

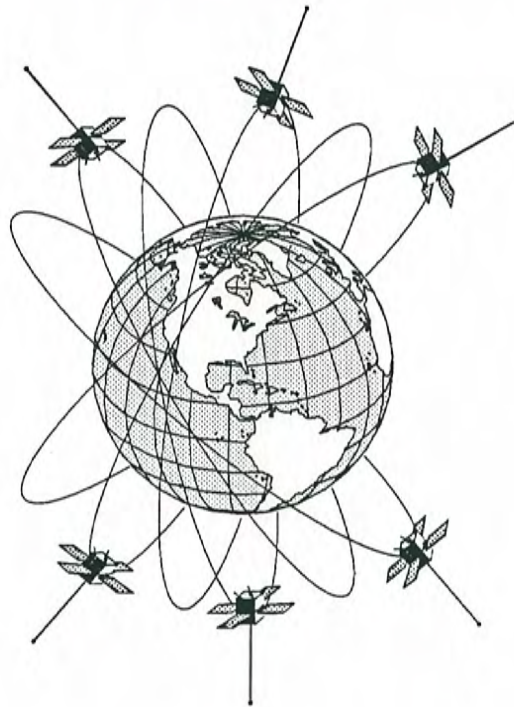
Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

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MAY 11 1990

Domestic Facilities Division
Satellite Radio Branch

APPLICATION
of
STARSYS, INC.



For a
LOW EARTH ORBIT (LEO) SATELLITE SYSTEM

"STARNET"

May 4, 1990

Volume I

EXECUTIVE SUMMARY

This Application seeks Commission approval for the leading provider of low earth orbit ("LEO") mobile satellite services ("MSS") communications to implement a new ultra-low-cost system to benefit millions of Americans. STARSYS, Inc. ("Applicant") is an affiliate of North American CLS, Inc., ("NACLS"). NACLS has provided cutting-edge LEO MSS to the scientific community for over eleven years. Applicant has now engineered a pioneering new commercial LEO MSS system, STARNET. The STARNET system will save many lives, assist individuals confronted with dangerous or frightening situations, better protect property and enhance the U.S. economy.

Applicant's affiliates have experience with over 13,000 user terminals of the currently-existing LEO MSS system called "ARGOS". Applicant built on this unmatched platform of experience to design its mass market STARNET system. No other system has the potential to serve as many mobile users, with such ultra-low-cost terminals, from as expansive a basis of experience in successfully implementing LEO MSS technology.

Applicant and its affiliates have been the true leaders of LEO MSS technology for over a decade. With prompt FCC approval for this Application, the fruits of these pioneering efforts can now be enjoyed directly by millions of American families and businesses.

THE STARNET SYSTEM

Applicant proposes to construct, launch and operate a pioneering STARNET system of 24 satellites placed in circular orbits approximately 1,300 kilometers above the earth. The system will be capable of providing 24-hour two-way communications and position determination service everywhere in the world. Service will be provided through ultra low-cost, portable transceivers, expected to cost about \$75. Primary and back-up Processing, Analysis and Control Centers (PACCs) in the United States will interconnect with the global telecommunications network via standard interfaces (including X.25).

STARNET SPACE SEGMENT

The STARNET system consists of leading edge space, control and user segment technology. The space segment includes 24 satellites which are distributed randomly on 50 to 60 degree inclined planes in circular orbits at 1300 Km. The satellites will be designed for high reliability and five-year life. A capacity of between ten and twenty million subscribers can be comfortably handled with the STARNET system design.

Applicant and its affiliates have more experience than any other organization in the design and construction of low earth orbit mobile satellite payloads. Since 1979, Applicant's affiliates have constructed 14 and operated 7 low earth orbit mobile satellite payloads. These spacecraft have operated with a reliability exceeding 99%. Applicant intends to apply this experience to ensure the highest quality LEO satellite technology is made available to the American public.

The STARNET space segment can be constructed and launched by any of several qualified suppliers. Over a dozen firms have LEO satellite construction capability, and several companies offer LEO launch services. See, e.g., Appendix 5 for letter of MicroSat Launch Systems, Inc.

STARNET USER SEGMENT

The STARNET user segment consists of millions of ultra-low-cost terminals operating at VHF frequencies. These portable and mobile terminals will transmit to the satellites at 4,800 bps over 10 - 18 KHz channels using only 1 Watt. Subscribers will be able to send messages of up to 32 characters. These same terminals will be able to receive messages from the satellites at 9,600 bps over 4 - 30 KHz channels.

Applicant's affiliates have more experience than any other company in the world in the field of low earth orbit mobile satellite terminals. To date, Applicant's affiliates have provided service to over 13,000 terminals in a wide variety of scientific and specialized uses. With the Commission's approval of this application, the vast Argos experience with low earth orbit mobile terminals can benefit millions of Americans directly.

CONTROL SEGMENT

The STARNET LEO satellites will communicate with regional earth stations to interconnect various system users, to make position determinations, and to control space segment operations. The regional earth stations will be linked in a hub-type network to the major data processing center.

Applicant's affiliates have substantial experience in the operation of LEO satellite receiving earth stations. To date, and in cooperation with the U.S. Government, two (2) global recorded data receiving stations are in place at Wallops Island, Virginia, and Fairbanks, Alaska, and in cooperation with the French government, another one (1) is operated in Lannion, France. In addition to these three (3) global stations which also capture regional data, a regional earth station was established in Melbourne, Australia, with another to be established in Tokyo, Japan this year. In fact, within the private and public sectors there are more than a thousand S-Band, L-Band, and VHF receiving

stations operating globally, which provides the opportunity to establish "hand-shake" data acquisition arrangements. Applicant intends to apply its considerable national contact point knowledge and expertise to ensure the American public has access to, and enjoys, the highest quality and most cost-effective array of LEO mobile satellite services.

STARNET SERVICE CAPABILITIES

The two-way communications and ultra low-cost positioning capabilities of the STARNET system are unmatched by any technology developed to date. STARNET's array of services includes:

- two-way messaging from \$75 calculator-size terminals;
- interconnection with the public switched telephone network;
- position determination anywhere in the world;
- emergency alert services, for safety of life or property;
- environmental monitoring services, to reduce pollution;
- mobile property and construction equipment management services, for anti-theft purposes;
- automatic vehicle pollutant emission level monitoring;
- electronic license plate functions for intelligent vehicle-highway systems;
- bio-sensor monitoring for telemedicine applications;
- home remote control; and
- judicial system locating service.

Applicant projects that approximately 10% of the U.S. population, about 25,000,000 people, will subscribe to the above array of pioneering mobile satellite services. Applicant has tailored its STARNET services to meet the needs of the American in the 1990s and beyond. These needs fall into three key areas:

- Safety-of-Life
- Protection of the Environment
- Economic Efficiency

STARNET services directed at bio-sensor monitoring and rescue applications directly address the safety-of-life market. As our population continues to mature, and the bio-electronics field continues to mushroom, needs for telemedicine links are projected to skyrocket. The unique STARNET system will enable remote monitoring of all kinds of bio-sensors so that the infirm need not be precluded from an outdoor lifestyle. With regard to rescue applications, STARNET predecessor technology already has saved lives, even with severe commercial usage restrictions. With these restrictions removed for the commercial STARNET system, it is certain that many more lives can be saved among outdoors enthusiasts, motorists, and the general public.

STARNET services aimed at environmental protection include emission monitoring and ambient air and water quality monitoring. The STARNET system has been designed to have the capacity to monitor the emission levels of each of the estimated two (2) million industrial vehicles in the United States. When pollution control equipment is not working properly, a radio message would be sent via STARNET to the vehicle's owner. It would also be possible, subject to applicable legislator and regulatory constraints, to arrange for a copy of the radio message to be sent to the local Department of Motor Vehicles. STARNET terminals are so inexpensive that they can be located throughout the USA's more populated regions. By attaching pollutant measurement sensors to a STARNET terminal, a satellite message can be sent whenever the sensor reports excessive levels of the pollutant.

STARNET services directed at economic efficiency include two-way messaging, anywhere around the globe, via a calculator-size terminal that sells for under \$75. Savings, in terms of unnecessary car trips, missed appointments and the like, translate into many billions of dollars on a national scale. Transportation costs are one of the major cost factors in any product. The STARNET system will help reduce these costs by minimizing out-of-route miles and long waits at telephone booths. By creating several billion dollars worth of economic efficiency, the STARNET system will make America more competitive in the tough global markets of the 1990s and beyond.

THE MARKETS

Applicant proposes to offer its capabilities on a private, non-common-carrier basis to organizations with regular business operations in various market segments. Applicant believes that with its particular service mix, entries into service as a private satellite operator will be more effective than common carrier operations in meeting STARNET's anticipated market demand.

The immediate market for STARNET consists of those organizations that provide products or services in the automotive, health care, recreational equipment, mobile communications and environmental protection industries. Capacity on the STARNET system will be sold to such organizations in Million Transmission (MT) units. These end-user sales organizations will then be free to market the STARNET capacity to final customers in whichever manner they believe to be best.

Applicant's market research indicates a total demand for its services of approximately 100 Million Transmission units per year. This demand is divided among the automotive (40%), health care (20%), recreational equipment (15%), mobile communications (15%), and environmental protection (10%) industries. Sales prices for MT units must be individually negotiated due to the unique type of service different markets require (e.g. mostly messaging; mostly positioning).

Several of the STARNET markets are inconsistent with monthly subscription-type fees. These markets are geared to one-time, product-type purchases. Unlike other satellite systems and proposals, the STARNET private non-common carrier offerings will enable product manufacturers to build-in communications service capabilities without the necessity of burdening the consumer with a recurring subscription charge.

REQUESTED FREQUENCY BANDS

The STARNET system requires the use of the spread-spectrum technique requiring twice one megahertz of bandwidth, but making it the most

spectrum-efficient satellite system ever proposed to the FCC. Specific frequencies requested are:

- 137 - 138 MHz and 1 MHz at 149 - 149 MHz, shared use with competing other LEO MSS systems of 1 MHz;

or on a non spread-spectrum basis

- 509 KHz in the 137 - 137.509 MHz band for Space-to-Earth transmissions;
- 411 KHz in the 148.0 - 148.411 MHz band for Earth-to-Space links.

The frequencies needed by the STARNET system are allocated domestically and internationally for satellite services. However, the specific LEO MSS service proposed by Applicant is not specified for this band. Accordingly, Applicant is also filing today a Petition for Rulemaking to establish a Private Low Earth Orbit Spread Spectrum Mobile Satellite Service in the above-identified frequency bands.

Applicant's affiliates have substantial experience with LEO MSS propagation characteristics. This experience has been gained due to a decade of operations at the 401.650 MHz frequency bands employed by Applicant's affiliates. Based on this experience, Applicant is certain that the requested frequencies are the best choice for the STARNET service. Frequencies below those requested herein will suffer serious propagation, reliability and availability constraints. Frequencies much above those requested will result in severe cost penalties that undermine the mass market nature of the STARNET service.

Applicant believes the best approach for the Commission is to authorize the STARNET system on a "Modified Primary" basis in the U.S. This means that STARNET users will be protected against any subsequent users in these frequencies. Modified Primary status will also require that Applicant not complain of any interference from existing users in these bands. The spectrum and modulation techniques used in the STARNET system have been carefully engineered not to cause any harmful

interference to the relatively few NASA, NOAA, military mobile radio and non-government users in these bands.

The STARNET system is the most spectrum-efficient mobile satellite service ever proposed to the Federal Communications Commission. Over 100 million users can be equipped with satellite radios that will operate without interfering with other users in the same bandwidth.

APPLICANT'S READINESS TO PROCEED

Applicant's affiliates are the world's most experienced operators of low earth orbit mobile satellite systems. These organizations have spent tens of millions of dollars and thousands of man-years developing the technology being proposed to the Commission today. Applicant is ready, willing and able to commence construction of its STARNET system promptly upon receipt of the requisite approval.

Applicant has expended great energy and funds on the development of a detailed market model for its STARNET system. Automotive, health care, environmental, recreational, and other markets have been investigated with both empirical studies and real-world operating technology. No other company in the world has performed as much LEO MSS market trial research as have Applicant and its affiliates.

To demonstrate its commitment, Applicant is also filing, concurrent with this application, a request for a waiver of the construction permit requirement of section 319(d) of the Communications Act of 1934, to start detailed design and preliminary construction by June 1990. Promptly upon Commission waiver of the applicable section 319(d) requirements, Applicant will invest substantial engineering time and resources, wholly at its own risk, in the development of the STARNET system.

THE PUBLIC INTEREST

The proposed STARNET system is the fastest, most cost-effective, and most technologically efficient way for the American public to benefit from LEO MSS technology. Insofar as LEO MSS technology directly serves the public interest in safety of life, protection of property and economic growth, it follows that the public interest strongly favors grant of this Application.

The STARNET system can most expeditiously advance the public interest benefits of enhanced U.S. safety and economic growth because:

- The Applicant is fully "up-to-speed" on LEO MSS technology, given that its affiliates have been successfully operating LEO MSS satellites for eleven (11) years;
- The Applicant's affiliates are the world's leaders in LEO MSS services, pioneering the application of these services to safety of life, environmental protection, outdoor recreation, protection of property, mobile communications, and scientific research;
- The Applicant's affiliates are the world's leader in low-cost satellite terminal manufacturing management. Applicant's associated manufacturers produce user terminals, with retail sales prices below \$1000, which are already the world's least expensive satellite communications terminals.
- Applicant's affiliates have a decade-long track record of meeting on schedule all of their undertakings to develop LEO payloads, launch them on approved U.S. launch vehicles, operate ground control centers reliably a round-the-clock, and make available via multiple manufacturers a diverse array of user equipment for various applications.

Due to these outstanding qualifications, the public will be most assured of getting the best available LEO MSS technology, in the shortest possible

time, if the STARNET application herein is approved by the Federal Communications Commission. Once STARNET is implemented, American industry can become more globally competitive and American lives can be made safer. This is the very essence of the public interest that Applicant's STARNET system seeks to serve.

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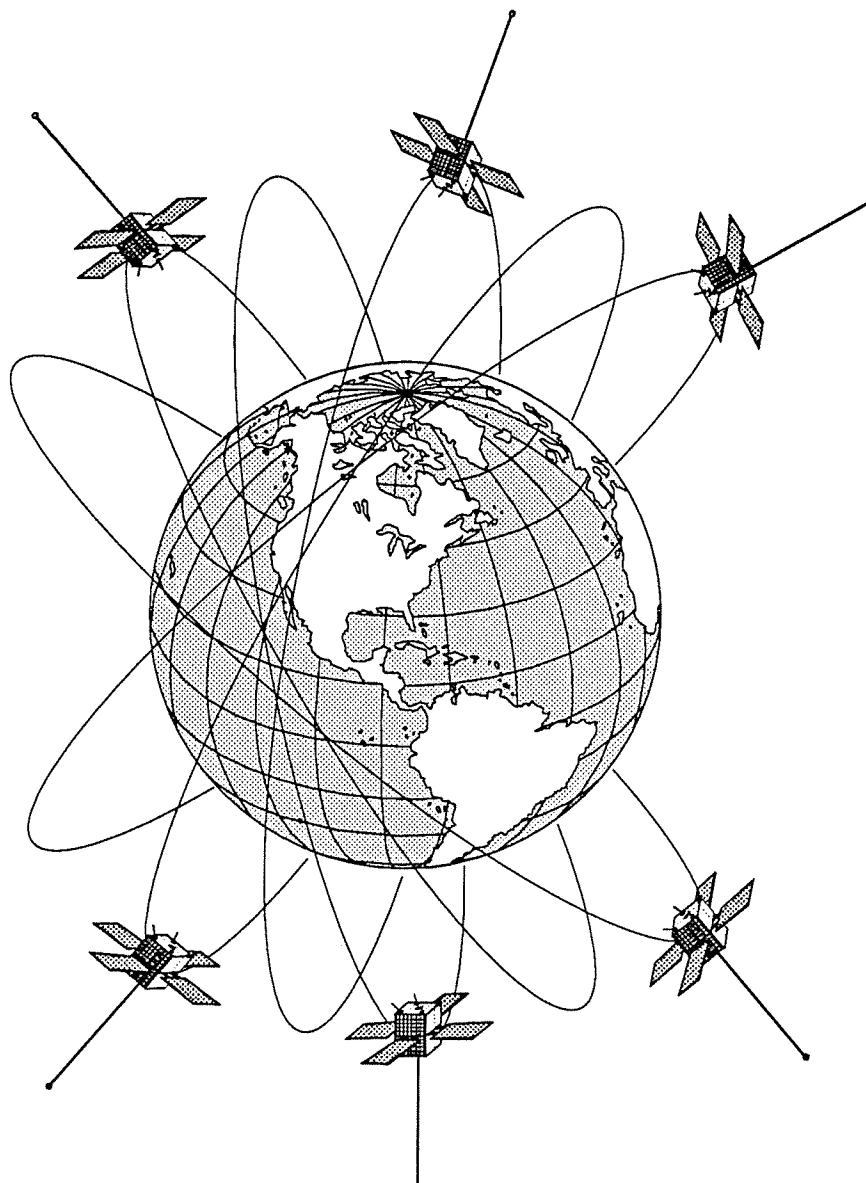
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STARNET CONSTELLATION

PART I

THE STARNET SYSTEM EMPLOYS A PIONEERING COMBINATION OF LOW EARTH ORBIT SATELLITE, HIGH SPEED COMPUTER AND LOW COST USER TERMINAL TECHNOLOGY TO PROVIDE A PRIVATE MOBILE COMMUNICATIONS SERVICE OF UNPRECEDENTED CAPACITY AND SCOPE

Applicant has strategically blended together the separate technologies of low earth orbit (LEO) satellites, high-speed computers and low-cost user terminals to produce a truly state-of-the-art and market-responsive mobile communications service. No other private mobile communications system has ever been developed with the multi-million user capacity, worldwide scope, and universally-accessible pricing of Applicant's STARNET system.

A. THE STARNET SERVICE

The key features of the STARNET service are two-way communications and positioning, marketing under a private, non-common carrier distribution structure, and a worldwide coverage capacity adequate to handle many millions of users. Applicant believes that this unique combination of service features will find a vast market in America's maturing telecommunications market of the 1990s.

1. Two-way Communications and Positioning

STARNET system users will enjoy full two-way data communications, digital speech output, and reliable Doppler-based positioning services. Applicant believes it has developed a pioneering combination of these services that is unmatched by any other proposed operating system.

Two-way data communications will consist of messages of up to thirty-two (32) characters in either the send or receive directions. Longer messages of up to 100 characters may be sent in separate

packets and will be assembled into an integrated whole message in the user terminal logic circuitry. Messages may also be sent from any user terminal to any other user terminal simply by addressing its unique ID code. Messages may also be sent to any compatible data display device - such as PCs, smart phones, or faxes - via the STARNET X.25 interface to the global telecommunications system.

Messages received on the STARNET user terminal may be displayed in one of three ways. The messages may be scrolled across the user terminal's LCD display. The messages may be printed on an optional thermal micro-printer. The messages may also be "spoken out" via a digital speech synthesis chip, incorporated into STARNET user terminals.

Positioning services include reporting the location of a user terminal to someone else, and giving a lost person his or her own location via their user terminal. Applicant's affiliates have more experience than any other organization in the world in the use of LEO satellites for positioning services. Applicant has built upon this experience to design a commercial version of its technology that promises to deliver yet greater benefits to the private marketplace.

Positioning of any user terminal occurs automatically in the STARNET system. User transmissions are received via a STARNET satellite and then downlinked to a regional processing station. The signals are then fed into STARNET computers where sophisticated software programs determine latitude and longitude. Applicant believes that its Doppler-shift positioning software, together with the ranging technique, is the most accurate in the world.

After a position in terms of latitude and longitude is calculated, that information may be sent anywhere - to a distant dispatch computer control center, to a fax machine, to another user terminal, or back to the user terminal via the new "Voice Locator" service. When the "Voice Locator" service is activated, the STARNET positioning computer performs two additional functions:

- the latitude and longitude are translated into human language references such as "Corner of 19th and M Street" or "Washington Beltway at Exit 30";
- the human language references are provided as digital speech output into the public switched telephone system.

As a result of Applicant's revolutionary "Voice Locator" capability, many new positioning services can be provided to the general public. For example, if one family member is worried about another who has not arrived when expected, they can phone a number such as 1-800-STARNET. A voice STARNET response system will prompt them to type in (using their touchtone phone) the ID code of the STARNET unit they are interested in. STARNET's voice response system will then "speak out" a message such as "At 6 PM, your user terminal was on the San Diego Freeway, near Torrance." The family can then rest a bit more at ease, knowing that another L.A.-area traffic jam is their biggest concern.

Applicant's "Voice Locator" feature also has potential for several safety of life ramifications. For example, a forest ranger can query for the location of a lost backpacker; the Coast Guard can query for the location of a lost mariner; a parent can query for the last location of a lost child.

2. Private, Non-Common Carrier Offering Tailored to Market Requirements

The STARNET capacity will be sold in bulk to providers of related products. Each such arrangement is certain to be unique due to varying market requirements and the tremendous flexibility of the STARNET system. Customers will include manufacturers of automobiles, mobile communications equipment, pollution control sensors, and health care devices. Capacity will also be sold in bulk to organizations involved in related services. These customers will include insurance companies, automobile associations, and travel and entertainment concerns.

Oftentimes the kind of organizations that are best at building space hardware may not be at all successful in marketing consumer products. Applicant's market research has indicated that many applications of LEO mobile satellite services will be frustrated if the user is burdened with any kind of a recurring charge. On the other hand, the incorporation of a LEO mobile satellite service capability into a related product - such as a car, all-terrain-vehicle, bio-sensor - may enable significantly increased sales for that product, if the purchaser does not get "stuck" with yet another recurring bill. The private, non-common carrier structure of the STARNET offering enables the greatest flexibility in arranging to deliver LEO mobile satellite services in accordance with market requirements. This is because bulk purchasers of STARNET capacity can establish their own pricing policies for the service on the basis of their expert knowledge of consumer market needs.

3. Capacity of Millions and Worldwide Coverage

The STARNET system's greatest attribute is its design as a mass consumer system. Applicant's market research indicates a capturable market of 10% of the U.S. population, or twenty-five (25) million user terminals. The STARNET system has been designed to handle this traffic load flexibly and reliably.

Furthermore, the STARNET system is an inherently global system. This feature is increasingly important in the 1990s, a decade in which government policymakers and industrialists alike are telling us to prepare for global travel, a global economy, and, ultimately, a global lifestyle.

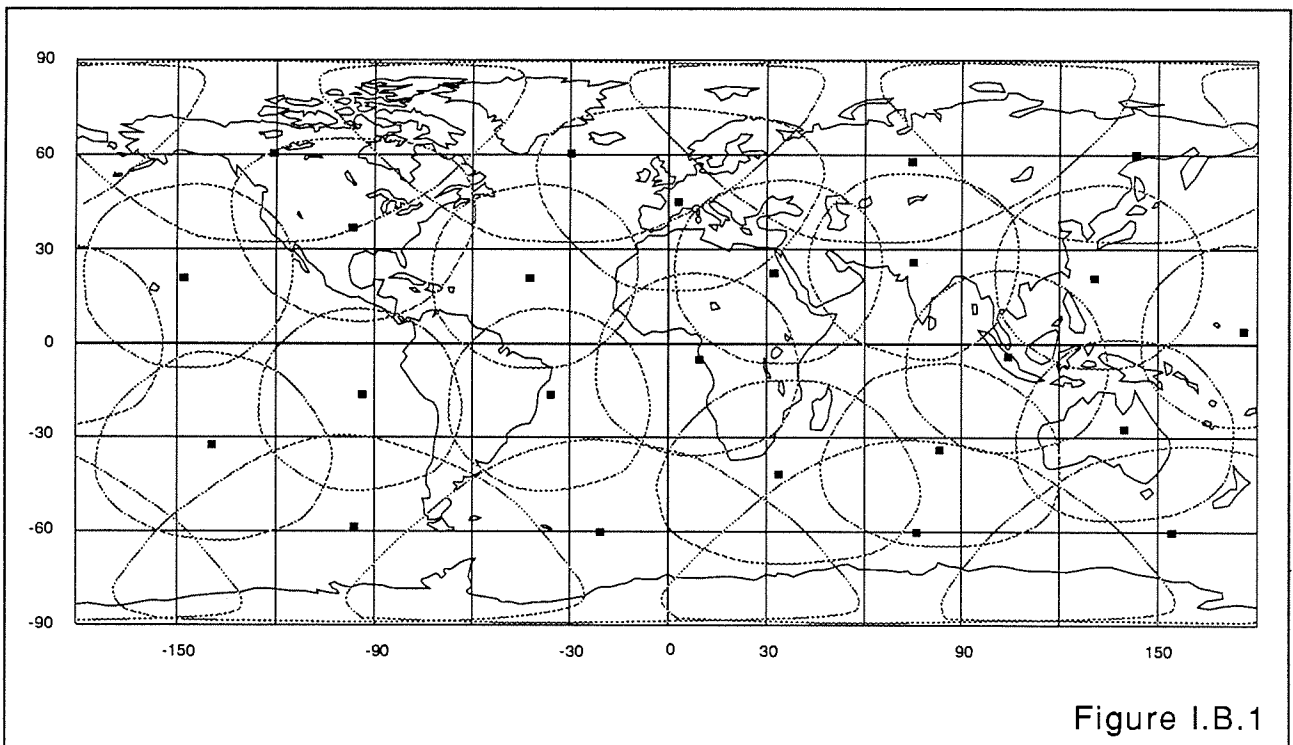
B. PIONEERING COMBINATION OF HIGH-TECH AND LOW-COST TECHNOLOGY

One of the most exciting features of the STARNET system is its combination of high-technology and low-cost technology. The result of this combination is that the largest number of people get access to some

of the world's most sophisticated telecommunications services. This feature of the STARNET system is manifestly in the public interest.

1. STARNET Multiple Satellite Constellation

The STARNET Multiple Satellite Constellation (see Figure I.B.1) described in detail in Part VII of the Application, is the result of several high-technology trends. The satellites will be built of new high-strength, lightweight materials to enable maximum lifetime in orbit for a given payload mass. The satellites will incorporate newly-developed, simple, reliable, and efficient telemetry and diagnostic systems. The result of these high-tech advancements is to develop a more reliable, cost-effective and useful LEO mobile satellite service to the user community.

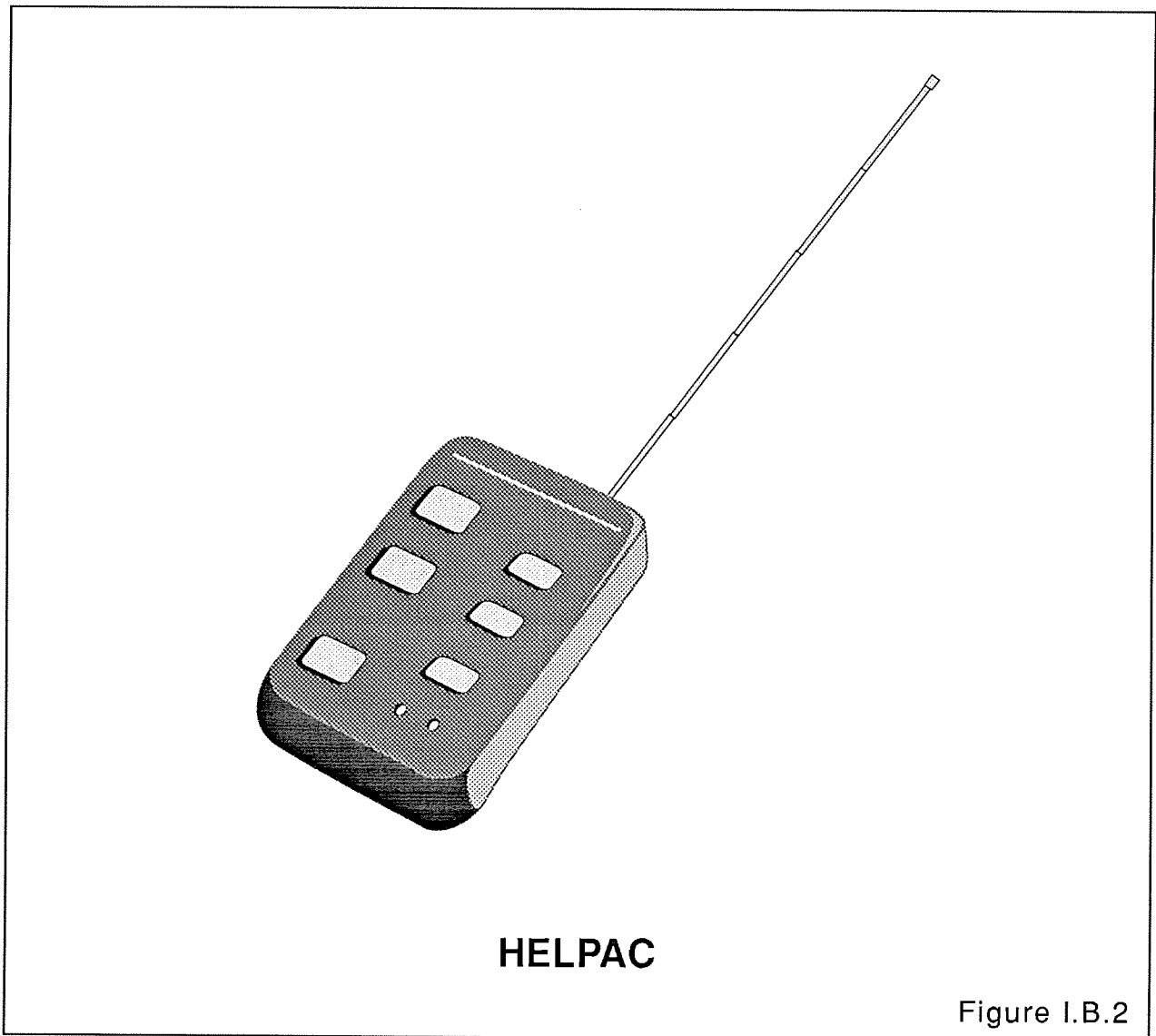


2. STARNET Low Cost User Terminal

Some STARNET applications do not require a two-way system, so the LOCPAC Extra Low-Cost User Terminal, at an estimated retail price of less than \$50, will provide preprogrammed transmission according to the number of daily requested locations or messages (data collection)

such as environmental control, drifting buoy tracking, animal tracking, etc.

The STARNET HELPAC Low Cost Two-Way User Terminal had an estimated retail price of less than \$75, a dramatic breakthrough in the cost of satellite access equipment (see figure I.B.2). Applicant and its affiliates can speak with great credibility in terms of user terminal pricing several suppliers today provide Applicant's affiliate, with Argos, user terminals for less than \$1000.



As the chart below shows, Applicant's existing satellite user terminals are already by far the least expensive satellite access equipment available:

MANUFACTURER	SATELLITE ACCESS	PRICE
Telonics	CLS Argos	<\$1000
Magnavox	NNSS TRANSIT	\$1200
Marinetek	GPS NAVSTAR	\$1700
Various	Galaxy Ku band	\$2500
Various	Galaxy C band	\$3000
Magellan	GPS	\$3000
Hughes	Geostar	\$4100
Qualcomm	GTE Gstar Ku Band	\$4100
Sony	Geostar	\$4100

It is particularly important to recognize that the Applicant will be able to incorporate a substantial amount of state-of-the-art technology into its user terminals. Among the new technology to be incorporated, (with estimated parts cost) are:

- Two-way communications and positioning — \$11
- Digital speech synthesis — Optional
- Thermal micro-printer — Optional
- Power-saver circuitry for long life — \$2
- VLSI logic circuitry for greater reliability and flexibility — \$10
- One megabyte of RAM standard — \$2

TOTAL ESTIMATED PARTS COST — \$25
(1993 purchases; large volume)

The user terminals will be manufactured entirely on automated lines, with very little labor input. American factories will therefore be in a strong competitive position.

3. STARNET High Speed Control Segment

The STARNET high-speed control segment will downlink signals from the orbiting constellation of satellites, perform message switching functions, make positioning calculations, control system operations, and offer a wide array of wide-driven value-added services. In order to cover continental and U.S. territories, two (2) regional stations will receive signals from the satellites as they come into view. These regional stations will be connected to the STARNET Processing, Analysis and Control Center (PACC) located on the East Coast and another PACC located on the West Coast via a hub network using high quality fiber optic and ISDN terrestrial links.

The PACC East and West will have a number of separate processing computers as indicated in Part VII of this Application. The STARNET PACCs also offer interconnection to the public switched telephone network, and through regional and international telecommunications networks. Applicant and its affiliates have several years experience in interconnecting its existing Argos control center in Landover, Maryland to the regional and international telecommunications networks. In its eleven years of operation, Argos has successfully provided over 6 million minutes of 99.99% reliable telecommunications network links.

PART II

THE STARNET SYSTEM SERVES CRITICAL MARKET REQUIREMENTS IN THE AUTOMOBILE, MOBILE COMMUNICATIONS, HEALTH CARE, ENVIRONMENTAL PROTECTION AND RECREATIONAL ELECTRONICS INDUSTRIES

The following two stories, and many more like them, are true.

On a stormy day at sea a yachtsman is washed overboard. He has the time to grab onto nothing other than his CLS Argos satellite transmitter. Signals from his transmitter are received by a low earth orbit Argos satellite receiver and beamed down to a ground station on earth. Sophisticated computer programs quickly calculate his location and send an appropriate SOS to local rescue officials. The yachtsman is saved, thanks to the low earth orbit mobile satellite technology of CLS Argos.

A truck driver parks his rig in downtown Los Angeles to visit a restaurant for a well-deserved break. When he returns, the truck is gone - stolen. Fortunately his company had equipped the truck with a CLS Argos satellite transmitter. The Los Angeles police receive the precise location via satellite, recover the truck and apprehend the thief.

The CLS Argos low earth orbit mobile satellite system, although restricted by bandwidth, regulation and government agreements to special applications, has demonstrated for over eleven years, numerous safety of life and property benefits. Because of the many restrictions on CLS Argos, excepting certain demonstration projects such as the two stories above, STARSYS was incorporated to offer the many benefits of LEO MSS technology to the public on a commercial basis.

The STARNET system is a multi-industry, multi-market technology. The same technology that provides critical communications and positioning services to the automobile industry also provides safety-of-life services in the health care and recreational electronics industries. Applicant has

performed thousands of hours of market research into LEO mobile satellite service markets. Some of this research, especially as it pertains to the instant Application, is summarized below.

A. AUTOMOBILE INDUSTRY MARKETS FOR STARNET

Market research has indicated that automobile industry requirements for STARNET services may be divided into three main categories: Electronic Vehicle Monitoring, Anti-Theft Technology, and Vehicle Location information. Each of these market requirements may be addressed with a single STARNET user terminal in each vehicle.

1. Electronic Vehicle Monitoring

There are approximately 170 million vehicles in the United States, including trucks, buses, autos and motorcycles. The fastest growing portion of automobile costs in the United States are electronic systems, currently representing upwards of 30% of vehicle cost.

STARNET user terminals may be conveniently and inexpensively built into new vehicles as an electronic vehicle monitoring system. If any electronic-controlled system, including in particular a pollution-control system, is operating outside of commercial specifications or federal and state regulations, the STARNET user terminal can be programmed to automatically send a notification as to which system is deficient (see Figure II.A.1).

Alternatively, the STARNET user terminal may be designed to transmit information on a wide variety of automotive systems. For example, any unscheduled maintenance required - braking, engine, or passive restraint systems - could be silently transmitted via STARNET to the dealer from which the vehicle was purchased. The dealer can then call or send a letter to the registered owner advising them of a need for unscheduled maintenance. Use of the STARNET system for unscheduled maintenance alerts can save lives due to avoidance of mechanical automobile failure. STARNET systems can also establish a better

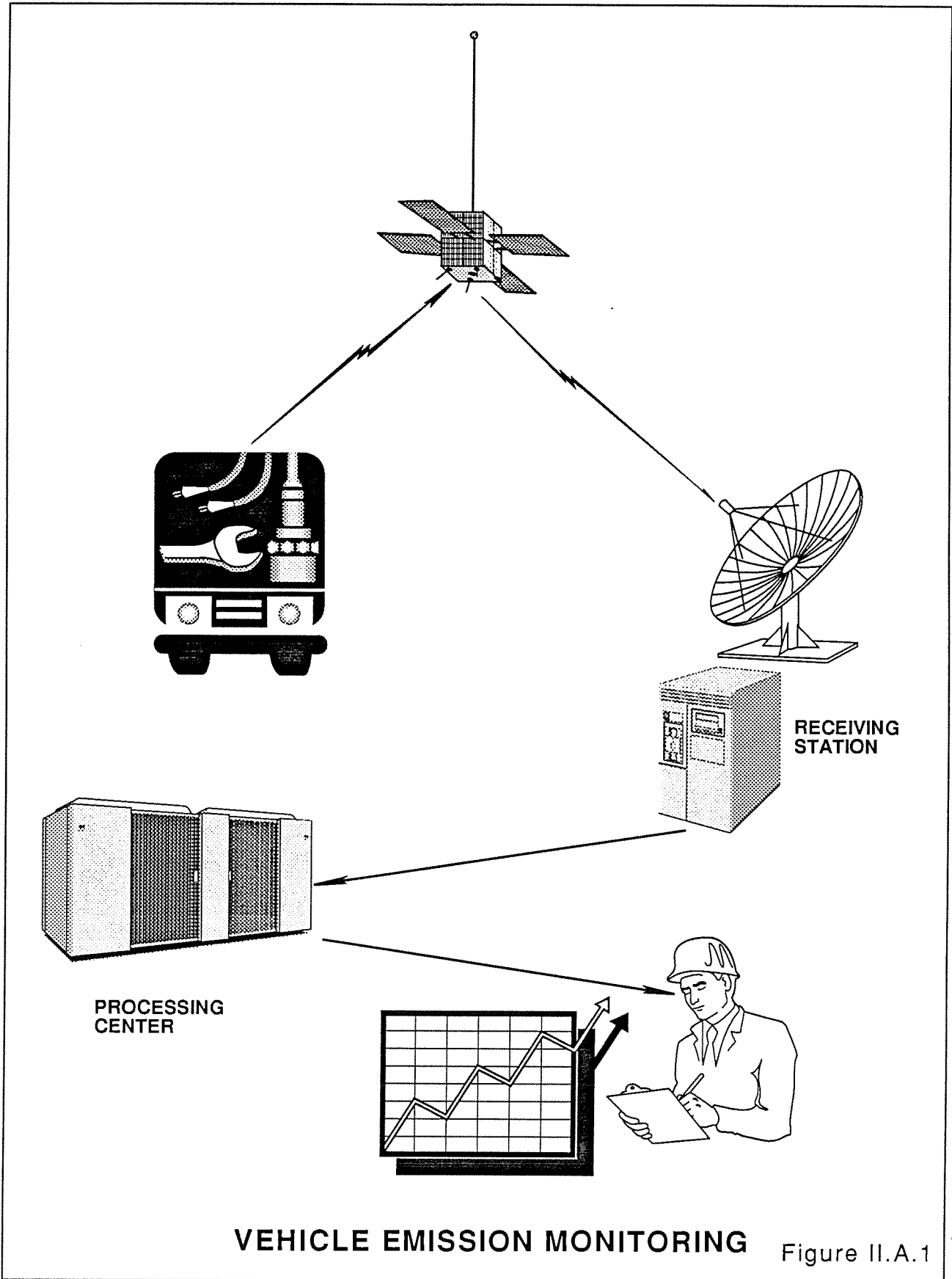


Figure II.A.1

partnership relationship between the automobile companies and their consumer customers.

2. Anti-theft Technology

There are about 2,000 major construction equipment robberies in the U.S. annually. Every house, farm or warehouse in this country is susceptible to robbery. The STARNET system will allow the subscriber's property to send SOS signals; information about the location of the building, time and date, is rapidly transmitted to a security center, (police, insurance company, fire department) and consequently the criminals can be quickly intercepted (see Figure II.A.2).

The STARNET system offers a superior solution to anti-theft technology. Current land-based systems, such as Lo-Jack, are limited to nearby coverage areas (such as a single state), and cost as much as \$600 per car. Nevertheless, such systems are already credited with the recovery of many stolen cars. Consequently, insurance deductions of about 15% are reported for Lo-Jack users.

Unlike terrestrial anti-theft systems, the STARNET system will provide complete U.S. (and global) coverage, and is projected to cost only \$75 per vehicle. This nearly twelve-fold reduction in price, and vast increase in coverage, will contribute to a major increase in the utility and availability of anti-theft technology.

Market research has indicated that anti-theft technology offers the following key benefits:

- Early location of stolen vehicles will limit damage done to the vehicle;
- Early location of stolen vehicles more often results in the arrest of thieves;
- Effective anti-theft locating systems reduce insurance bills.

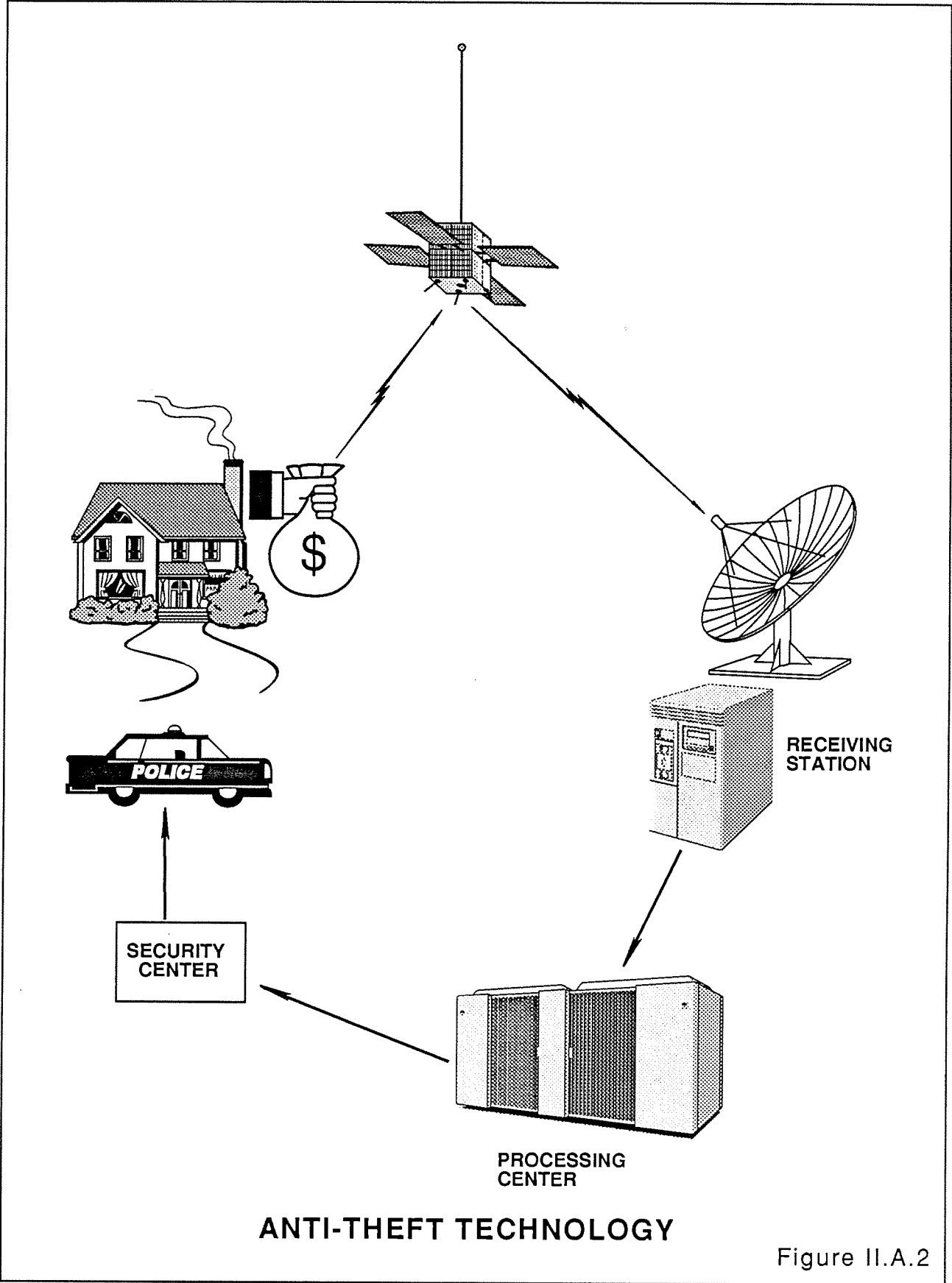


Figure II.A.2

Applicant's research for this system revealed there are over 1.4 million car thefts per year, of which less than 20% are ever recovered. At an average recovery value of 60%, and an average car value of \$10,000, the total cost of car theft to owners and insurers is in excess of \$10 billion dollars per year!

Applicant's marketing strategy will enable automobile manufacturers to offer satellite anti-theft systems as a standard feature in their new models. This approach is likely to result in much faster market penetration than current or alternative concepts based on after-market sales or recurring subscription service bills.

In practice, a phone call to a number such as 1-800-STARNET would be made after a car is stolen. A voice response system would direct the caller to key in their license plate number on a touchtone phone. The current location of the car would be reported via a voice synthesis capability, as well as a notification that fax and telex messages (as appropriate) were being sent to the closest police department and the state department of motor vehicles.

If an automobile manufacturer wishes instead to handle all the 1-800-STARNET functions themselves, such an approach is perfectly acceptable under the STARNET private, satellite operator structure. The important point is to implement a nationwide satellite anti-theft system. There is no organization better able to do this than Applicant, due to the experience of its affiliated companies. In fact, the first vehicle ever recovered via satellite monitoring was a tractor-trailer rig in Los Angeles - located via Applicant's affiliate Argos satellite system transmitter, marketed by Geostar Corporation of Washington, D.C., and recovered by the Los Angeles Police Department.

3. Vehicle Location Information

America's love affair with the automobile has no end in sight. Recent announcements have been made by General Motors of a high performance electric car, and projections were just released by the

Department of Transportation showing continued automobile growth throughout the 21st century. As cars become smarter (more electronics), and highways become more congested, the need for communications with cars is certain to become increasingly acute.

Substantial progress in automobile communication has been accomplished using cellular communications technology. However, cellular technology is too expensive and not optimally designed for basic vehicle location information functions. The STARNET system complements the voice-oriented cellular communications network by providing a very inexpensive, and automatic, means of identifying a car and its location at nearly all times (see Figure II.A.3).

The market for Applicant's STARNET vehicle location service is sized as follows:

POTENTIAL MARKET	170 Million U.S. Vehicles
ADDRESSABLE MARKET	130 Million Personal Vehicles (assumes commercial vehicles use more expensive and sophisticated systems)
CAPTURABLE MARKET	40 Million Vehicles Covered by Automobile Club Membership

Applicant's STARNET vehicle location service would operate much like the anti-theft service. A phone call to a number such as 1-800-STARNET will trigger a voice response menu asking the user to press 1 if they are reporting a theft, 2 if they want to know a car's location, or 3 for other services. In this case, the user would press 2, and be queried as to the ID number of the STARNET terminal. After a brief pause of no more than a few seconds, a clear quality digital voice would tell the caller that at a specified time the vehicle was near a determined intersection.

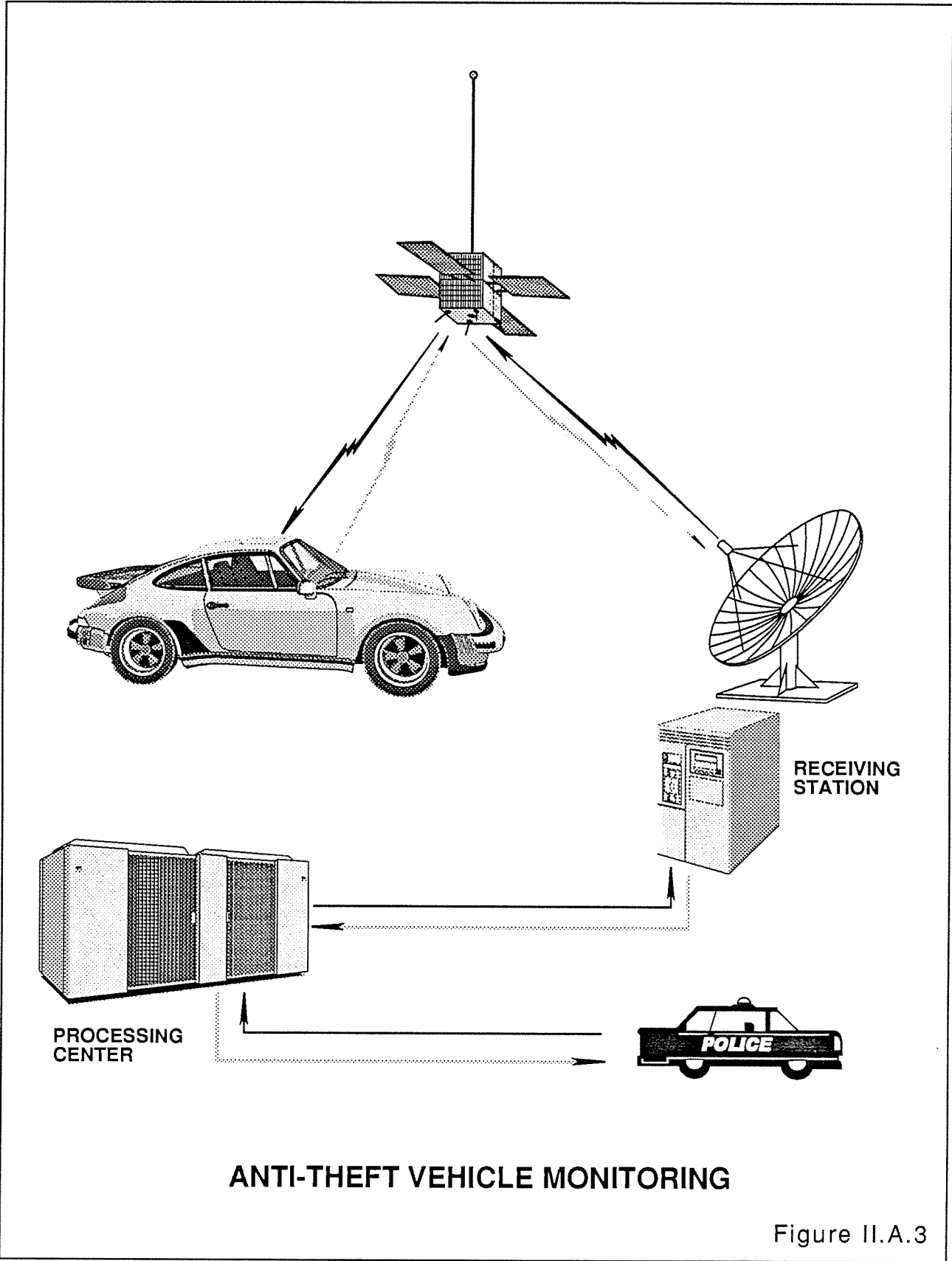


Figure II.A.3

B. MOBILE COMMUNICATIONS INDUSTRY NEED FOR STARNET

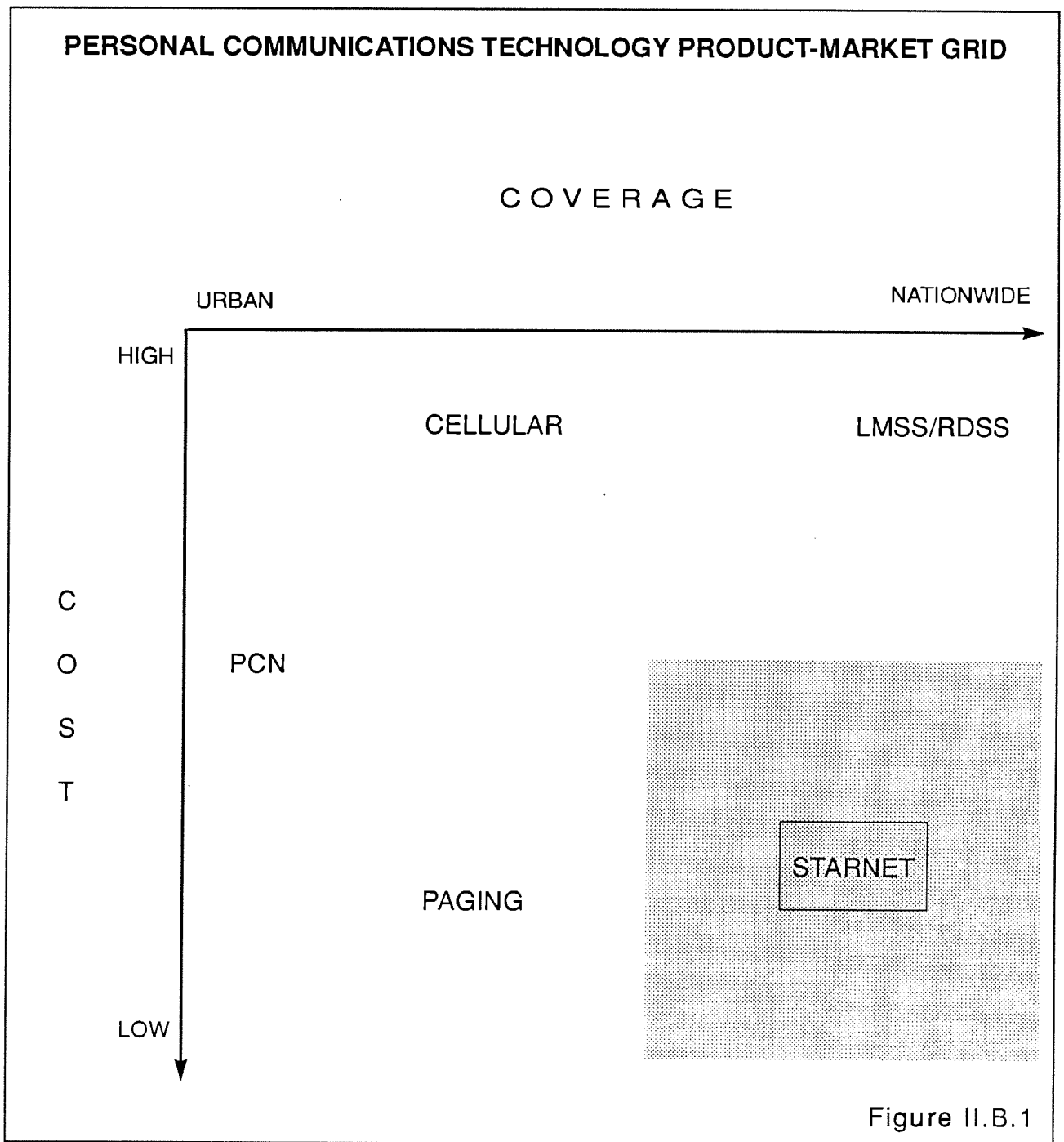
In addition to the strong market for STARNET within the automobile industry, there is also a robust demand for it in the general mobile communications industry. In this market sector, strong demand for STARNET services have been identified as a personal communications technology, as a low-cost two-way messaging system, and as a global messaging network.

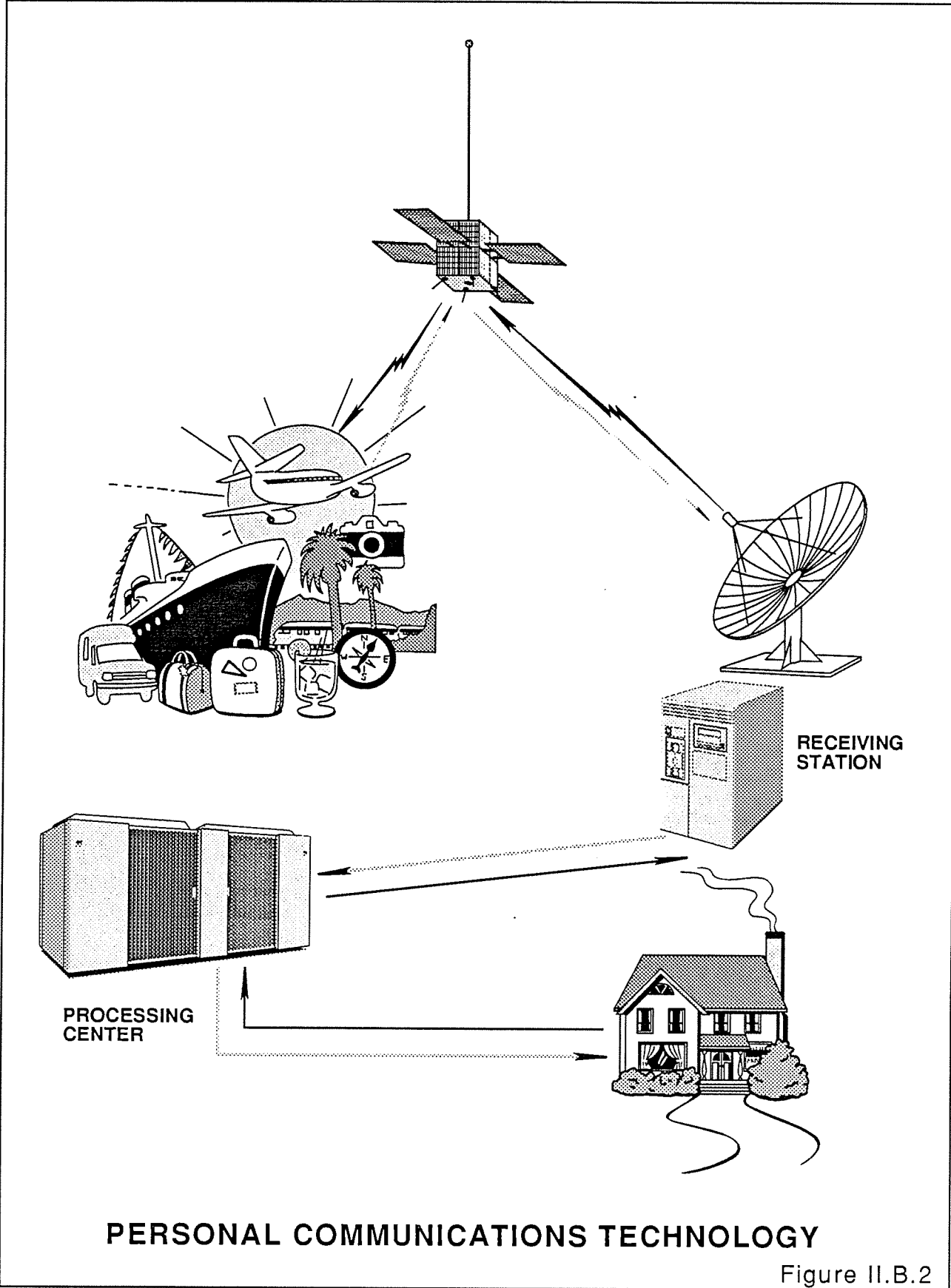
1. Personal Communications Technology

Personal communications technology is experiencing explosive growth. Previously the only options available were private half-duplex radio systems or CB radio. However, the 1980s engendered a new age of personal communications technology with cellular communications, nationwide alphanumeric paging, and cordless telephones. Nevertheless, as is usually the case, some technology usually stimulates the public's appetite for more technology. It is very rare indeed that one communications system renders obsolete any other form of communication. For example, paging is growing even more rapidly than previously now that cellular is available.

Despite the development of cellular and cordless telephony, there is still a vast unmet demand for personal communications. Cordless telephony is only useful for a very limited range of about 1000 feet (300 m), and cost factors have limited cellular service penetration to less than 2% of the U.S. population. Although new concepts such as Personal Communication Networks and Land Mobile Satellite Service are on the drawing boards, these technologies will also fall far short of satisfying America's appetite for personal communications. The Personal Communications Networks are envisioned as urban-area only systems, and are expected to be as costly as cellular for airtime. The Land Mobile Satellite Service requires expensive (multi-thousand dollar) user equipment to reach distant geostationary satellites.

Figure II.B.1 is a Personal Communications Technology Product Market Grid showing the large U.S. market that STARNET is able to address.





2. Low-Cost Messaging Systems

In addition to the general need for new personal communications technologies to fill a clear void in the product-market grid shown above, there is also a market among commuters for low-cost messaging systems. The following statistics indicate very well the magnitude of the problem.

- 110 Million commuters now exist in the U.S.
- Urban traffic delays among these commuters are projected to increase 50% by the year 2005.
- Annual cost for excess or wasted travel, mostly avoidable with better low-cost mobile communications, is estimated at \$46 billion!

The STARNET system will enable millions of consumers and business people to send and receive messages at low cost. No other private satellite system yet developed has the low cost and high capacity of the STARNET system proposed herein.

In practice, messages will be typed out on a simple keypad for immediate transmission via the STARNET system. The Processing, Analysis and Control Centers (PACCs) will be capable of storing various address lists for the user. Hence, brief names such as "G. Bush", "Dad", or "Office", will be all that is needed for an address. The PACCs, after recognizing the user's chip ID (burned in at the factory), will then look for the address. Recognized addresses will be those stored in the PACC system memory (programmable via 1-800-STARNET voice response system), or other ID codes. After the address, the STARNET system expects a message of up to thirty-two (32) characters. Users will key in messages when stopped in a car, from their offices or homes, or even from remote areas such as at the beach or in the mountains. The message will then be sent by STARNET via whichever medium is indicated by the stored address. These media

may be fax, phone (with digital speech output), telex, PC or another STARNET user terminal.

The market for STARNET's low-cost two-way messaging service could be nearly as large as the U.S. population. The user terminals will be easy enough for a child to operate. The capturable market forecast for the STARNET system is 25% of the current U.S. commuting population, or approximately 25 million persons.

3. Remote Home Management

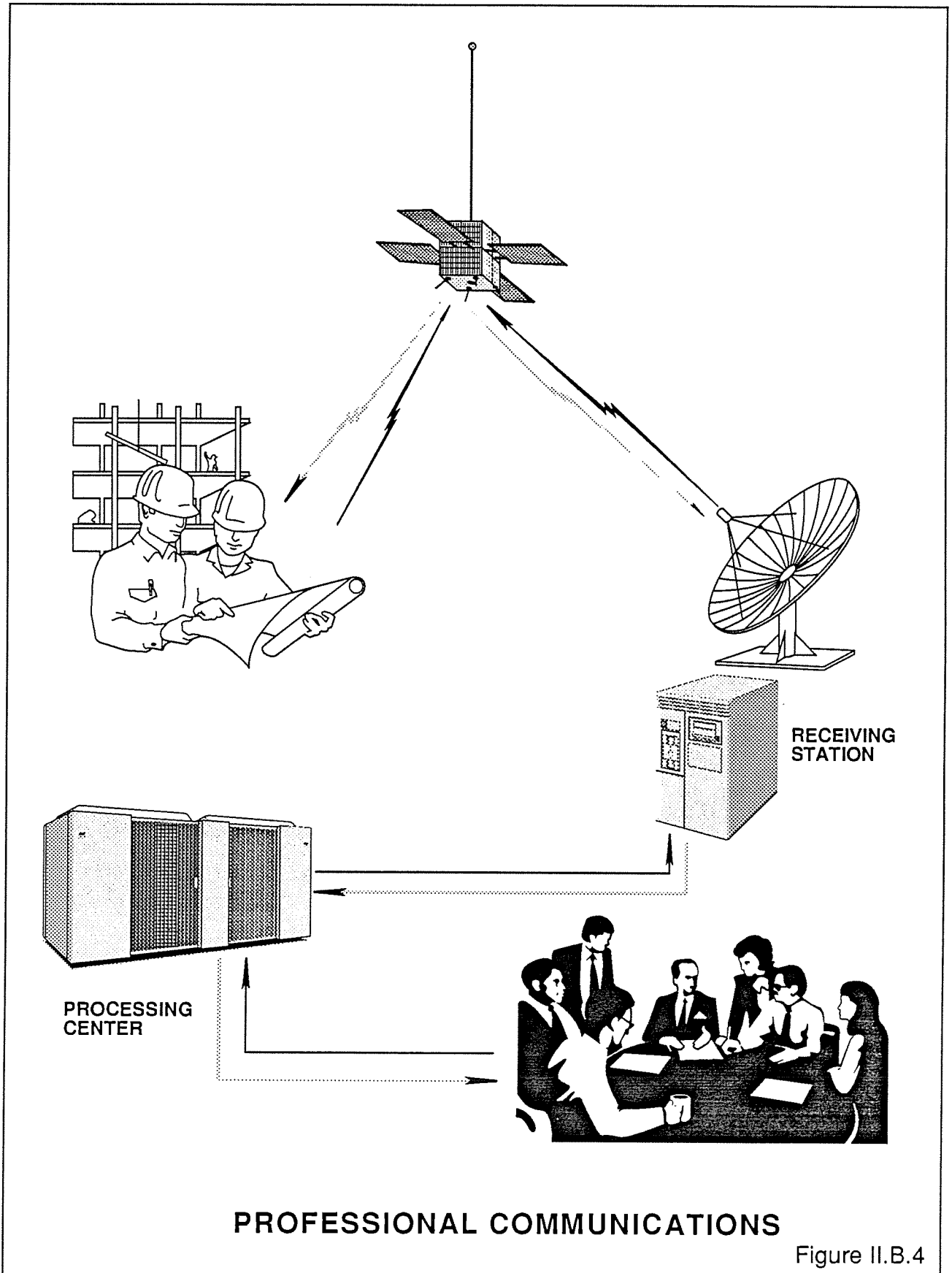
The STARNET system may be used remotely for controlling the basic functions of a house. Both vacation and primary homes can have their heat, light and air conditioning controlled remotely via STARNET.

The potential market for this service can be quantified as equal to the 185 million electric, gas and water meters in the U.S. An addressable market can be quantified as equal to the 89 million U.S. homes with utility service. Applicant projects it will capture 1% of these homes, or 890,000 customers.

4. Global Messaging Networks

Many government agencies and industrial corporations have focused on two key trends for the 1990s - digital communications (information technology) and globalization. It is commonly accepted that the world's economies, and even to some extent societies, are highly intertwined. Furthermore, the trend direction is toward even greater global integration.

It is ironic that the global digital world is missing a low-cost global digital messaging network. STARNET resolves that irony by putting into the pocket of any international business person, government official, journalist or tourist a \$75 calculator-sized device capable of global digital communications (see Figure II.B.4).



Many American business people suffer frustration in trying to get messages to home offices or to families when in distant countries, with few English speakers, and often overloaded telecommunications circuits. These frustrations are shared by the Japanese and other foreign business people trying, with little English, to get messages through busy American hotel switchboards. All too often the messages left for visiting foreign business people on pink message slips bear a mis-transcribed name, an improper number of phone digits, and a cryptic message.

The STARNET system will go a long way toward resolving these and other global messaging problems. From Nepal to Namibia, and everywhere in between, the American traveler will be able to send and receive digital messages on his or her \$75 STARNET pocket terminal. Similarly, Applicant expects that travel and entertainment companies, such as American Express, will offer the STARNET terminals to foreign business people and others visiting the United States.

The potential market size for Applicant's global messaging service is one million units per month, the number of international travelers to the and from the United States. Since many of these travelers are repeat visitors, the addressable market is considerably smaller, estimated at 200,000 units per month, or 2.4 million units per year. Ultimately, the STARNET system is expected to capture 15% of its customers in this market segment.

C. TELEMEDICINE APPLICATIONS ADDRESSED BY STARNET

One of the most revolutionary aspects of the STARNET proposal is its "democratization" of satellite technology down to the \$75 per terminal. With this vastly broadened access potential, entire new vistas of market potential become available. These new vistas, such as telemedicine and recreational electronics, were not plausibly within sight of existing big satellite user "hardware", with weight measured in pounds and costs counted in thousands. With the STARNET system, pocket portable

satellite terminals will literally change the way society thinks about distance and communications.

1. Outpatient BioSensor Monitoring

With continued dramatic drops in the price and size of microprocessor-based devices, such as bio-sensors, it is now possible to carry a sophisticated piece of medical electronics in shirt pocket size (see Figure II.C.1). At the current rate of miniaturization it is already reasonable to carry on an outpatient monitoring program for certain conditions via remote telemetry. As this trend grows, especially with the expected substantial growth in health care burdens, the STARNET system is able to provide a uniquely valuable telemedicine service.

2. Remote Pacemaker Monitoring

STARNET will allow accurate monitoring of a heart condition for outpatients equipped with Pacemaker devices. Miniaturized biotechnology will radio-trigger the STARNET terminal when pre-determined hazardous conditions are reached, and automatically provide medical information to the patient's doctor. He or she will be able to make the proper decision after medical consultation.

3. Preventative Telemedicine Technology

STARNET telemedicine application also include monitoring key vital signs of outpatients enjoying recreational activities. It is always unfortunate to suffer health problems, and extra efforts are hence called for to permit this sector of our population to enjoy as full a life as possible. While home-based Medic Alert systems are enjoying wide application, due to nearly universal telephony, there is no comparable system for time spent outdoors. The STARNET system will be able to

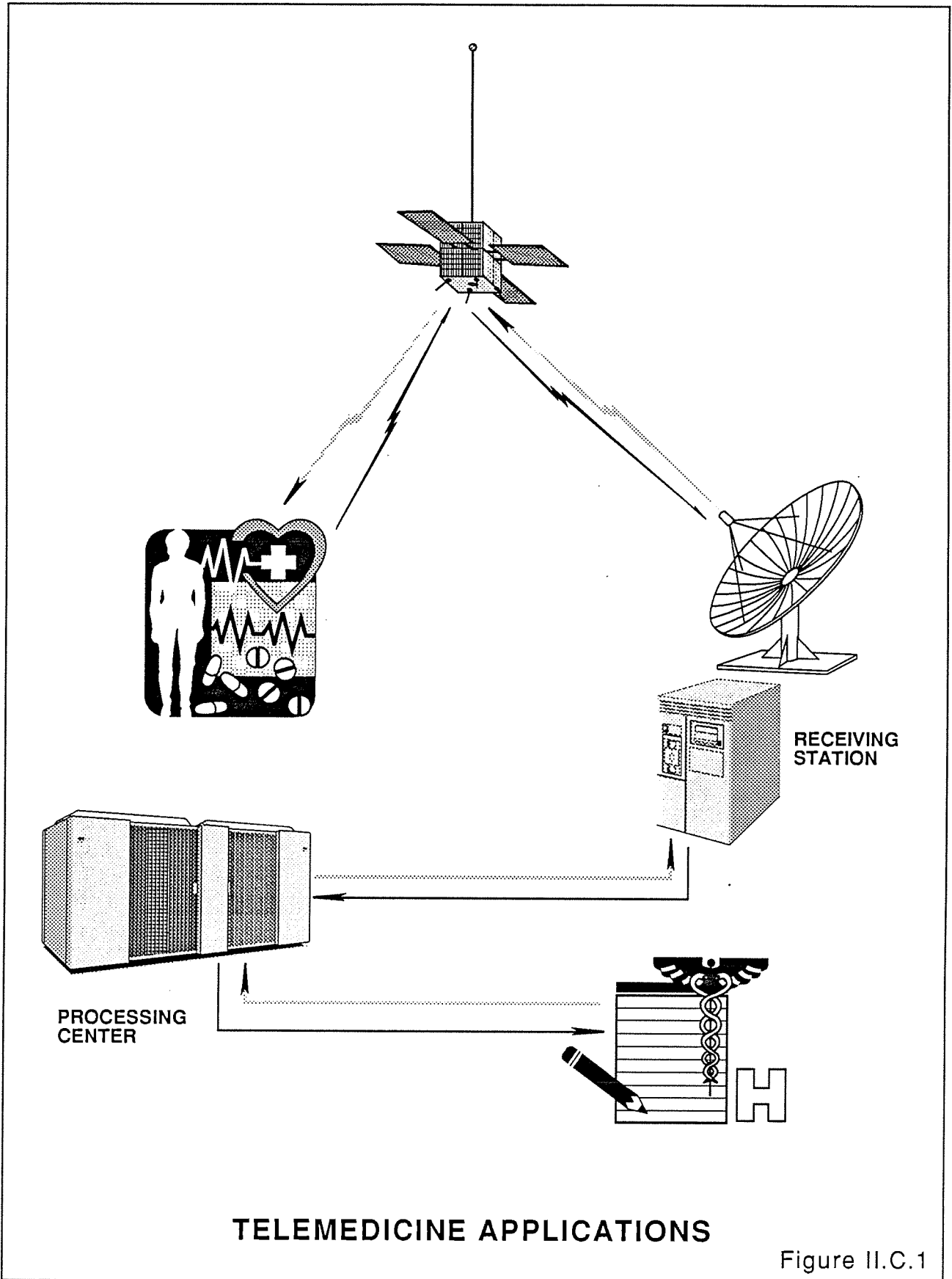


Figure II.C.1

fill this void, whether the user is on a beach, in the desert, or visiting a national forest.

D. ENVIRONMENTAL PROTECTION MISSIONS SERVED BY STARNET

The STARNET system authorized pursuant to this Application will make a major contribution to environmental protection. It is worth noting that STARNET's contribution will be both *direct* - such as in the vehicle emission, air and water quality monitoring applications discussed in this section, and *indirect*, such as by reducing wasted travel, as described in the previous section on Low-Cost Two-Way Messaging markets.

1. Vehicle Emission Monitoring

Vehicle emissions are one of the largest contributors to pollution. Indeed, the New York City government recently announced that air quality had deteriorated there (after several years of improvement) due to the increased number of vehicles on the road. Toward this end, the federal and state governments have repeatedly imposed ever lower limits on the emission of various pollutants from consumer and industrial vehicles. However, it is virtually impossible to enforce these vehicle pollution controls on a continuous basis. It is well known that many of America's 170 million vehicles need to have their emission control systems serviced. This failure in the vehicle emission control pillar of modern environmental protection policy can be ably addressed with a cheap STARNET/pollutant sensor coupler.

Unical Chairman Richard Stegmeier recently said that older cars cause up to 30 times the pollution of newer models. Proposals have been made to help clean up Los Angeles by paying \$700 each for the first 7,000 pre-1971 cars turned in, offering free emission inspections and anti-pollution adjustments on pre-1975 cars, and patrolling freeways to get traffic-clogging stranded motorists rolling again. These plans could cost many millions of dollars in the next two years. STARNET's vehicle monitoring capability is part of a new movement of finding

ways to cut pollution that are easier, quicker, and cheaper than clean-air proposals being debated on Capitol Hill.

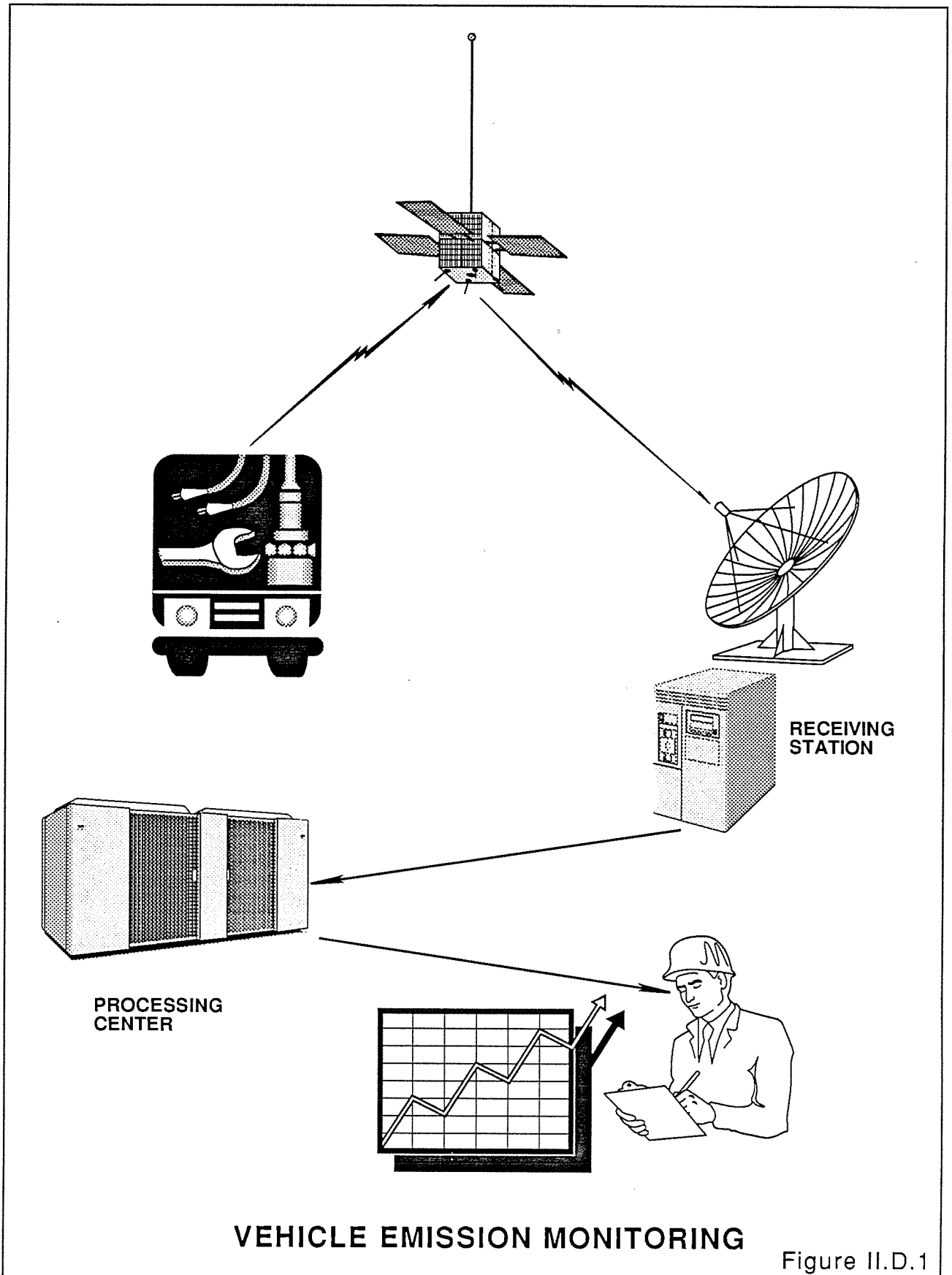
Applicant has not made any quantitative forecast for the use of STARNET as a pollutant monitoring system. Nevertheless, it may reasonably be expected that the country's 2 million trucks would be a likely first target for a system imposed by Congress or the Environmental Protection Agency. These trucks are already subject to numerous federal regulations, including pollution control equipment and various safety equipment (see Figure II.D.1).

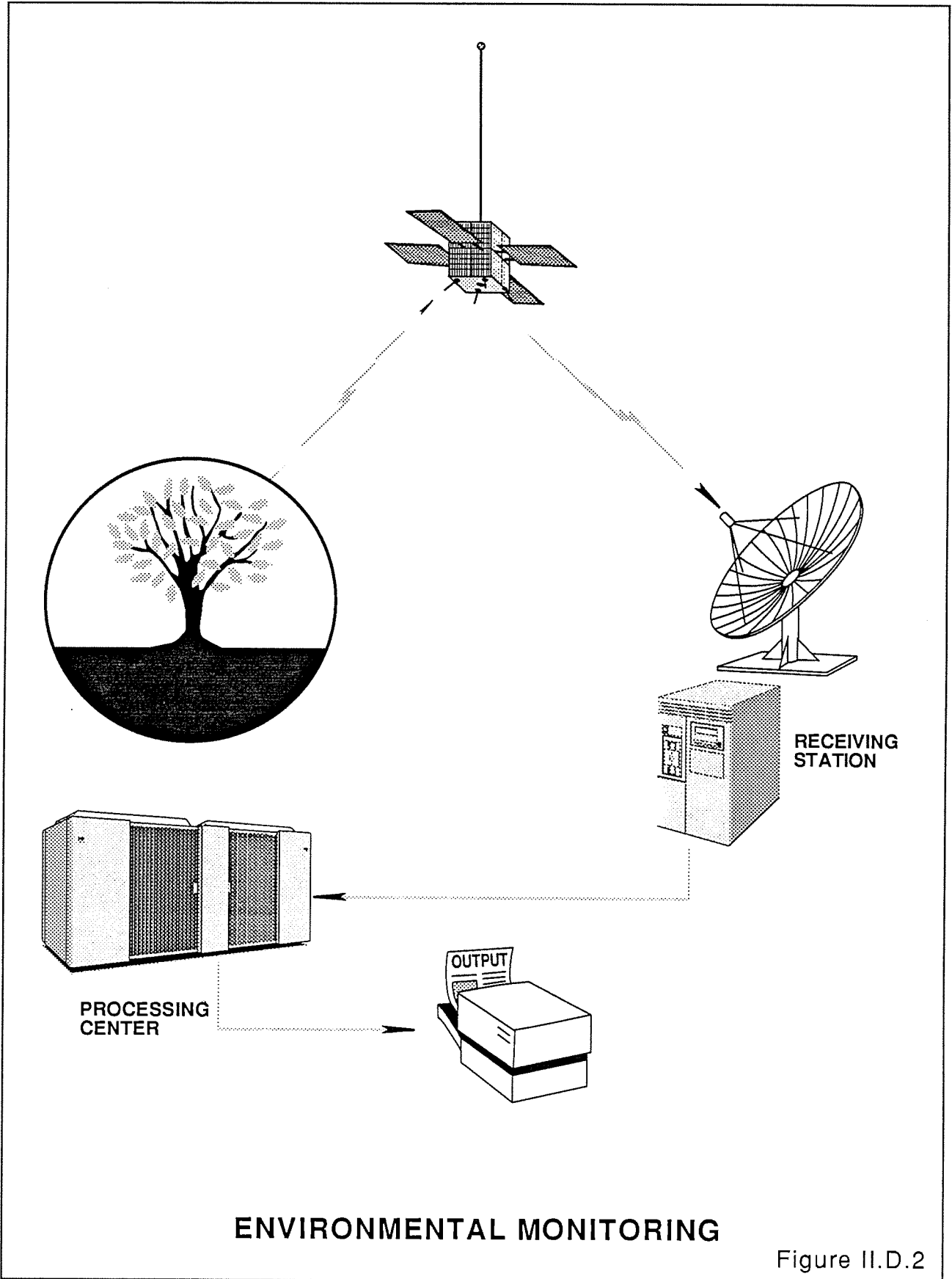
2. Air Quality Ambient Condition Monitoring

As America continues to clamp down on its environmental issues, there is a widely recognized need for continuous in situ ambient condition monitoring throughout the entire country. The purpose for monitoring is both to determine, over time, if there are changes in the environment and to ensure that local industries are complying with existing regulations.

To date, there has not been any ambient condition monitoring technology that is affordable for a nationwide program. New Jersey, for example, uses VSATs as part of a flood warning system based on 31 rain gauges. This network alone cost the state over \$1 million to install and nearly \$300,000 a year to operate. (Nevertheless, it is reported to have saved at least \$2 billion in potential flood damage).

The STARNET terminals, at less than \$75 each, are the first satellite technology affordable enough for mass deployment with appropriate air quality sensors. In this regard, STARNET's LEO mobile satellite service technology can be expected to make an important contribution to environmental protection (see Figure II.D.2).





ENVIRONMENTAL MONITORING

Figure II.D.2

3. Water Quality Ambient Condition Monitoring

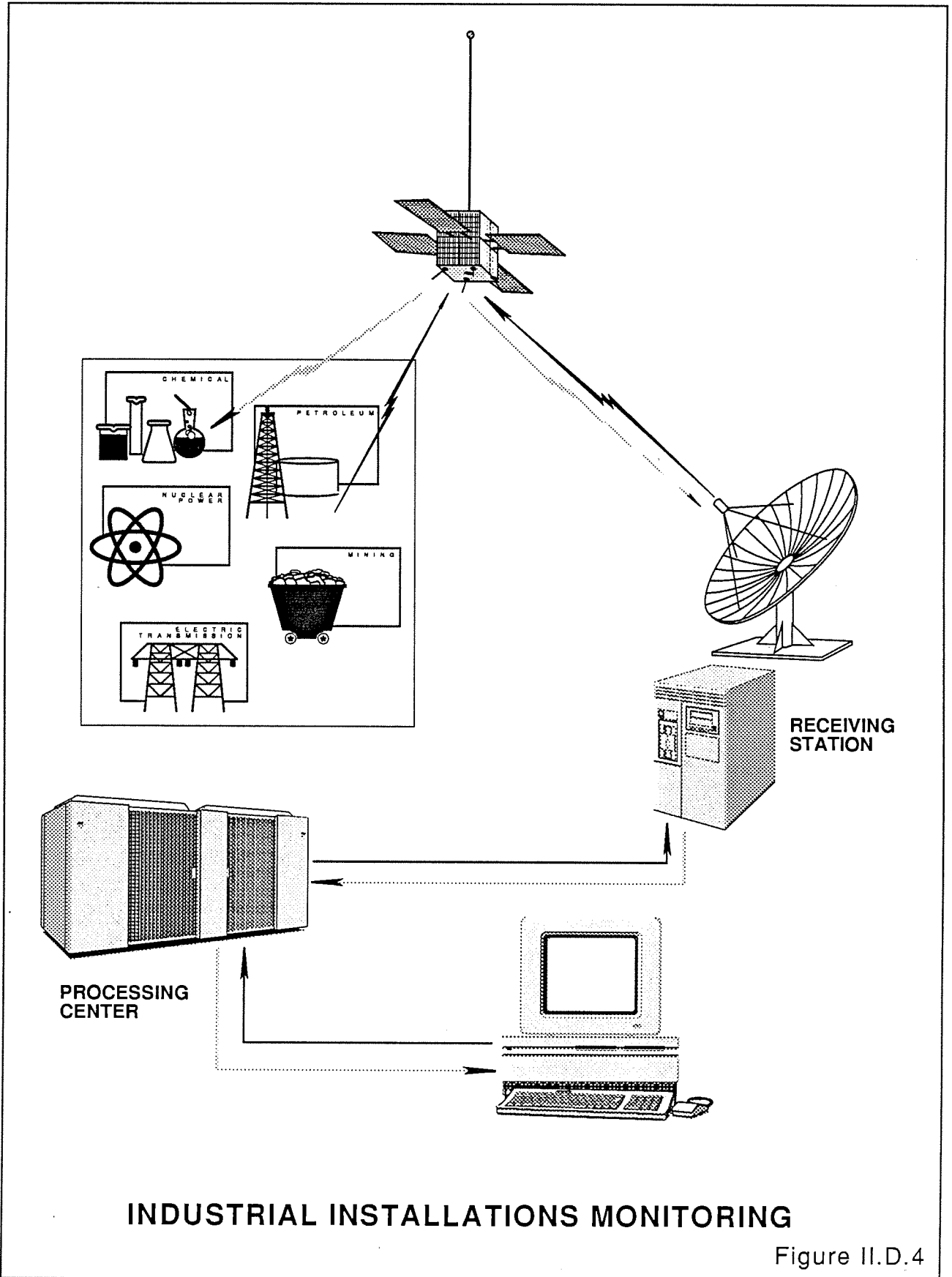
Water quality monitoring, as with air monitoring, requires many thousands of radio-reporting sensors to perform an effective wide-area job. In the past, with non-commercial systems, there was too small a user base to provide ultra-low-cost user satellite terminals. Applicant has incorporated many innovative changes into its STARNET system to vastly increase its capacity. This huge capacity, in turn, enables broad commercial utilization and hence ultra-low-cost user terminals. With water-proof versions of these new user terminals, hydrological ambient conditions will be able to be measured on a continuous basis over vast portions of salt and fresh water.

The STARNET system will also make a major contribution to NASA's Mission to Planet Earth by providing in situ data from water-borne user terminals as a complement to the vast harvest of data from satellite imaging equipment scheduled for launch in the 1990s and beyond. In situ data from STARNET terminals will also help scientists better understand changes in the contaminant levels of the ocean due to various pollutants. Resultant conclusions based on STARNET data may help to save millions of people from premature illness or death due to cancer-causing hydrologic pollutants at excessively high levels.

4. Remote Well and Pipeline Monitoring

Thousands of remote wells and pipelines lack telemetering capability; VSAT's are often too expensive. STARNET can help address this need with a very low cost telemetering terminal.

There are over 500,000 active and remote oil/gas wells in the U.S. Also, thousands of pipelines will typically have dozens of pumping stations along their routes, each requiring up to 15 monitors for very frequent communications with control centers. The STARNET low-cost terminals can readily satisfy these needs (see Figure II.D.4).



E. RECREATIONAL ELECTRONICS MARKETS FOR STARNET

The recreational electronics market is growing rapidly with the fuller development of American resort areas and the health/exercise orientation of ever-growing numbers of people. The STARNET system expects a large recreational electronics market with its ability to directly address several key customer needs:

- sense of security in case of emergency;
- maintain communications if necessary;
- reduce instances of lost outdoor enthusiasts;
- revenue growth needed by equipment rental firms;
- reduction of resort insurance rates.

1. Satellite Search and Rescue Technology

Applicant's market research indicates that a satellite search and rescue product would be a "must have" for vacationers going anywhere far removed from telephones. Such regions include National forests, mountains, wilderness areas, and deserts. At a price of \$75, market research indicates that a STARNET terminal would be considered as necessary as comparably priced items such as tent, backpack and Gore-Tex clothing. Applicant is conservatively projecting an ultimate capturable market of three million user terminals in this market segment - less than the number of National park visitors each year.

In addition, a large search and rescue market exists for locating lost boaters. There are over 12 million pleasure boats in the U.S. Assuming 90% of these are very small local boats, capturing 10% of the larger boats implies a customer base of 120,000 pleasure boats (see Figure II.E.1)

2. Remote Area Communications Capability

Aside from search and rescue applications, there is a general day-to-day need for remote area communications capability among people

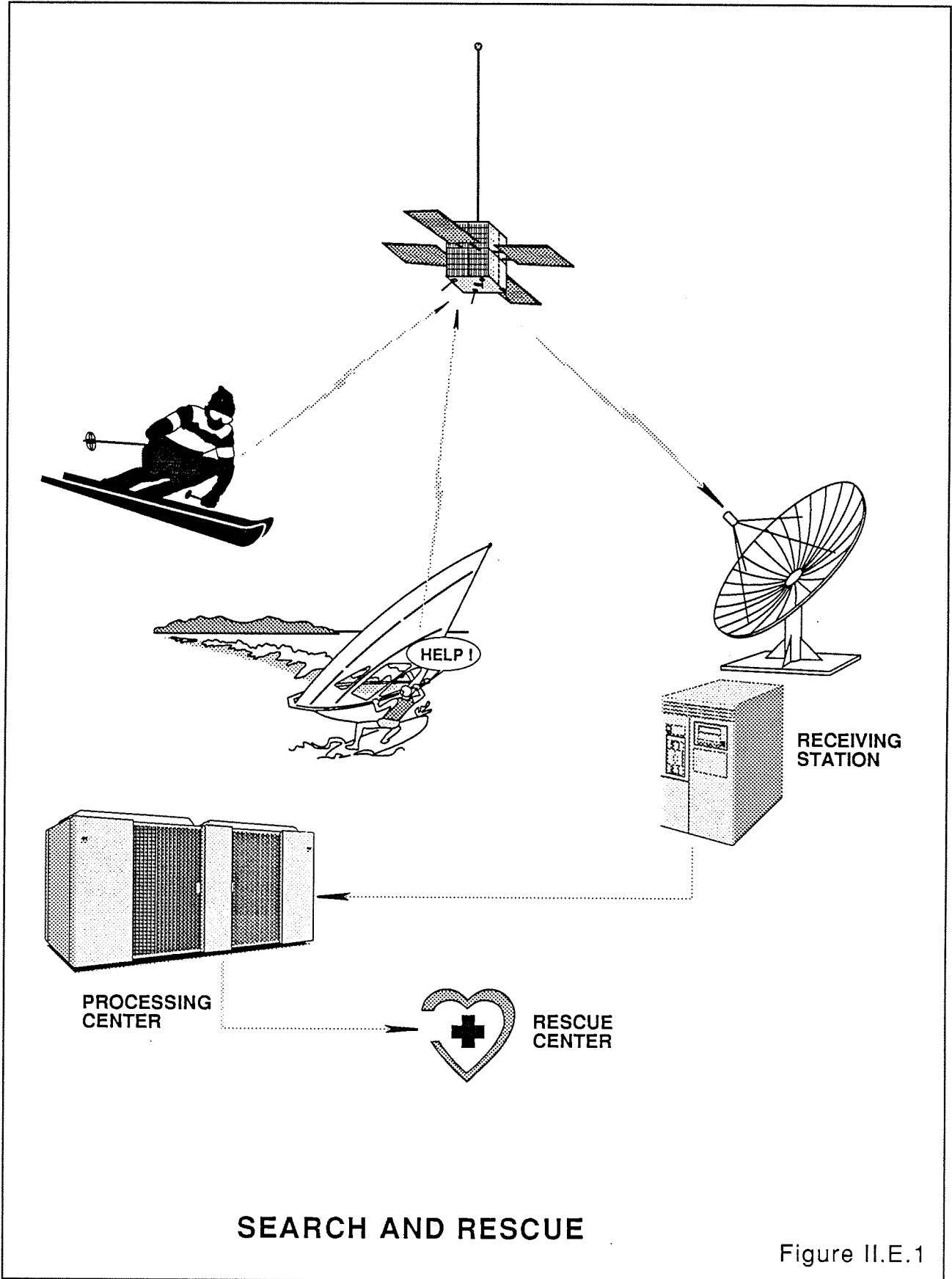


Figure II.E.1

living in such locales. While universal telephony will soon be available, through such innovations as IMM's UltraPhone, AMSC's Satellite Phone, and GMC's Digital Phone, most rural people will find these technologies too expensive or awkward for use outside of their vehicles. For example, two cooperating nature researchers or ski rangers on opposite sides of a mountain would probably prefer a cheap STARNET message to an expensive phone call via satellite.

In a similar vein, groups of backpackers, anglers, or cross-country skiers would find STARNET a convenient and inexpensive way to stay in touch during the day. Satellite phones are not likely to be practical for such common outings, although they can certainly be expected in most high-end rural vehicles.

F. MARKET FOR HANDICAP-SUPPORT TELECOMMUNICATIONS

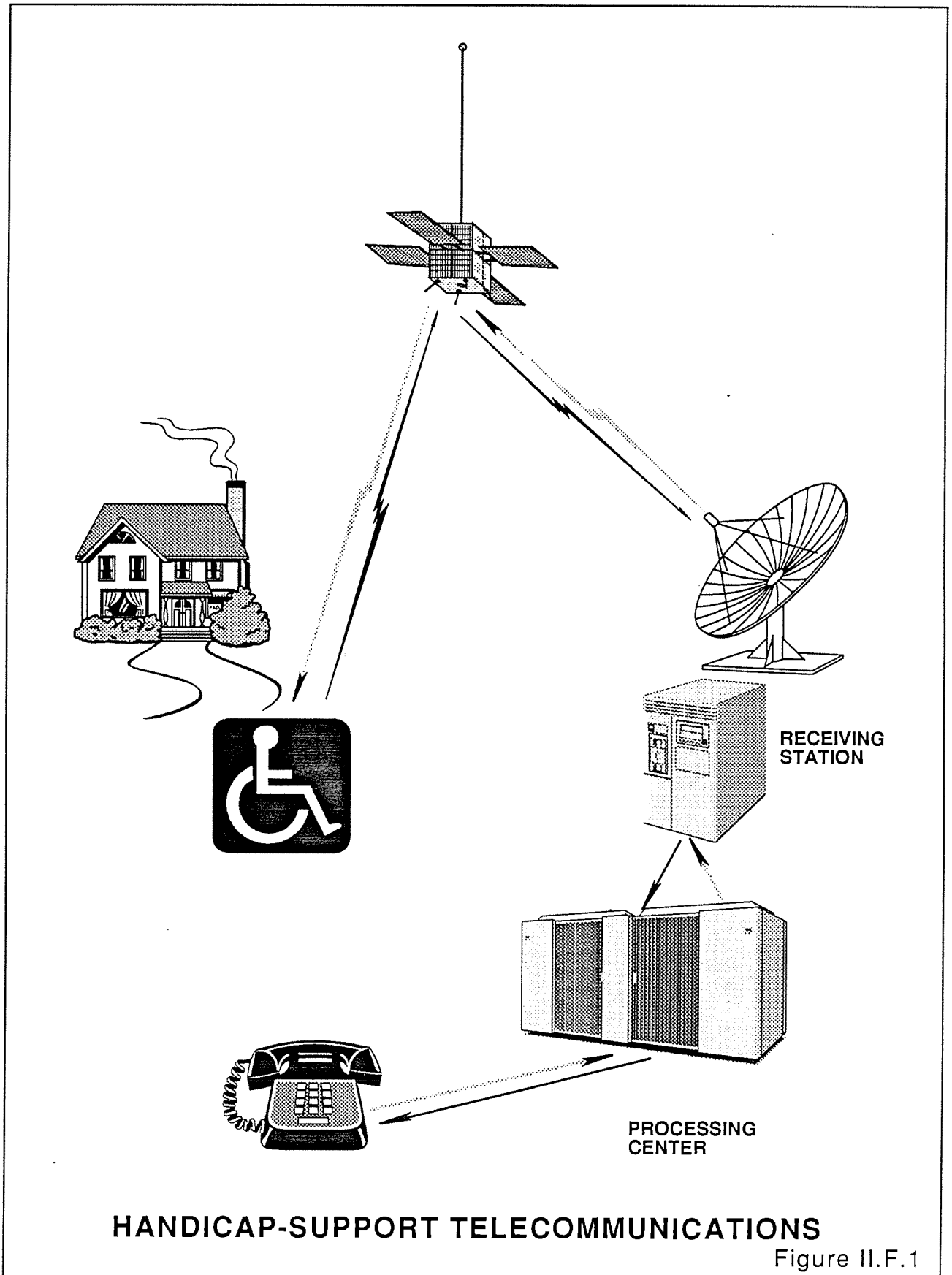
The STARNET system also expects a substantial market among the severely hearing-impaired, for whom the system would be an always available means of visual communications. One of the key benefits of the STARNET design for the handicapped is its interface to the public switched telephone network. As a result, even a voice-impaired person could key-in a person's phone number, and type out a message. The PACC East or PACC West would dial the requested number, and when someone or an answering machine comes on line, would speak out the message using digital voice output processors (see Figure II.F.1).

G. QUANTITATIVE SUMMARY OF STARSYS MARKET APPROACH

Segmentation of the market is based on the type of terminal used by the customer base. Basically, two types are to be considered:

HELPAK - Two-way low cost terminal:

A terminal from which only one type of message can be transmitted and receipt acknowledged, or a terminal which can be interrogated and can transmit only one message.



KEYPAC - Two-way multi-function terminal:

A terminal that can send and receive longer messages and can be interfaced with databases and communication networks (portable PC with communication functions).

These two basic types of terminals lead to the definition of two different types of service:

HELPAC services: a maximum number of messages per year will be identified through agreement with user.

- Emergency Road Service
- Recreational Search and Rescue (Yachts, Climbers, Etc.)
- Medical Emergency
- Remote Monitoring of:
 - . Houses (Main and Vacation)
 - . Industrial Facilities
 - . Environment (Pollution Control)
- Stolen Property (Cars, Boats, Construction Equipment)
- Container and Box Car Tracking

KEYPAC — A broad array of messaging capabilities for:

- Environmental Monitoring (Weather and Oceanic and Animal Tracking)
- Business (Professional Communications)
- Personal Communications (Toward Information Data Bases and Toward Relations)
- Fleet Management (Trucks, Trains, Rental Cars)
- Handicapped or Elderly, or Ill People (Monitoring of Elderly, Diseased and Handicapped People)
- Navigation and Communication Systems (Yachts, Fishing Vessels, Cars)

Addressable and Capturable Market

	Address. (In Millions)	Capt. Terminals
Basic:		
• Emergency Road Service	50	5
• Recreational Search & Rescue:		
. Yachts	22	2
. Climbers	22	3
• Medical Emergency	12	3
• With Extra Messages:		
• Remote Monitoring of:		
. Houses (Main and Vacation)	10	2
. Industrial Facilities	5	1
. Environment (Pollution Control)		0.1
• Stolen Property:		
. Cars	130	10
. Boats	22	1
• Containers and Box Car Tracking	5	0.5

KEYPAC MESSAGES AND ADDED VALUE SERVICES

• Environment Monitorings:		
. Weather & Oceanic & Animal Tracking	1	0.1
• Business:		
. Professional Communications	8	2
. Personal Communications		
-Access Information Data Bases	5	0.5
-Access Other Users	2	0.1
• Fleet Management:		
. Trucks	1.5	0.75
. Trains	1	0.5
. Rental Cars	2	1

• Handicapped Or Elderly Or Ill People	15	3
• Navigation and Communication Systems:		
. Yachts	22	1
. Fishing Vessels	1	0.1
. Cars	130	1

Capturable Market

Basic System	27.6 Million Terminals
Two-Way System	10 Million Terminals

Market Evolution - Number of Terminals (X1000)

	1995	96	97	98	99	2000	2001	2002
HELPAC	225	600	1200	2025	3075	4425	5325	6375
KEYPAC	75	200	400	675	1025	1475	1775	2125
TOTAL	300	800	1600	2700	4100	5900	7100	8500

PART III

AUTHORIZATION OF STARNET WILL SERVE THE PUBLIC INTEREST, NATIONAL INTEREST AND GLOBAL INTEREST IN ENHANCED SAFETY AND ECONOMIC DEVELOPMENT

Congress, in enacting the Communications Act of 1934, directed the Federal Communications Commission to:

[M]ake available . . . to all the people of the United States a rapid, efficient, Nation-wide . . . radio communications service with adequate facilities at reasonable charges . . . for the purpose of promoting safety of life and property through the use of . . . radio communication. . . .

47 U.S.C. § 151. Further, Congress directed that, in exercising this mandate, the Commission should “[s]tudy new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest.” 47 U.S.C. § 303(g). Approval of the STARNET system is fully consistent with this broad mandate.

The STARNET system applied for herein will serve the public interest in several different and important ways. It will save lives, protect property, help safeguard the environment, and monitor persons on probation and on parole. The system will also improve the efficiency of American business, especially in the transport sector, thereby enhancing American competitiveness in the global economy. The STARNET system will also serve the national interest in developing a free and open global market in telecommunications services. In so doing, Applicant’s technology is also helping to provide an infrastructure for greater global economic integration.

The STARNET system applied for herein accomplishes all of these public, national and global interest objectives without interfering with any other user. This makes it an extraordinarily efficient user of the frequency

spectrum. It is also important to recognize that the private, non-common carrier structure proposed herein will enhance competitiveness and market responsiveness in the mobile communications business sector. This too implements directly the Communications Act's mandate to allocate spectrum in the public interest, convenience and necessity.

A. THE STARNET SYSTEM WILL SAVE LIVES, PROTECT PROPERTY, HELP SAFEGUARD THE ENVIRONMENT, AND MONITOR PERSONS ON PROBATION AND ON PAROLE

Safety-of-life and property have long been hallmarks of the public interest, as defined by Congress and by the Commission. See, e.g., 47 U.S.C. § 151. In the 1990s, safety of life and property includes the environment. There is little doubt regarding the deleterious impact of a polluted environment on public health and safety. The STARNET system directly serves the public interest by saving lives, safeguarding property and helping with environmental protection efforts.

1. Demonstrated Search and Rescue Benefits

The ability of Applicant's technology to help save lives has been demonstrated over and over again. Mariners tossed overboard have been saved only through the Argos LEO positioning satellite system. In addition, nearly identical technology used in the COSPAS/SARSAT system has been credited by NASA with saving the lives of over 1000 downed pilots and marooned yachtsmen. Clearly the public interest would be served by making such a life-saving technology generally available to the entire American public, at a cost of less than \$75 per user terminal (see Figure II.A.3).

2. Demonstrated Anti-Theft Benefits

The ability of Applicant's technology to combat construction equipment and vehicle theft has been proved in practice. In the Summer of 1987,

Applicant's affiliate, Argos satellite system, was responsible for the first-ever use of space technology in the recovery of a stolen vehicle. A truck belonging to Countrywide Transport had been equipped with one of Applicant's user terminals by the Geostar Corporation of Washington, D.C. While the driver stopped for a coffee break, a thief broke into the vehicle and stole it, not realizing it was one of the first vehicles ever incorporating a satellite tracking device. The Countrywide Trucking company's management alerted Geostar Corporation, which used the Argos-determined coordinates to pinpoint the truck's location on a detailed city map. When the truck stopped, the Los Angeles Police Department was provided with its location and went to both recover the vehicle and arrest the thief.

One of the pioneering differences between the STARNET system applied for herein and its predecessor Argos technology is that the latter only covers the United States several hours a day. The STARNET system will provide 24 hour coverage of the entire world. Accordingly, Applicant's already demonstrated ability to provide anti-theft protection will be measurably enhanced. Such a capability manifestly implements the Communication Act's mandate to use the frequency spectrum for the protection of property (see Figure II.A.2).

3. Demonstrated Environmental Monitoring Benefits

The STARNET system applied for herein will enable a dramatic expansion of Applicant's global environmental monitoring capabilities. In particular, there will be a big reduction in the cost of user terminals resulting from the great increase in capacity and system utilization. With less expensive user terminals it will be possible to effect much more environmental monitoring. These "Mission to Planet Earth" capabilities of the proposed system have dramatic potential to help warn of ecological disaster. Accordingly, they promote not only the public interest of the United States, but the global interest worldwide (see Figure III.A.3).

4. Benefits of Monitoring Parolees and Persons On-Probation

The U.S. has a very large prison population, and prison construction costs are skyrocketing. There has been considerable success with the use of electronically-supervised parole as an alternative to prison for some criminals. STARNET can serve this need.

For example, over 700,000 are now in jail and nearly two million are on probation. Incarceration costs exceed \$30,000 per person per year. By using the STARNET system, law enforcement agencies can reduce prison populations and help combat crime.

B. THE STARNET SYSTEM WILL IMPROVE THE EFFICIENCY OF AMERICAN BUSINESS, ESPECIALLY IN THE TRANSPORT SECTOR, THEREBY ENHANCING AMERICAN ECONOMIC COMPETITIVENESS

The public interest is directed not only to safety of life and property, but also to ensuring that the radio spectrum is used to enhance quality of life. A healthy economy is critical to high quality lives. The proposed STARNET system incorporates several important capabilities that are certain to make positive contributions to America's competitiveness in the global economy.

1. Proven Just-In-Time Production Benefits

Studies in Japan, Europe and the United States have proven many times the economic benefits of just-in-time production techniques. The key to the economic benefits involves avoidance of unnecessary production material inventory. Instead of burdening a factory with stockpiled inventory, such production materials are delivered by truck "just-in-time" for being needed. It should go without saying, however, that a vehicle tracking and communications system plays a critical role in ensuring that "just-in-time" deliveries are on schedule.

For large factories, high power geostationary satellite systems provide a ready answer to "just-in-time" communications

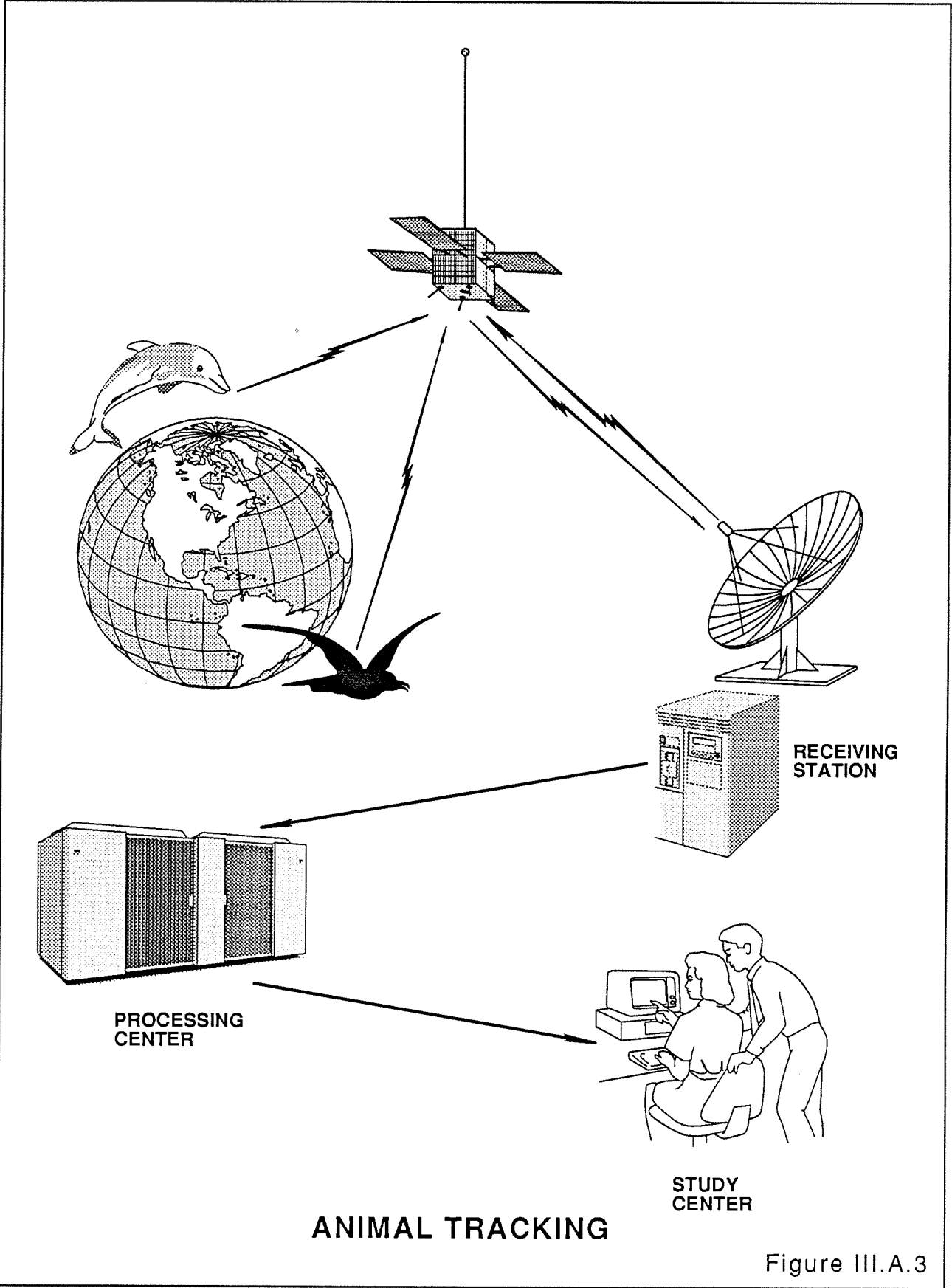


Figure III.A.3