Personal **C**ommunications **S**ystems (PCS)

What is PCS?

The one sentence answer:

> PCS is the emergence of new wireless telecommunications and computer product networks which will provide over 100 million business and household consumers with almost unlimited ubiquitous voice, fax, data, and video conferencing services by the year 2000.

The one paragraph answer:

> PCS embodies untethered telecommunications and computer networking services of potentially unlimited variety. Today's analog voice cellular services, which represent a $15 billion industry, are now being supplemented by digital cellular technology which is providing a 10 fold increase in system capacity as well as improved range, and voice quality. Tomorrow's digital PCS technology potentially increases this capacity more than a 1000 times by dramatically reducing the cell size and using more efficient data transmission methods. The net affect will be to rapidly push the range of potential services beyond voice to many new types of computer communications and video teleconferencing services. These smaller cell sizes also substantially reduce transmitter power levels, thereby providing very long battery life and lighter, more compact products.

The one page answer:

PCS is breaking down the physical barriers imposed by wireline communications and will soon offer substantially greater varieties of services and features to both home and business users than is currently available. A case in point: The Japanese government predicts that the implementation of PCS technology will improve business productivity by a dramatic 30%, and also infers that the countries who are the first to capitalize on this opportunity will be the economic power houses of the 21st. century.

Imagine a world without wires that is a reality in less than 5 years time. All telecommunications and computer products will be battery powered and will incorporate small antennas which transmit and receive high speed digital data containing voice, fax, computer data, pager and email messages, point of sale transactions, video teleconferencing images, as well as many new yet to be defined services.

Homes and offices will no longer be wired for telephone, modem and fax lines. Computer networks will no longer use coax cabling to connect workstations to servers and printers. Wireline products such as pay phones, office desk phones, home fixed and cordless phones, and desktop computers will all become obsolete. In their places will be small, portable personal PCS "Personal Communicators" - new hybrid telecommunications/computing devices. In fact, a number of leading edge companies have already announced their first generation PCS products.

PCS products will have decisive advantages over standard computer and cellular telephone products. They will be smaller, lighter and cheaper - with batteries that will last much, much longer. Telephone usage costs will be within 10-20% of the cost of standard wireline calls and packet type data transmissions such as email and pager messages and point of sale credit/debit services will be handled seemlessly with very quick response times. All this from any location, at any time.

In the near term, the convenience and cost effectiveness of PCS services will steal customers away from wireline and cellular services. In 3-5 years, new buildings, subdivisions, cities and many developing countries will not even bother stringing miles of wires underground, on poles and in the walls of buildings - it just won't be economical or desirable. PCS will truly bring about the wireless future.

A Technical Brief

PCS has its roots in the existing cellular telephone technology. The basic concept embodied in "cellular" technology is bandwidth, or channel, re-use in adjacent cells.

Why is this important? The wireless world is akin to real estate - there is only so much land available, and likewise, there is only so much bandwidth available for PCS type services, and for all intents and purposes it is already spoken for. The politics of wireless, or RF (radio frequency), resource allocation is regulated world-wide with legal issues of ownership and licensing dominating any introduction of new wireless technologies.

Again, like real-estate, scarcity of resources leads to efficient use strategies. As the wireless age arrives, the need for increased numbers of channels with greater data carrying capacity is growing exponentially. Finding that additional capacity is the primary focus of PCS technology. The roll-out of current analog cellular telephone networks was the first large scale commercial telecommunications bandwidth, or channel, re-use scheme and forms the basis for all future cellular technologies.

Digital cellular technology is now starting to provide a 10 times increase in the number of voice channels from a technique known as Time Division Multiple Access (TDMA), which takes each existing analog cellular channel and divides it digitally into 10 separate channels. The cell sizes do not change but the amount of information that can be transmitted increases.

PCS technology relies on much smaller cell sizes to allow the same channels to be reused many more times in a given area. A cell size of less than 1000 feet will typically be used, versus the current 2-10 mile average, resulting in a sub-division of area, and therefore capacity increase, of potentially 1000 times. Like digital cellular's replacement of analog cellular technology, PCS technology will introduce yet another data transmission scheme called Code Division Multiple Access (CDMA).

This new method of data transmission is much more efficient than TMDA and is another powerful capacity expansion tool. More information (bits and byte of data) can be squeezed into a given amount of bandwidth using a very complex "spread spectrum" technology that literally allows all channels to use all of the available bandwidth at the same time.

Implementation Issues

Taking a city the size of Toronto with its 4,000,000 inhabitants and implementing PCS technology would require approximately 10,000 cells to be networked together. This large number of cells must be connected very efficiently in order to handle the volume of data traffic that would be present at any given time. Two things are vitally important: (1) installing individual cells must be relatively inexpensive (in the order of $1000. each) and, (2) connecting them together to a digital super highway backbone must also be cost effective.

There is no question that fiber optics networks will be a fundamental backbone technology for PCS networks, but running fiber cable to every cell transmitter site will, at least initially, be cost prohibitive. This is where the existing cable TV infrastructure comes into use.

TV coax cable runs underground and above ground on utility poles in practically every community in North America. TV coax cable also has huge amounts of unused bandwidth which makes its perfectly suited to PCS data connectivity tasks. A third benefit is that it is already wired in a perfect distribution pattern for connecting the PCS cells to the backbone fiber optics super highways and their associated data routing switches. These reasons are strong enough for the Cable TV infrastructure to be targeted as the primary candidate for PCS cell connectivity by both telephone and cable TV consortiums alike.

1. Non-disclosure

This business plan is confidential, containing information proprietary to Performance Solutions and Amblin Holdings. None of the information contained in this plan may be reproduced or disclosed to any person under any circumstances without their express written permission.

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2. Executive Summary

We've all heard it before:

"Our company is the next Apple"

"We believe we have the potential to be the next Microsoft"

"There is no doubt that we will be the next Compaq"

"Our development paths mirror those of Sun Microsystems"

"Etc., etc., etc. . . . "

Unfortunately, almost to a company, those wonderful and exciting dreams never materialize. The reasons for not achieving those heights are diverse and wide in scope. However, when you analyze the reasons for the success of the Microsoft's, the Compaq's and the Sun Microsystems', the same three critical components are always present:

- Great products, extremely well positioned, in an exploding market
- Consistent, superior management

and

- Proper Capitalization

Whenever any one of these three critical components are missing or at sub-par levels, success is very difficult to achieve.

This business opportunity that you are about to explore contains two of the three critical components and therefore warrants your serious consideration in becoming our financial partner.

3. The Enterprise

Performance Solutions/Amblin Holdings has launched a new company in Vancouver, Canada, which is involved in the rapidly expanding wireless Personal Communications Systems ("PCS") marketplace. The foundation for our new company is the acquisition of a 3 year old Vancouver area company, PCS-Microcell, a division of Enterprise Technologies Corp. ("ETC", formerly Nexus Engineering Corp.), which has pioneered PCS Infrastructure technology and products, and holds a number of significant pending patents in this area. Performance Solutions has also vended in additional PCS Personal Communicator product intellectual property.

Our business has been formed with the objective of becoming a major participant in the exploding PCS industry which is estimated to be greater than $100 Billion in size by the year 2000 with up to 100 million Personal Communicator devices in use by that time. This means huge growth in an industry that is in its infancy today. We are perfectly positioned in both PCS Infrastructure and Personal Communicator products and services to take maximum advantage of this market opportunity. Please reference the *PCS Marketing Supplement Binder* that accompanies this business plan for more details on the definition of PCS and the marketing opportunities involved.

3.1. PCS-Microcell

The PCS-Microcell business has been at a financial break-even position during the last year by focusing solely on R&D and by selling it's R&D services to customers in the FCC Pioneer Preference marketplace. ETC has directly invested approximately $2.7 Million into PCS technology and product development over a 3 year period. Additional indirect investments in technology transfers, technical know-how and marketing and sales efforts via ETC/Nexus with its 100,000 product installations in 94 countries adds approximately $1 Million to create a total current investment of $3.7 Million.

PCS-Microcell has developed a broad PCS Infrastructure product line and has forged strong relationships with numerous telephone and cablevision TV companies in North America and other telecommunications companies internationally. They have established a reputation for providing high quality, technically innovative PCS products in a responsive manner during this initial roll out stage of the developing PCS markets.

PCS-Microcell has been very successful by concentrating on a core excellence in RF design and network support services. Among other achievements, they have: (1) demonstrated the world's first PCS network using cable TV plant, and (2) demonstrated the world's first PCS network to support moving vehicles at low cost.

Despite these strong points, PCS-Microcell, as a division of ETC, is being negotiated for acquisition because of parent corporation financial troubles and a mandate by ETC shareholders to dissolve/liquidate all business operations.

3.2. The New Business

A combination of the technical capabilities and reputation of PCS-Microcell, and the additional technology, marketing and management skills being assembled by Performance Solutions/Amblin Holdings, has produced a powerful new business with the following strengths:

- Core Technology: Key Patents and Pending Patents, Designs, Products, People, and Know-How in both PCS Infrastructure and PCS Personal Communicator products
- Market Timing: Huge market expansion in the last 6 months with major corporate acquisitions and mergers taking place, network and product plan announcements
- Market Exposure: Current Participation in important PCS Field Trials worldwide, Strong publicity to date, Good customer base
- Market Size: >$100 Billion by the year 2000
- Market Growth: Starting at near "zero" today, 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 our 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. Our strong management team, combined with a focus on core competencies and additional leverage from partnerships, technology licensing and sub-contracting, is our prime response to this exciting challenge. Our highly conservative financial summary projections, which cover the next 5 years, are as follows:

Financial Summary Projections (000's)

	1993 **1/4 of Yr 3**	1994 **Year 4**	1995 **Year 5**	1996 **Year 6**	1997 **Year 7**
Revenue	**406**	**6,666**	**17,850**	**37,700**	**70,249**
COGS	212	2,841	7,880	16,954	31,468
Net R&D	69	835	1,654	3,083	5,450
S,G&A	477	2,737	5,795	9,430	15,544
Profit	**(351)**	**254**	**2,524**	**8,236**	**17,790**

Staffing	20	41	84	146	237

4. Key Personnel

Ralph Scobie is one of the two co-founders of this new business, and is CEO & Chairman with direct reporting from the President as well as the Sales, Marketing, Finance, Accounting and General Operations senior management. He was educated at the University of British Columbia with an honors degree in Economics. He is President and CEO of Amblin Holdings Ltd. and currently holds the position of Executive Vice President with Shared Network Services, responsible for handling corporate mergers, acquisitions, and corporate turn-arounds in the last 4 years.

Mr. Scobie was a co-founder of the highly successful Integra Systems 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 he was involved in venture capital financing and operations. Mr. Scobie 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 the other co-founder, and is President with direct reporting from the Development, Manufacturing, Service and MIS senior management. He was educated at Queens' University with a degree in Electrical Engineering and is a registered Professional Engineer. He is 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 senior management positions with Motorola's Wireless Data Products and Customer Service divisions where he managed the development of the first portable RF terminals to operate on the ARDIS public RF data network. 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 2 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. He has recently vended in his Performance Solutions PCS intellectual property in the process of co-founding this company.

Dr. Andrew Beasley joins us as Vice President of Development, from the same position within PCS-Microcell/ETC. He was educated in London, United Kingdom, at the Cambridge and London Universities, with multiple degrees in Physics and Electrical Engineering with specialization in RF communications. Prior to this he helped found the PCS-Microcell division of Nexus Engineering Corporation. Before this he was Director of Research and Development for the Nexus corporation over-all. In addition to his many technical and management achievements at Nexus, he was responsible for the introduction of the Queens/ATC 1GHz 150 channel headend - to date, the world's most advanced cable TV system.

Dr. Beasley has worked in the RF research and development business for over 15 years for many Canadian and British technology companies. He holds key patents in PCS technology and is the inventor of many of the products and designs that form the heart of the PCS-Microcell product line. Andrew is a visionary in the PCS business and is committed to the success of our business.

Dr. Norman Wai joins us as Vice President of Strategic Marketing. He is a Canadian Citizen and holds degrees in Electrical Engineering from the University of Manchester, United Kingdom, with a specialization in wireless data communications. He comes from a long term consulting position with Hutchison Paging in Hong Kong where he was responsible for the implementation of the Hutchison PCS/CT-2 telecommunications network which utilizes PCS-Microcell MEX products. Prior to that his business was involved in the roll out the second largest paging system in Hong Kong.

Dr. Wai also worked for the Hong Kong Post Office as the director of the regulatory division responsible for RF telecommunications systems. At that time he oversaw the approval of MDI/Motorola's first public wireless data system. He has an in-depth understanding of worldwide wireless regulatory issues. He also has a wide ranging knowledge and interest in PCS/CT-2 technology from both an engineering and marketing perspective. Norman has recently applied for patents in PCS/CT-2 in relation to MEX type implementations and has a great many high level industry contacts in the PCS business.

The position of CFO is currently being negotiated.

5. The Products and Services

The existing products offered in the PCS-Microcell portfolio include a series of PCS Infrastructure products that provide the necessary signal conversion from network wireline communications to the wireless radio frequency ("RF") signals that are picked up and transmitted by the portable Personal Communicators (telephones, pagers, computers, etc). For a full technical description of these products, please reference the *PCS Marketing Supplement Binder*. These converter units can be used in many different types of PCS systems as follows:

5.1. Existing CT-2 Systems

CT-2 and CT-2 "plus" systems are now in place in many countries including the United Kingdom, France, Germany, and Hong Kong. These are digital technology micro-cellular networks that currently carry telephone signals. Companies such as Motorola make the telephone handsets and base stations. PCS-Microcell makes a product called the Microcell Extender ("MEX") that can be used to provide increased area coverage by acting as antenna repeaters in areas such as public rapid transit systems, shopping malls, and similar installations. A major international telecommunications firm has recently placed a $2.2 Million production order with PCS-Microcell for these products.

5.2. Wireless PBX Systems

Northern Telecom and GE/Erricson are now introducing wireless private branch exchange ("PBX") in-building business phone systems. A product called the Base Station Extender ("BEX") and the above mentioned MEX can be used to economically provide wide-area coverage extensions to these systems. Erricson is currently discussing a strategic partnership proposal with PCS-Microcell in this regard with the intent of conducting limited field trials this year.

5.3. New PCS Networks

When PCS networks roll out in countries such as the United States and Canada that have ubiquitous Cablevision TV networks installed, the task of interconnecting the millions of microcells is solved economically with a modular PCS-Microcell product called a Remote Antenna Driver ("RAD") that hangs off the utility pole and links the antenna to the cablevision infrastructure. The connection back to the telecommunications "data super highway" then occurs back at a central facility. PCS-Microcell RAD units are installed and operating in many United States PCS field trials at this time.

These are just a few examples of the almost endless array of uses for the MEX, BEX and RAD products. While the MEX product line is projected to provide a significant revenue stream in the next 2-3 year period, the RAD products will eventually be a very high volume product line as the North American PCS roll out ramps up in 1996-97. Supporting services include network design, installation, consulting and system performance verification.

5.4. Personal Communicators

The Personal Communicator products technology vended in from Performance Solutions involves niche market Personal Communicator designs such as ultra-compact wireless touch screen and pen input based terminals, simple 2 way pagers, and associated docking stations and accessories. These products are still in the early stages of development.

While the Personal Communicator market is in its infancy, the RF data networks that are required for operation, such as ARDIS and RAM, are already in operation in North America. Therefore, unlike the general PCS market, a definitive customer/application must be targeted and then immediate sales opportunities will unfold. Our initial research indicates that point of sale applications would be an excellent initial opportunity.

5.5. Network Transaction Revenues

As an integral part of our marketing strategy, after initial manufacturing business has been secured, we will position ourselves to become an extension of the PCS Network operators ongoing transaction revenue stream. This will involve some form of partnership in terms of a reduced selling margin plus extended network service and support in exchange for on-going transaction revenues. Our products will have unique network remote diagnostics, monitoring and maintenance features incorporated that will enable us to quickly achieve our goal.

An example would be the a voice telephone call where a total transaction fee of $0.30 would be split $0.295 for the operator and $0.005 for us. Higher fees will result when additional value added services are included in the application. Due to the undefined and long term nature of these transaction revenue streams, they have not been included in our proforma financial projections.

6. The Market & Marketing Strategy

6.1. Market Identification

The MEX, BEX and RAD products have a wide range of potential customers that can benefit from this distributed antenna technology as follows:

- MEX and BEX products selling to OEMs such as Northern Telecom and GE/Erricson or directly to the telecommunications companies as wireless PBX system extenders. Market potential of $250 Million in sales over 5 years.

- MEX and BEX products selling to PCS/CT-2 telecommunications companies as add-ons to existing CT-2 systems, made by Motorola and other companies, as system extenders. Market potential of $1 Billion in sales over 5 years.

- BEX, RAD and MEX products selling to cablevision TV companies as PCS microcell antenna networks, both for consumer and commercial use. Market potential of $7-10 Billion in sales over 5 years.

The published estimates for the developing niche market Personal Communicator business, classified as "hand-held" products in the trade journals, is $18.5 Billion per year by 1997. While some companies have released general purpose products in the market already, industry experts feel that a focus on specific market niches will be the prime motivator behind the public acceptable of PCS services in general. It is assumed that by 1996, we will have captured 2% of the $600-800 Million wireline credit/debit POS terminal market with the remaining sales in 2 way pagers. These are obviously highly conservative estimates, given the size of the general PCS market by that time.

6.2. Competition

There is no current direct competitive threat due to PCS-Microcell's leadership position in this emerging market. Potential competitors range from traditional cable TV trunk amplifier manufacturers, such as California Amplifier, and large Cable/Satellite TV equipment manufacturers such as Jerrold/General Instrument, Scientific Atlanta and Drake, to others which are not currently in related markets but have similar business core technologies.

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 over-the-air transmission technology. PCS-Microcell has pioneered most of the key technological breakthroughs that facilitate the use of PCS services over cable TV plant.

There is no known competition in the CT-2 market or wireless PBX markets at this time. The only alternative to a MEX/BEX system extension is adding more base stations which is not a cost effective alternative.

There is certainly indirect competition in the emerging North American PCS market in terms of competing technologies against cable TV PCS services. These include direct telephone interconnections to PCS antenna systems, TV set top converter PCS antennas, and wide area services such as TDMA cellular services.

In the case of the telephone to PCS antenna systems, the PCS-Microcell technology has decisive installation and operational cost advantages (by a factor of 10-20 times!). Set top converter PCS systems (such as those offered by Jerrold) only provide in house coverage and are an inexpensive telephone local loop bypass scheme - this is not true PCS. Finally, TDMA cellular systems will be too expensive for widespread consumer acceptance and will not have the bandwidth to support the unlimited range of services that PCS will require.

The only existing known competitive threats to the Personal Communicator business are equivalent wireline technologies. While these technologies are well established, a significant percentage of the market will move towards wireless alternatives when they become available in the next 1-3 years.

6.3. Marketing Strategy

The specific marketing segments that we will focus on will include all United States Infrastructure roll outs for RAD and MEX units. There are also opportunities to license patents and designs to 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.

The international CT-2 market represents a more or less short term (2-4 year) opportunity to provide initial manufacturing volumes and gross margin dollars to help ramp-up our manufacturing capacity toward the larger and longer sustaining North American PCS industry opportunities. CT-2 will provide a near term, strong, positive revenue stream. Our marketing projections are based on an orderly sales growth of 100% per year in this market leading up to the United States PCS roll out.

The North American wireless PBX market, while providing an additional short-medium term sales growth opportunity, has not yet been fully quantified. The opportunity that exists with Erricson is currently being analyzed and therefore we have conservatively omitted any revenue stream projections from the wireless PBX market in our financial proforma projections.

In the short to medium term we will position ourselves as a manufacturer. How-ever, the long term key to our prosperity and growth is in moving towards being a service provider which will allow us to gain access to the lucrative transaction and network support revenues. This will be achieved by carefully partnering with service providers and possibly reducing product sales margins to secure long term support and transaction type contracts. Our strategy will include a focus on high reliability equipment with built-in network diagnostics capabilities that will provide the value added functionality that will be necessary to participate in the transaction and/or service and support revenue stream. See the Development section of this business plan for more details.

As discussed in the Development section of this business plan, we will license 3rd. party applications developers to develop custom software for our generic Personal Communicator products. This will allow us to focus on core competencies while growing the business rapidly to meet the expected demand.

PCS-Microcell has already established important industry contacts. While the important work of product development will continue and grow in scope, a substantial increase in strategic marketing and sales development work will start in earnest once the acquisition has been completed.

7. Intellectual Property

There are many ways for us to protect our intellectual property rights: patents, trademarks, copyrights, and trade secrets. By its very nature a patent is a public disclosure, with it's fundamental purpose being dissemination of important technical information to the world community in exchange for some form of compensation. It is our intent to exploit and protect our technical leadership position in the PCS market with regular patent filings. We also plan to license our patented technologies to our selected strategic partners in industry niche markets. We are committed to exploiting this partnership niche to increase revenue dramatically without increasing overheads.

A number of intellectual property patents have already been applied for as follows:

7.1. Infrastructure Products

From 1990 until the end of 1991, PCS-Microcell developed pioneering technologies in the Infrastructure area covering RAD technology. This work was funded by the Rogers-Cantel group, a Canadian cablevision and cellular telecommunications consortium, which in turn applied for a number of patents in their own names. PCS-Microcell is allowed to license this patented technology for a "commercially reasonable" fee. From the end of 1991 onwards, PCS-Microcell has filed for 9 more significant patents in this area in its own name covering MEX, BEX and RAD technology.

In the United States a cablevision consortium, "US CableLabs", monitors and to some degree controls the technology and associated standards in use in the cablevision industry today. Rogers-Cantel has sold it's patent rights to US CableLabs for some undisclosed compensation. US CableLabs has expressed an interest in acquiring the PCS-Microcell patents. The intent would be to allow free use of these patents to cablevision equipment manufacturers (to stimulate the emerging PCS market) in exchange for a royalty fee and/or exclusive marketing rights in some cases.

These Rogers-Cantel and US CableLabs negotiations are complex and have not been addressed effectively by PCS-Microcell/ETC in the last year due to resource limitations. We will apply suitable resources to sort out these issues soon after the PCS-Microcell business acquisition has been completed.

7.2. Personal Communicators

While there are no patents pending at this time, submissions will be made at the end of the current stage of development relating to industrial design and electrical design issues. As a general matter of course, all important operating system and applications software will be protected by copyrights. It is our intention to obtain the vast majority of the required Personal Communicator technology via licensing and strategic partnership agreements. This is due to the wide range of technologies embodied in these types of products (See the *PCS Marketing Supplement Binder* for more information). Our focus will be in producing Personal Communicator products which utilize leading edge industry technology in unique and innovative ways.

8. Development Plan

8.1. Product Development Process

Our product development process is one of the most important factors in determining the ultimate profitability of our company. Proper management of this process affects technical and financial risks, time to market, manufacturability, serviceability, quality, gross margins and most importantly, the performance/price point required for successful marketing of our products.

As stated previously, we will avoid the pit-fall of product driven marketing. Our emphasis on strategic marketing, as considered separate from sales competitive analysis, will give our product development groups the necessary vision and long term focus that keeps our new product introductions from being a game of catch-up with the competition. Rather, our new products will continue to a position us as market leaders.

We will execute a "gated" development process. Fed by formalized requirements from the strategic marketing group, the development teams must respond with a product development specification document that is to be signed off by all company departments. All issues from 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, and resource requirements will be defined and approved in advance of the start of any new development effort.

As a general rule, our manufactured gross margin targets will be greater than 55%. This target, plus the product technical specifications, forms the true yardstick by which the product development process can be judged. All of the individual details must add up to a product that is profitable to manufacture and support, while meeting market requirements.

8.2. Product Development Status

8.2.1. Infrastructure Products

While most versions of these products are relatively far along in the development process, our corporate requirements for a formal gated development process, as stated above, have not been met entirely under the corporate direction of ETC. Once the PCS-Microcell acquisition has been completed, a more formalized process will be put in place.

Another important issue relates to corporate quality goals. The North American cablevision industry has traditionally been focused on low cost solutions to system designs. This has its roots in the monopolistic market positions that cable operators have enjoyed over the years that have resulted in profit taking activity (United States cable TV consumer satisfaction ratings of just 42% underline just how bad the problem is).

In contrast, the North American telephone companies have consistently focused on providing high quality, reliable service to its customers. As PCS arrives, the quality, reliability and performance levels of cable systems must rise to that of the telephone companies. This means performing Accelerated Life Testing (ALT) on our new products and designing in an array of quality, network diagnostics and maintenance features that will be necessary to achieve the reliability levels that will be demanded of the PCS network providers. This will be one of our leading competitive advantages.

As a general introduction to the following product status reports, the PCS market is still very young and therefore most of these products will continue to evolve, change or be superseded in the next 2-4 years.

MEX

Of the 3 products under development, the MEX is the closest to release into volume production. Field trials and pilot production gates have been completed. The final stages of preparing detailed manufacturing, service and support documentation, working out volume production processes and testability are underway at this time. This is in anticipation of receiving the first large production orders of this product for delivery in 4Q93.

BEX

The BEX is a companion product to both the MEX and the RAD. Engineering prototypes have been developed and extensive field trials have taken place. CT-2 versions of this product are in the final stages of pre-production. Some advanced versions of this product line, which are targeted to future base station technologies, still have open requirements specifications and may remain in development for some period of time.

RAD

The RAD is being positioned as a modular product with plug-in modules that will allow network upgrades to new services as they become available. The RAD is also targeted at the North American cable interconnect market which is the least stabilized and furthest from volume production orders. For this reason, the RAD product will stay in the early engineering prototype/field trial stage for the near term.

8.2.2. Personal Communicators

The enabling technologies for this series of products has been carefully researched and defined - see the *PCS Marketing Supplement Binder* for details on these technologies. In addition, many of the industrial design, mechanical, electrical and software top level design specifications have been completed. The next step in the development process is to create working models and preliminary marketing/sales brochures to attempt to secure a large customer order before further efforts are expended.

A unique aspect of the Personal Communicator business will be the diversity of applications supported on the relatively generic hardware platforms that we are developing. Rather than writing every custom application that our marketing teams identify and our customers demand, we will actively support 3rd. party application developers both locally and internationally via a well documented and supported operating system and hardware platform developers kit.

8.3. Organization

Our development group is separated into 2 teams: PCS Infrastructure products (PCS-Microcell), and Personal Communicator products. This is due to the differing skill sets required given that the Infrastructure group requires strong Analog/RF skills while the other group is more Digital/Software oriented. A combined team of Computer Aided Designers ("CAD"), Industrial Design, and Management Information Services ("MIS" - computer networks) supports both groups.

All development work takes place on IBM PC/Novell Networks using a combination of DOS and Windows operating systems. Our CAD and Software teams will migrate towards Windows NT as applications are released.

8.4. Technologies/Engineering Skills

The core technology embraced in our business is RF. There are a great variety of both analog and digital support technologies that we also employ but they are secondary to the requirement for a strong core expertise in RF engineering. With the acquisition of PCS-Microcell and the combined talents of our management team, we are positioned to sustain a new market leadership niche. Fortunately, our company is based in Vancouver and therefore a superb talent pool of RF and telecommunications engineers are available locally to draw from to help fuel our growth. Additional key RF and telecommunications staff have been targeted and are currently awaiting completion of our acquisition before formal employment offers are made.

9. General Operations/Manufacturing Plan

9.1. Organization

All of our Infrastructure and Personal Communicator products are being designed for high volume computerized assembly, testing, configuration, and product tracking using predominantly surface mount electronic component technology ("SMT"). SMT manufacturing processes require bulk purchases of components on "tape and reel", the machinery is very expensive (requiring high utilization for cost effective purchase), and a high level of operational expertise is required. Consequently, our board level assembly will be sub-contracted out to established expert firms in this area.

We will maintain a manufacturing and general operations staff to source materials and perform board and unit level assembly, test, and configuration. Final product will be shipped from our facilities. Only in very high volume, sustained production orders will consideration be given to turn-key offshore product manufacturing.

Our service and manufacturing groups will 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 will be bar-coded for product tracking purposes.

One of the powerful management tools that we will use to control manufacturing, inventory, sales orders, purchasing, A/P, A/R, and G/L is an integrated MRP/accounting computer system. 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 us to be able to manage a world class, build to order, just in time manufacturing process.

9.2. Total Quality Focus

We will apply for, and receive certification to the ISO9000 quality standard. This will provide us with an industry recognized quality program which is essential for our Asian and European markets where ISO9000 certification could be a condition of sale. The ISO9000 quality standard interlinks all activities from material incoming inspection procedures, to manufacturing process control, test equipment calibration and product tracking. All of our important sub-contractors and suppliers will also be required to be ISO9000 certified.

The concept of "6 Sigma" corporate quality standards will apply to all aspects of our business, particularly product development and manufacturing. "6 Sigma" revolves around the concept of continuous improvement and zero defects principals. All general operations meetings start with a review of departmental quality progress reports.

The specifics relating to our manufacturing processes include providing a 3.4 in 1 million rate of actual defects found per opportunity for a defect to occur. As example, if there were 10 solder joints on a circuit board, an allowable failure rate of any 1 solder joint would be 1 in every 340,000. A typical product may have 500-2000 "opportunities for defects" so the actual quality targets are far lower than first expected. Never-the-less, these quality goals are targeted on best in class standards. As can been seen, a product with fewer opportunities for defects is inherently a higher quality product.

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

9.3. 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 our corporate quality and inventory control goals are met. This is especially important for our "just in time" manufacturing process. We will insist on formal partnership agreements with all of our key sub-contractors and suppliers.

9.4. Inventory Control/Asset Management

Our inventory control system is integrated into the over-all MRP/accounting system software package. Material storerooms will be created both for our internal manufacturing lines, as well as those of our sub-contractors. Our suppliers will also be required to keep an on-hand inventory of specific class A, B, and C components, as determined by this system.

Our objective for asset management is to achieve greater than 6 turns per year.

10. Financials

As a general company policy, we will always be market driven, not product driven. Strategic product performance/pricing points will drive our product development specifications and internal financial goals of an aggregate minimum 55% gross margin will determine targets for manufactured cost of goods. This is reflected in the detailed manufacturing schedule listed later on in this document.

In 1993, we are conservatively estimating that only 50% of one existing MEX order will be booked and shipped. The remaining 1993 revenues are from well established R&D funding and field trials sources. The cost of PCS-Microcell business acquisition is not directly included but the indirect costs of overhead staffing, new marketing and sales efforts, and a move to new facilities is detailed.

1994 is targeted to be the first year of substantial manufactured goods sales which addresses the emerging United States PCS market and our ability to ramp-up internal manufacturing capacity to service the international CT-2 market opportunities.

Excluding the investment capital required to acquire PCS-Microcell, this business is expected to incur a $351K loss in 1993 and an additional Q1-2 1994 period loss due to the following factors:

- The existing business must be moved to new facilities and lease hold improvements and infrastructure investments will have to be made
- The current business has practically no basic over-head costs allocated to it from the parent company, ETC, therefore, as title transfers to the new business, monthly overheads of $50K will initially transform the business from a break-even status to a small loss.
- The addition of executive, sales & marketing management that is required to drive us towards the available opportunities adds another $50K per month overhead cost initially, and rises as we enter 1994 and push to close major strategic business partnerships and contracts.
- Infrastructure (PCS-Microcell) product development costs will increase as we develop our product lines at a faster rate to meet the anticipated large orders in mid 1994. Accelerated R&D spending is necessary to address the current CT-2 and Wireless PBX opportunities.
- Personal Communicator product development costs will start upon completion of the acquisition. It is anticipated that a maximum of $150K will have to be invested before a large customer order is secured for delivery in mid-late 1994.

Our cash flow projections indicate that we will need to raise $5 Million to purchase the PCS-Microcell business from ETC and provide adequate cash reserves to support the initial investment in the business. We will also secure another $1M investment by Jan-95 towards working capitol (primarily A/R). As stated above, the cost of capitalizing on the enormous PCS marketing opportunities requires a significant initial investment in sales & marketing and R&D.

We intend to place a percentage of the overhead costs into product development to leverage the available 35% investment tax credit for R&D costs that is available to Canadian companies. This is one reason the S,G&A totals only 25%. Our sales and marketing costs are not as large as might be expected due to the product sales and distribution channels that we will employ. The nature of this business is to sell to a few, large customers that must be considered as complex sales opportunities, rather than to sell to many low volume opportunities.

Over the five year projection period we expect to have a minimum 100% growth in revenues each year with a 5 year average ROI of 40%.

We intend to lease our facilities as the business will grow at such a rate that a new location will be required every 1.5-2 years. We will also be acquiring additional equipment for manufacturing and development each year of the projection. By 1995, depending on revenue acheivements, we expect to have $3,000,000 in fixed assets (less depreciation).

Attached are the following financial tables:

- Consolidated ProFormas Yrs 3-7
- Cash Flow Projections Yrs 3-5
- Manufacturing Schedule Yrs 3-7
- Over-All Staffing Schedule Yrs 3-7
- R&D Schedule Yrs 3-7