriers: Stuck on Stickiness 26
Managed Network Services: The Outsourced Network 30
Enhanced Broadband Voice 31
Fixed Mobile Convergence 33
Boundary Blurring 34
References 35

2 BROADBAND AND THE INFORMATION SOCIETY 37

Impact of Telecommunications on the Economy 39
Wireless Versus Wired Network Economics 40
Broadband Matters 42
<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>So What of Broadband Wireless in All This?</td>
<td>42</td>
</tr>
<tr>
<td>How Does the United States Rank Against the Rest of the World?</td>
<td>44</td>
</tr>
<tr>
<td>Expansion of the DOI</td>
<td>47</td>
</tr>
<tr>
<td>References</td>
<td>49</td>
</tr>
<tr>
<td>3 GLOBAL WIRELESS MARKET ANALYSIS</td>
<td>51</td>
</tr>
<tr>
<td>Macro Trends</td>
<td>52</td>
</tr>
<tr>
<td>The Era of “Mass Specialization”</td>
<td>61</td>
</tr>
<tr>
<td>Review of Major Markets</td>
<td>68</td>
</tr>
<tr>
<td>The Developing World is Catching Up Rapidly</td>
<td>75</td>
</tr>
<tr>
<td>References</td>
<td>76</td>
</tr>
<tr>
<td>4 THE VIRTUAL DISPLACES THE PHYSICAL</td>
<td>77</td>
</tr>
<tr>
<td>From Circuits to Packets</td>
<td>78</td>
</tr>
<tr>
<td>“Lies, Damn Lies and Statistical Access Networks”</td>
<td>79</td>
</tr>
<tr>
<td>Moore’s Law Finally Reaches Telecom</td>
<td>80</td>
</tr>
<tr>
<td>The “New Broadband” Eclipses “Neo Broadband”</td>
<td>82</td>
</tr>
<tr>
<td>Regulatory and Public Policy Collide with Technology Shifts</td>
<td>83</td>
</tr>
<tr>
<td>References</td>
<td>87</td>
</tr>
<tr>
<td>5 CONVERGENCE FINALLY ARRIVES</td>
<td>89</td>
</tr>
<tr>
<td>The Quad Play: Voice, Data, Video, and Mobility</td>
<td>89</td>
</tr>
<tr>
<td>The Quad-Play Advantage</td>
<td>90</td>
</tr>
<tr>
<td>Fixed Mobile Convergence and Unlicensed Mobile Access</td>
<td>93</td>
</tr>
<tr>
<td>Broadband Market Overview</td>
<td>100</td>
</tr>
<tr>
<td>6 DRIVERS OF BROADBAND CONSUMPTION</td>
<td>105</td>
</tr>
<tr>
<td>Trends in Mobile and Converged Content Markets</td>
<td>105</td>
</tr>
<tr>
<td>User Interface</td>
<td>105</td>
</tr>
<tr>
<td>Handset Display Graphics</td>
<td>107</td>
</tr>
<tr>
<td>Mobile Video Content</td>
<td>109</td>
</tr>
<tr>
<td>Music</td>
<td>109</td>
</tr>
</tbody>
</table>
9 BROADBAND IP CORE NETWORKS

User Authentication and Log-In 155
Provisioning 156
Fixed- and Mobile-Converged Services Over a Unified Packet Network 157
Fixed Broadband Wireless Networks 159

10 WIDEBAND 3G TO BROADBAND 4G—COLLISION AND CONVERGENCE OF STANDARDS 167

Collision of 3G and WiMAX Standards 168
3GPP and Long-Term Evolution 169
WiMAX and Mobile WiMAX 175

11 RADIO TECHNOLOGY—MOVING THE GOAL POSTS 191

Enabling Technologies 191
Generic Radio Devices 195

12 CONTENTION AND CONFLICT—REGULATORY, POLITICAL, FINANCIAL, AND STANDARDS BATTLES 199

Regulatory Drivers 200
Radio Spectrum Allocations 202
Radio Spectrum Auctions: A Failed Policy? 203
Financial Realities 205
The Standards Wars: Proprietary Versus Open Standards 207
The Many Faces of the Standards Process 208

13 CONCLUSION 213

Economic Growth 214
Public Policy 215