

THE WIRELESS BUSINESS CONNECTION

*Tracking, analyzing and forecasting
the In-Building Wireless and Public Wireless Markets*

Table of Contents & Sample Pages

THE WIRELESS BUSINESS CONNECTION

Second Quarter 2000 Report

Table of Contents

Section 1: Second Quarter 2000 Public Licensed and Wireless LAN Markets	5-36
Public Licensed Wireless Market	6-31
Second Quarter U.S. Public Wireless Subscriber Results.....	6-11
Figure 1: Cumulative Subscribers by Carrier, Second Quarter 2000, U.S.....	8
Figure 2: Net Subscriber Adds by Carrier, Second Quarter 2000, U.S	10
Figure 3: Average Revenue Per User, U.S	11
Second Quarter Canadian Public Wireless Subscriber Results	12-13
Figure 4: Cumulative Subscribers by Carrier, Second Quarter 2000, Canada .	13
Figure 5: Net Subscriber Adds by Carrier, Second Quarter 2000, Canada..	13
Figure 6: Average Revenue Per User, Canada.....	13
Mergers/Acquisitions	14-24
<i>Pending Mergers..</i>	14-16
<i>Completed Mergers..</i>	17-19
<i>International Partnerships</i>	20
Figure 7: Pending Mergers/Acquisitions	21-22
Figure 8: Completed Mergers/Acquisitions	23-24
Digital Migration	25-26
Figure 9: Progress on Cellular Carriers' Digital Deployments	25-26
3G Update.....	27-31
<i>US Auctions..</i>	27-28
<i>Canadian Auctions..</i>	28
<i>3G Standard Developments..</i>	28-29
<i>3G Deployments & Trials..</i>	29
Figure 10: 3G Contracts/Trials.....	30-31
Wireless LAN Market..	32-36
Market Developments	32-33
<i>FCC approves HomeRF bandwidth increase</i>	32
<i>WECA awards 18 new WiFi™ certifications</i>	32
Figure 11: WiFi™ Certified Products	33
Acquisitions.....	34-36
<i>Texas Instruments/Alantro Communications</i>	34
<i>Symbol Technologies/Telxon....</i>	34
<i>Psion/Teklogix....</i>	35-36
Product Introduction.....	36
<i>Atheros Communications AR5000....</i>	36

THE WIRELESS BUSINESS CONNECTION

Second Quarter 2000 Report

Table of Contents

Section 2: Second Quarter 2000 In-Building Wireless Market Results	37-63
Licensed Products	38-40
Product Enhancements.....	38
<i>Ericsson Mobile Advantage Wireless Office</i>	<i>38</i>
Acquisitions	38
<i>Cisco/Jetcell</i>	<i>38</i>
Partnerships.....	39
<i>Natural MicroSystems/Telit Networks</i>	<i>39</i>
Product Introductions	39-40
<i>Travelers Telecom WirelessConnect.....</i>	<i>39-40</i>
Product Discontinuation	40
<i>Hughes Network Systems AIReach Office.....</i>	<i>40</i>
Converged Voice and Data Products	41
Product Enhancements	41
<i>SpectraLink NetLink</i>	<i>41</i>
Unlicensed Products	42
Product Discontinuations	42
<i>Intel.....</i>	<i>42</i>
Acquisitions.....	42
<i>ECI Telecom/ELCO Holdings</i>	<i>42</i>
Distribution.....	42
<i>Ascom/Ensource</i>	<i>42</i>
Spinoff.....	42
<i>Avaya/Lucent</i>	<i>42</i>
Market Analysis	43-63
Second Quarter 2000 In-Building Wireless Handset Results, U.S	43
Figure 12: Quarterly Handset Shipments, U.S.....	43
In-Building Wireless Multi-Cell Shipments By Technology	44
Figure 13: Quarterly Multi-Cell Handset Shipments by Technology, U.S	44
Review of Handset Market Share Results by Vendor	45-46
Figure 14: Multi-Cell Handset Shipments by Vendor, U.S.....	45
Figure 15: Multi-Cell Handset Market Share by Vendor, U.S	46

THE WIRELESS BUSINESS CONNECTION

Second Quarter 2000 Report

Table of Contents

Section 2: Second Quarter 2000 In-Building Wireless Market Results	37-63
Market Analysis Continued	43-63
Review of Handset Market Share Results by Product	47-48
Figure 16: Single & Multi-Cell Handset Shipments by Product, U.S.....	48
Quarterly In-Building Wireless System Results, U.S.	49-50
Figure 17: Multi-Cell System Shipments by Technology Solution, U.S.	50
Review of System Market Share Results by Product	51-52
Figure 18: Multi-Cell System Shipments by Product, U.S.	52
Canadian Market Overview	53
Figure 19: Quarterly Single & Multi-Cell Handset Shipments, Canada.	53
Figure 20: Single & Multi-Cell Handset Shipments by Vendor, Canada	53
Pricing Update	54
Figure 21: Average Price Per End-User, Single & Multi-cell U.S.	54
Figure 22: Average Price Per End-User by Technology, U.S.	54
Product & Distribution Summary.....	55-57
Figure 23: Chronology of IBW Product Availability	55
Figure 24: Distribution Channel Overview	56-57
Five Year Market Forecast	58-63
Figure 25: Q2'00 Handset Results Against 2000 Forecast	58
Figure 26: 5 Year Forecast of Handset Shipments by Technology	60
Figure 27: 5 Year Forecast of Average Revenue Per User by Technology U.S...	61
Figure 28: 5 Year Forecast of Total Revenues by Technology, U.S.....	62
Figure 29: Market Shares by Technology Solution, 1999 vs. 2004	63
Section 3: Market Database	64-127
Completed Wireless Mergers/Acquisitions, 1999.....	65
Completed Wireless Mergers/Acquisitions, 1998.....	66
5 Year PCS Forecast by Technology.....	67
5 Year Wireless Forecast.....	68
Single & Multi-cell Handset Shipments by Product Line	69-70
Single & Multi-cell Handset Shipments by Vendor, U.S.	71-72
Multi-cell Handset Shipments by Product Line	73-74
Multi-cell Handset Shipments by Vendor, U.S.	75-76
Handset Shipments by Technology Solution	77

THE WIRELESS BUSINESS CONNECTION

Second Quarter 2000 Report

Table of Contents

Section 3: Market Database (Continued)	64-127
Handset Shipments by System Type	78
New Handset Shipments, U.S.	79-80
Add-on Handset Shipments	81-82
Single and Multi-cell System Shipments	83-84
Multi-Cell System Shipments, U.S.	85-86
System Shipments by Technology, U.S.	87-88
Total Revenues by Product Line, U.S.	89-90
Total Revenues by Vendor, U.S.	91-92
Revenues by Technology Solution	93
Average Revenue per Handset by Vendor	94-96
Average Revenue per Handset by System Type	97
In-Building Wireless Forecast -- Handsets, Revenues, Systems	98-102
Single and Multi-Cell Handset Shipments by Product Line, Canada	103
Single and Multi-cell Handset Shipments by Vendor, Canada	104
Multi-cell Handset Shipments by Product Line, Canada	105
Multi-cell Handset Shipments by Vendor, Canada	106
Systems Shipped by Product, Canada	107
Single and Multi-Cell System Revenues by Product, Canada	108
Multi-Cell System Revenues by Product, Canada	109
Average Revenues Per Handset by Vendor, Canada	110
Single and Multi-Cell Handset Shipments By Product Line, N. America	111-112
Single and Multi-Cell Handset Shipments By Vendor, N. America	113-114
Multi-Cell Handset Shipments By Product Line, N. America	115-116
Multi-Cell Handset Shipments By Vendor, N. America	117-118
Handset Shipments by System Type, N. America	119
Single and Multi-Cell System Shipments By Product Line, N. America	120-121
Single and Multi-Cell System Shipments By Vendor, N. America	122-123
Multi-Cell System Shipments By Product Line, N. America	124-125
Multi-Cell System Shipments By Vendor, N. America	126-127
Glossary	128-131

THE WIRELESS BUSINESS CONNECTION

**Public Licensed
Wireless
Market**
(Continued)

Figure 8: Completed Mergers/Acquisitions 2000, Continued

COMPANIES	DESCRIPTION	COMPLETION DATE
TELUS Corporation Clearnet Communications, Inc.	TELUS acquired Clearnet.	Oct-00
SBC BellSouth	SBC and BellSouth have combined their U.S. wireless businesses. The joint venture will be a separate entity and will be owned 60% by SBC and 40% by BellSouth.	Oct-00
Alltel SBC	Alltel acquired licenses from SBC in LA including: New Orleans, Baton Rouge, Iberville, St. James, Plaquemines.	Oct-00
AT&T Verizon Wireless (GTE)	AT&T acquired wireless systems from SBC in San Diego, CA.	Oct-00
AT&T SBC	AT&T acquired licenses from SBC in Indianapolis, IN.	Oct-00
Leap Wireless International Radiofone PCS, L.L.C.	Leap Wireless International has acquired a wireless operating license in Pittsburgh, PA from Radiofone PCS, L.L.C.	Sep-00
France Telecom Vodafone AirTouch - Orange	France Telecom acquired the UK operator, Orange, from Vodafone AirTouch for \$40.6 billion.	Aug-00
AT&T Wireless U.S. Cellular	AT&T acquired interests in Hawaii RSA 3 from U.S. Cellular.	Aug-00
CFW Communications PrimeCo PCS	CFW Communications Company acquired PrimeCo's PCS licenses, assets and operations in the Richmond and Hampton Roads areas of VA.	Jul-00
Verizon Wireless CFW Communications Company.	Verizon Wireless acquired licenses in Highland, VA from CFW Communications Company.	Jul-00
Leap Wireless International PCS DevCo, Inc.	Leap Wireless International acquired a license in Dayton, OH from PCS DevCo, Inc. which covers POPs of 1.2 million.	Jul-00
A&T Wireless Vodafone AirTouch	AT&T Wireless acquired the remaining partnership interests it didn't own in the Bay Area Telephone Company from Vodafone AirTouch - a joint venture between the two companies.	Jun-00
Qwest Communications Inc. US West	Qwest Communications acquired US West.	Jun-00
Bell Atlantic GTE	Bell Atlantic merged with GTE to form Verizon Communications.	Jun-00
Alltel GTE/Bell Atlantic/Vodafone AirTouch	Alltel and Bell Atlantic/GTE/Vodafone AirTouch completed the final phase of a wireless property exchange in 13 states. This phase added markets in Alabama, Florida, Ohio and South Carolina to Alltel's network, and markets in Illinois, Indiana, New York and Pennsylvania to Bell Atlantic's network.	Jun-00
AT&T Vodafone AirTouch, GTE, Bell Atlantic	AT&T acquired wireless properties in San Francisco from Vodafone AirTouch/GTE/Bell Atlantic.	Jun-00
Telapex, Inc. (Cellular South) Alltel	Telapex acquired all of Alltel's PCS operations in Mobile, AL & Pensacola, FL, to eliminate overlap caused by Alltel's pending wireless property transactions with GTE/Bell Atlantic/Vodafone AirTouch.	Jun-00
AT&T Wireless One Network	AT&T acquired Wireless One Network which operates in northwest and southwest Florida covering POPs of 1.6 million and has 177,000 subscribers.	Jun-00

THE WIRELESS BUSINESS CONNECTION

Wireless LAN Market

Market Developments

FCC approves HomeRF bandwidth increase

The FCC approved the petition to enable the HomeRF Working Group to increase the transmission-speed capabilities of the Shared Wireless Access Protocol (SWAP) to 10 Mbps. The HomeRF Working Group member companies and others, including Intel, Compaq, Proxim and Siemens first proposed this rule change in September 1998. The petition requested that frequency-hopping spread-spectrum devices be permitted to increase speeds by modulating more spectrum during each hop within the 2.4 GHz ISM frequency band. The change allows the HomeRF WG to leverage the capability of the frequency, creating a seamless upgrade path to 10 Mbps, while allowing backward compatibility for current products.

This rule change will enable HomeRF products to better compete against 802.11b direct sequence products. However, 802.11b products that will operate at 22Mbps and 802.11a products that will operate at 54Mbps may be available sooner than next generation HomeRF products. This rule change may be too little and too late for HomeRF products to adequately compete going forward against Wi-Fi approved products which will operate at higher transmission rates and represent a growing number of interoperable products. As laptop manufacturers embed 802.11b NICs into their laptops, more companies and public areas such as airports install 802.11b wireless LANs, consumers are going to want to use their wireless LANs everywhere without worrying about compatibility issues.

WECA awards 18 new Wi-Fi™ certifications

The Wireless Ethernet Compatibility Alliance (WECA) announced in September it had awarded eighteen new Wi-Fi™ certifications. There are now a total of 46 products from 20 companies that have passed the Wi-Fi™ certification test. Wi-Fi™ certification testing began in April 2000. Wi-Fi™ certified products are interoperable with each other and are based on the IEEE 802.11b standard that supports maximum data rates up to 11Mbps. All products awarded the Wi-Fi™ logo undergo rigorous independent testing at Agilent's Silicon Valley Networking Lab.

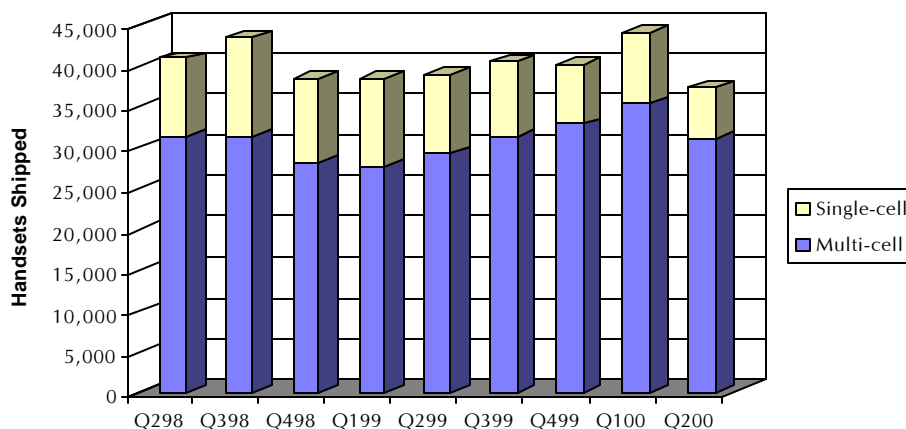
THE WIRELESS BUSINESS CONNECTION

Market Analysis

Second Quarter 2000 In-Building Wireless Handset Results, U.S.

The In-Building Wireless market was down 15% from the previous quarter with multi-cell handset shipments decreasing 12% and single-cell shipments dropping 27%. Of the total 37,273 handset shipments in the second quarter, 83% were multi-cell and 17% were single-cell. Year-over-year growth was down 4% with this decline due to a 35% decrease in single-cell sales; distribution problems were responsible for this decline. Multi-cell handset shipments were up 6% year-over-year due to the introduction of new Licensed and Converged Voice & Data multi-cell products.

Figure 12: Quarterly Handset Shipments, U.S.



Handset Shipments

	Q298	Q398	Q498	Q199	Q299	Q399	Q499	Q100	Q200
Multi-cell Handsets	31,174	31,202	28,082	27,642	29,179	31,218	32,771	35,286	30,973
Single-cell Handsets	9,638	12,110	10,319	10,690	9,717	9,160	7,303	8,600	6,300
Total Handsets	40,812	43,312	38,401	38,332	38,896	40,378	40,074	43,886	37,273

Growth Rate Over Previous Year

	Q298	Q398	Q498	Q199	Q299	Q399	Q499	Q100	Q200
Multi-cell Handsets	86%	69%	15%	15%	-6%	0%	17%	28%	6%
Single-cell Handsets	2%	-16%	26%	33%	1%	-24%	-29%	-20%	-35%
Total Handsets	56%	32%	18%	19%	-5%	-7%	4%	14%	-4%

Growth Rate Over Previous Quarter

	Q298	Q398	Q498	Q199	Q299	Q399	Q499	Q100	Q200
Multi-cell Handsets	29%	0%	-10%	-2%	6%	7%	5%	8%	-12%
Single-cell Handsets	20%	26%	-15%	4%	-9%	-6%	-20%	18%	-27%
Total Handsets	27%	6%	-11%	0%	1%	4%	-1%	10%	-15%

Average Revenue per User by Vendor, U.S. ¹

			<i>Price Change over Previous Year</i>													
			<u>1996</u>	<u>1997</u>	<u>Q198</u>	<u>Q298</u>	<u>Q398</u>	<u>Q498</u>	<u>1998</u>	<u>Q199</u>	<u>Q299</u>	<u>Q399</u>	<u>Q499</u>	<u>1999</u>	<u>Q100</u>	<u>Q200</u>
U-PCS	Proprietary	ECI Telecom	-	-2%	-12%	-18%	-18%	-15%	-17%	-13%	-7%	-14%	-14%	-11%	-8%	-8%
U-PCS	PCI	Nortel	-3%	-12%	-1%	12%	4%	4%	5%	-25%	-25%	-19%	-21%	-22%	-2%	-2%
U-PCS	Proprietary	Harris	-	-5%	-17%	-16%	-13%	20%	-14%	0%	0%	0%	0%	0%	0%	0%
U-PCS	PWT	Lucent	-	-16%	-7%	-7%	-7%	-17%	-15%	0%	0%	0%	-7%	-2%	0%	0%
U-PCS	PWT	Ericsson	-	-	-	-	-	-7%	-6%	-6%	-2%	-2%	-2%	-3%	0%	0%
U-PCS	PACS	NEC	-	-14%	-14%	-14%	-11%	-8%	-12%	0%	0%	0%	0%	0%	0%	0%
U-PCS	Proprietary	Comdial	-	-	-	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%
U-PCS	Proprietary	Toshiba	-	-	-	-	-	-	-	-	-	0%	0%	0%	0%	0%
U-PCS	Proprietary	Telrad	-	-	-	-	-	-	-	-	-	-	-	-	-	-
900 MHz Multi-cell		Ericsson	-	-9%	2%	2%	0%	0%	1%	0%	0%	-	-	0%	-	-
900 MHz Multi-cell		SpectraLink	23%	-35%	-4%	-7%	-9%	-9%	-8%	-7%	-2%	0%	0%	-2%	0%	0%
900 MHz Single-cell		Lucent	-19%	57%	0%	0%	0%	-5%	-1%	-11%	-11%	-11%	-6%	-9%	0%	0%
900 MHz Multi-cell		Mobicel	-	-	-	-	-	-2%	-1%	-2%	-2%	-2%	0%	-2%	0%	0%
Licensed ²	TDMA	Nortel	-	-	-	-	-	0%	0%	0%	-	-	-	-	-	-
Licensed ²	AMPS	AGCS	-	-	-	-	-	-	-	-20%	-20%	-11%	-11%	-15%	-	-
Licensed ²	AMPS	Astronet	-5%	-10%	-14%	-12%	-6%	-	-8%	-	-	-	-	-100%	-	-
Licensed ²	AMPS	Panasonic	-20%	-10%	-8%	-11%	-9%	-5%	-8%	-5%	-	-	-	-1%	-	-
Licensed ²	TDMA	AGCS	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.4 GHz ³		Symbol	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.4 GHz ³		SpectraLink	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Licensed ²	TDMA	Ericsson	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U-PCS	Proprietary	eOn	-	-	-	-	-	-	-	-	-33%	-27%	-20%	-24%	-15%	9%
Average			5%	-2%	2%	4%	1%	-4%	1%	-9%	-8%	-8%	-8%	-8%	-8%	-2%

¹ "Street level" pricing including controller, base stations, and handsets

² Price does not include handset. Wireless carrier provides handset.

³ Price includes phone and controller with 16 users. The price assumes 2.4 GHz Wireless LAN installation. Symbol's average price per user is for their NetVision phone not NetVision Data phone.