



Research Notes

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PCS WIRELESS, INC.

PCS-VSE

Initial Coverage--Special Situation--Speculative Buy Rating

Price:	\$1.50
52 Week Range:	\$0.45-4.25
Yield:	0.00%
Dividend:	\$0.00

Shares Outstanding:	27.7M
Fully Diluted:	31.8M
Market Capitalization:	\$42.0M
Book value p/s:	\$0.45
Cash & Equivalents p/s:	\$0.42
LT Debt/Equity:	0.00:1



Year	Revenue mil.	N.I. mil.	Fiscal E.P.S.	Avg. Shares o/s (mil.)	P/E X	Revenue Growth
1997E	35.00	7.60	0.23	32.50	6.52	2233.33%
1996E	1.50	(4.65)	(0.17)	28.00	N.M.	(11.76)%
1995	1.70	(3.12)	(0.17)	18.36	N.M.	(8.23)%
1994	.318	(1.77)	(0.17)	10.33	N.M.	(18.38)%

Introduction: Securing a major contract will provide up-side potential

- **PCS Wireless** is in a position to participate in the **Personal Communications Services (PCS)** infrastructure build-up taking place in the U.S. during the next two-three years.
- Strategic alliance with **ADC Telecommunications, Inc.** provides **PCS Wireless** with an experienced and reputable senior joint venture partner to market and manufacture its line of distributed antenna arrays (DAAs) and a cash infusion of C\$2.1 million.
- **The Company's** products have been successfully field trialed and tested by numerous PCS infrastructure equipment suppliers. To date, over US\$4.8B in contracts have been awarded to the infrastructure equipment suppliers by the consortiums.
- Currently **Lockheed Sanders**, a division of **Lockheed Martin**, is the only viable alternative source of CDMA remote antenna drivers and CDMA remote antenna signal processors which is estimated to be worth approximately US\$400M-US\$600M over a 3-3.5 year period.
- We recommend the purchase of PCS Wireless shares for aggressive capital appreciation investors seeking to leverage on the PCS industry with price target of C\$3.50-C\$3.80 within the next 12-14 months.

Richard Woo: High-Tech Research

February 01, 1996

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Valuation

During the 2nd quarter of calendar 1995, **PCS Wireless** received a contract from **Ericsson** worth approximately C\$37M, which was subsequently canceled because of the U.S. PCS consortiums deciding to implement CDMA instead of GSM air interface. The share price of **PCS Wireless** traded as high as C\$4.25 a share on the contract. With approximately 22m shares outstanding at the time, the market capitalization was C\$93.5M or a sales/market capitalization rate of 2.5X. Based on a net non-taxed margin of 9.5%-10%, the earnings per share would have been \$0.16-\$0.17 per share with P/E multiples of 25X-26.6X.

Using our current model with sales at C\$35M, with shares outstanding of 32.5M and applying a P/E multiple of 16X (factoring Lockheed Sanders as a competitor which did not exist before) on earnings of C\$0.23 yields a price of C\$3.68 and a sales/market capitalization rate of 3.3X which we feel is justifiable for a target of C\$3.50-C.\$3.80 a share within the next 12-14 months.

Recommendation

These shares are very speculative in nature and are only suited for high risk capital appreciation portfolios. To date **The Company** has not received a major contract and we are not certain when a major contract will be obtained. Delay of PCS roll-out can take longer than expected and if a contract is awarded to **Lockhead Sanders** before **PCS Wireless** this would substantially affect the price of **PCS Wireless** common shares. Our core analysis is based strictly on the U.S. PCS industry but would indicate that the international PCS market is developing. With over US\$4.8B of contracts awarded for base station equipment to date by the consortiums, we believe a major contract will be awarded to **PCS Wireless** and others will follow.

Company Profile

PCS Wireless, Inc. (The Company) designs, manufactures, and markets **distributed antenna array ("DAA")** products for use in the Cellular and wireless personal communications services industry. The Company's products consist primarily of **dedicated coaxial based DAAs** consisting of **microcell extenders (MEXs)** and **base station extenders (BEXs)** for indoor use, and wide area network based DAAs consisting of **remote antenna drivers (RADs)** and **remote antenna signal processor (RASPs)** for outdoor use.

The Company's **MEX/BEX** and **RAD/RASP** products are designed to (i) improve the performance of **Personal Communications Services networks (PCS)**; (ii) reduce the cost of deployment of **PCS**; (iii) decrease the operating cost of current cellular networks; (iv) increase zone coverage of base stations; and will play an essential role in terms of **PCS network roll out** in North America.

To date, **The Company's DAA** products have been subjected to field testing by **PCS telecommunication equipment suppliers** in the U.S., including **AT&T, Ericsson, Motorola, Northern Telecom**, and with international telecommunications companies, including **Hutchison Paging of Hong Kong, France Telecom, Singapore Telecom and Australia Telecom**.

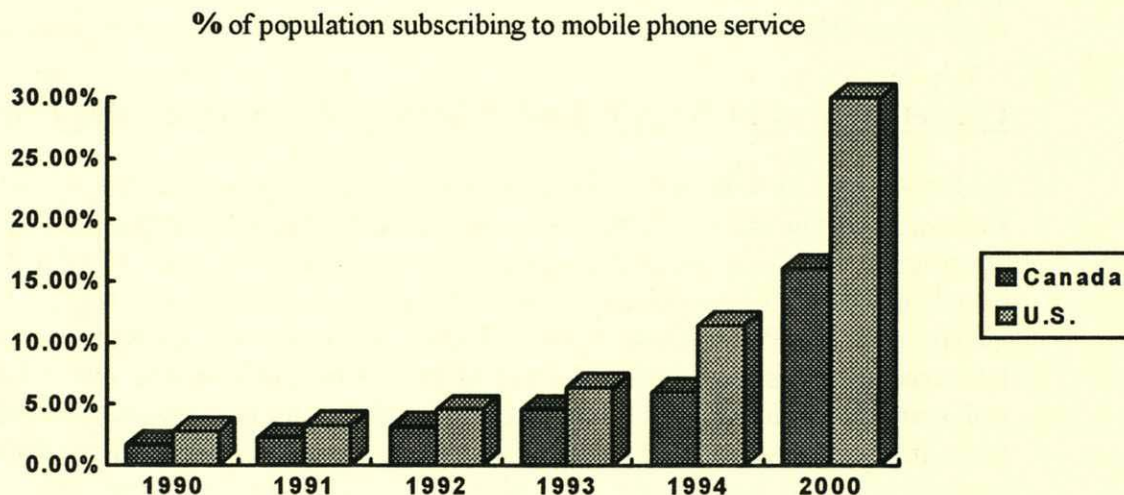
Personal Communications Services ("PCS") Defined

"PCS" is a broad range of radio communications services that free individuals from the constraints of the wireline public switched telephone network and enable them to communicate when they are away from their home or office telephone. Current types of PCS can include cordless telephones, paging services and cellular phones. These types of PCS systems require the user to have a different telephone for a different location (home, office and car) and a different telephone number for each phone. The planned implementation of PCS would enable the subscriber to use a lightweight PCS phone that could be used in several different environments (home, office and car) in conjunction with a wireless private branch exchange (PBX), or for mobile public telephone service. A PCS phone would be able to access the local, national, and international telecommunication networks from any location with a single PCS phone and a single PCS number.

Cellular phones, currently being used are analog in nature and are not capable in terms of their capacity to provide emerging essential services such as high-speed fax and data transmission which a PCS network and PCS phone can provide because of its digital medium.

Code Division Multiple Access (CDMA) - North American Standard

Currently it is estimated that there are over 50 million cellular telephone subscribers worldwide and 25 million users in the U.S. alone, and according to industry estimates the cellular market will continue to grow at approximately 20% for the next five years. The additional subscribers will further crowd the current cellular airwaves.



Source: Industry Canada; Cantel; Kidder Peabody & Co.

The cellular system network presently being used is called **Advanced Mobile Phone System (AMPS)** and because of its limited broadcast spectrum, overcrowding of the airwaves will eventually occur resulting in blocked calls, dropped calls, overlapping, and general quality reduction. As early as 1988, the **Cellular Telecommunications Industry Association (CTIA)** established a set of **User Performance Requirements (UPR)** dictating the essential development for a digital wireless communications protocol that will increase cellular capacity at least ten times over AMPS. The CTIA also expressed the need for improved voice, service, flexibility, privacy and high speed data transmission capabilities.

In response to the UPR standards, **Qualcomm Inc.** developed **CDMA** a sophisticated digital technology which can provide a 10 to 20 times increase in capacity of AMPS, and 3 times more capacity than Time Division Multiple Access (TDMA). Additional benefits of CDMA include superior voice quality, enhanced privacy, lower battery consumption, smaller and cheaper handset units and CDMA's digital control channel will enable users to access new services such as mobile transmission, facsimile, and incoming caller identification.

The U.S. **Federal Communications Commission (FCC)** by licensing 2.4 times more radio frequency (RF) spectrum at 1,9Ghz will enable the mass market to access PCS and bring a revolution to the telecommunications industry.

Global System for Mobile Communications (GSM) in Europe

GSM, the European version of TDMA, was developed to provide a common 900Mhz mobile phone standard throughout Europe. Presently a new frequency band for GSM is being used at 1800Mhz to 2000Mhz to provide wireless office phone services, mobile communications, home cordless service and mass market penetration in Europe.

Cancellation of PCS GSM 1900 RAD/RASP Contract with Ericsson

An initial order for C\$8 million **PCS Wireless RAD/RASP** with a further C\$29 million forecasted during calendar 1996 was canceled during the second quarter of 1995. The cancellation was the result of the major consortiums deciding to use CDMA in the U.S. instead of GSM air interface as CDMA offered more advantages in terms of capacity, quality and based on trials it was proven to be more compatible with cable infrastructure. This cancellation resulted in **PCS Wireless** having to divert R&D, sales and marketing, and financial resources to CDMA based RADs/RASPs which The Company was continuing to develop but not as stringently as GSM for which it had received a formal contract for equipment. Since GSM was currently deployed across Europe with base stations and handsets being available for subscribers from **Motorola, Ericsson and Nokia**, it was a proven technology and ramp-up of a GSM network was feasible as debugging would not be a problem. CDMA an unproven air interface would eventually take more time for roll-out as testing by CDMA equipment suppliers in conjunction with the consortiums would continue further.

U.S. PCS Industry in Review

FCC Auctions over US\$7.7 Billion in 1.9 Ghz PCS Licenses

During March of 1995 over US\$7.7 billion in PCS licenses were auctioned with four major consortiums accounting for US\$5.6 billion of the licenses. The four main consortiums included the following:

- **Wireless Co. (Sprint, TCI, Cox, Comcast, and APC)** paid US\$2.11 billion for 29 markets
- **AT&T** paid US\$1.68 billion for 21 markets
- **PCS Primeco (Bell Atlantic, Nymex, US West and Airtouch)** paid US\$1.11 billion for 11 markets
- **Pacific Telesis** paid US\$689 million for 2 markets

With over US\$7.7 billion invested in licenses, a nationwide PCS infrastructure build-up is planned for the next two to three years as the consortiums are eager to obtain a return on their investment.

Contracts for CDMA Base Station Equipment Awarded

- In an effort to be the first of the consortiums to offer PCS, **PCS Primeco (Bell Atlantic, Nymex, US West and Airtouch)** awarded an estimated contract for CDMA equipment for its PCS network worth approximately US\$1 billion (50/50) to **AT&T** and **Motorola** to supply hardware and software for complete end-to-end wireless communications systems including base stations and switching equipment.
- **Wireless Co. (Sprint, TCI, Cox, Comcast and APC)** as of February 1st, 1996 awarded **AT&T** and **Northern Telecom** contracts worth a total of US\$3 billion to supply PCS network infrastructure equipment. It is estimated that the PCS network will eventually serve 32 cities and over 182 million subscribers.
- During September (1995) **Motorola** with **DSC Communications, Corp.** edged out **AT&T** by securing a contract worth approximately US\$800 million to supply **GTE** (which paid US\$419 million for four metropolitan areas) for PCS infrastructure equipment.

The two main suppliers of CDMA base station equipment obtaining the core equipment contracts will eventually be **AT&T** and **Motorola**, with **Northern Telecom** and **Ericsson** playing smaller roles along with others. Companies with direct relations with these players will be well positioned to benefit from the PCS network roll-outs.

Distributed Antenna Arrays (DAAs)

PCS operates within an airwave radius of approximately 100 metres in buildings and approximately 800 metres outdoors as compared to cellular which operates within a radius of 10 miles. It is estimated that the eventual set up of the PCS networks will require tens of thousands of expensive radio-base stations and switches to seamlessly connect them together. By utilizing DAAs the coverage can be improved or maintained by using fewer base stations. DAAs help extend the range of a base station's antenna by reshaping and enlarging the zone coverage within a microcell.

Base Station Extenders (BEX)/Microcell Extenders(MEX)

BEXs/MEXs are designed to operate on dedicated coaxial PCS networks. The products are designed to be used mainly for indoor microcell and picocell communications for in-building usage, shopping centres, hospitals, factories, business districts, and residential communities. By utilizing a BEX/MEX in conjunction with a base station, the radio frequency (RF) is extended within a microcell while requiring less base stations.

Remote Antenna Drivers (RAD)/Remote Antenna Signal Processors (RASP)

The RAD/RASP DAAs are designed to operate on cable television networks (it is estimated that approximately 80% of the homes in North America are connected to cable TV networks). The products are installed by hanging on the existing cable lines and use the cable lines' 60 volt alternating current system as its power source. The RAD/RASP are bi-directional and are used to interface with the central base station.

Strategic Alliance with ADC Telecommunications, Inc.

PCS Wireless, Inc. recently finalized a strategic alliance with ADC Telecommunication, Inc., a U.S. based manufacturer and marketer of (i) transmission and networking systems for voice, data and video networks; and (ii) fiber optic, twisted-pair and coaxial network products. During its fiscal 1995 year end sales amounted to US\$586.2 million. The alliance consists of the following contingencies:

- I. ADC will purchase 5 million PCS Wireless shares, or 15% of PCS in three tranches. The first tranche of 1,666,667 shares has been purchased for C\$1.26 a share (C\$2.1 million) upon closing of the agreement as of January 29, 1996. The second equity position will be exercised upon receipt of a RAD (GSM or CDMA) contract, with the last position to be exercised when initial deliveries of Cellmex products to ADC begins. With an equity contribution in PCS Wireless an appointee of ADC will join the board of directors of PCS Wireless.

- II. The two companies will form a 50/50 joint venture to design, manufacture and market worldwide RADs and RASPs products. Initial equity financing will be US\$5 million. **PCS Wireless** will transfer product development and R&D personnel to the joint venture while **ADC** will provide access to its manufacturing, sales and marketing resources. Further details from this portion of the agreement disclosed by **PCS Wireless** management: (i) **ADC** will pay 33% of the operating costs during the first year and 50% for the subsequent years and; (ii) **PCS Wireless** will accrue 50% of joint venture revenues with the other 50% going to **ADC**. With **ADC** paying 50% of operating costs, **PCS Wireless'** operating costs of \$450k monthly will eventually decline to approximately \$250k monthly after the first year.
- III. A non-exclusive original equipment manufacturing (OEM) and licensing agreement will be signed between the parties, where **PCS Wireless** will supply **ADC** with frequency division duplex (FDD) cellular and MEX/BEX products to be integrated into **ADC's** current wireless products.

Strategic Alliance Provides Access to ADC's Resources

We believe **PCS Wireless** will benefit from **ADC's** marketing and distribution channels given **ADC's** current customer base which include the following groups: (i) public network providers which consist of the Regional Bell Operating Companies (RBOCs), other telephone companies, long distance carriers, wireless service providers, the major cable TV operators and other domestic public network providers; (ii) private and governmental network providers; and (iii) international network operators.

We believe the strategic alliance gives **PCS Wireless** credibility through **ADC** as its senior joint venture partner. Whereas the CDMA suppliers were taking considerable amount of time with due diligence in terms of dealing with or giving **PCS Wireless** a contract because of **PCS Wireless'** limited operating history in response to the consortiums concerns, negotiating through **ADC** as a senior joint venture partner would solve this problem. However, the fact remains that PCS networks will require DAAs for successful set-up.

ADC currently markets a wireless product line called Citywide which includes the Citycell radio frequency, Cityrad air to air re-radiator and wideband digital microcell for adding and extending cellular communication coverage in large urban areas. **ADC's** experience and rapport with the RBOCs are solid and it would be plausible if a contract for **PCS Wireless** equipment would be secured through **ADC**.

Financial Projections

To date The Company has only minimal revenues through the sale of trial equipment and small sale of equipment to international parties. Without any major contracts to date and with PCS only being in its infancy stages, financial projections are difficult to forecast accurately.

While speaking to various parties involved in PCS and deriving the data we are projecting at this point in time that the infrastructure cost of building the PCS networks will be approximately 1.5X-2X the cost of the licenses in the U.S. alone. This would amount to approximately US\$11.6B to US\$15.4B probably over a span of 3-3.5 years. The markets for the RADs and RASPs would be approximately US\$400M-US\$600M depending on the penetration of the subscribers.

Initially the build-up of PCS will be prioritized by market potential, revenue generation, cable TV structure, and payback period. The most densely populated Major Trading Areas (MTAs) will probably see build-up first and then the minor ones afterwards.

It is to our knowledge that PCS Wireless and AT&T are in discussion relating a potential order of 3000-4000 RADs worth approximately US\$18M for the Los Angeles-San Diego MTA with another possible contract to follow during the second half of calendar 1996.

Due to the initial investment of the major consortiums and the competitive nature of the industry, it can be estimated that at least one MTA should be established by each consortium during calendar 1996. Assuming effective coverage the market for RADs/RASPs should be in the area of approximately US\$70M-US\$80M.

Major Risk Factors

Lockheed Sanders, Inc. (A Lockheed Martin Company)

Realizing the market potential of RADs/RASPs to PCS, Lockheed Sanders entered into the bidding of RADs/RASPs by developing RADs for CATV infrastructure, RASPs, Head End Computers (HECs) and a sophisticated Operations Administration Maintenance and Provisioning (OAM&P) sub-system for CDMA. Lockheed Sanders to date has no products for GSM nor does its product line include MEXs/BEXs.

To date, both Motorola and AT&T have recently tested both vendor's CDMA products. We are unaware of the other major equipment suppliers conducting trials. Results of the trials are unknown to date and we do not know which vendor's products will be chosen for PCS roll-out during early 1996. However, we do believe that considering that there is no other alternate source of RADs/RASPs and given the importance and vitality of the licenses fees and economical ramifications involved any disturbance in supply would be disastrous. Therefore a second source of RADs/RASPs would be clearly needed and it would be wise for the equipment suppliers to apportion the contracts to each vendor.

To date it is to our knowledge that there has not been any interest by the major equipment suppliers to develop CDMA RADs/RASPs or any interest of a possible acquisition of the two vendors. However, as PCS roll-out gains momentum the situation can rapidly change.

PCS Wireless, Inc.
Consolidated Statement of Operations
Year End February 28
Canadian(\$000s)

	1994	1995	1996E	1997E
Revenue	318	1,702	1,500	35,000
Cost of revenue	<u>161</u>	<u>1,067</u>	<u>1,118</u>	<u>22,400</u>
Gross profit	157	635	382	12,600
				<u>64.0%</u> <u>36.0%</u>
Operating expenses:				
Selling & Marketing	271	719	800	1,300
General & Administration	646	1,039	1,400	1,500
R & D	214	1,009	3,000	2,000
Amortization	138	579	700	700
Write-down of inventory	-	411	-	-
Total operating expenses	<u>1,269</u>	<u>3,757</u>	<u>5,900</u>	<u>5,500</u>
Income (loss) before discontinued operations	(1,112)	(3,122)	(5,518)	7,100
				<u>15.7%</u> <u>20.3%</u>
Discontinued operations				
Gain on settlement of debt	93	-	-	-
Write-down of mineral properties	(573)	-	-	-
Loss on investment in shares	(177)	-	-	-
				<u>0.0%</u> <u>0.0%</u> <u>0.0%</u>
Interest income	-	-	864	500
Income (loss) before income taxes	(1,769)	(3,122)	(4,654)	7,600
Provision for income taxes	=	=	=	=
Net Income (loss)	<u>(1,769)</u>	<u>(3,122)</u>	<u>(4,654)</u>	<u>7,600</u>
				<u>21.7%</u> <u>0.0%</u> <u>21.7%</u>
E.P.S.	(\$0.17)	(\$0.17)	(\$0.17)	\$0.23
Avg. # Shares O/S	10,325	18,363	27,975	32,500

PCS Wireless, Inc.
 Consolidated Balance Sheet
 Year End February 28
 Canadian (\$000s)

	1994	1995	9M-96
Assets			
Current assets:			
Cash & short-term investments	47.3	116.1	10,424.8
Accounts receivable	205.2	493.1	350.0
Amounts due from consulting fee	54.8	46.5	-
Inventories	157.9	530.2	340.0
Prepaid expenses & other	<u>29.4</u>	<u>31.8</u>	<u>100.0</u>
Total current assets	494.5	1,217.8	11,214.8
Capital assets	<u>2,643.3</u>	<u>2,777.1</u>	<u>2,788.2</u>
Total assets	3,137.8	3,994.9	14,003.0
Liabilities			
Current liabilities:			
Accounts payable and accrued liabilities	1,039.4	1,506.9	170.8
Deferred revenue	103.3	470.6	2,190.0
Royalty payable	-	-	90.0
Current portion of capital leases	<u>50.3</u>	<u>89.5</u>	<u>120.0</u>
Total current assets	1,193.0	2,067.0	2,570.8
Long-term capital lease obligations	<u>-</u>	<u>55.5</u>	<u>88.0</u>
Total liabilities	1,193.0	2,122.5	2,658.8
Shareholders' Equity	1,944.8	1,872.4	11,344.2
Liabilities & Shareholders' equity	3,137.8	3,994.9	14,003.0