

**Wireless Communications Infrastructure,
Subscriber, and Handset Markets: Moving to
Achieve Above 90% Penetration**

**Wireless Market Strategies,
Opportunities, and Forecasts
2000-2006**



Picture by Susie Eustis

Opportunity To Leverage Demand For Mobility

Market In Balance

**Concerns About Safety / Increasing Demand
Create Market Opportunity**

New Generation Of Wireless Products

The new generation of wireless products relate to the convergence of voice and data markets. There is a convergence of telephone handsets and handheld computers.

The wireless industry is emerging as a dominant force in communications systems. Wireless systems once thought to peak at 25% penetration have a well-defined market opportunity. User penetration is expected exceed 90% of the population in developed regions.

The number of wireless subscribers at 541.8 million in the end of 2000 is forecast to reach 1.8 billion by 2006. Infrastructure spending will increase disproportionately to subscriber growth as companies seek to achieve broad systems coverage.

Wireless data markets will grow very slowly until there is broad systems coverage and calls are not constantly interrupted.

WIRELESS COMPANIES PROFILED

ALCATEL
APACK TECHNOLOGIES
ERICSSON
FUJITSU
INTERMEC TECHNOLOGIES
KYOCERA INTERNATIONAL
LUCENT TECHNOLOGIES
LXE
METRICOM
MOTOROLA
NEC
NOKIA
ONE.TEL

OPENTV

Spyglass

9-4

9-4

PALM
QUALCOMM
SIEMENS
SUN MICROSYSTEMS
SAMSUNG
SYCHIP
SYMBIAN
WORLD WIRELESS

9-41

MOBILE

Wireless Markets: The Pause That Refreshes

MOBILE

Market Forecasts 2001-2006

Market Shares 2000

Based on analysis of year 2000 revenue in multiple market segments

REPORT METHODOLOGY

This is the forty sixth in a series of market research reports that provide forecasts in communications, telecommunications, the Internet, computer, software, and telephone equipment. The project leaders take direct responsibility for writing and preparing each report. They have significant experience preparing industry studies.

Forecasts are based on primary research and proprietary data bases. Forecasts reflect analysis of the market trends in the segment and related segments. Unit and dollar shipments are analyzed through consideration of dollar volume of each market participation in the segment.

Forecasts are based on industry analysis as well. Knowledge of infrastructure, storage, processing, and device capabilities plays a significant role in determining what markets will grow rapidly. Thinking about opportunities from a broad perspective and knowledge of hundreds or thousands of industry segments creates strategic advantage for WinterGreen Research reports as this knowledge is brought to bear on analysis of specific industry segments.

Market share analysis includes conversations with marketing directors, distributors, leading market participants, and companies seeking to develop measurable market share. Over 200 in depth interviews are conducted for each report with a broad range of key participants and opinion leaders in the market segment.

WinterGreen Research serves as a catalyst for implementation of cross-fertilization of ideas between one industry segment and another.

WINTERGREEN RESEARCH, INC.

INDUSTRY AND SUBSCRIBER SEGMENTATION OF

WORLDWIDE WIRELESS EQUIPMENT AND HANDSETS BY REGION

YOU MUST HAVE THIS STUDY

**WIRELESS INFRASTRUCTURE, SUBSCRIBER, AND HANDSET MARKET
EXECUTIVE SUMMARY**

The Study Gives Detailed Information About Products, Technologies, Market
Shares, and Market Participants

ORDER FORM

Return To: WinterGreen Research, Inc.

6 Raymond Street, Lexington, MA 02421 USA

Phone: (781) 863-5078 --- Fax: (781) 863-1235

PLEASE ENTER MY ORDER FOR:

REPORT # A80310019587 225 PAGES 90 TABLES AND FIGURES 2001 \$2,800

WINTERGREEN RESEARCH, INC.

MOBILE

Wireless Communications Markets: Wireless Infrastructure, Subscriber, and Handset Markets: Moving to Achieve Above 90% Penetration

MARKET STRATEGIES, MARKET FORECASTS, 2000-2006

-ALL REPORTS ARE AVAILABLE IN EITHER PRINT OR PDF -

___ ENCLOSED IS MY CHECK PRINT \$2800 WEB SITE VERSION \$5,600

___ PLEASE BILL MY COMPANY USING P.O. NUMBER _____

___ PLEASE CHARGE MY MASTERCARD/VISA/AMERICAN EXPRESS--CARD NUMBER _____

EXP. DATE _____

___ ADDITIONAL COPIES, @ \$375 (EXTRA COPY PRICE IN EFFECT ONLY WITH INITIAL ORDER)

SIGNATURE X _____ DATE _____

NAME _____ TITLE _____

COMPANY _____

DIVISION _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

TELEPHONE _____ FAX _____

E-MAIL _____

PLEASE NOTE: RESIDENTS OF MASSACHUSETTS AND CONNECTICUT MUST INCLUDE APPROPRIATE SALES TAX

SUBSCRIBERS OUTSIDE THE UNITED STATES MUST PROVIDE PREPAYMENT IN U.S. FUNDS

REPORT # S80310009519 300 PAGES 125+ TABLES AND FIGURES 2000 \$2,800

Table of Contents

Wireless Infrastructure, Subscriber, and Handset Markets: Moving to Achieve Above 90% Penetration

Market Strategies, Opportunities, and Forecasts 2000-2006

Table of Contents

EXECUTIVE SUMMARY WIRELESS MARKETS

ES-1

BRAIN TUMORS
WIRELESS SYSTEM MARKETS
WIRELESS DATA
WIRELESS EQUIPMENT MARKETS
DATA TRANSMITTED THROUGH WIRELESS
WIRELESS NETWORK ACCESS SOLUTIONS
SHORT MESSAGING

ES-
ES-

1. MOBILE VOICE AND DATA MARKET DESCRIPTION

1-1

REPORT # S80310009519 300 PAGES 125+ TABLES AND FIGURES 2000 \$2,800

**VALUE CHAIN
MOBILE DATA**

GPRS Applications

3G IMPACT ON OPERATORS

DESIGNING, BUILDING, AND LAUNCHING

DIGITAL WIRELESS NETWORK

EVOLUTION OF PERSONAL PORTALS 1-8

1.6 EVOLVING FROM CDMAONE TO THIRD-GENERATION SYSTEMS 1-9

1.7 MIGRATION TO INTERNET PROTOCOL (IP) BASED SERVICES 1-10

1.8 MOBILE OPERATOR BUSINESS CONSTRAINTS 1-10

1.9 RADIO FREQUENCIES 1-11

1.10 PERSONAL PORTAL ENGINES 1-11

1.10.1 The Role Of Personal Portal Engines In 1-13

Driving Message Integration

1.11 OPEN ARCHITECTURE ADVANTAGES 1-18

1.12 COMPETITIVE ADAPTABILITY 1-20

2. WIRELESS INFRASTRUCTURE MARKET FORECASTS 2-1

2.1 SWITCHING TECHNOLOGY GSM/CDMA/3G 2-2

2.1.1 GSM 2-5

2.1.2 Wireless Infrastructure Market Shares 2-6

2.1.3 Market Shares of Wireless Infrastructure Markets 2-10

2.2 WIRELESS MARKET FORECASTS 2-15

2.3 3G WIRELESS APPLICATIONS 2-20

2.3.1 Third Generation Wireless Systems 2-22

2.3.2 Third Generation Base Stations 2-26

2.3.3 PCS 2-27

2.3.4 Wireless Infrared Data 2-27

2.4 LMDS 2-29

2.5 WIRELESS LAN 2-30

2.6 SCADA MARKET STRATEGY 2-30

2.7 ITV MARKET OPPORTUNITY 2-33

2.8 INTERNET-BASED APPLICATIONS AND SERVICES 2-33

2.8.1 Delivery Of Internet-Based Content 2-34

2.9 HEALTHCARE TELECOMMUNICATION MARKETS 2-34

2.10 HOSPITAL WIRELESS SYSTEM 2-37

2.11 SPREAD SPECTRUM 2-38

2.11.1 Spread Spectrum Market Opportunities 2-42

2.11.2 Spread Spectrum Customers 2-43

3. WIRELESS HANDSET AND INTERNET APPLIANCE MARKET

FORECASTS 3-1

3.1 WIRELESS HANDSET MARKET GROWTH FACTORS 3-1

3.2 WIRELESS HANDSET MARKET SHARES 3-3

3.3 WORLDWIDE WIRELESS SUBSCRIBER MARKET FORECASTS 3-11

3.4 WIRELESS HANDSET MARKET FORECASTS 3-31

3.5 HANDHELD COMPUTERS AND INTERNET APPLIANCES 3-55

3.5.1 Market Shares 3-56

3.5.2 Market Forecasts 3-59

3.6 SCADA 3-61

4. WIRELESS SERVICE PROVIDER MARKET FORECASTS 4-1

4.1 WIRELESS SERVICE PROVIDER NEEDS 4-1

4.2 MARKET DRIVING FORCES 4-3

4.3 MARKET OUTLOOK 4-4

4.4 CHANGE IN WIRELESS MARKETS 4-6

4.5 WIRELESS COMMUNICATIONS GROWTH OPPORTUNITIES 4-8

4.6 MARKETING GLOBALLY 4-12

4.7 WIRELESS SERVICE PROVIDERS 4-14

4.7.1 Wireless Service Provider Revenue 4-15

4.7.2 Wireless Service Provider Needs 4-17

5. WIRELESS MARKET REGIONAL ANALYSIS 5-1

5.1 WIRELESS INDUSTRY 5-1

5.2 WIRELESS SUBSCRIBER REGIONAL ANALYSIS 5-2

	5.3 WIRELESS COMPANIES	5-5
5.4	WIRELESS DEVELOPED COUNTRY MARKET PENETRATION	5-9
	5.5 WIRELESS INFRASTRUCTURE	5-10
5.6	WIRELESS HANDSET REGIONAL MARKETS	5-18
	5.7 CURRENCY FLUCTUATIONS	5-22
5.8	REGIONAL COMPETITIVE POSITIONING	5-23

6. WIRELESS PRODUCTS 6-1

	6.1 NETWORK SYSTEMS	6-1
6.1.1	Open Systems / Middleware	6-2
6.1.2	Support For Growth In Phases	6-3
6.1.3	Maximized Resource Utilization	6-4
6.1.4	Nokia Network System Positioning	6-4
6.1.5	Nokia GSM	6-5
6.1.6	Nokia 3G Initiatives	6-5
6.1.7	Nokia WAP For The Operators	6-6
6.1.8	Siemens Wireless Network Products	6-7
6.1.9	Ericsson Wireless Network Products	6-8
6.1.10	Ericsson 3G	6-8
6.1.11	Ericsson CDMA Systems	6-9
6.1.12	Motorola Wireless Network Products	6-10
6.1.13	Motorola GPRS Infrastructure	6-10
6.1.14	Lucent Wireless Network Products	6-12
6.1.15	Lucent Application Processor Cluster (APC)	6-16
6.1.16	Lucent Microcell	6-16
6.1.17	Lucent Ethernet Interface Node	6-18
6.1.18	Lucent Wireless Network Benefits	6-18
6.1.19	Lucent Wireless Infrastructure Positioning	6-19

6.1.20	Lucent Mobile Internet	6-20
6.1.21	Alcatel Wireless Network Products	6-20
6.1.22	Alcatel Wireless System Key Features	6-21
6.1.23	Bosch Infrastructure For Mobile Radio Operators	6-21
6.1.24	Bosch Digital Multipoint Systems	6-22

6.2 WIRELESS SWITCHES 6-24

6.2.1	Nokia Wireless Switches	6-25
6.2.2	Ericsson	6-25
6.2.3	Ericsson GPRS Support Nodes Switch Packet Data	6-26
6.2.4	Ericsson Route Packet Functionality	6-27
6.2.5	Ericsson GPRS Architecture	6-27
6.2.6	Lucent Technologies	6-28
6.2.7	Alcatel Digital Cellular	6-29

6.3 BASE STATIONS 6-29

6.3.1	Nokia	6-29
6.3.2	Lucent Base Stations	6-32
6.3.3	Lucent Packet Base Stations	6-36
6.3.4	Siemens GSM Base Station	6-37
6.3.5	Siemens Third Generation Wireless Solutions	6-38
6.3.6	Siemens S-PRO Base Station	6-39
6.3.7	Ericsson GSM Systems	6-41
6.3.8	Ericsson Indoor Base Station	6-42
6.3.9	Ericsson WCDMA Base Stations	6-42
6.3.10	Alcatel Base Stations	6-46

6.4 FIXED WIRELESS ACCESS 6-47

6.4.1	Lucent Fixed Wireless Access	6-48
-------	------------------------------	------

6.5 WIRELESS LAN 6-49

6.5.1	Hospital Systems	6-50
6.5.2	Avaya	6-51
6.5.3	Avaya Wireless Features	6-52
6.5.4	Avaya PBX Wireless Interoperability	6-54
6.5.5	Nortel Wireless Solution	6-57
6.5.6	Alcatel Fixed Wireless Access Solution	6-57
6.5.7	Alcatel LMDS Radio Base Station	6-58
6.5.8	Siemens Wireless	6-59
6.5.9	Ericsson Wireless Targeted To Hospitals	6-60
6.5.10	NEC Wireless Premises Systems	6-61
6.5.11	Nortel Wireless PBX	6-62

6.6 HANDSETS 6-63

6.6.1	Nokia Wireless Handsets	6-65
6.6.2	Nokia Multiple Capability Handsets	6-66
6.6.3	Nokia Card Phone	6-66
6.6.4	Nokia Solutions To Access Internet	6-67
6.6.5	Siemens Wireless Handsets	6-68
6.6.6	Motorola Digital Wireless Telephones	6-68
6.6.7	Motorola Digital Wireless Telephones	6-69
6.6.8	Alcatel Handsets	6-70
6.6.9	Samsung	6-72
6.6.10	Lucent Strategic Alliances	6-73

6.7 VOICE OVER IP 6-74

6.7.1	Lucent Voice Over IP	6-74
6.7.2	Motorola Voice Over IP	6-75
6.7.3	Motorola Bluetooth	6-76

6.8 INTERNET APPLIANCES 6-77		
6.8.1	Nokia Desktop Flat Panel Displays	6-79
6.8.2	Lucent Wireless Broadband	6-80
6.8.3	Spyglass Network Appliance Browser	6-81
6.9 SPREAD SPECTRUM 6-84		
6.9.1	World Wireless	6-85
6.9.2	Multizone Wireless Products	6-85
6.9.3	Telxon Corporation	6-85
6.9.4	Digital Wireless Spread Spectrum	6-86
6.9.5	Wireless Scientific	6-87
6.10 INTERACTIVE VOICE RESPONSE (IVR) 6-89		
6.10.1	Avaya Interactive Voice Response	6-90
6.10.2	Nortel Voice, Data, Videonetwork	6-93

7. WIRELESS TECHNOLOGY 7-1

7.1 KEY TECHNOLOGIES			
7.2 WIRELESS APPLICATION PROTOCOL (WAP)			7-1
7.2.1	Nokia WAP Browser	7-2	
7.3 BLUETOOTH			
7.4 GLOBAL EVOLUTION (EDGE)			
7.4.1	EDGE Supported Services	7-4	
7.5 AIR INTERFACES			
7.6 WIRELESS PACKET RADIO SERVICES TECHNOLOGY			7-9
7.7 GPRS SUPPORT NODES			
7.7.1	PacketGSM technology	7-12	
7.7.2	GPRS Changing The Operator Business Environment	7-13	
7.7.3	Nokia GPRS Core Solution	7-14	
7.7.4	Two-Way Radio Regulation	7-14	
7.8 SPREAD SPECTRUM TECHNICAL ISSUES			7-15
7.8.1	Ranges	7-16	

7.8.2 Screen 7-16

8. WIRELESS APPLICATIONS 8-1

8.1 BLUETOOTH APPLICATIONS 8-1

8.1.1 decrease RF To The Head 8-2
8.1.2 Connecting Digital Devices 8-2
8.1.3 Nokia And Fujifilm Mobile Imaging Technology 8-3
8.1.4 Simulation 8-3
8.1.5 Bluetooth Stereo Headset 8-4

8.2 SECURE INTERNET COMMUNICATIONS 8-5

8.2.1 Nokia IP Network Security Solution 8-8
8.2.2 Nokia Network / Western PCS 8-10

**8.3 SINGAPORE TELECOMMUNICATIONS SELECTS
LUCENT TECHNOLOGIES BILLING SOLUTION 8-11**

8.4 LUCENT TECHNOLOGIES AND SUN MICROSYSTEMS TRIAL GPRS 8-13

8.5 LUCENT TECHNOLOGIES MOBILE COMMERCE IN ASIA-PACIFIC 8-16

8.5.1 Lucent Broadband Wireless 8-18

8.6 MOTOROLA AND CISCO SYSTEMS WIRELESS INTERNET 8-19

8.7 FRANCE TELECOM MOBILE INTELLIGENT NETWORK INFRASTRUCTURE 8-20

8.8 PUBLIC SAFETY WIRELESS SYSTEMS 8-21

8.9 SPREAD SPECTRUM APPLICATIONS 8-24

8.9.1 Oceanographic Research 8-28
8.9.2 Railroads 8-28
8.9.3 Refinery Data Acquisition And Control 8-28
8.9.4 Avaya Healthcare Applications 8-29
8.9.5 Nortel Wireless Hospital Applications 8-30
8.9.6 Motorola Police Radio System 8-30

8.9.7	The Motorola Police Solutions	8-31
8.9.8	Police Fight Crime On-Line	8-32
8.9.9	Hong Kong Police Digital Nokia Tetra System	8-33
8.9.10	Police Conferencing	8-35
8.9.11	Medical Applications	8-36
8.9.12	Fire Applications	8-37

8.10 SPREAD SPECTRUM CONFERENCING SYSTEMS 8-37

8.10.1	Applications For Commercial Spread Spectrum	8-39
--------	---	------

9. WIRELESS COMPANY PROFILES 9-1

9.1 ALCATEL 9-1

9.1.1	Alcatel LMDS solution	9-3
-------	-----------------------	-----

9.2 APACK TECHNOLOGIES

9.3 ERICSSON

9.3.1	Ericsson 3G	9-6
9.3.2	Mobile Internet GPRS	9-7
9.3.3	Ericsson Customers	9-7
9.3.4	Internet Applications	9-8
9.3.5	Consumer Products	9-9
9.3.6	Focus And Concentration Of Product Portfolio	9-9
9.3.7	Ericsson Regional Market Participation	9-11
9.3.8	Western Europe	9-12
9.3.9	Japan	9-12
9.3.10	UMTS Network Equipment	9-13

9.4 FUJITSU

9.4.1	Fujitsu Limited	9-14
-------	-----------------	------

WINTERGREEN RESEARCH, INC.

9.4.2 1999 Revenue Fujitsu Network Communications 9-14

9.4.3 Fujitsu Network Communications 9-16

9.5 INTERMEC TECHNOLOGIES

9.6 KYOCERA INTERNATIONAL

9.7 LUCENT TECHNOLOGIES

9.7.1 Optimay GmbH 9-19

9.7.2 Lucent Technologies Wireless Infrastructure Positioning 9-20

9.7.3 Lucent Technologies Software Products Group 9-20

9.7.4 Lucent Technologies Competence

Centre For Wireless Communications In Milan Italy 9-21

9.7.5 One.Tel And Lucent 9-22

9.7.6 Lucent Wireless Technology Research Department 9-22

9.8 LXE

9.9 METRICOM

9.10 MOTOROLA

9.10.1 Personal Communications Segment 9-26

9.10.2 Global Telecom Solutions Segment 9-27

9.10.3 Motorola Positioning For Convergence 9-28

9.10.4 Corporate Structure 9-30

9.10.5 Motorola Wireless Strategic Alliances 9-31

9.10.6 Motorola customer base 9-33

9.11 NEC 9-35

9.11.1 NEC Switching And Mobile Communications Systems 9-37

9.12 NOKIA 9-37

9.12.1 Nokia Solutions 9-39

9.13 ONE.TEL 9-41

9.14 OPENTV 9-41

9.14.1 Spyglass 9-41

9.14.2 SPYGLASS REvenue 9-42

WINTERGREEN RESEARCH, INC.

9.15 PALM 9-43
9.16 QUALCOMM 9-44
9.17 SIEMENS 9-45

9.17.1 Siemens Information And Communication Networks 9-45

9.18 SUN MICROSYSTEMS
9.19 SAMSUNG
9.20 SYCHIP
9.21 SYMBIAN
9.22 WORLD WIRELESS COMMUNICATIONS

9.22.1 World Wireless Communications Telemetry 9-49

9-48

List of Tables and Figures

TABLE ES-1 ES-4
WIRELESS GROWTH MARKET FORCES
FIGURE ES-2 ES-6
TOTAL GLOBAL WIRELESS EQUIPMENT SHIPMENT FORECASTS

TABLE 1-1 1-2
3G SERVICE CREATION AND EXECUTION PLATFORM BASES
TABLE 1-2 1-5
MOBILE PORTALS CONTENT-BASED SERVICES POSITIONING
TABLE 1-3 1-5
MOBILE OPERATOR PARTNERSHIP POSITIONING
TABLE 1-4 1-6
KEY ASSETS OF THE MOBILE OPERATOR IN THE 3G BUSINESS MODEL
TABLE 1-5 1-6
VENDOR POSITIONING FOR 3G
TABLE 1-6 1-8
KEY ASPECTS OF PERSONAL PORTALS
TABLE 1-7 1-9
TYPES OF PERSONAL PORTAL INTEGRATION ENGINES
TABLE 1-8 1-12

REPORT # S80310009519 300 PAGES 125+ TABLES AND FIGURES 2000 \$2,800

ROLE OF PERSONAL PORTAL INTEGRATION ENGINES

TABLE 1-9 1-15

APPLICATION INTEGRATION ENGINE FUNCTIONS

TABLE 1-10 1-19

OPEN ARCHITECTURE ADVANTAGES

TABLE 2-1

WIRELESS GROWTH MARKET FORCES

FIGURE 2-2 2-3

WIRELESS INFRASTRUCTURE EQUIPMENT TECHNOLOGY, 2000

TABLE 2-3 2-3

WIRELESS INFRASTRUCTURE EQUIPMENT

TECHNOLOGY, 1999 AND 2000

FIGURE 2-4 2-4

WIRELESS INFRASTRUCTURE EQUIPMENT TECHNOLOGY, 2006

TABLE 2-5 2-5

WIRELESS INFRASTRUCTURE EQUIPMENT TECHNOLOGY, 2006

FIGURE 2-6

WORLDWIDE WIRELESS SHIPMENTS BY COMPANY, 2000

TABLE 2-7 2-9

WIRELESS COMMUNICATIONS EQUIPMENT PROVIDER

SHIPMENTS BY SEGMENT, PERCENT, 2000

TABLE 2-8 2-10

WIRELESS COMMUNICATIONS EQUIPMENT PROVIDER

SHIPMENTS BY SEGMENT, DOLLARS, 2000

FIGURE 2-9 2-13

WORLDWIDE WIRELESS INFRASTRUCTURE

SHIPMENTS BY COMPANY, 2000

FIGURE 2-10 2-14

WORLDWIDE WIRELESS HANDSET MARKET SHARES, DOLLARS, 2000

TABLE 2-11 2-15

WIRELESS INFRASTRUCTURE EQUIPMENT PROVIDER

SHIPMENTS, 1999 AND 2000

FIGURE 2-12 2-16

GLOBAL WIRELESS BASE STATION EQUIPMENT

SHIPMENT FORECAST, 2000-2006

FIGURE 2-13 2-17

GLOBAL WIRELESS SWITCHING EQUIPMENT
SHIPMENT FORECAST, 2000-2006
FIGURE 2-14 2-18

GLOBAL WIRELESS HANDSET SHIPMENT FORECAST, 2000-2006
FIGURE 2-15 2-19

TOTAL GLOBAL WIRELESS EQUIPMENT
SHIPMENT FORECAST, 2000-2006
TABLE 2-16 2-20

GLOBAL TELECOMMUNICATIONS WIRELESS EQUIPMENT
SHIPMENT FORECASTS BY SEGMENT, DOLLARS, 2000-2006
TABLE 2-17 2-21

APPLICATIONS FOR THIRD GENERATION WIRELESS SYSTEMS
TABLE 2-18 2-24

NEXT GENERATION WIRELESS APPLICATIONS
TABLE 2-19 2-28

TYPES OF IRDA MOBILE AND HANDHELD DEVICES
TABLE 2-20 2-29

MAJOR WIRELESS DATA MARKET GROWTH FACTORS
TABLE 2-21 2-31

MARKET FOR SCADA ENABLED PUBLISH SUBSCRIBE MESSAGING, 2000-2006
TABLE 2-22 2-36

WIRELESS HEALTHCARE TELECOMMUNICATIONS MARKET DRIVING FORCES
TABLE 2-23 2-36

SPREAD SPECTRUM CONFERENCING AND OTHER
EMERGENCY CONFERENCING VOICE APPLICATION
MARKET SEGMENT FORECASTS, 1998-2005
FIGURE 2-24 2-39

WORLDWIDE SPREAD SPECTRUM MARKET SEGMENTS, 2006
TABLE 2-25 2-40

WORLDWIDE SPREAD SPECTRUM CONFERENCING VOICE,
VOICE / DATA, 1999-2006
TABLE 2-26 2-41

WORLDWIDE SPREAD SPECTRUM CONFERENCING DATA, 1999-2006

TABLE 3-1 3-2
WIRELESS HANDSET MARKET GROWTH FACTORS
FIGURE 3-2 3-3

WORLDWIDE WIRELESS HANDSET MARKET SHARES, DOLLARS, 2000
TABLE 3-3 3-4

WORLDWIDE WIRELESS HANDSET MARKET SHARES, DOLLARS, 2000
FIGURE 3-4 3-5

U.S. WIRELESS HANDSET MARKET SHARES, DOLLARS, 2000
TABLE 3-5 3-5

U.S. WIRELESS HANDSET MARKET SHARES, DOLLARS, 2000
FIGURE 3-6 3-7

EUROPEAN WIRELESS HANDSET MARKET SHARES, 2000
TABLE 3-7 3-8

EUROPEAN WIRELESS HANDSET MARKET SHARES, 2000
FIGURE 3-8 3-9

JAPANESE WIRELESS HANDSET MARKET SHARES, DOLLARS, 2000
TABLE 3-9 3-9

JAPANESE WIRELESS HANDSET MARKET SHARES, 2000
FIGURE 3-10 3-10

ASIA PACIFIC WIRELESS HANDSET MARKET SHARES, 2000
TABLE 3-11 3-11

ASIA PACIFIC WIRELESS HANDSET MARKET SHARES, 2000
FIGURE 3-12 3-12

WORLDWIDE WIRELESS SUBSCRIBER
REGIONAL MARKET SEGMENTS, 2000
FIGURE 3-13 3-13

WORLDWIDE WIRELESS SUBSCRIBER
REGIONAL MARKET SEGMENTS, 2006
FIGURE 3-14 3-14

TOTAL WORLDWIDE WIRELESS SUBSCRIBERS, 2000-2006
TABLE 3-15 3-15

WIRELESS SUBSCRIBER REGIONAL
MARKET FORECASTS, 2000-2006
FIGURE 3-16 3-16

TOTAL WORLDWIDE WIRELESS SUBSCRIBER
MARKET PENETRATION, 2000-2006
TABLE 3-17 3-17

WIRELESS SUBSCRIBER MARKET PENETRATION, 2000-2006
FIGURE 3-18 3-18

U.S. WIRELESS SUBSCRIBERS, 2000-2006
FIGURE 3-19 3-19

U.S. WIRELESS SUBSCRIBER MARKET PENETRATION, 2000-2006

FIGURE 3-20 3-20

EUROPEAN WIRELESS SUBSCRIBERS, 2000-2006

FIGURE 3-21 3-21

EUROPEAN WIRELESS SUBSCRIBER
MARKET PENETRATION, 2000-2006

FIGURE 3-22 3-22

JAPANESE WIRELESS SUBSCRIBERS, 2000-2006

FIGURE 3-23 3-23

JAPANESE WIRELESS SUBSCRIBER MARKET
PENETRATION, 2000-2006

FIGURE 3-24 3-24

ASIA / PACIFIC WIRELESS SUBSCRIBERS, 2000-2006

FIGURE 3-25 3-25

ASIA / PACIFIC WIRELESS SUBSCRIBER
MARKET PENETRATION, 2000-2006

FIGURE 3-26 3-26

TOTAL DEVELOPMENT COUNTRY WIRELESS
SUBSCRIBERS, 2000-2006

FIGURE 3-27 3-27

TOTAL WORLDWIDE DEVELOPED COUNTRY WIRELESS
SUBSCRIBER MARKET PENETRATION, 2000-2006

TABLE 3-28 3-28

WIRELESS SUBSCRIBER MARKET PENETRATION,
DEVELOPED COUNTRIES, 2000-2006

FIGURE 3-29 3-29

TOTAL UNDER DEVELOPED COUNTRY WIRELESS
SUBSCRIBERS, 2000-2006

FIGURE 3-30 3-30

TOTAL WORLDWIDE UNDER DEVELOPED COUNTRY
WIRELESS SUBSCRIBER MARKET PENETRATION, 2000-2006

TABLE 3-31 3-31

WIRELESS SUBSCRIBER MARKET PENETRATION,
UNDER DEVELOPED COUNTRIES, 2000-2006

FIGURE 3-32 3-32

TOTAL WORLDWIDE WIRELESS HANDSET
UNIT SHIPMENTS, 2000-2006

TABLE 3-33 3-33

WIRELESS HANDSET REGIONAL MARKET
FORECASTS, UNITS, 2000-2006
FIGURE 3-34 3-34

TOTAL WORLDWIDE WIRELESS HANDSET
SHIPMENTS, DOLLARS, 2000-2006
TABLE 3-35 3-35

WIRELESS HANDSET REGIONAL MARKET
FORECASTS, DOLLARS, 2000-2006
FIGURE 3-36 3-36

U.S. NEW VS. REPLACEMENT WIRELESS
HANDSET MARKET SEGMENTS, 2000
FIGURE 3-37 3-37

U.S. NEW VS. REPLACEMENT WIRELESS
HANDSET MARKET SEGMENTS, 2006
FIGURE 3-38 3-38

U.S. WIRELESS HANDSET MARKET
FORECASTS, UNITS, 2000-2006
FIGURE 3-39 3-39

U.S. WIRELESS HANDSET FORECASTS, DOLLARS, 2000-2006
TABLE 3-40 3-40

U.S. WIRELESS HANDSET MARKET
FORECASTS, UNITS, NEW VS. REPLACEMENT, 2000-2006
TABLE 3-41 3-40

U.S. WIRELESS HANDSET MARKET
FORECASTS, DOLLARS, 2000-2006
FIGURE 3-42 3-41

EUROPEAN NEW VS. REPLACEMENT WIRELESS
HANDSET MARKET SEGMENTS, 2000
FIGURE 3-43 3-42

EUROPEAN NEW VS. REPLACEMENT WIRELESS
HANDSET MARKET SEGMENTS, 2006
FIGURE 3-44 3-43

EUROPEAN WIRELESS HANDSET MARKET
FORECASTS, UNITS, 2000-2006
FIGURE 3-45 3-44

EUROPEAN WIRELESS HANDSET
FORECASTS, DOLLARS, 2000-2006
TABLE 3-46 3-45

EUROPEAN WIRELESS HANDSET MARKET
FORECASTS, UNITS, NEW VS. REPLACEMENT, 2000-2006
TABLE 3-47 3-45

EUROPEAN WIRELESS HANDSET MARKET
FORECASTS, DOLLARS, 2000-2006
FIGURE 3-48 3-46

JAPANESE NEW VS. REPLACEMENT
WIRELESS HANDSET MARKET SEGMENTS, 2000
FIGURE 3-49 3-47

JAPANESE NEW VS. REPLACEMENT WIRELESS
HANDSET MARKET SEGMENTS, 2006
FIGURE 3-50 3-48

JAPANESE WIRELESS HANDSET MARKET
FORECASTS, UNITS, 2000-2006
FIGURE 3-51 3-49

JAPANESE WIRELESS HANDSET FORECASTS,
DOLLARS, 2000-2006
TABLE 3-52 3-50

JAPANESE WIRELESS HANDSET MARKET FORECASTS, UNITS, NEW VS.
REPLACEMENT, 2000-2006
TABLE 3-53 3-50

JAPANESE WIRELESS HANDSET MARKET
FORECASTS, DOLLARS, 2000-2006
FIGURE 3-54 3-51

ASIA / PACIFIC NEW VS. REPLACEMENT
WIRELESS HANDSET MARKET SEGMENTS, 2000
FIGURE 3-55 3-52

ASIA / PACIFIC NEW VS. REPLACEMENT
WIRELESS HANDSET MARKET SEGMENTS, 2006
FIGURE 3-56 3-53

ASIA / PACIFIC WIRELESS HANDSET
MARKET FORECASTS, UNITS, 2000-2006
FIGURE 3-57 3-54

ASIA / PACIFIC WIRELESS HANDSET
FORECASTS, DOLLARS, 2000-2006
TABLE 3-58 3-54

ASIA / PACIFIC WIRELESS HANDSET MARKET FORECASTS, UNITS, NEW VS.
REPLACEMENT, 2000-2006

TABLE 3-59 3-55
ASIA / PACIFIC WIRELESS HANDSET MARKET
FORECASTS, DOLLARS, 2000-2006
FIGURE 3-60 3-56
WORLDWIDE HANDHELD COMPUTER HARDWARE
MARKET SHARES, 2000
TABLE 3-61 3-56
HANDHELD COMPUTER HARDWARE MARKET SHARES, 2000
FIGURE 3-62 3-57
WORLDWIDE HANDHELD COMPUTER
SOFTWARE MARKET SHARES, 2000
TABLE 3-63 3-58
HANDHELD COMPUTER SOFTWARE
OPERATING SYSTEM MARKET SHARES, 2000
FIGURE 3-64 3-59
WORLDWIDE HANDHELD COMPUTER FORECASTS,
UNITS, 2000-2006
TABLE 3-65 3-60
HANDHELD COMPUTER MARKET, UNIT SHIPMENT
ANALYSIS, 2000-2006
FIGURE 3-66 3-60
WORLDWIDE HANDHELD COMPUTER INSTALLED BASE,
UNITS, 2000-2006
TABLE 3-67 3-61
INTERNET APPLIANCE MARKET PENETRATION,
INSTALLED BASE ANALYSIS, 2000-2006
FIGURE 3-68 3-61
WORLDWIDE HANDHELD COMPUTER FORECASTS, DOLLARS, 2000-2006
FIGURE 3-69 3-62
EMBEDDED SYSTEMS SCADA INSTALLED BASE, UNITS, 2000-2006
TABLE 3-70 3-63
MARKET FOR SCADA ENABLED PUBLISH SUBSCRIBE
MESSAGING, 2000-2006

TABLE 4-1
WIRELESS SERVICE PROVIDER NEEDS

TABLE 4-2	
MEANS TO ACHIEVE AN INTERNET PRESENCE	
TABLE 4-3	
WIRELESS TELECOMMUNICATIONS MARKET DRIVING FORCES	
TABLE 4-4	
WIRELESS COMMUNICATIONS INFRASTRUCTURE BENEFITS	
TABLE 4-5	
CHANGE IN WIRELESS MARKETS	
TABLE 4-6	
TELECOMMUNICATIONS MARKET GROWTH OPPORTUNITIES	
TABLE 4-7	
HANDSET MARKET GROWTH FACTORS	
TABLE 4-8	
COMMUNICATIONS NETWORK MARKET OPPORTUNITIES	
TABLE 4-9	
MARKETING GLOBALLY	
FIGURE 4-10	4-14
U.S. WIRELESS SERVICE PROVIDER SUBSCRIBER MARKET SHARES, 2000	
TABLE 4-11	4-15
U.S. WIRELESS SERVICE PROVIDER MARKET SHARES, DOLLARS, 2000	
FIGURE 4-12	4-16
U.S. WIRELESS SERVICE PROVIDER MARKET SHARES, DOLLARS, 2000	
TABLE 4-13	4-16
U.S. WIRELESS SERVICE PROVIDER MARKET SHARES, SUBSCRIBERS, 2000	
FIGURE 4-14	4-17
TOTAL WORLDWIDE WIRELESS SUBSCRIBERS, 2000-2006	
FIGURE 4-15	4-18
WORLDWIDE WIRELESS SERVICES MARKET FORECASTS, 2000-2006	
TABLE 4-16	4-19
WORLDWIDE WIRELESS SERVICES MARKET FORECASTS, 2000-2006	

TABLE 5-1	5-3
WIRELESS SUBSCRIBER REGIONAL MARKET FORECASTS, 2000-2006	
FIGURE 5-2	5-4
WIRELESS SUBSCRIBER REGIONAL MARKET SEGMENTS, 2000	
FIGURE 5-3	5-4
WIRELESS SUBSCRIBER REGIONAL MARKET SEGMENTS, 2006	

TABLE 5-4 5-5
WIRELESS INFRASTRUCTURE EQUIPMENT
PROVIDER SHIPMENTS, 1999 AND 2000
FIGURE 5-5 5-6
WORLDWIDE WIRELESS INFRASTRUCTURE AND HANDSET
SHIPMENTS BY COMPANY, 2000
TABLE 5-6
NOKIA REVENUE BY REGION
TABLE 5-7
SIEMENS REVENUE BY REGION
TABLE 5-8
MOTOROLA REVENUE BY REGION
FIGURE 5-9 5-9
TOTAL WORLDWIDE DEVELOPED COUNTRY WIRELESS
SUBSCRIBER MARKET PENETRATION, 2000-2006
TABLE 5-10 5-10
WORLDWIDE WIRELESS INFRASTRUCTURE SHIPMENTS
BY COMPANY, DOLLARS, 2000
TABLE 5-11 5-11
WORLDWIDE WIRELESS WIRELESS INFRASTRUCTURE SHIPMENTS
BY COMPANY, DOLLARS, 2000
TABLE 5-12 5-12
U.S. WIRELESS WIRELESS INFRASTRUCTURE SHIPMENTS
BY COMPANY, DOLLARS, 2000
TABLE 5-13 5-13
EUROPEAN WIRELESS WIRELESS INFRASTRUCTURE SHIPMENTS
BY COMPANY, DOLLARS, 2000
TABLE 5-14 5-14
JAPANESE WIRELESS WIRELESS INFRASTRUCTURE SHIPMENTS
BY COMPANY, DOLLARS, 2000
TABLE 5-15 5-15
WIRELESS EQUIPMENT PROVIDER SHIPMENTS BY
SEGMENT, PERCENT, 2000
TABLE 5-16 5-16
WIRELESS EQUIPMENT PROVIDER SHIPMENTS BY
REGION, PERCENT, 2000
TABLE 5-17 5-17
WIRELESS EQUIPMENT PROVIDER SHIPMENTS

BY REGION, DOLLARS, 2000

TABLE 5-18 5-18

WIRELESS COMMUNICATIONS INFRASTRUCTURE AND
HANDSET PROVIDER SHIPMENTS BY REGION, DOLLARS, 2000

TABLE 5-19 5-19

WIRELESS COMMUNICATIONS
HANDSET PROVIDER SHIPMENTS BY REGION, DOLLARS, 2000

TABLE 5-20 5-20

WIRELESS COMMUNICATIONS
HANDSET PROVIDER SHIPMENTS BY REGION, UNITS, 2000

TABLE 5-21 5-21

WIRELESS COMMUNICATIONS INFRASTRUCTURE AND
HANDSET PROVIDER SHIPMENTS BY REGION, DOLLARS, 2000

TABLE 6-1

WIRELESS NETWORK SYSTEMS POSITIONING

TABLE 6-2

ISSUES RELATING TO USING THE SWITCH BASE AS A PLATFORM

TABLE 6-3

NOKIA 3G POSITIONING

TABLE 6-3 (CONTINUED)

NOKIA 3G POSITIONING

TABLE 6-4

LUCENT FLEXENT™ WIRELESS NETWORK PRODUCTS

TABLE 6-5

SERVICE PROVIDER CHALLENGES ADDRESSED BY LUCENT

TABLE 6-6

LUCENT TECHNOLOGIES WIRELESS NETWORKS OPEN, STANDARDS EVOLUTION

TABLE 6-7

LUCENT WIRELESS SYSTEM ENHANCEMENTS

TABLE 6-8

LUCENT NETWORK ELEMENTS

TABLE 6-9

LUCENT MICROCELL CHARACTERISTICS

TABLE 6-10

BOSCH DMS FEATURES AND FUNCTIONS

TABLE 6-11
BOSCH SOLUTIONS FOR MOBILE RADIO NETWORKS
TABLE 6-12
NOKIA BASE STATION FAMILY FEATURES
TABLE 6-13
NOKIA METROSITE WCDMA BASE STATION FEATURES AND FUNCTIONS
TABLE 6-14
LUCENT GLOBAL EVOLUTION (EDGE) BBASE STATION MARKET POSITIONING
TABLE 6-15
LUCENT 3G SOLUTIONS
TABLE 6-16
MAIN TASKS OF THE ERICSSON RADIO NETWORK CONTROLLERS (RNC)
TABLE 6-17
MAIN TASKS OF THE ERICSSON RADIO BASE STATIONS (RBS)
TABLE 6-18
TOOLS FOR RADIO ACCESS MANAGEMENT TO AID OPERATORS
TABLE 6-19
KEY BENEFITS OF FIXED WIRELESS ACCESS SYSTEMS
TABLE 6-20
LUCENT BROADBAND WIRELESS ACCESS PRODUCTS
TABLE 6-21
AVAYA WIRELESS FEATURES
TABLE 6-22
AVAYA PBX WIRELESS INTEROPERABILITY
TABLE 6-23
WIRELESS HANDSET PRODUCT FEATURES
TABLE 6-24
WIRELESS HANDSET PRODUCT POSITIONING
TABLE 6-25
NOKIA 3G SERVICE CREATION AND EXECUTION PLATFORM
TABLE 6-26
ALCATEL MOBILE HANDSET PRODUCT POSITIONING
TABLE 6-27
SAMSUNG HANDSET POSITIONING
TABLE 6-28
MAP ADVANCED IP BASED SERVICES
TABLE 6-29
MOTOROLA BLUETOOTH PRODUCTS

TABLE 6-30
SPYGLASS MICROSERVER FUNCTIONS
TABLE 6-31
SPYGLASS MICROSERVER USES
TABLE 6-32
PRISMSERVER-BASED CONTENT DELIVERY
AND TRANSFORMATION PLATFORM CHARACTERISTICS
TABLE 6-33
WIRELESS SCIENTIFIC PRODUCT LINE
TABLE 6-34
INTERACTIVE VOICE RESPONSE FUNCTIONS
TABLE 6-35
PRODUCTIVITY GAINS FROM AVAYA INTERACTIVE VOICE RESPONSE (IVR)

TABLE 7-1
EDGE SYSTEM POSITIONING
TABLE 7-2
EDGE SUPPORTED APPLICATIONS
TABLE 7-3
MOBILE TELEPHONY AIR INTERFACES

TABLE 8-1
SELECTED BLUETOOTH APPLICATIONS
TABLE 8-2
SECURE WIRELESS INTERNET COMMUNICATION FUNCTIONS
TABLE 8-3
SECURE WIRELESS INTERNET COMMUNICATION PARAMETERS
TABLE 8-4
NETWORK SURVEILLANCE FUNCTIONS
TABLE 8-5
NOKIA SECURITY SOLUTION PRODUCT FUNCTIONS
TABLE 8-6
LUCENT BILLING SOFTWARE SOLUTIONS
TABLE 8-7
LUCENT/SUN: COLLABORATION ISSUES ADDRESSED
TABLE 8-8

MOBILE INTERNET SOLUTIONS

TABLE 8-9

LUCENT TECHNOLOGIES WIRELESS PRESENCE IN ASIA-PACIFIC

TABLE 8-10

PRINCIPAL CUSTOMERS FOR TWO-WAY RADIO

TABLE 8-11

PRINCIPAL CUSTOMERS FOR TWO-WAY RADIO SYSTEMS SOLUTIONS

TABLE 8-12

SPREAD SPECTRUM APPLICATIONS

TABLE 8-13

SPREAD SPECTRUM MARKETS TARGETED

TABLE 9-1

ALCATEL MOBILE NETWORK POSITIONING

TABLE 9-2

ERICSSON STRATEGIC POSITIONING FOR WIRELESS MARKETS

TABLE 9-3

MOTOROLA STRATEGY FOR CONVERGENCE

TABLE 9-4

MOTOROLA WIRELESS STRATEGIC ALLIANCES

TABLE 9-5

NOKIA MOBILE DATA SOLUTIONS

WIRELESS MARKET DYNAMICS

MANY OF THESE KEY TOPICS HAVE PHENOMENAL SUBCATEGORIES

ABOUT THE COMPANY

WinterGreen Research, founded in 1985, provides strategic market assessments in telecommunications, communications equipment, health care, and advanced computer technology. Industry reports focus on opportunities that will expand existing markets or develop major new markets. The reports assess new product and service positioning strategies, new and evolving technologies, and

REPORT # S80310009519 300 PAGES 125+ TABLES AND FIGURES 2000 \$2,800

technological impact on products, services, and markets. Market shares are provided. Leading market participants are profiled, and their marketing strategies, acquisitions, and strategic alliances are discussed. The principals of WinterGreen Research have been involved in analysis and forecasting of international business opportunities in telecommunications and advanced computer technology markets for over 30 years.

ABOUT THE PRINCIPAL AUTHORS

Ellen T. Curtiss, Technical Director, co-founder of WinterGreen Research, conducts strategic and market assessments in technology-based industries. Previously she was a member of the staff of Arthur D. Little, Inc., for 23 years, most recently as Vice President of Arthur D. Little Decision Resources, specializing in strategic planning and market development services. She is a graduate of Boston University and the Program for Management Development at Harvard Graduate School of Business Administration. She is the author of recent studies on worldwide telecommunications markets and the Top Ten Telecommunications market analysis and forecasts.

Susan Eustis, President, co-founder of WinterGreen Research, has done research in communications and computer markets and applications. She holds several patents in microcomputing, electronic voting machines, and parallel processing. She is the author of recent studies of the Regional Bell Operating Companies' marketing strategies, Internet Strategies, a study of Internet Equipment, Worldwide Telecommunications Equipment, Top Ten Telecommunications, Digital Loop Carrier, Web Hosting, and Application Integration markets. Ms. Eustis is a graduate of Barnard College.