Business Plan - 1Q95 Update

Document # 010195-1 Rev 1.1

PCS Wireless, Inc. • #95 - 200 Granville Street, Vancouver, B.C., Canada, V6C 1S4 • Telephone (604) 689-7722 • Facsimile (604) 689-7745

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"The industry reckons that PCS will sweep through global telecommunications in the same way as the personal computer roared through the computer industry in the 1980's."

- The Economist

1. Executive Summary

With sales to 25 customers in 12 countries, and patents pending in 25, PCS Wireless Inc. is recognized worldwide as a leader in the design and manufacture of Distributed Antenna telecommunications systems. PCS Wireless, Inc. is poised to capitalize on wide acceptance of these new technologies. Our products dramatically improve the performance of wireless communications networks and drastically reduce the cost of deployment and operation (up to 80%).

PCS Wireless, Inc. is a 5 year old business which is involved in the new and rapidly expanding wireless Personal Communications Services ("PCS") markets worldwide. This embryonic market is estimated to involve US$20-50 Billion in infrastructure expenditures in the next 3-5 years in the U.S. alone. PCS Wireless designs and manufactures specialised antenna products for this PCS market with a potential market segment size of over US$1 Billion over the same period.

While currently listed on the VSE, we have put in place plans to list on the TSE by the summer of 1995 and the NASDAQ exchange in early 1996. Market conditions have improved to the point where large networks are being deployed now both in the U.S. with the completion of the FCC PCS auctions raising in excess of US$7.7 Billion, as well as internationally. Our technology has been widely accepted as critical to the success of these networks. The business has proven to be operationally very strong with on-time new product introductions, on-time production shipments, and substantial progress towards ISO9001 corporate quality certification.

In addition to these general business conditions, PCS Wireless has successfully positioned its Platform RAD product line with the U.S. Wireless Co LP consortium who acquired 31 of 50 PCS licenses from the FCC towards the formation of a national network. This deserves special mention as our technology may be being chosen as the defacto industry standard for deploying current and next generation wireless communications via Cable-TV networks. We have recently signed a 3 year supply agreement with Motorola, with an initial US$2 Million in equipment deliveries for this customer in mid 1995. Additional trial agreements with AT&T, Ericsson, and Northern Telecom have been signed which will lead to volume supply agreements in the next few months. Technology development and volume manufacturing partnerships will also be announced shortly.

It this point in the year we are now positioned to meet our financial goals for FY96 (Feb/96 year end) of a minimum of C$17 Million in revenues and C$1.5 Million in earnings. There is also additional potential for further technology licensing deals to add significant earnings to both the FY96 and FY97 proforma targets listed here.

"PCS is likely to be a $50 Billion industry by the close of the decade. The system will serve as many as 150 million people world-wide and 60 million people in the United States . . ."

- IEEE Communications

2. The Enterprise

PCS Wireless, Inc., located in Vancouver, Canada, is involved in the rapidly expanding wireless Personal Communications Services ("PCS") marketplace. The business designs and manufactures specialised Distributed Antenna Array ("DAA") products for various types of PCS networks world-wide including cable television, fiber optics and dedicated coax communications technologies. DAA technology is key to the economic success of emerging PCS networks as it allows system operators to optimise cell sizes and coverage zones to ever changing system capacity requirements.

PCS Wireless was formed with the objective of becoming a major participant in the exploding PCS industry which is currently estimated to involve US$20-50 Billion in infrastructure expenditures in the next 3-5 years in the U.S. alone. PCS Wireless designs and manufactures specialised antenna products for this PCS market with a potential market segment size of over US$1 Billion over the same period. This means huge growth in an industry that is in its infancy today. PCS Wireless is perfectly positioned with its DAA technology, pending patents, industry associations and product offerings to take maximum advantage of this market opportunity.

PCS Wireless, Inc. has developed a broad PCS infrastructure product line and forged strong relationships with numerous telephone and cablevision TV companies in North America and other telecommunications companies internationally. The business has established a reputation for providing high quality, technically innovative PCS products in a responsive manner during the initial roll out stage of the developing PCS market place. Volume production orders are now being signed.

PCS Wireless, Inc. has been very successful by concentrating on a core excellence in RF design and network support services. Among other achievements, we have: (1) demonstrated the world's first PCS network deploying telephony and data service over cable television plant, and (2) demonstrated the world's first PCS network to support moving vehicles at low cost.

A combination of the technical capabilities and reputation of our engineering staff, and the additional marketing and management skills has produced a powerful business with the following strengths:

- Core Technology: Key patents and pending patents, designs, products, people, and know-how covering PCS DAA products and services. 3 U.S. DAA Patents granted already.
- DAA Experience: Unquestionably the most experienced business in PCS DAA RF product design, system implementation and integration - 5 years of unique and un-challenged trial work
- Market Timing: Huge market expansion now with the completion of the FCC PCS auctions in the U.S. PCS Wireless is the "time to market" industry leader - a huge advantage in this exploding industry.
- Market Exposure: 5 years of participation in all important PCS field trials and system sales worldwide, Strong publicity to date, Good customer base. Some large sized production orders.
- Sales Orders: Strong C$5.5 Million sales from Jan 01/94 to date with large follow-up potential from existing customers. Large orders from a number of sources are pending.
- Market Size: >US$20 Billion within 5 years, >US$1 Billion in the DAA market segment in the U.S. alone, many times that worldwide
- Market Growth: Starting at near "zero" in 1993, this represents the most significant, fastest moving new technology/market creation this century
- Market Impact: Governments predict up to a 30% increase in business productivity from the implementation of PCS technology. Those who capitalize on this opportunity will be the global economy leaders of the 21st. century.

With these almost overwhelming statistics and PCS Wireless Inc's very strong positioning in this market, the key factors affecting success lie not so much in product/marketing issues as they lie in the ability to manage huge growth. The strong management team, combined with a focus on core competencies and leverage from additional pending industry partnerships, technology licensing and sub-contracting, is the businesses prime response to this exciting challenge.

PCS Wireless Inc.'s financial summary projections, which cover the next 3 years, are as follows:

Financial Summary Projections (000's)

	1995 Year 5	1996 Year 6	1997 Year 7	Totals
Revenue	16,594			
COGS	7,723			
Net R&D	2,544			
S,G&A	4,863			
Profit	1,464			
Staffing	50			-

"The next decade will see the emergence of fortunes in ever-changing transmutations of PCN, digital video, multimedia and wireless computers that dwarf the yields of cable and cellular."

- Forbes Magazine

3. Key Personnel

Ralph Scobie is President & CEO. He was educated at the University of British Columbia with an honors degree in Economics. As Executive Vice President of the Simkin Group, Mr. Scobie was responsible for strategic development and financial implementations for key businesses. Before this he was a co-founder of Integra Systems, a POS business, and held the position of President and CEO during his tenure there. Integra had an enviable track record of more than $16 Million in sales within 24 months of starting up with a first year profit in excess of $800,000. on sales of $3.8 Million.

Prior to this, Mr. Scobie was involved in venture capital financing and operations. He also held senior sales and management positions with Xerox of Canada and the Royal Bank of Canada. Mr. Scobie brings a long list of business leadership and management skills to the business.

Derek Spratt is Executive Vice President. He was educated at Queens' University with a degree in Electrical Engineering and is a registered Professional Engineer. He was president of Performance Solutions, an engineering consulting and product development business, and was Vice President of Nexus Engineering Corporation before that time, managing a $10 Million business unit with 75 employees. As an OEM to General Instrument, his business developed the world's first Digital HDTV commercial satellite TV receiver in addition to all other Jerrold/GI commercial satellite receiver products.

Previous to this, Mr. Spratt held 2 management positions with Motorola's Wireless Data Products and Customer Service divisions, first where he managed the development of the first portable RF computers to operate on the ARDIS and DBP public RF data networks, and later held the position of Maintainability Engineer. Before that he was with Integra Systems in various senior management roles where he oversaw the development, manufacture and service of over 15,000 POS terminals in a 4 year period. He has also worked with many other start-up businesses and has a strong total quality business focus. He brings a broad depth of experience to the business in the areas of business management and product development.

Dr. Andrew Beasley is Vice President of Technology. He was educated in the United Kingdom, at Cambridge and London Universities, with multiple degrees in Physics and Electrical Engineering with specialization in RF communications. In 1990 he founded the PCS-Microcell division of Nexus Engineering Corporation which ran as a successful business for 2 years, with worldwide "firsts" in PCS technology with a "blue chip" customer base. This division provided the core technology and products for PCS Wireless, Inc.

Dr. Beasley has been responsible for programs and projects as diverse as the world's largest cable TV headend, Canada's largest spaceborne antenna, the signal processing units of the Canadian air traffic control system, as well as numerous other communications, aerospace and defence systems.

Dr. Beasley has worked in the RF research and development business for over 17 years as Vice President, Director, Business Manager, Project Manager, System Engineer, and Engineer. He has key patents pending in PCS technology and is the inventor of many of the products and designs that form the heart of the PCS Wireless product line. Andrew plays a key role in the PCS business with his unique blend of technology and market knowledge.

Paul Lancaster, P. Eng. is Vice President of Engineering. He holds a degree as an Electrical Engineer from Bristol University, U.K., is a registered Professional Engineer, and has a total of more than 32 years of product development experience in the fields of telecommunications, CATV and broadband systems. In the last 15 years he has worked in the capacity of VP/Director of Engineering for Northern Telecom, Glenayre Electronics, Integra Systems, and Xinex Labs Inc.. Paul brings an exceptionally well balanced approach to the discipline of product development of DAA/CATV products for PCS Wireless.

Suresh Singh is Vice President of Operations. He holds a degree as a Certified General Accountant. Mr. Singh has a strong background in finance, accounting, general business operations and manufacturing. Prior to accepting this position with PCS Wireless, Inc., he worked with DS Management as a business unit manager, responsible for P&L for a number of independent businesses.

Suresh Singh was a founding employee of Integra Systems Inc. and held the position of Vice President of Operations for a 4 year period. During this time, he lead the business in the creation of the manufacturing and service divisions, and in the process built, shipped and serviced over 15,000 Point of Sale terminals for the convenience store industry. He also has further experience as a general operations and manufacturing manager with other businesses in Canada.

Anthony Chu is Director of Quality. He was educated at the Montreal Technical Institute with a degree in Engineering Applied Science in 1972. He has held Mechanical Design Management positions with Novatel, Microtel, and Motorola. While at Motorola's Wireless Data Division, he took on the challenge of being the division's Qiuality/6 Sigma Training Instructor for "Design for Manufacturability" (DFM) and "Design for Assembly" (DFA) courses. Anthony has positioned PCS Wireless as a total quality focused company at an early stage in its growth and is currently responsible for all aspects of the ISO9001 quality program implementation.

Guylain Roy is Director of Sales. He was educated at McGill University, holds a Master's degree in Electrical Engineering and is a registered Professional Engineer. Mr. Roy brings over 8 years of telecommunications experience with a strong emphasis on wireless voice and data systems. He has worked for Northern Telecom Canada, where he developed key commissioning procedures for the introduction of a new generation of DMS switching products. He joined Ericsson Communications Canada in 1990 and held product and project management roles for cellular and mobile data systems. In 1992, Mr. Roy became Western Account Manager and was responsible for all personal communications systems sales and marketing activities in Western Canada.

Richard Topham is Financial Controller. He was educated at the University of Victoria with a degree in Economics and is a certified Chartered Accountant. Mr. Topham articled with Price Waterhouse from 1989 to 1992. In this capacity, Mr. Topham was involved in audits for major corporations, both public and private. Prior to accepting his current position with PCS Wireless, Inc., Mr. Topham was running R. Topham Consulting Services, an accounting consulting business.

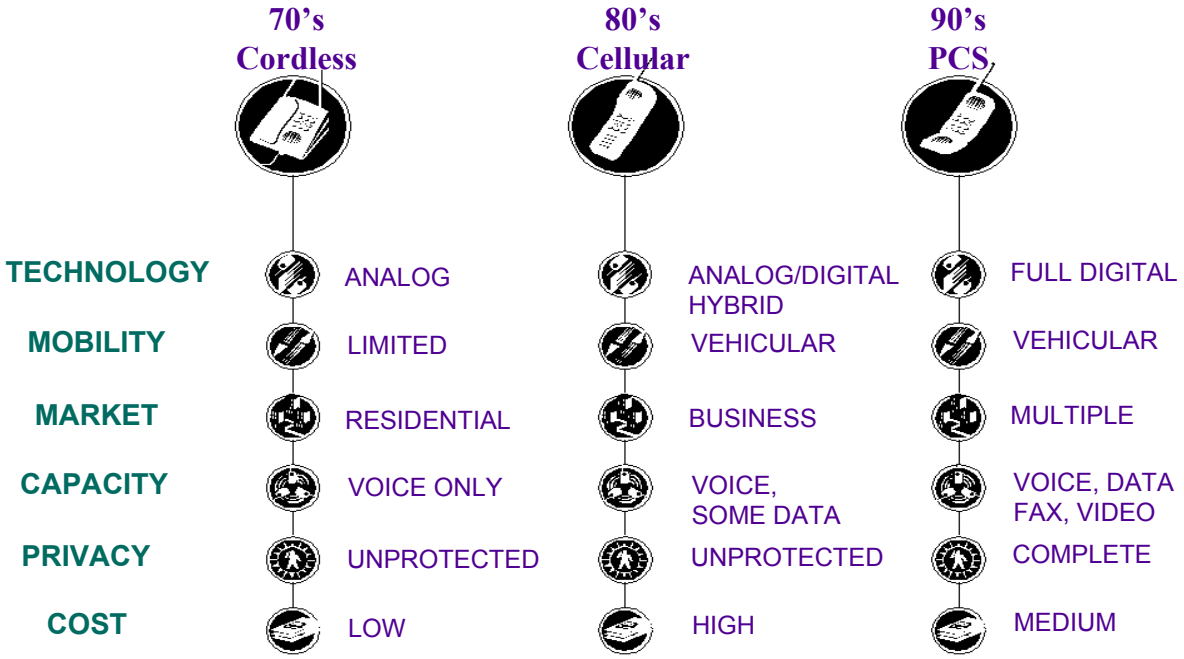
4. PCS - An Emerging Technology

The following table illustrates some of the primary benefits of Personal Communications Services over existing wireless communications technology. To some people, PCS means simplified calling and a “personal phone # for life”, to others, it means advanced digital communications technology at new radio frequencies, and finally to others as “microcellular” communications - low power, low cost, cellular communications for the masses.

PCS networks will compete with existing cellular services in some markets and compliment them in others. In its most basic form, PCS is the “poor man’s cellular” - an ideal product for non-business users who want the safety and convenience of any-where, any-time wireless communications. PCS also offers many significant benefits to business users in the form of digital security, data (email, fax, LAN) services, more calling capacity and smaller product size and cost. There is something for everyone.

PCS markets are initially developing in niche areas - private office wireless PBX systems, shopping malls, transit systems and local community public areas. Eventually, these systems will merge together to form complete coverage for cities. Already established in Europe and Asia, PCS networks are now starting to be aggressively deployed throughout North America.

The Communications Technology Wave

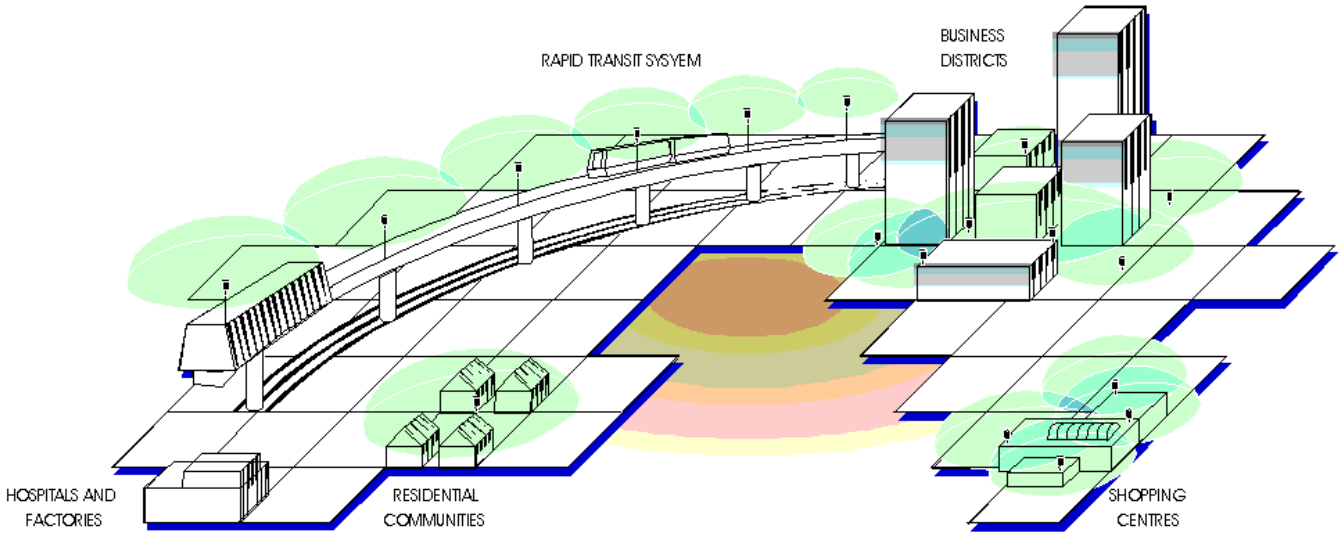


"PCS will make business more productive and more rewarding. It will enhance the security of individuals and make their lives more satisfying. PCS will enable poorer countries to overcome wired infrastructure handicaps affordably and efficiently."

- IEEE Communications

5. Distributed Antenna Array Technology

The products developed by PCS Wireless Inc. all employ distributed antenna array (DAA) technology. Section 8 of this Platform RAD business plan covers the intellectual property and provides a reference description of the specific patent filings relating to this technology. Additional technology trade secrets cannot be disclosed in this document. The basic functionality of DAAs, their applications, usage benefits, and some technical details are covered here.



5.1 What is a DAA?

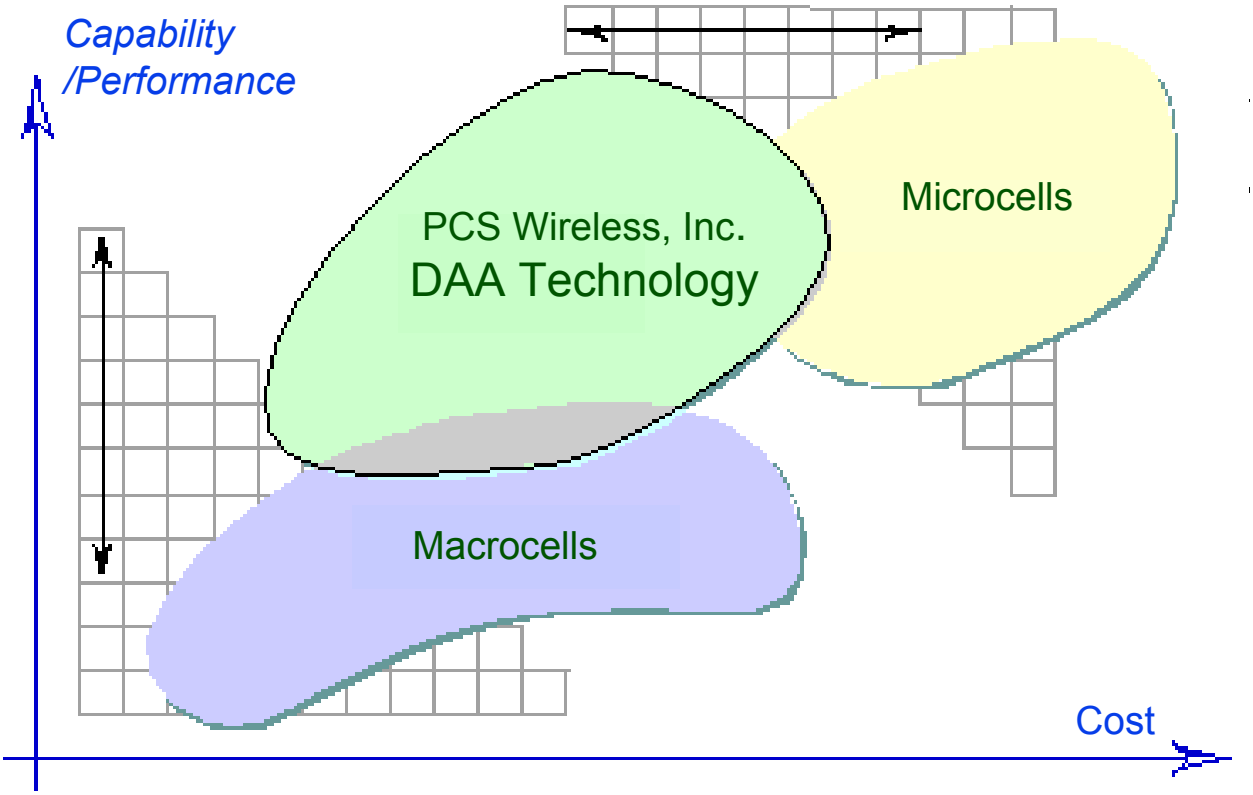
PCS Wireless, Inc. does not sell wireless base stations, telephone handsets, personal communicators or any other end user equipment. The various versions of DAAs that have been developed by PCS Wireless act as simple extensions to a base station's antenna. By disconnecting a base station antenna and connecting a DAA, the RF coverage zone (the area from which a wireless call can be placed) is reshaped and potentially enlarged many times. The base station and handsets communicate as before, but the signals are "transported" seamlessly through the DAA which acts as an "analog pipe".

An individual DAA antenna element provides identical signal quality, and call capacity to the base station that it is connected to. The output signal normally radiated by a base station's antenna is now radiated by the DAA element. Likewise, the handset signal level that appears at the DAA element's antenna is repeated at the base station's antenna port.

In wireless telecommunications systems without DAAs, relatively expensive base stations are placed where-ever the best RF coverage zones are created. For low power/low tier PCS networks, coverage is only as far as the nearest concrete wall or column. This means that fairly large boxes must be placed on the sides of buildings, on ceilings, on poles, and in other visible public areas. If 100% coverage is required, then a potentially large number of low power PCS base stations may be required for a given area. For high tier/high power PCS networks, large antennas and towers are required.

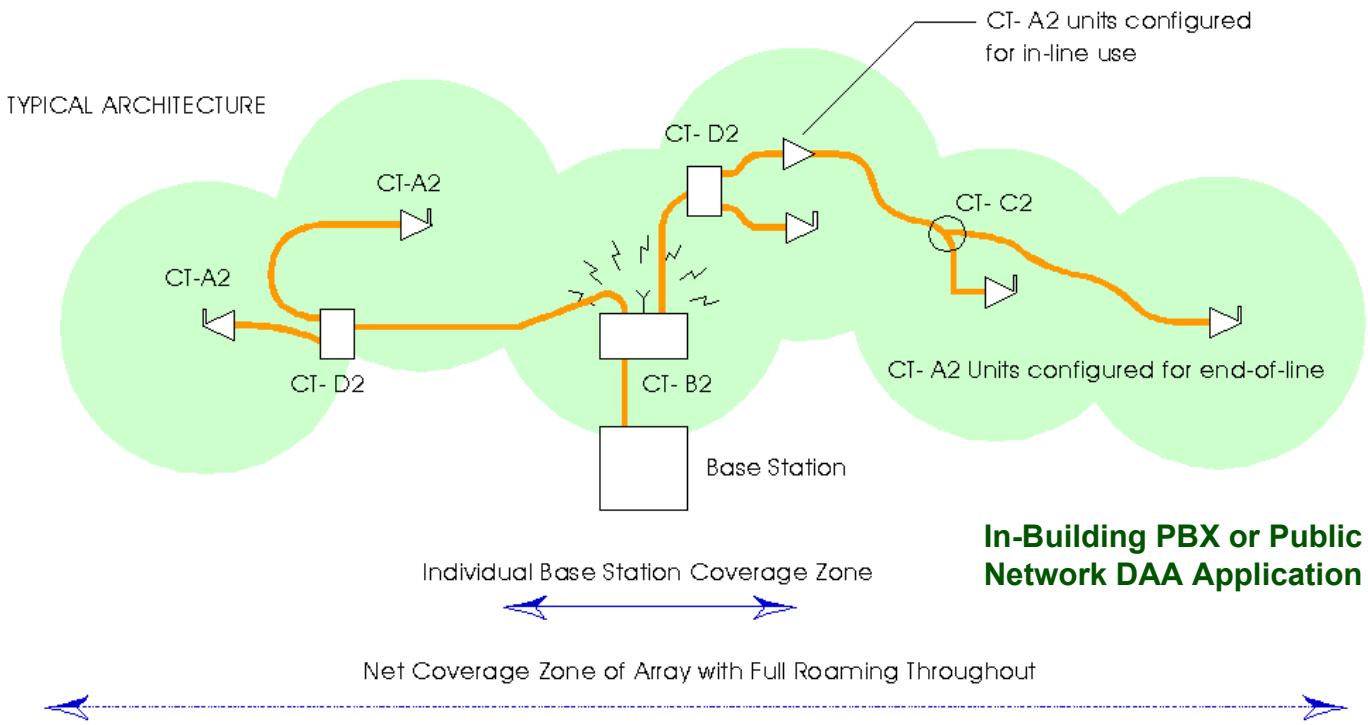
5.2 DAA Advantages

DAAs make it possible to combine the advantages of conventional macro cellular - i.e. low cost coverage, wide area roaming and vehicular mobility - with those of micro cellular, including the use of low cost/low power handsets and enhanced system capacity. The use of our DAA products result in a dynamically configurable middle-ground between macrocell and microcell infrastructures that substantially improves the economies of both PCS and cellular systems. The diagram below demonstrates the cost-performance trade-offs that our products provide solutions for:



DAA elements break the dependence of having to provide base stations everywhere RF coverage is needed. By utilizing base stations only for the needed system capacity and replacing the excess base stations with lower cost DAA elements for area coverage, overall system costs are markedly reduced. This simple extension of the coverage zone is illustrated here:

DAAs extend the coverage area of individual basestations

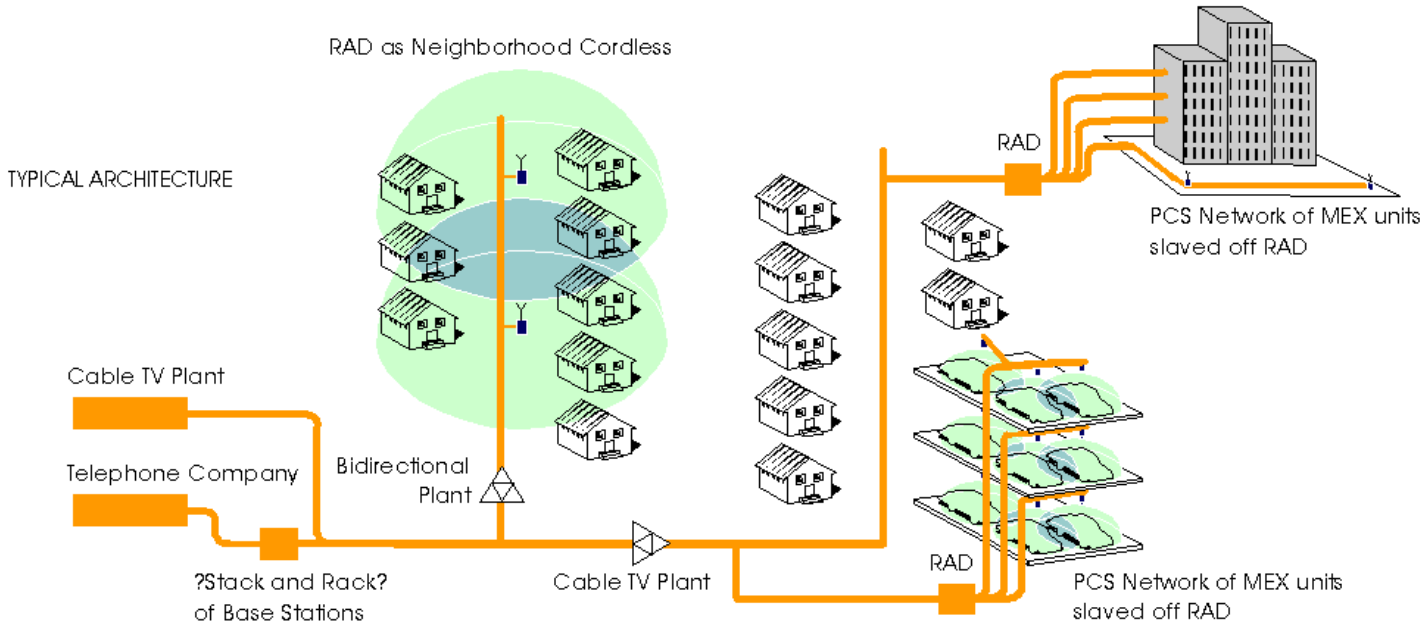


The base stations can be located in equipment rooms away from vandals and environmental hazards while tiny DAAs are ideally located where coverage is needed. Since all system controls, RF signals, and power requirements are fed to the DAA elements via coax cables from the base station location, site cabling and system reliability issues are much less complex.

Our DAA products include central Windows based diagnostics tools to provide for remote status monitoring, software downloading, analog and digital loop-back testing and system configuration. DAA system integration and deployment is simply and accurately accomplished with our “auto install” features which eliminate the need for any initial tuning or calibration work.

Our CATV based DAAs not only use the available 60VAC system powering but they hang off of the cable strand thereby eliminating the general need for site acquisition. These products can be intermixed with our non-CATV products to form complex networks as illustrated below:

CATV Based PCS DAAs



When system capacity requirements increase, there is no need to obtain access to the DAA elements - additional base station resources can be installed in the equipment room where access is simple and convenient. As system capacity requirements grow beyond the limits of the spectrum allocation for the DAA, groups of DAA elements can be remotely reassigned to interface to separate basestations - thereby creating dynamic “cell splitting” options.

By allowing multiple operators and/or a mix of private and public services to share the same DAA infrastructure, the capital cost of network deployment is markedly reduced.

The environmentally sealed enclosures of all of our DAA products allow for outdoor coverage even when connected to base stations that are designed for indoor use only. As can be seen from the above, PCS Wireless Inc.’s DAA technology provides unparalleled flexibility and cost effectiveness in PCS wireless network design and deployment.

5.3 DAA Technical Details

PCS Wireless Inc.'s product offerings are broken down into 2 primary groups as follows: (1) Dedicated coax/fiber optics based DAAs which include Base Station Extenders (BEX) and Microcell Extenders (MEX); and, (2) Cable television (CATV) based DAAs which include the Platform Remote Antenna Drivers (RAD) and Remote Antenna Signal Processors (RASP).

The only significant difference between BEX/MEX systems and RASP/RAD systems is the additional complexity required by the RASP/RAD systems for operation on CATV networks. CATV network operation requires that PCS signals co-exist with video carriers and other signals. Additionally, systems must work in noisier environments with lower signal power levels. BEX/MEX systems have the comparative luxury of operating on dedicated cable lines.

DAA elements are technically bi-directional RF amplifiers, with receive/transmit signal splitting and combining functions, filtering functions, and (model dependent) agile frequency conversion ("mixing" or "heterodyne") to intermediate cable transport frequencies. Each DAA element (MEX or RAD) also has a microprocessor that communicates with the associated base station extender (BEX or RASP).

The base station extenders provide base station interface circuitry, status monitoring and remote control functions, system sync data, and cable power to the DAA elements. The remote software features are very powerful as they allow almost complete control over the system from a central location. Even system software updates can be downloaded over the network to individual DAA elements. If a DAA element failure were ever to occur, it could be quickly identified and replaced.

PCS Wireless Inc.'s products are designed for low power/low tier PCS type networks as well as high power/high tier cellular systems such as GSM (DCS1900), AMPS, IS-54, and IS-95. Additionally, the Platform RAD/RASP products are based on a modular open-architecture design that also potentially allows for non-PCS CATV services to be processed by this equipment.

"Telelocator projects more than 50 million PCS subscribers [in the USA] in the next 10 years."

- Telecommunications Report

6. Intellectual Property

PCS Wireless Inc. employs many means to protect its intellectual property rights: patents, trademarks, copyrights, and trade secrets. By its very nature a patent is a public disclosure, with its fundamental purpose being dissemination of important technical information to the world community in exchange for some form of compensation.

It is PCS Wireless Inc.'s intent to protect its technical leadership position in the PCS market with a continuation of its regular patent filings and substantial legal counsel. PCS Wireless also plans to license its patented technologies to selected strategic partners in industry niche markets. PCS Wireless is committed to exploiting this partnership niche to increase revenues without increasing overheads.

PCS Wireless has filed for 10 significant patents, each covering multiple patentable inventions (some are filed in multiple countries) in the area of DAA technology covering MEX, BEX and Platform RAD, RASP technology as follows:

- Time Delay Independent Base Station
- Basic Microcell Extender Concept and Implementation Details
- Wireless PBX via Distributed Antenna
- RF Repeater Arrangement with Reduced Noise
- Distributed RF Repeater Arrangement for Wireless Telephone
- RF Repeater with Reduced Noise
- RF Repeater Arrangement with Improved Frequency
- Distributed RF Repeater Arrangement for Cordless Telephones
- Broadband TMDA-TDD Roaming without software hand-off
- Modular Antenna Driver for CATV networks

"This new form of cellular communications [PCS] . . . promises to bring wireless calling to the masses."

- Business Week

7. Products & Markets

The products offered in the PCS Wireless portfolio include a series of PCS DAA products that provide enhanced wireless telephone and/or personal communicator coverage zones, flexible system capacity handling, and cell to cell roaming for all types of PCS communications services. The primary groups of products fall under 2 categories: (1) Dedicated coax/fiber optics based DAAs which include Base Station Extenders (BEX) and Microcell Extenders (MEX); and (2) Cable television based DAAs which include the Platform Remote Antenna Drivers (RAD) and Remote Antenna Signal Processors (RASP).

These MEX, BEX, Platform RAD and RASP products are designed to operate with "generic" interfaces to many popular CT2, CT2+, DECT900, DCTU1900, GSM900, DCS1800, PCS1900, AMPS, IS-54, IS-136 and IS-95 wireless/cellular base stations and handsets. Supported modulation schemes include various forms of Time Division Duplex (TDD), Frequency Division Duplex (FDD), Time Division Multiple Access (TDMA), and Code Division Multiple Access (CDMA) techniques.

These related products and markets include:

7.1 Wireless PBX Systems - Low Tier

A number of companies have introduced wireless private branch exchange (PBX) in-building business phone systems that are based on either the CT-2+ or DECT "low tier" standards at 900 Mhz. Examples include the Northern Telecom Companion and Ericsson FreeSet Systems. Again, various models of the BEX/MEX DAA systems can be used to economically provide wide-area coverage extensions to these systems. Call capacity can be combined from multiple individual base stations that would each normally provide, say 4 calls to each of 4 areas, and instead provide 16 call capacity to the total combined area.

At present, these low tier wireless PBX systems are experiencing slow market acceptance.

7.2 Wireless PBX Systems - High Tier

There has recently been a huge increase in the market plans for rolling out private "cellular" PBX systems that use existing phones operating at 800 Mhz under both AMPS and IS-54 (analog / digital) protocols. All major cellular telecommunications vendors are positioning themselves to be able to offer low cost versions of their public cellular base stations for use in these private systems. The missing component is a low cost coverage technology to allow for a single low power base station to cover large areas in a flexible, expandable manner - new BEX/MEX models provide this solution.

There are also plans to rollout 1.9 Ghz versions of these private cellular systems in parallel with the new PCS licenses now auctioned in the U.S. by the FCC. In-building coverage is an important issue for public systems at 1.9 Ghz due to increased signal attenuation at these higher frequencies. Many public PCS service operators are planning to market hybrid public/private in-building cellular systems to their business customers - it solves both problems at the same time. Once again, new BEX/MEX models provide exceptionally cost effective coverage for these 1.9 Ghz basestations (IS-136, PCS1900 and 1.9 CDMA IS-95).

PCS Wireless is working with all of the major U.S. PCS auction winners on providing in-building coverage solutions for their customers using both 800 Mhz and 1.9 Ghz BEX/MEX DAA systems. PCS Wireless is also discussing an OEM agreement with Ortel Communications Corp. to acquire their fibre optics back-haul technology for long cable runs which are encountered in large buildings and campus environments.

7.3 Existing CT2 Systems

Older technology CT2 systems are now in place in over 20 countries including the United Kingdom, France, Germany, Hong Kong, Singapore and Australia. PCS Wireless, Inc.'s BEX/MEX DAA systems are used in many of these countries to provide increased area coverage by acting as antenna repeaters in areas such as public rapid transit systems, shopping malls, and similar installations. There are many benefits that DAA elements provide to these older CT2 systems, including: creation of roaming corridors; allowing centralization of the base station resources; providing wide area coverage with minimal and centrally expandable call capacity; and most importantly, substantially reducing the cost of providing 100% area coverage by replacing base stations with DAA elements at a reduced price.

CT-2 technology is rapidly being superseded by more advanced wireless networks worldwide. While new international wireless technologies such as GSM are rapidly expanding worldwide, many CT-2 operators continue to expand their systems. There are also a surprising number of new systems planned for rollout in 1995 in Europe and Asia. PCS Wireless is working with almost all of the CT-2 equipment vendors and operators in this regard.

7.4 CATV Based PCS Networks

With PCS networks rolling out in countries such as the United States and Canada that have ubiquitous cable television (CATV) networks installed, the task of interconnecting the thousands of microcells is solved economically with the modular Platform RASP/RAD products that hang off the utility pole cable strand and links the DAA elements to the wireless base stations via the CATV infrastructure. The connection back to the telecommunications "data super highway" then occurs back at a central facility.

Platform RAD technology solves a number of problems for wireless network operators including:

- Little or no effort required for site acquisition for base stations and antennas
- Strand mounted antennas reduce environmental impact
- Fast deployment - 1/2 hour installation time for 0.5 mile coverage area (PCS1900)
- Centrally located basestations for ease of expansion and service
- Remote, dynamic cell-grouping and cell-splitting capabilities
- Modular architecture allows for multiple protocol capability (AMPS, GSM and/or CDMA simultaneously)
- Very economical RF coverage

Additionally, MEX DAAs can be attached to the Platform RAD units for additional coverage where either the cable plant is not present or where “nulls” are located. Platform RAD units are installed and operating in many United States PCS field trials at this time.

7.5 Residential MEX

In third world countries, there is a potential need for in-building DAAs that operate from a wireless link to a remote PCS network. This can be accomplished by supplying a specific type of MEX which has a directional antenna pointing towards the remote PCS network, and in-building coax runs connecting antennas in various parts of the building core.

For additional information on these products and the technical issues surrounding DAAs, please reference the previous section on Distributed Antenna Array Technology.

8. The Market & Marketing Strategy

8.1 Competition

There are currently no PCS DAA competitors at this time. Eventually, wireless Manufacturers may have to attempt to offer DAA extensions to their systems to remain economically competitive with other vendors. Therefore, PCS Wireless Inc.'s potential industry OEM and sales partners are also potential competitors. The following list of companies is currently being used by PCS Wireless in its partnership/competitive strategic positioning efforts:

> GPT Ltd, Orbitel Mobile Communications Ltd, Shaye Communications, Northern Telecom, Sony Telecom, Motorola, SIP Italia, Siemens AG, Matsushitu Communications Industrial Ltd, Dassault Automisnes et Telecommunications, Ericsson, OmniPoint, Qualcomm, Nokia, AT&T

The primary difference between the current technology behind the products and markets that these potential competitors have, and the emerging PCS market requirements for these microcell antenna networks, is the intelligent DAA transmission technology. PCS Wireless has pioneered most of the key technological breakthroughs that facilitate the use of PCS DAA elements via coax and over CATV cable plant. The only alternative to a MEX/BEX system extension is adding more base stations which has proven to be an uneconomical solution in many applications.

There is certainly indirect competition in the emerging North American PCS market in terms of technologies competing against CATV PCS services. These include relatively expensive direct wireline telephone interconnections to PCS antenna systems, CATV digital trunking modems with remote located basestations (Motorola's CableComm product line), CATV set top converter PCS antennas, and existing and new wide area macrocellular services such as the new 1.9 Ghz TDMA and CDMA variants.

8.2 Marketing Strategy

The various benefits and selling strategies relating to DAA technology are covered elsewhere in this document. For the time being, PCS Wireless is the only DAA equipment vendor in the world and therefore initial market penetration efforts have been very successful. Eventually, competition will require a change in marketing and sales tactics, but for now, the major marketing goal is to sell into all major markets worldwide. It is quite possible that PCS Wireless will gain a substantial market share in the long term due to its very early and successful field trials involvement, and marketing and sales efforts (see the following section on Customer References).

The specific marketing segments that PCS Wireless Inc. is focusing on include participation in all high profile United States PCS field trials for Platform RAD and MEX units as well as direct sales to CT2 system operators in all CT2 countries. There are also opportunities to enter into licensing agreements with other companies which is a practical way to penetrate a larger percentage of the market, given the large ramp-up expansion and working capitol requirements that would otherwise be necessary. Our pending development partnership agreement will provide chip set solutions for simple licensing options.

The existing international CT2 market has represented a more or less short term (2 year) opportunity to provide initial manufacturing volumes and gross margin dollars to help ramp-up PCS Wireless Inc.'s manufacturing capacity toward the larger and longer sustaining U.S. PCS industry opportunities. CT2 markets are providing a near term, strong, positive revenue stream. There is also significant potential for CT2 systems to be deployed in many 3rd. world countries.

The U.S. PCS market is the main event this year and into the next. Supply agreements with Motorola, Northern Telecom, Ericsson and AT&T are our current focus. Their marketing and distribution channels will be utilized under OEM agreements. Sub-licensing options will also be discussed in the context of providing chip sets within 18 months. PCS Wireless will provide all production capabilities for these OEM customers from a manufacturing partner agreement with a large U.S. sub-contract telecommunications manufacturer.

9. Customer List/Sales to Date

In its 5 year history, PCS Wireless/PCS-Microcell has sold products and services to the following customers:

- Canadian Cable Labs & Rogers Engineering - Canada, Sale of RASP/RAD units, Field Trial Support, 1990-1991. $300,000.
- Time Warner - U.S.A., Sale of RASP/RAD units, Field Trial Support, 1992. $35,000.
- Canadian Cable Labs & Rogers Engineering - Canada, RASP/RAD Consulting, 1992. $35,000.
- Satcom - U.S.A., Sale RASP/RAD units, Consulting, Field Trial Support, 1992. $75,000.
- US West - U.S.A., Sale of BEX/MEX units, Field Trial Support, 1992.
- Hutchison Paging - Hong Kong, Sale of BEX/MEX units, Field Trial Support, 1992.
- Satcom - U.S.A., Sale of BEX/MEX units, 1992.
- Cablevision Systems Corp - U.S.A., Sale of BEX/MEX units, Field Trial Support, 1992.
- Cantel - Canada, Sale of BEX/MEX units, 1992.
- BC Mobility - Canada, Sale of BEX/MEX units, 1992.
- US Cablelabs - U.S.A., Sale of BEX/MEX units and Delay Independent Base Stations, Field Trial Support, 1992.
- Cablevision Systems Corp - U.S.A., Sale of BEX/MEX and RASP/RAD units, Consulting, Field Trial Support, 1992. $125,000.
- Cox Cablevision - U.S.A., Sale of CDMA RASP/RAD units, $70,000.
- Adelphia - U.S.A., Sale of RASP/RAD units, 1993. $16,000.
- Cablevision Systems Corp. - U.S.A., Sale of various Platform RASP/RAD units, Consulting, Field Trial Support, 1993. Approx. $250,000.
- Hutchison Paging - Hong Kong, Deposit for Sale of 200 BEX/MEX units, Deployment Support, December 1993. $32,734.
- Australia Telecom - Australia, Sale of 100 BEX/MEX units, Deployment Support, December 1993- February 1994. $170,492.
- Singapore Telecom - Singapore, Sale of BEX/MEX units, Field Trial Support, December 1993. $7,980.
- Malysia Telecom - Malaysia, Sale of BEX/MEX units, Field Trial Support, December 1993. $10,275.

- Hutchison Paging - Hong Kong, Sale of 200 BEX/MEX units, Deployment Support, January - March 1994. $235,609.
- Telesis/Pacific Bell - U.S.A., Sale of Diversity 75 BEX/MEX units, Consulting, Field Trial Support, December 1993 - January 1994. $245,000.
- Cablevision - U.S.A., Sale of CDMA Platform RAD units, Consulting, Field Trial Support, January -May 1994. $50,000.
- Hutchison Paging - Hong Kong, Sale of 400 BEX/MEX units, Deployment Support, April - May 1994. $500,000.
- Northern Telecom - Canada, Demo Sale of BEX/MEX Trial System, January 1994.
- Folec Communications - Singapore (for deployment in Vietnam), Sale of 200 BEX/MEX units, June 1994. $200,000.
- BC Mobility - Canada, Sale of 944 CT-2+ BEX/MEX units, May 1994.
- Ericsson - U.S.A., Sale of 8 DSC1900 Platform RAD units, Deployment Support, June 1994. $100,000.
- Guangzhou, Shenzhen, Shenyang, Wenzhou, Dalian (CT-2 operators) - China, Sale of 5 BEX/MEX Trial Systems, June-July 1994.
- France Telecom - France, Sale of 5 BEX/MEX Trial System, July 1994.
- Microcell 1-2-1 - Canada, Sale of 2 BEX/MEX Trial Systems, August 1994.
- Telezone - Canada, Sale of BEX/MEX Trial System, August 1994.
- Microcell 1-2-1 - Canada, Sale of 5000 BEX/MEX units, September, 1994. $4,500,000. - Canceled, currently re-negotiating a 1.9 Ghz equipment sale.
- France Telecom - France, Sale of BEX/MEX Systems, November, 1994.
- Mobility Canada - Canada, Sale of BEX/MEX Trial System, November, 1994.
- Guangzhou, Shenzhen, Shenyang, Wenzhou, Dalian (CT-2 operators) - China, Sale of 250 BEX/MEX Systems, December 1994, $300,000.
- Motorola - U.S.A., Sale of 10 DCS1900 Platform RAD units, Deployment Support, December, 1994, $110,000.
- Northern Telecom - U.S.A., Sale of 20 CDMA/DCS1900 Platform RAD units, Deployment Support, December, 1994, $254,000.
- Ericsson - U.S.A., Sale of 25 DCS1900 Platform RAD units, Deployment Support, January, 1995, $300,000.
- AT&T - U.S.A., Sale of 12 CDMA1900 Platform RAD units, Deployment Support, February, 1995, $225,000.
- Motorola - U.S.A., Sale of 750 DCS1900 Platform RAD units, March 1995, $3,00,000.

10. Product Development Process

10.1 Overview

PCS Wireless views the product development process as one of the most important factors in determining the ultimate profitability and over-all success of the company. All of the following Standard Operating Procedures (SOPs) discussed here have been incorporated into our ISO9001 program. By properly managing this process, there is a strong positive impact on:

- technical and financial risks
- time to market
- manufacturability
- serviceability
- quality
- gross margins
- the performance/price point required for successful sales

10.2 Product Development Specifications

Formalized product development requirements initiate from the strategic marketing group in the form of a Marketing Requirements Specification (MRS). The development teams respond to these proposals with a Product Development Specification (PDS) document that is signed off by all company departments. The general content of each PDS includes:

- market requirements
- manufactured gross margins
- quality targets
- detailed electrical, mechanical, and software specifications
- manufacturing processes
- service and support deliverables
- technical and financial risk analysis
- schedule
- documentation requirements
- resource requirements

The target manufactured gross margin targets will always be clearly defined in the PDS. This target, plus the product technical specifications, forms the yardstick by which the product development process is judged. All of the individual details must add up to a product that is profitable to manufacture and support, while meeting market requirements.

10.3 Gated Development Process

To achieve the above goals, a "gated" development process is executed. Each gate consists of a high level project management meeting where the progress and continued viability of the development program is reviewed against the PDS requirements and the current market conditions. These gates are set at the following points in the development program:

- PDS complete
- Detailed Circuit Description/Software Requirements complete
- Engineering Prototype Unit Verification complete
- Engineering Pre-Production Unit Verification complete
- Pre-Production Unit/Documentation Verification complete (Ship Acceptance)

These gating meetings are conducted by the development team members and require sign-off by the product manager and other senior management as may be suitable.

10.4 Running Specification Changes

Changing product specifications in the middle of a development process are highly risky. Proper engineering planning and up-front marketing research is required to minimize the number of times a product development process is impacted by changes in direction.

When a significant product specification change is being proposed by anyone, a formal development gating meeting must be convened to study the proposal and determine the impact to the development program (in terms of quality, required resources, schedule delays, and budget over-runs).

10.5 Ship Acceptance

New products can only enter volume production for shipment to customers after a general ship acceptance sign-off has been achieved. Any products that have not received approval from the ship acceptance board must only be shipped to the customer with a written waiver from that customer indicating that they are fully aware of the pre-release nature of the product they will be receiving. All such products are to be clearly labeled as "pre-production" units.

The ship acceptance board includes:

- product manager
- quality manager
- production manager
- service manager

10.6 Design For Manufacturability Guidelines

Product quality can be defined in many ways, but the most important metric is a measurement of the opportunity for defect occurrences in a design. A ratio of defect opportunities vs. actual measured defects defines the ultimate quality of both the design and the manufacturing process. PCS Wireless, Inc. has a “6” Sigma process tolerancing specification that closely matches that of Motorola.

Reducing the complexity of a design automatically improves quality but just as importantly, a product must be designed to meet the available manufacturing process tolerances. Pre-production manufacturing runs can be used to estimate the quality level to be expected in volume production and this value can then be compared to the corporate quality requirements in effect at the time (currently set at 5.4 "Sigma") for Ship Acceptance criteria.

10.7 Design For Serviceability Guidelines

All new product releases shall include the following standard service deliverables.

- Service Manual with detailed circuit description, assembly/disassembly procedures, list of service aids, test procedures, bill of materials and PCA layouts, etc.
- An acceptable level of sub-assembly spares are to be supplied to the identified service depots upon release of the product to production. Initially, a number of complete units may be supplied as an interim measure.
- A training video and follow-up training course with all required training materials in the operation and service of the product.
- Delivery of IBM PC compatible service software diagnostics and related service aids. This includes any custom equipment that may be needed to service the units.

Additionally, the maintainability/service manager must be consulted during all important gates in the development process to ensure that the process will likely result in achievement of all of the above serviceability goals as well as proper product design to ensure ease of service and support.

10.8 Accelerated Life Testing

For all new product introductions, a complete ALT program must be completed before ship acceptance is granted. The ALT program is designed to simulate real world environmental condition extremes that stress the product and force design weaknesses to exhibit their failure mechanisms. This is to include a minimum of 5 pre-production product samples using 3 to 5 test loops of:

- Temperature and Humidity Cycling Tests, with Power On/Off Cycles
- Corrosion Tests
- Dust Tests
- Vibration and Shock Tests
- Performance Verification Testing

The ALT process is performed at independent testing laboratories. An aggregate projected in-field failure rate calculation is performed based on the results. Ship acceptance criteria is based on comparing this value to the corporate ALT requirements in effect at the time (currently set at 0.5% failures per year).

10.9 Product Quality Evaluation

For all new product introductions, a complete PQE program must also be completed before ship acceptance is granted. The PQE program is designed to test the product functionality against design specifications. This is to include a minimum of 3 pre-production product samples undergoing tests for:

- Performance at Temperature and Humidity Extremes
- Proper Operation after 6 axis drop testing
- Regulatory Approval (EMI, Safety, etc) testing
- Proper Operation after ESD testing

The PQE process is also performed at independent testing laboratories. Ship acceptance criteria is based on comparing actual performance to design specifications. All tests must be passed.

10.10 Performance Oriented Compensation

Most PCS Wireless, Inc. employees have a performance bonus plan that ties the quality of their work and their contribution to the success of the business to clearly defined cash and equity rewards.

11. Product Development Status/Plans

11.1 DCS1900 Platform RAD/RASP

Started in Jan/94. Ship Acceptance July/95.

- 8 people, 15 months, 12 man-years of effort
- Designed initially for field trials for Ericsson, Motorola and Northern Telecom - not fully productized until May/95, minimal remote S/W status monitoring during trials
- FCC regulatory approvals by May/95, Industry Canada approvals by July/95
- This program allows for the completion of 1.9 Ghz simulcasting testing, plus new board layouts, new MWT amplifiers, changes in the design to improve manufacturability and performance, etc. from older 800 Mhz designs.
- The existing OEM/machined housing design will be maintained until field trials are completed. A new cast housing will be developed in time for volume production.
- Consideration will be given to providing some form of integrated antennas into the housing for DCS1900 and possibly IS-95.
- Development work will include S/W hooks into various base station vendor OSS/network operations management S/W, including: remote communications, diagnostics, uP control over configuration, agility for cell-grouping and cell-spitting, etc.
- Matching development work on the Mixer MEX/BEX program to align with the wrap-up of this program (technology will be transferred)
- Hooks for H/W and S/W will be introduced to allow for slaved MEX operation at a later date.
- This product development forms the basis for all other development programs noted below.

11.2 800 MHz AMPS/IS-54 Platform RAD/RASP

Started in November/94. Ship Acceptance in July/95.

- 3 people, 8 months, 2 man-years of effort
- This is an incremental program over the DCS1900 program and will result in additional modules for simultaneous operation of AMPS/IS-54 cellular through the network.
- Following on the heals of the 1.9 Ghz field trial RAD program and the BEX/MEX Auto Install program, will utilize all of the Phase III Auto Install BEX/MEX S/W features
- Will require additional field trials to work out deployment issues
- Requires Industry Canada approvals before FCC approvals.

11.3 1900 MHz CDMA/IS-95 Platform RAD/RASP

Will Start in January/95. Ship Acceptance in November/95.

- 3 people, 10 months, 2.5 man-years of effort
- This is an incremental program over the DCS1900 program and will result in additional modules for simultaneous operation of IS-95 cellular through the network.
- Will require additional field trials to work out deployment issues
- Requires FCC approvals.

11.4 Auto-Install 800MHZ AMPS/IS-54 MEX - Slaved off of RAD

Started in June/94. Ship Acceptance in August/95.

- 5 people full time for 14 months, 6 man-years of effort
- Program is broken down into 3 phases:

  Phase I - remote status (failures only) monitoring of MEXs

  Phase II - adds auto output power control (P_{in}=P_{out})

  Phase III - adds full 2 way communications, extensive uP control and status monitoring

- Gives us USA, Canada and Europe approved product by phase 2
- Secondary benefit is vastly improved “maintainability” and “serviceability” via remote status monitoring, diagnostics and S/W downloading
- 60 VAC powering
- Need to consider 2 way communications to be compatible with Mixer MEX, RAD and Cableless MEX future functionality. See the MEX/BEX PC Interface Unit product plan for the compatible PC equipment requirements.

11.5 1.9 GHz DCS1900/IS-95 MEX - Slaved off of RAD

Started in September/94. Ship Acceptance in September/95.

- 4 people full time for 12 months, 4 man-years of effort
- Ties into the development of the above Auto-Install MEX program, and the future cableless MEX program
- Uses the new MWT sourced amplifier. A heterodyne “mixer” based product.
- Both TDD and FDD based products (TMDA and CDMA) will be produced
- Will require new MEX housing (same as for BEX with different top housing - no power supply). Prototypes will use existing BEX housing.

11.6 RAD/RASP Fiber Optics Interface

Will Start in February/95. Ship Acceptance in September/95..

- 2 people full time for 7 months, 14 man-months of effort
- Ortel OEM deal

12. Development Organization

PCS Wireless Inc.'s development group is currently separated into 3 groups: the advanced engineering / technology assessment group (TAG), BEX/MEX products group, and RAD/RASP products products. This is due to the differing skill sets required by each group. A combined team of Computer Aided Designers ("CAD"), Industrial Design, and Management Information Services ("MIS" - computer networks) supports both groups.

Most development work currently takes place on Compaq 486 based Prolinea/MT PCs operating on a 10-Base-T Novell 3.12 Network using a combination of DOS 6.22 and Windows 3.1 operating systems. PCS Wireless Inc.'s CAD and Software teams are currently migrating towards the Windows NT O/S as applications are released.

PCS Wireless Inc.'s primary application software packages include: MS Office (Word, Excel, PowerPoint, Email), MS Project, MS Access, ACT!, ProComm, Expandable, Intel Faxability for Networks, and PADS. PCS Wireless Inc.'s network resources are also fully remotely accessible for users who are away from the office, including PC Anywhere, MS Mail Remote, and Internet Email/Surfing.

The Mitel telephone system has voice mail and direct line access for all users (available after normal business hours or via backdoor # using the voice mail prompts).

12.1 Technologies/Engineering Skills

The core technology embraced in PCS Wireless Inc.'s business is RF transport. There are a great variety of both analog and digital support technologies that PCS Wireless also employs but they are secondary to the requirement for a strong core expertise in RF engineering.

With the combined talents of PCS Wireless Inc.'s management team, PCS Wireless is positioned to sustain a new market leadership niche. Fortunately, PCS Wireless is based in Vancouver and therefore a superb talent pool of RF and telecommunications engineers are available locally to draw from to help fuel the expected growth. There is also a local Motorola wireless division nearby to allow for potential interaction if required.

13. General Operations/Manufacturing Organization

13.1 Organization

All of PCS Wireless Inc.'s products are designed for high volume computerized assembly, testing, configuration, and product tracking using predominantly surface mount electronic component technology. Consequently, PCS Wireless Inc.'s board level assembly is sub-contracted out to ISO9000 approved firms in this area as well as offshore.

PCS Wireless maintains a low volume manufacturing and general operations staff to source prototype and development materials and perform board and unit level assembly, test, and configuration. Final product is typically drop shipped directly to customers from our sub-contractor's facilities.

PCS Wireless Inc.'s service and manufacturing groups have low volume SMT component placement and re-work equipment on-hand to perform re-work as necessary. All products and their associated sub-assemblies are bar-coded for product tracking purposes.

One of the powerful management tools that PCS Wireless Inc. uses to control manufacturing, inventory, sales orders, purchasing, A/P, A/R, and G/L is an integrated MRP/accounting computer system called Expandable. In addition to providing an on-line system for process control and information retrieval, this represents a key management reporting and control tool that allows management of a world class, build to order, just in time manufacturing process.

13.2 Quality - ISO9001/"6" Sigma

PCS Wireless is preparing for, and will receive certification to the ISO9001 quality standard by April 1995. The ISO9001 quality standard interlinks all activities from marketing definitions and product development to material incoming inspection procedures, manufacturing process control, test equipment calibration and product tracking. All of PCS Wireless Inc.'s important sub-contractors and suppliers are also required to be ISO9002 or equivalent certified.

The concept of "6 Sigma" corporate quality standards as originally developed by Motorola applies to all aspects of PCS Wireless Inc.'s business, particularly product development and manufacturing.

The only effective way to achieve the goals of "6 Sigma" are to have close cooperation between the product development, manufacturing, and custom service groups. PCS Wireless Inc.'s mandate is to have the development teams treat the manufacturing and service groups as their customers. With early and often development process participation by the manufacturing/service engineering staff, PCS Wireless Inc.'s products will have a much higher chance of meeting corporate profitability goals by ensuring that the product designs fit within manufacturing process tolerances.

13.3 Sub-Contractors & Suppliers

A key piece of the quality puzzle is the relationship and controls relating to the use of sub-contractors and suppliers. A carefully established relationship ensures that PCS Wireless Inc.'s corporate quality and inventory control goals are met. This is especially important for the "just in time" manufacturing process. PCS Wireless insists on formal partnership agreements with all key sub-contractors and suppliers.

13.4 Inventory Control/Asset Management

PCS Wireless Inc.'s inventory control system is integrated into the over-all MRP/accounting system software package. Material storerooms have been created both for PCS Wireless Inc.'s internal manufacturing lines, as well as those of PCS Wireless Inc.'s sub-contractors. The suppliers are also required to keep an on-hand inventory of specific class A, B, and C components, as determined by this system.

PCS Wireless Inc.'s objective for asset management is to achieve greater than 6 turns per year.

14. Financials

Attached.

Changing the way the world communicates

Answers to Common Questions about our Business, Products and Services

Document # 050694-1 Rev 1.0

PCS Wireless, Inc. • #95 - 200 Granville Street, Vancouver, B.C., Canada, V6C 1S4 • Telephone (604) 689-7722 • Facsimile (604) 689-7745

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1. Who is PCS Wireless, Inc.?

PCS Wireless, Inc. is a publicly traded telecommunications company based in Vancouver, British Columbia. The VSE trading symbol is “PCS”.

PCS Wireless, Inc. is involved in the rapidly expanding wireless Personal Communications Services (PCS) marketplace. The business designs and manufactures specialised Distributed Antenna Array (DAA) products for various types of PCS networks world-wide including cable television, fiber optics and dedicated coax communications technologies. DAA technology is key to the economic success of emerging PCS networks as it allows system operators to optimise cell sizes and coverage zones to ever changing system capacity requirements.

1.1 Corporate History

The foundation for PCS Wireless, Inc. was the 1993 acquisition of a 3 year old Vancouver area company, PCS-Microcell, a division of Enterprise Technologies Corp. ("ETC", formerly Nexus Engineering Corp.), which pioneered PCS Infrastructure technology and products, and filed for a significant number of patents in this area.

1.2 What is the Core Competency of PCS Wireless?

PCS Wireless, Inc. started working with distribution antenna technology for mobile voice in 1990. The technology that the business subsequently developed and patented allows mobile voice users both the advantages of macro cells (e.g. wide roaming, low cost, vehicular mobility) and of microcells (e.g. frequency re-use capability, support to low power handsets) in an optimal mix which greatly improves the economics of a service.

Central to the product development process in the first 3 years was an emphasis on live trials with numerous Operators (e.g. Cable TV operators, CT-2 Operators, Regional Bell Operating Companies [RBOCs], telecos, etc.), to refine both hardware and system designs. PCS has trialed with FDMA, TDMA, and CDMA handsets operating on TDD and FDD duplexing over frequencies from 866 Mhz to 1.9 Ghz.

PCS Wireless, Inc. is a world leader in DAA technology with in excess of nine patents applied for on its proprietary technology.

1.3 What does PCS Wireless do?

PCS Wireless, Inc. designs, manufactures and sells products used in the transport of low power (PCS type) RF signals between base stations and handsets over a variety of microcell interconnect mediums, including Cable TV Plant and dedicated wires and cables (coax and fiber optics).

With its distribution antenna capability, PCS Wireless, Inc. products create “virtual base station” services over wires and cables, from a central “stack and rack” of base stations.

1.4 What product lines are available?

PCS Wireless Inc.'s product offerings are broken down into 2 primary groups:

- Dedicated coax/fiber optics based DAAs which include Base Station Extenders (BEX) and Microcell Extenders (MEX);
- Cable television (CATV) based DAAs which include the Platform Remote Antenna Drivers (RAD) and Remote Antenna Signal Processors (RASP).

The only significant difference between BEX/MEX systems and RASP/RAD systems is the additional complexity required by the RASP/RAD systems for operation on CATV networks. CATV network operation requires that PCS signals co-exist with video carriers and other signals. Additionally, systems must work in noisier environments with lower signal power levels. BEX/MEX systems have the comparative luxury of operating on dedicated cable lines.

1.5 DAA Technical Details

DAA elements are technically bi-directional RF amplifiers, with receive/transmit signal splitting and combining functions, filtering functions, and (model dependent) agile frequency conversion ("mixing" or "heterodyne") to intermediate cable transport frequencies. Each DAA element (MEX or RAD) also has a microprocessor that communicates with the associated base station extender (BEX or RASP).

The base station extenders provide base station interface circuitry, status monitoring and remote control functions, system sync data, and cable power to the DAA elements. The remote software features are very powerful as they allow almost complete control over the system from a central location. Even system software updates can be downloaded over the network to individual DAA elements. If a DAA element failure were ever to occur, it could be quickly identified and replaced.

1.6 Will DAAs work in non-PCS Wireless Systems?

PCS Wireless Inc.'s products are designed for low power PCS type networks but can be adapted to other cellular systems such as GSM (DCS1800), AMPS, IS-54, and IS-95 to act as in-building private system extenders and public system gap fillers. Additionally, the Platform RAD/RASP products are based on a modular open-architecture design that also potentially allows for non-PCS CATV services to be processed by this equipment.

2. BEX/MEX Products

In addition to the BEX/MEX products described below, PCS Wireless has volume production as well as pilot production facilities available to satisfy our customers requirements for everything from low volume semi-custom products, prototype full custom products, and high volume production of DAA products covering a range of frequencies, protocols and system capabilities.

2.1 CT-2 Network Products

PCS Wireless, Inc. has developed a low cost distribution antenna for CT-2 networks. The distribution antenna consists of a Microcell Extender (MEX) which functions as the virtual base station, and the Base Station Extender (BEX) which conveniently allows existing Base Stations to be combined together and then interfaced to a large number of MEXs.

Key points in the economic analysis of the MEX-BEX systems for CT-2 networks:

- A single BEX can "stack and rack" to support 14 simultaneous callers at a single central site.
  - ⇒ Recurring PSTN line rental charges may be reduced because of the call concentration at the central site.
  - ⇒ Simplified access, powering, maintenance and upgrade issues when all Base stations are centrally located.
- A single BEX can support up to eight MEXs with only a coax interconnect.
  - ⇒ No local powering required at the antenna site allowing recurring charges.
  - ⇒ Physically small unit at the antenna site allowing greater range of sites to be considered.
- The MEXs support wide area roaming of the caller (vehicular and pedestrian) between coverage zones.
  - ⇒ Wide area capability allows Base Stations to obtain trunking efficiencies.
- MEX imposes no limitations on the physical distribution of callers between cells (e.g. all 14 in one cell or all 14 spread over eight cells or all 14 moving dynamically between all eight cells).
  - ⇒ Allows further trunking efficiencies because of the lower call blocking probabilities.
- A MEX typically sells for 40% of the cost of a single CT-2 transceiver card.

2.2 DCT-900 Network Products

PCS has developed a MEX/BEX system to support DCT-900 as used for Ericsson's Wireless PBX. The principle engineering changes from CT-2 MEX/BEX concern the different frequency of operation, lower power levels and the incorporation of antenna diversity.

The economic analysis of the DCT-900 MEX/BEX is obviously similar to the CT-2 analysis, but with some changes of emphasis of which the most noteworthy are:

- Wireless PBX is a higher traffic density environment than CT-2, making the ability of the MEX-BEX to support any physical distribution of callers more important.
- DCT-900 operates at low cost power levels and therefore requires more antennas to cover a given area than does CT-2. The Radio Exchange limitations on the total number of Base Stations that can be supported, makes MEX/BEX an attractive way of increasing net coverage area without modifying the DCT-900 hardware.
- For the system supplier, the long term economic payback comes more from the recurring handset sales than in a CT-2 system.
- For DCT-900 the maximum number of simultaneous callers a single array is 32. For greater numbers, frequency re-use techniques must be used.

2.3 MEX/BEX Networks

MEX/BEX networks can be quite complex. Topologies and techniques that can be used:

- *Star networks.* The BEX can be field configured for linking, one, two or four coax runs to the central base station resource.
- *Tree and Branch networks*. PCS has power passing splitters that allow any individual coax run to be split into multiple coax runs.
- *Ring networks*. PCS has a power passing 10 dB taps that allow MEXs to associate with a ring of coax.
- *In line MEX.* MEX is gain adjustable from 20 - 40 dB of net gain. Used with RG-213 or RG-6 coax (each nominally 0.23dB/m loss at 866 Mhz), this allows large coax runs to be used. A "typical" in-building coax run would be 80 metres. However for even larger coax runs, MEX may be configured as a "power passing in-line amplifier" to come coax loss. Using 10 dB taps, MEX can be configured to amplify and drive more coax (in a power padding mode) while simultaneously driving an antenna.
  - ⇒ The coax type used can be 75 ohm (e.g. RG-6) or 50 ohm (e.g. RG-213) coax. In some countries and installs, plenum coax might be used because of fire-regulations.
- *Output Sync*. MEX can be field configured to provide a 500 Hz square wave that is useful for slaving collocated Base Stations to the same transmit-receive timing.
- *Remote antennas*. The MEX antenna may be replaced with a small coax run and a remote antenna. This gives more flexibility on placing in-building antennas.
  - ⇒ BEX can be field set to combine, one, two or three base stations. Using passive RF splitters this can be extended to combine up to six base stations.
  - ⇒ BEX requires access to the base station transmit-receive timing. Because the BEX processes this "sync" signal in software, the BEX can be field set to support differential, non-differential, square wave, rising edge sensitive or falling edge sensitive sync. The BEX also has advance-retard capability to re-align the sync signal for use by the MEX.
  - ⇒ BEX has the capability to support up to eight MEXs. However networks can be configured to support multiple BEXs off a single master BEX.

3. Cable TV Products: RAD Platforms

PCS Wireless, Inc. has developed products that form distributed antennas using existing Cable TV coax. In North America about 80% of homes are passed by pre-existing Cable TV coax.

The RAD Platform operates off a central "stack and rack" of base stations as the MEX does. However, the RAD Platform is designed to be mounted from the overhead coax "Strand" that hangs between telephone poles, and to use the Cable TV powering systems (60 v pk-pk square wave).

The economic of RAD Platforms gear off the following:

Excellent Trunking Efficiencies:

- Base Station Resource is centralized and dynamically allocated.

  ⇒ Compare with classic Telepoint where the resource is fixed assigned.

Excellent Call blocking statistics at any given RAD site:

- RAD is inherently a multi-channel concept that can support multiple simultaneous calls.

  ⇒ Compare with classic Telepoint where multiple transceiver cards are required to get reasonable performance.

Excellent "Roamer" Capabilities:

- RAD can be used as an element of a distributed antenna supporting roamer corridors without any additional equipment.

  ⇒ Compare with classic Telepoint where the inter-Base Station communication network necessary to support software call hand-off is as complex as the voice communication network.

Strand Mounted, Cable Powered antenna sites are often ideal and readily available:

⇒ Compare with classic Telepoint where site rental, site powering and site hook-up to the PSTN are all negotiated on a site-by-site basis.

Local Loop Bypass is straightforward:

- Centralization of the Base Station resource naturally leads to bypass switching at the central site.

Support to Multiple Handset types (and frequency bands) is straightforward:

- RAD can support multiple handset types and frequencies simultaneously.

Handset/Frequency dependent equipment are centrally located.

⇒ Compare with classic Telepoint where multiple handset types supported implies multiple transceiver cards of different types, at the field location.

Maintenance and Upgrade programs are straightforward.

- Base Station issues are simplified by the indoor/centralization of the resources.

RAD issues are simplified by the remote configurability capabilities.

⇒ Compare with classic Telepoint where the system upgrade and maintenance issues are field issued.

Uses an existing asset to provide an incremental income.

⇒ Compare to classic Telepoint where a complete network must be laid from scratch, or heavy use must be of the PSTN.

3.1 RAD Platform Networks

These networks can be quite complex, with the following topologies and characteristics:

- Built-in capabilities to support local gap fillers (MEX) or complex MEX arrays.
- Capabilities for remote reconfiguration (i.e. dynamically set cell size).

Architectures that have been field tested include:

- *Island Architecture:* Attractive as a first deployment architecture. Distributed arrays of up to 3,000 ft x 2,000 ft have been constructed.
- *Slave Architecture:* This architecture emphasis that RAD platform as a "gateway" the Cable plant offers to support MEX networks. Attractive as the subscriber base builds the network coverage grows.
- *Frequency Re-Use Architecture:* Attractive as the traffic density increases and off-air frequency re-use becomes and issue, (as compared to CATV Plant frequency re-use).

Support to moving vehicle, pedestrian and in-building mobile telephone over the CATV plant has been demonstrated on a variety of handset types and at a variety of frequencies.

4. Are there frequency re-use issues with distributed antenna technology?

Distribution antennas alone have no inherent capability to provides frequency re-use. However when used with handset technologies that have soft-handoff capabilities, normal and special frequency re-use schemes (e.g. interleaved arrays), can be used. Frequency re-use networks for CT-2 Plus Companion and DCT-900 have been successfully constructed for MEX-BEX systems.

5. Does PCS Wireless provide turn-key system solutions?

PCS Wireless, Inc. offers a range of products and services that include OEM PCS base stations and handsets from a number of vendors, as well as a complete line of accessories and custom options for specific installations. Everything from cables and connectors to mounting brackets and antennas can be furnished upon request.

6. Will PCS Wireless develop Custom OEM equipment?

PCS Wireless, Inc. is constantly evaluating new DAA technologies and associated partnership and OEM opportunities. We would be pleased to entertain any request that our customers may have. Many new products and services are currently under development that may fit within the required specifications.