

WICS



Wireless Fiber





WICS

A Glance at ET Industries

ET Industries, Inc. is emerging as a leading edge, high technology company positioned to meet the challenges presented by the evolving nature of telecommunications. ET Industries is a high technology company with a strong R & D background, led by founder Dr. John Howard. The company specializes in large, high speed, service integrated wireless communication systems for terrestrial and terrestrial-satellite applications. ET Industries' expertise, gained from in depth experience with military and commercial systems, enables the company to provide the custom design and implementation of wireless systems used for a wide array of applications. The primary vehicle to accomplish this is ET Industries' proprietary Wireless Integrated Communications System (WICS).

This cutting edge technology pushes the envelope by providing the unique ability to utilize a single antenna in multiple directions of choice to transmit data, voice and video signals, including high speed internet service. The key element in the system is ET Industries' Opti-Beam. This document provides a more detailed description of the WICS System.



WICS

Wireless Integrated Communication System

1. Introduction

ET Industries' Wireless Integrated Communication System (WICS) can be a terrestrial only or a terrestrial-satellite combination wireless system that provides inexpensive, reliable, expandable quality coverage over a country, a group of countries, or even worldwide coverage.

A terrestrial only system offers complete control of a country's communication services without the dependence on an expensive satellite system that may belong to a third party. Such a system is a far less expensive proposition than an optical fiber network, particularly in countries with difficult terrain. Expanding the service to cover large regions of the globe creates an economic and reliable alternative to optical fiber or satellite communication systems. A combination of terrestrial and satellite wireless technologies provides easy access to inter-regional and worldwide coverage with minimum cost.

In the following sections the technological advantages of WICS are explained through a detailed description of the system. After which follows a cost comparison between optical fiber and wireless communication.

2. The Description of Wireless Integrated Communication System (WICS)

The WICS is a wireless communication system that can digitally transmit data, voice and video signals in multiple directions and at long distances without the need for repeater stations. The result is that cost is minimized and reliability, quality and subscriber numbers are all increased substantially.

By employing a proprietary technique known as Opti-Beam, ET Industries is uniquely able to use a single antenna in multiple directions of choice to transmit data, voice and video signals (Figure 1).

Instead of using a short distance (low gain) omni directional antenna currently employed by most mobile wireless communication systems, ET Industries utilizes a long distance (high gain) narrow beam directional antenna (Figure 2). Normally a long distance antenna would increase substantially the number of subscribers in a single direction, but would prevent subscribers in all other directions from using the system. However, ET Industries has solved this problem with the help of our Opti-Beam technique that can either simultaneously or sequentially reemploy the high gain antenna so that the spherical coverage of the omni directional antenna can be achieved, along with the large increase of subscribers, in all directions (Figure 3). A further increase in the number of subscribers (high throughput) can be achieved by frequency reuse in certain directions (Figure 4).

An eight direction system would increase fourfold the number of subscribers that can be achieved implementing our frequency reuse technique.

Current Wireless Communication System

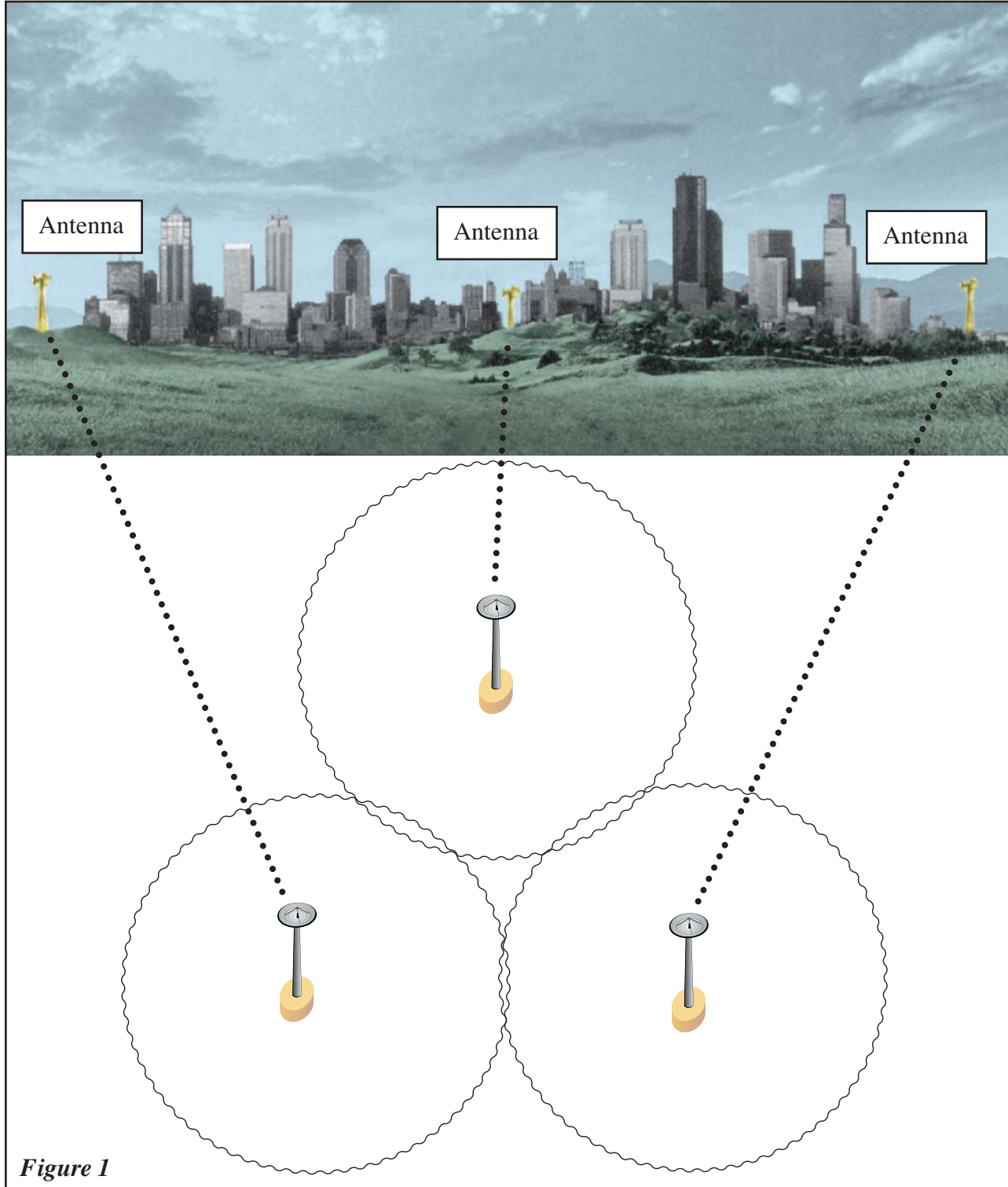


Figure 1

An Example of High Gain Directional Antenna

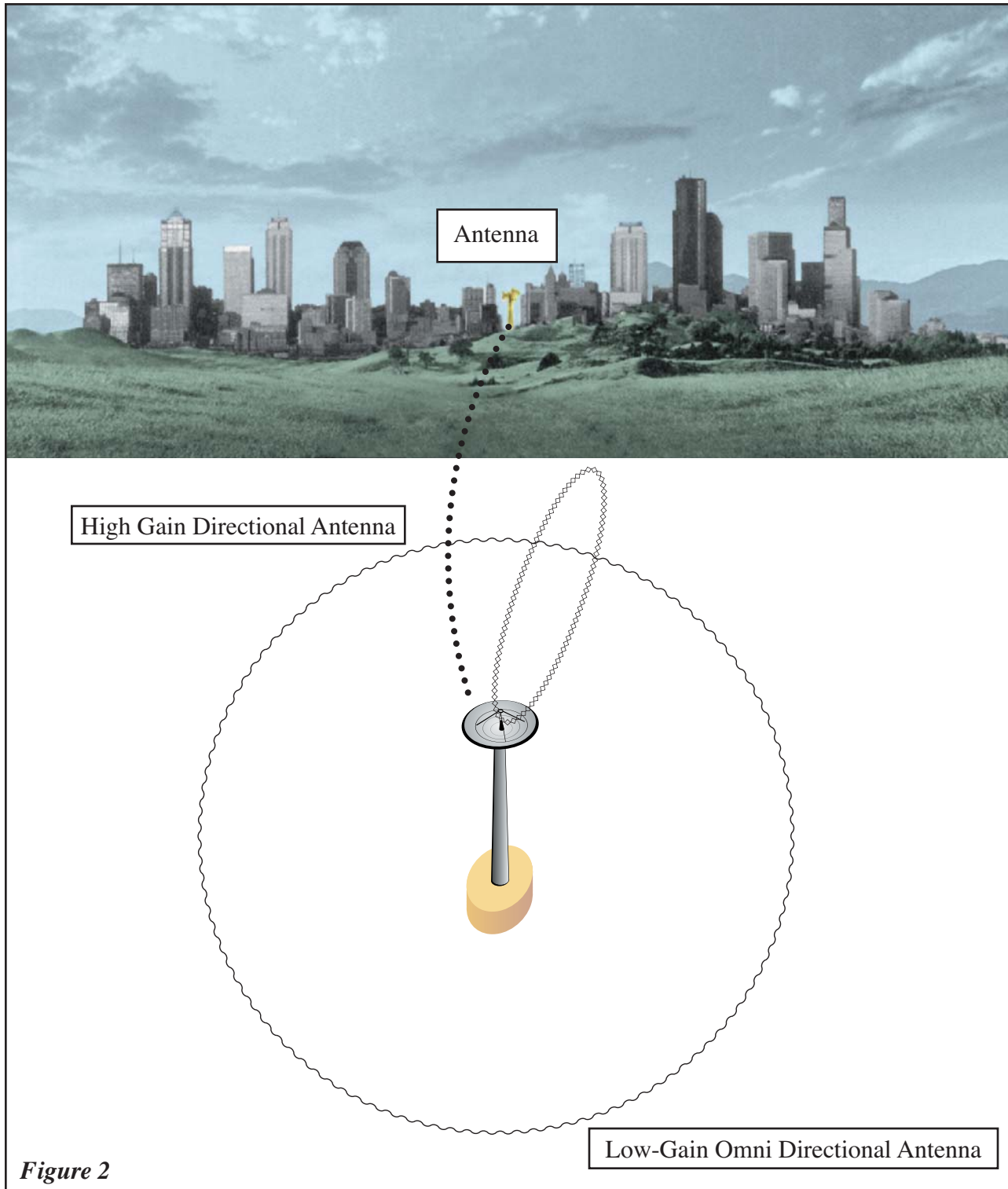
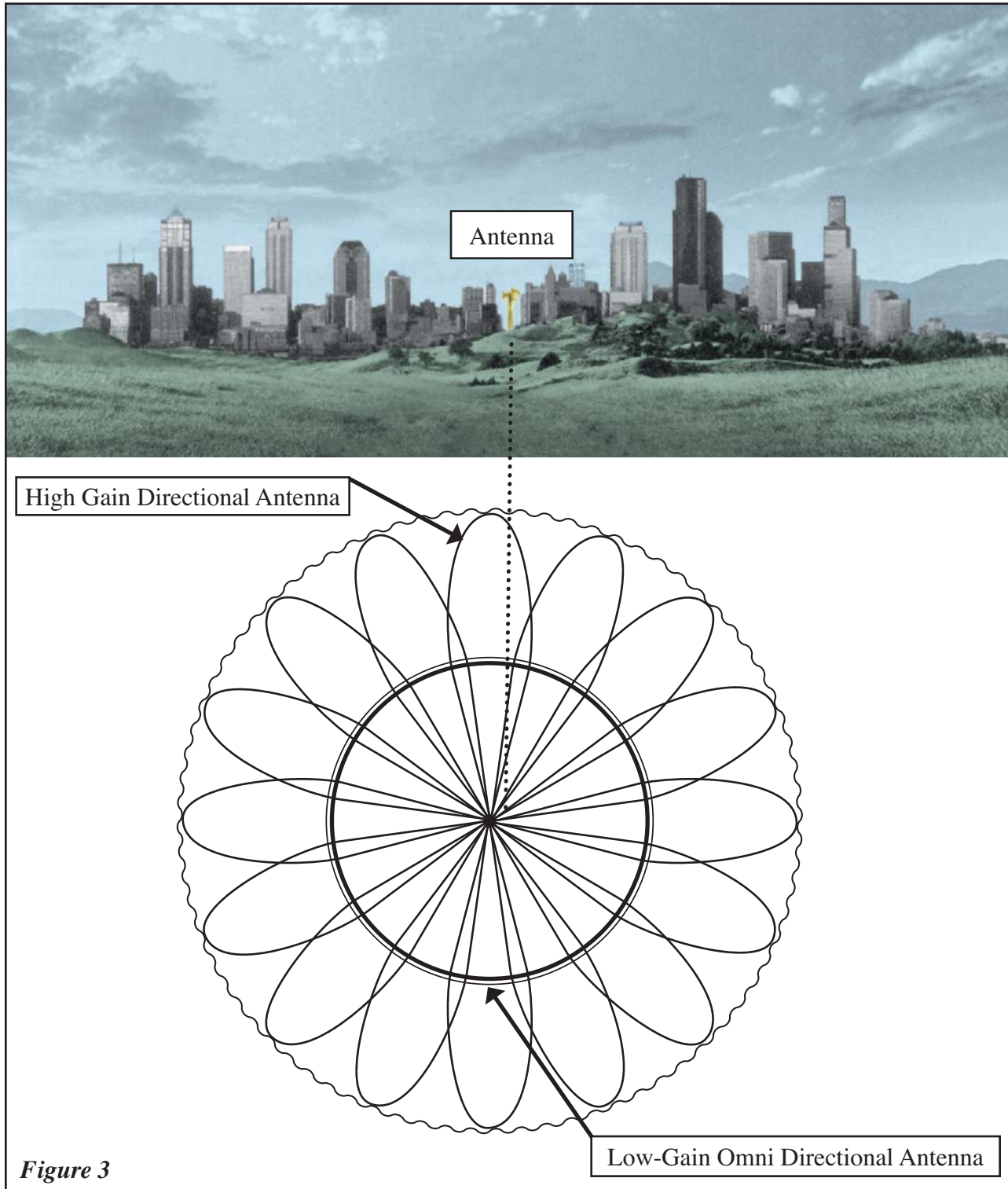


Figure 2

Comparison of Low Gain and High Gain Omni Directional Antennas



Frequency Reuse Pattern

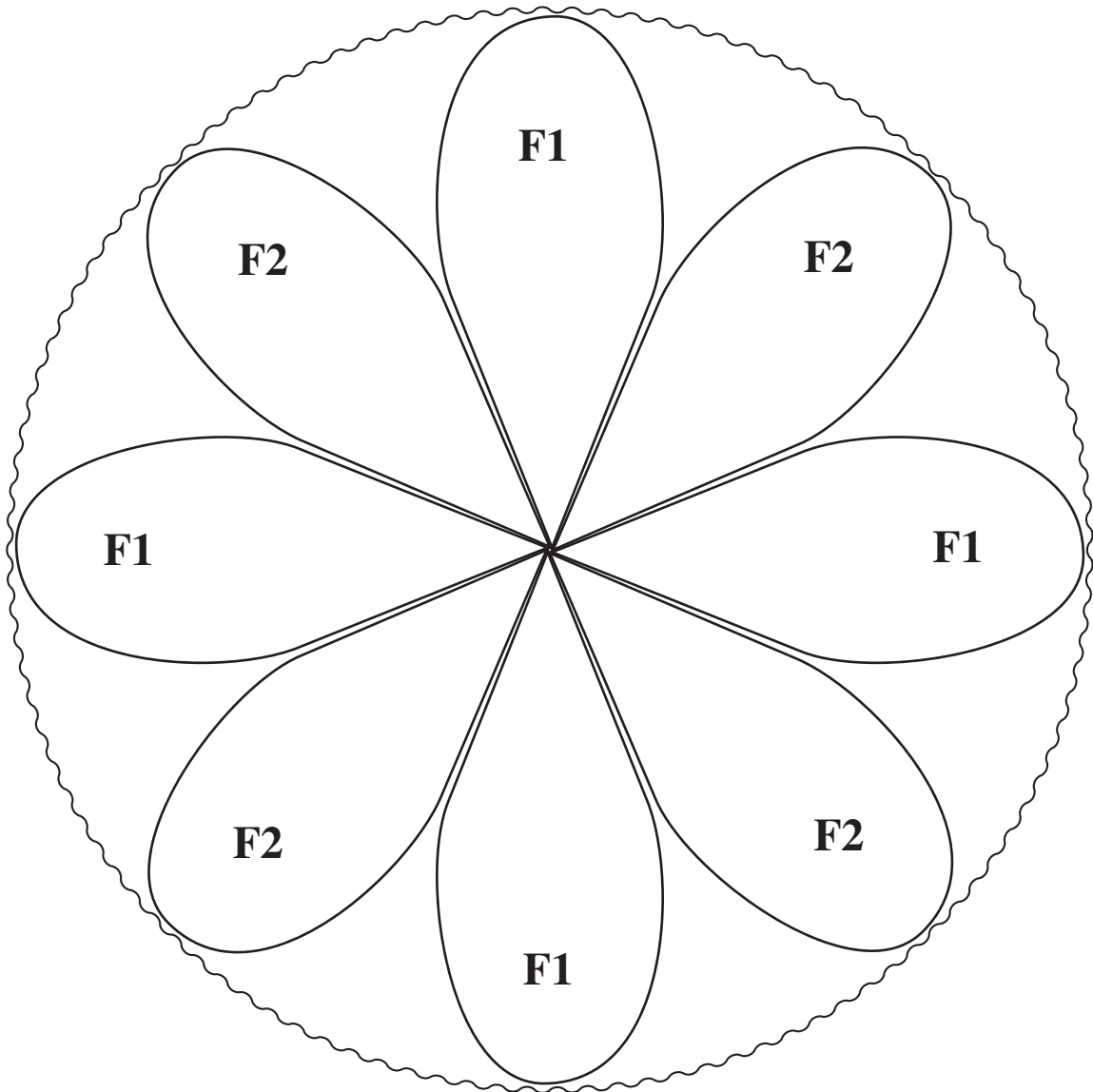


Figure 4

Wireless Integrated Communication System

The high gain antenna system presented above introduces a new concept of communication that utilizes space division termed Space Division Multiple Access (SDMA).

Employing adaptive interference suppression circuits, any number of unwanted interfering signals may be eliminated. The use of such “smart” circuits creates an antenna system called Smart Antenna.

In summary, the ETI Opti-Beam technique increases the number of subscribers and reduces cost by:

1. Increasing the coverage area.
2. Frequency reuse.
3. Interference cancellation.

Propagation of signals between cities and/or countries may be achieved by any of the following methods, or a combination of them.

2.1 WICS Line of Sight (LOS) Coverage

Connections between cities can be made by using line of sight repeaters at specific distances (Figure 5). Since the WICS employs high gain antennas, the number of repeater stations can be minimized, thus reducing the communication system provider’s cost (Figure 6). Opti-Beam use achieves multiple directions at each repeater when necessary.

2.2 WICS Tropo Scatter Coverage

In the case where terrain problems exist or because the cost of repeater systems is prohibitive, a combination of diffraction and troposcatter single antenna multiple beam techniques can be used to extend coverage over a country or a group of countries (Figure 7). Again the use of Opti-Beam is necessary in order to minimize the number of antennas employed. Figure 8 illustrates how bandwidth changes in relation to the increase in troposcatter range for different antenna gain.

2.3 Regional or Global Satellite Coverage

ETI has provided beamforming techniques to a number of satellite operators. A combination of satellite and terrestrial communication systems can achieve an inexpensive, global wireless communication service (Figure 9).

The Present Line of Sight (LOS) Coverage

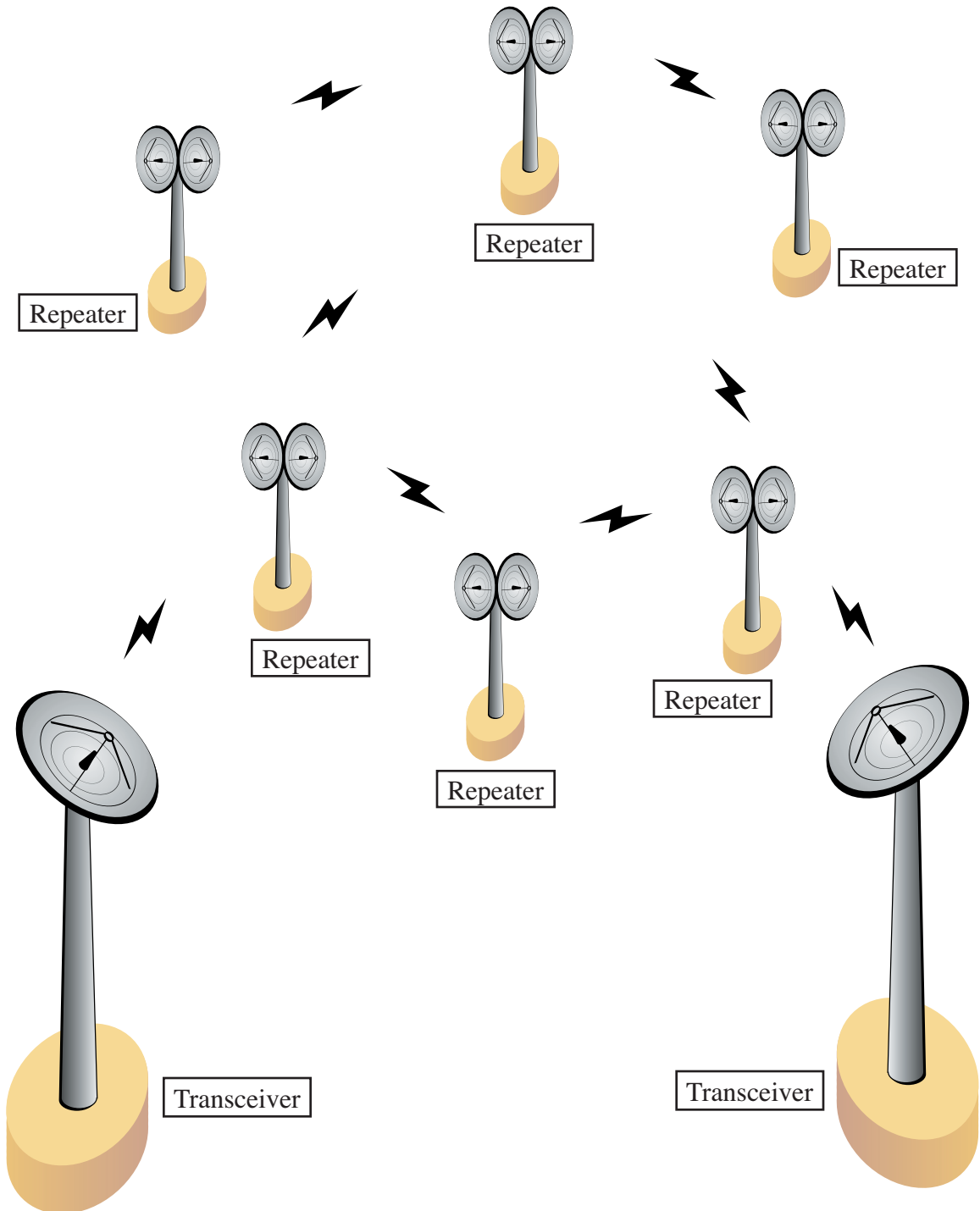


Figure 5

The Proposed Line of Sight (LOS) Coverage

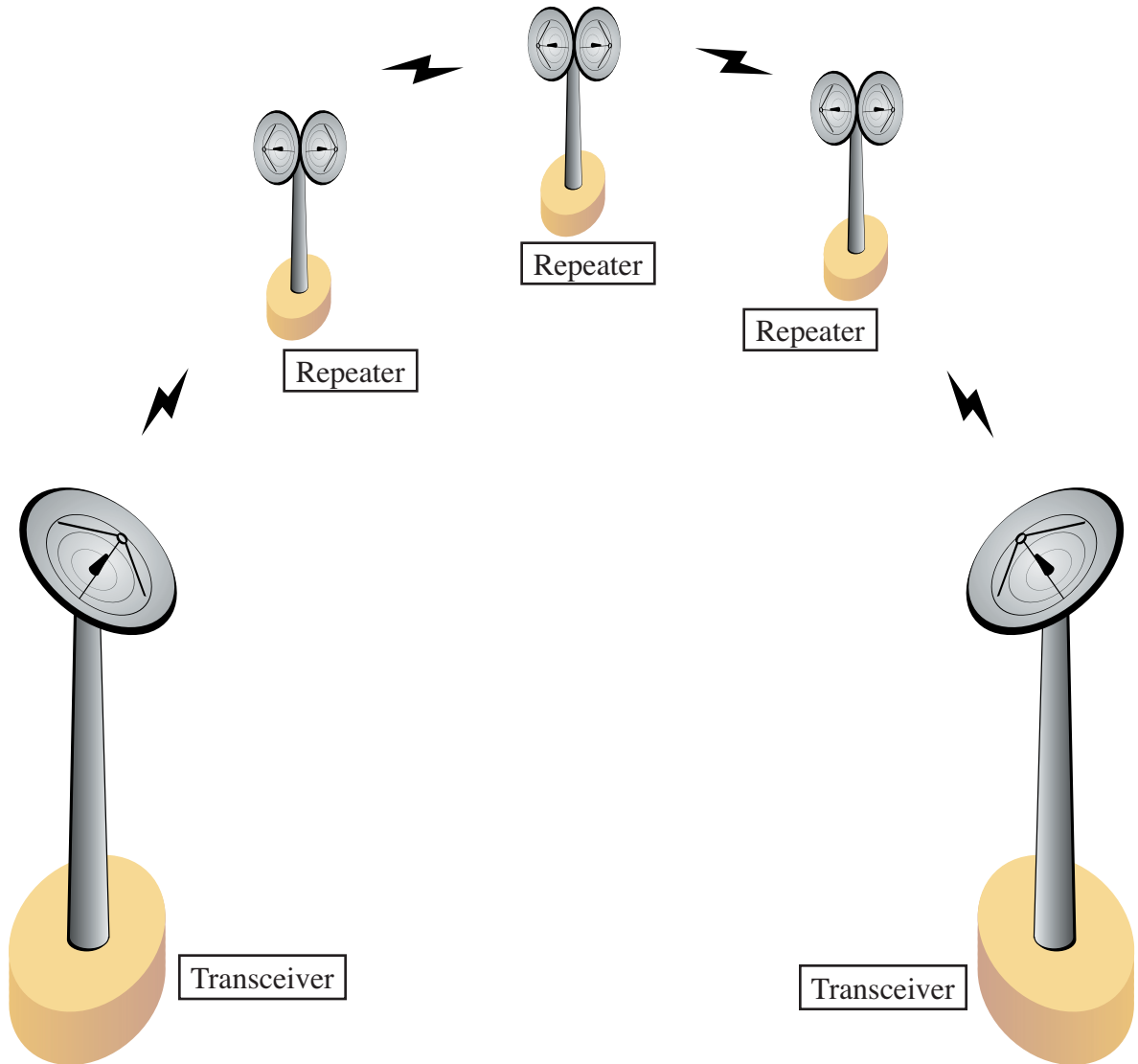


Figure 6

Troposcatter Earth Coverage

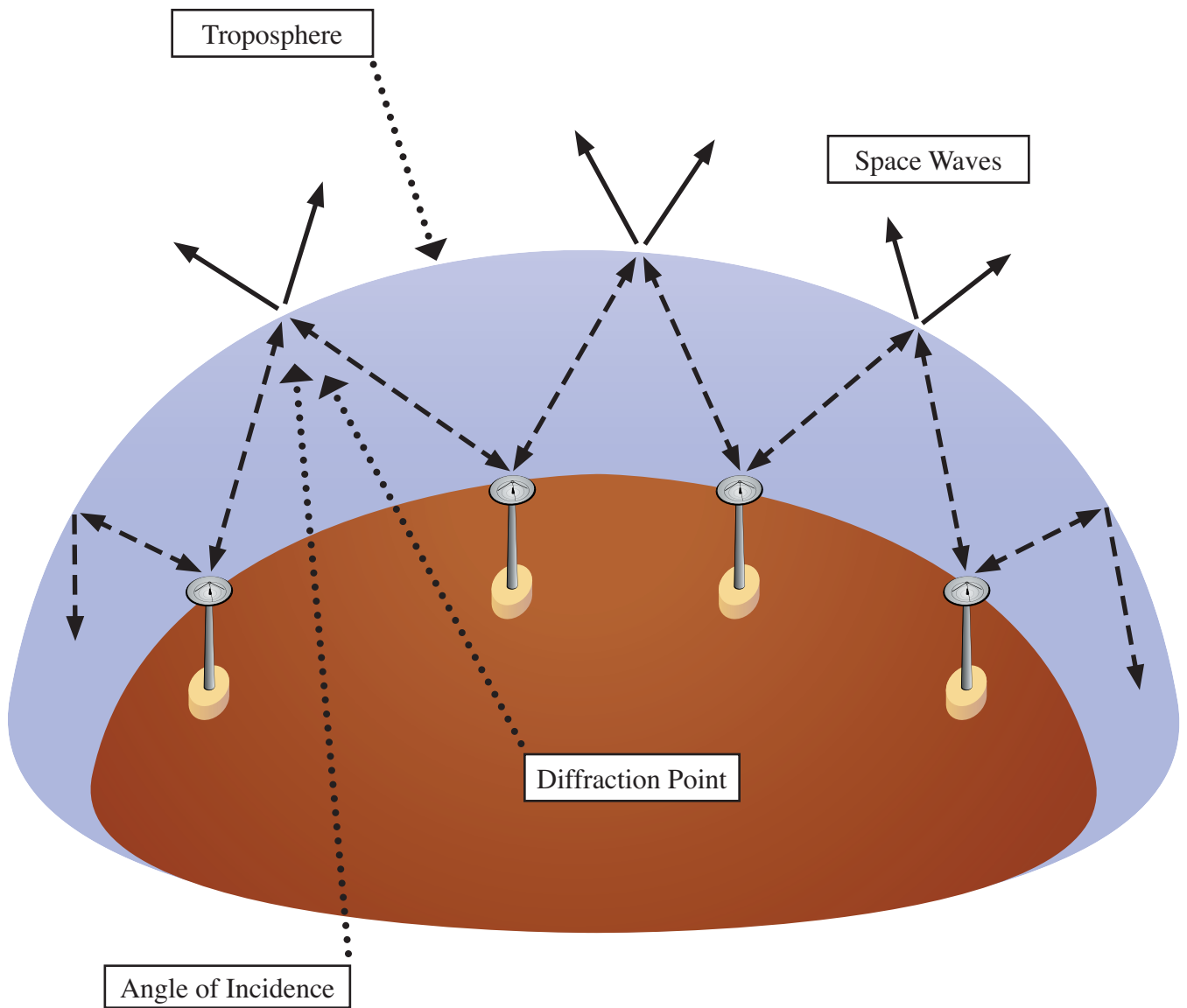


Figure 7

Bandwidth Vs. Troposcatter Range for Various Antenna Gain

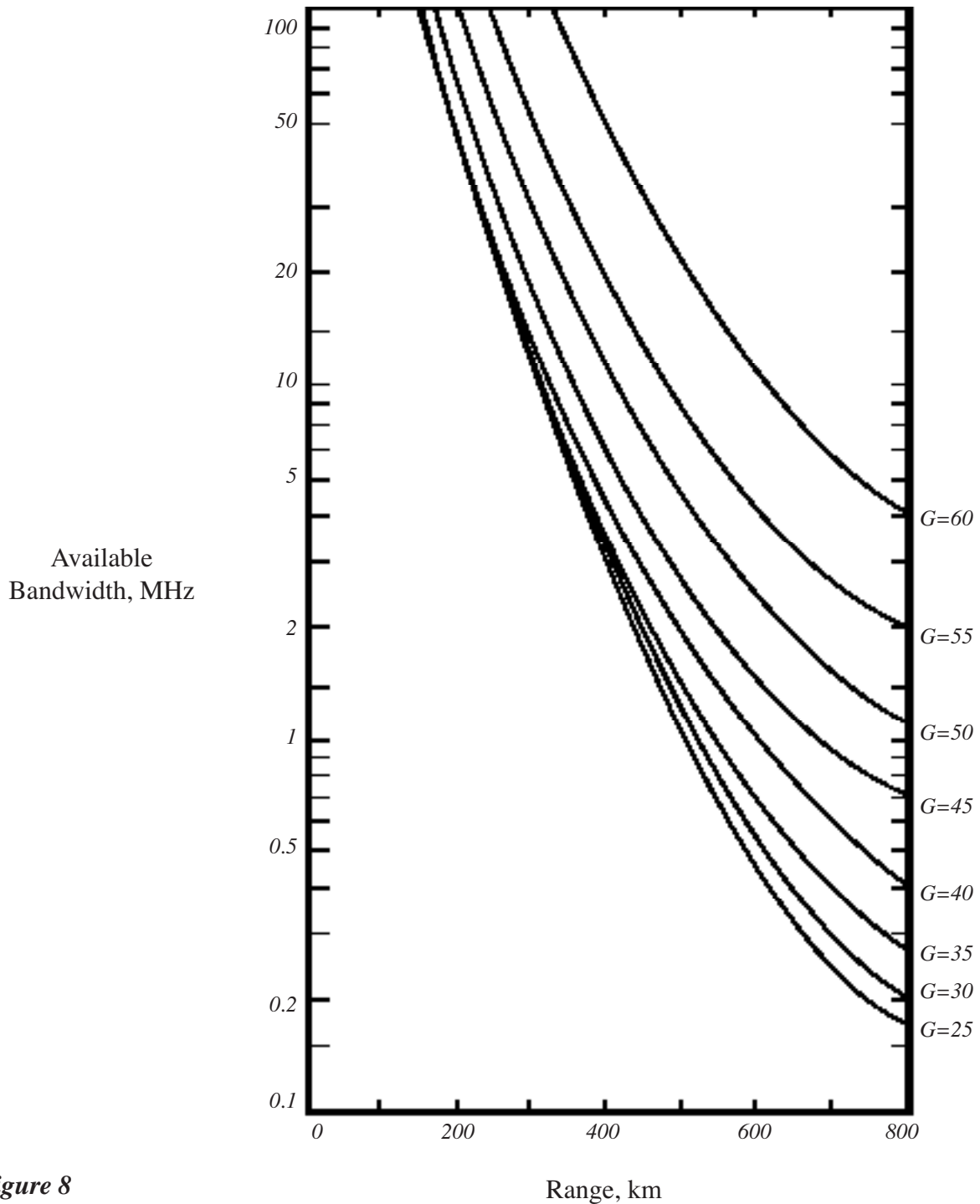


Figure 8

Satellite and Terrestrial Earth Coverage

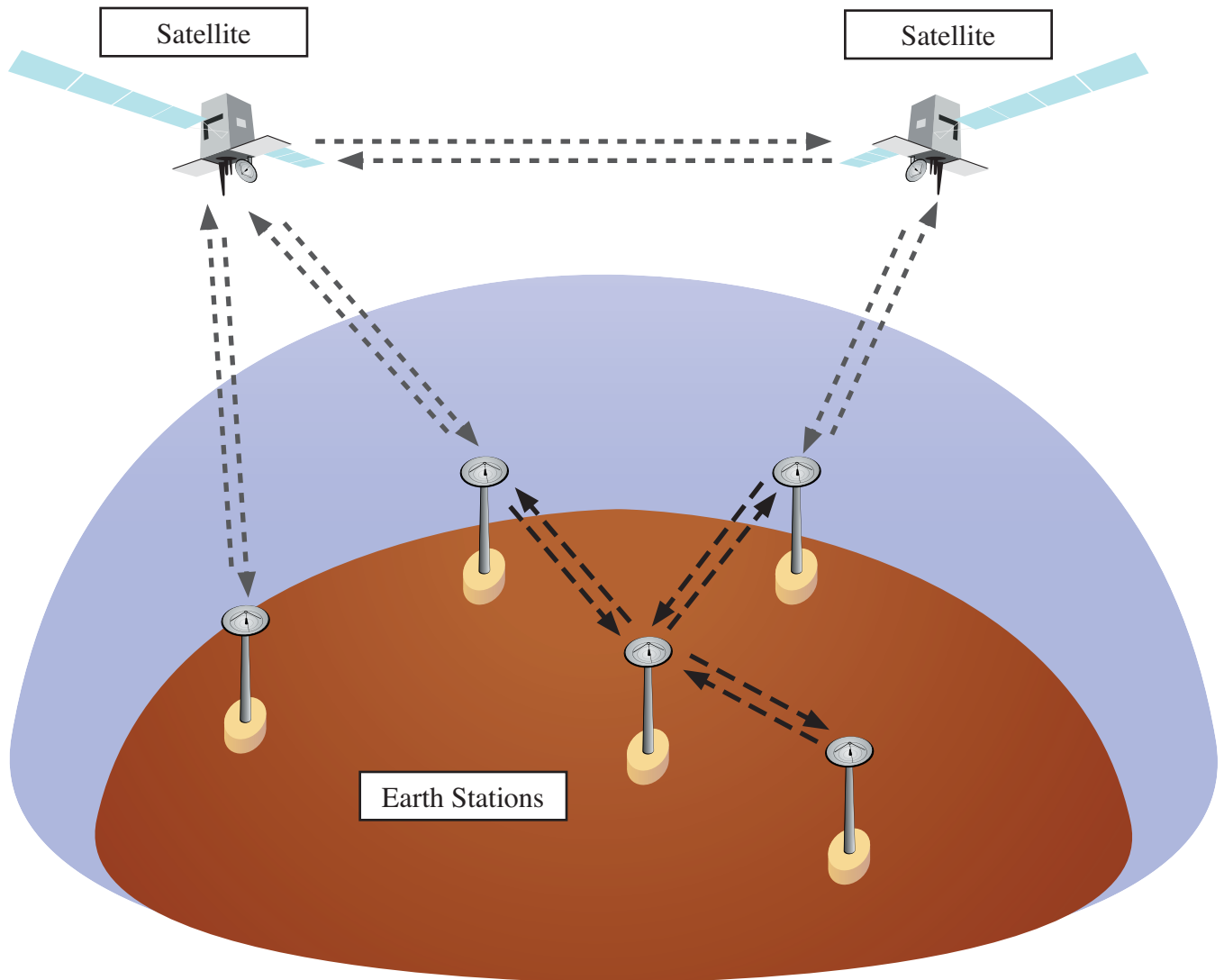


Figure 9

Wireless Integrated Communication System

3. Average Cost Comparison Between Communication Systems

The WICS is by far the least expensive system of communication. For a medium size country, such as Greece, the cost of an optical fiber communication system will be in excess of ten times the cost of a WICS. Additionally, the cost of a satellite communication link system is at least three times greater than the cost of the WICS.

4. Applications

Apart from the obvious uses, such as audio and video, there is a wide variety of other applications that the Wireless Integrated Communication System makes possible or vastly improves. Some of the applications are shown on the following pages, tables and figures.

5. Summary

ETI's Wireless Integrated Communication System can be used as a terrestrial or terrestrial-satellite combination communication system. It provides inexpensive, reliable, quality coverage that is expandable over a large grouping of countries.

Employing a proprietary technique known as Opti-Beam, WICS is uniquely able to employ a single smart antenna in multiple directions of choice to transmit data, voice and video signals.

A minimum number of antennas is therefore required to cover vast areas of land, thus increasing the number of users while substantially diminishing cost.

Using line of sight, troposcatter and satellite methods, global coverage may be achieved.



Sample Applications of the WICS System

Market	Messaging	File Transfer	Asset Tracking	Asset Monitor & Control	Alert Notification	Wireless E-mail
Transportation	X		X	X	X	X
Environmental	X		X	X	X	
Utility	X		X	X	X	
Oil & Gas	X		X	X	X	X
Automotive			X	X	X	
Agribusiness	X	X	X	X	X	X
Security			X		X	
Emergency	X	X	X		X	X
Health	X	X	X		X	X
Education	X	X	X	X	X	X
Business	X	X	X	X	X	X
Government	X	X	X	X	X	X
Consumers	X	X			X	X



WICS

Asset Tracking, Monitoring & Control

Asset Monitoring, Tracking and Supervisory Control: WICS allows for remote monitoring, tracking (position determination), and control of a ground asset (equipment, sea or land vehicle, etc.). Local monitor and control is provided by the embedded processor in the ground terminal which can be programmed to collect, process, and store data as well as to receive advanced instructions. Remote monitor and control is provided through the terrestrial main terminal of the ground asset allowing the customer to access status information and to send instructions. Tracking is provided by equipping the ground asset with a GPS receiver and relaying the GPS-derived position (longitude, latitude), velocity and course heading back to the command center.

Alert and Interactive Operations: Real-time and near real-time alerts (such as impending natural disasters, environmental hazards, a malfunctioning device or a special event, etc.) are detected by software determined by the user and located in the ground terminal. The terminal then transmits a priority message indicating the alert to the terrestrial main terminal. The terrestrial main terminal sounds its own alert, and/or conducts additional service functions in response (such as broadcasting a message to other terminals). Assets can operate interactively using the communication system allowing groups of equipment to work together to coordinate operations across widely dispersed systems and teams.

Multi-Casting: Broadcasting messages to large groups of ground terminals in parallel is known as multi-casting. Multi-casting can be initiated by a customer request (on demand multi-casting), pre-scheduled based on time or special event flags, initiated by an event sensed by an instrument onboard the terrestrial main terminal, by a message, or alert a broad and dispersed set of equipment or people.

Modes of Operation:

REAL TIME: Provides time critical real-time local, national, and regional communications between ground assets and with a central control facility.

NEAR REAL-TIME: Provides time-critical communications between terminals separated by great distances (i.e. greater than a continent). Two classes of service are provided: routine handling, and priority handling.

STORE & FORWARD: Provides communication of non-real time critical communications between terminals in local, national, regional, or global locations.

Terminal Types:

REMOTE TERMINALS: Small, robust, and environmentally protected terminals with computer processors and memory for application-specific interfaces and control of ground assets. Optional GPS receivers provide position determination services.

A variety of packaging options, antenna sizes shapes, and so forth are provided for the various market applications. Terminals are typically mated to a product (such as a meter, a water quality monitoring station, a shipping container, etc.) to create a total integrated solution.

MARKET APPLICATIONS:

Transportation Asset Tracking, Fleet Management, and Value-Added Services; Utility Automation Solutions; Environmental Monitoring and Hazard Alert Solutions; Agribusiness Solutions; Oil & Gas Industry Well, Substation and Transmission Grid Monitor & Control; Security Alert and Location Determination Solutions; Automotive Smart Car Solutions; Industrial and Government Equipment Management.



Two-Way Messaging

Two-Way Alphanumeric Messaging: Two-way, variable, alphanumeric messaging between messaging terminals anywhere on the earth or between a messaging terminal and a central site.

Voice Mail: Voice mail services between voice mail terminals or between a voice mail terminal and a central site. This service is provided by digitizing the speech of a user, transmitting the digitized data as messages to a receiving voice mail terminal and then reconstructing the speech through a voice synthesizer. Voice mail allows variable two-way messaging at a lower cost without the need for keypads, displays and the international character sets associated with a global market. It also provides a more simplified operation and supports customer's not able to read or write.

Wireless E-Mail: Two-way wireless e-mail services connect a user to internet e-mail from any location. An e-mail terminal can connect to a laptop computer and operate as an e-mail server, exchanging messages with the laptop and the satellite wherein it is downlinked to a Gateway Station and provided to the internet, or the user can operate a handheld e-mail terminal with a keypad and display.

Modes of Operation:

REAL TIME: Provides time critical real-time local, national, and regional communications between two terminals when a terrestrial main terminal is overhead. Mean response time under one minute for most regions of the world.

NEAR REAL-TIME: Provides time-critical communications between terminals separated by great distances (i.e.greater than a continent). Two classes of service are provided: routine handling and priority handling.

STORE & FORWARD: Provides communication of non-real time critical communications between terminals in local, national, regional, or global locations.

Terminal Types:

HANDHELD MESSAGING TERMINALS: Battery-powered handheld unit with a keypad and display provides the ability to enter and receive variable alphanumeric messages.

HANDHELD VOICE MAIL TERMINALS: Battery-powered handheld unit with a microphone and speaker.

LAPTOP E-MAIL TERMINALS: Battery or externally powered unit that connects to a laptop computer and contains an e-mail service and communications equipment. Communication services can operate independently of the laptop.

HANDHELD E-MAIL TERMINALS: Battery powered handheld terminal with a keypad and display.



File Transfer

Two-Way Computer File Transfer: The periodic transfer of data files to and from multiple locations. Files in the range of kilobytes to megabytes can be transmitted from a remote business, retail, health, education, or government location to other remote or urban locations via the satellite, or to a Gateway Station for distribution using terrestrial means.

Modes of Operation:

REAL TIME: Provides time critical real-time local, national, and regional communications between ground assets and with a central control facility.

NEARREAL-TIME: provides time-critical communications between terminals separated by great distances (i.e. greater than a continent). Two classes of service are provided: routine handling and priority handling.

STORE & FORWARD: Provides communication of non-real time critical communications between terminals in local, national, regional, or global locations.

Terminal Types:

FILE TRANSFER TERMINALS: PC-based terminals and high gain fixed antennas are installed in a fixed location. The antennas are easily mounted and do not require significant structural capability. The system can be powered through locally available means, and can be backed up by battery or other power generators for short periods of time in the event of a power failure or no locally available power.

Market Applications:

Business Network Solutions
Health Industry Solutions
Education Solutions
Government Services to Rural Regions



Applications and Associated Service Features

Personal Messaging and E-Mail

- Two way alphanumeric messaging
- Voice paging
- Voice mail
- Remote e-mail access

Utilities (Electric, Gas, Water)

- Automatic meter reading
- Tamper alert
- Power outage alert
- Substation monitor, alert, and control
- Information to customer for demand side management.
- Transmission grid monitor, alert, and control

Retail

- Vending machine monitor and control
- Copier machine monitoring and control
- Point of sale reporting
- Inventory management

Entertainment

- Movies on demand
- Music on demand
- Interactive games

Environmental

- Field data collection; unit monitor and control (water quality, seismic, ocean)
- Environmental and natural hazard alerts

Telecommunications

- Mobile
- Land wireless

Transportation (Truck, Rail, Shipping Containers)

- Tracking (position determination)
- Weight Sensors
- Open/Close alerts (for security & customer alerts)
- Refrigeration unit monitoring and control

Business

- Video Conference
- File transfers from physically dispersed facilities

Automotive

- Smart car applications (remote monitor, control, and messaging)
- Roadside assistance alerts
- Stolen vehicle alerts and locations

Security

- Intrusion alerts
- Stolen property alerts and location determination

Health

- Remote monitoring of patient physiological functions
- Telemedicine-Exchanging of information between physicians on real time basis; e.g. during surgery or other treatment of patients

General Industrial

- Inventory level monitor
- Field equipment monitor and control

Typical GSM Base Transceivers Station (BTS) coverage in urban area.

GSM-900 3-5km

GSM/DCS-1800 1.5-3km

GSM/PCS-1900 1.5-3km.

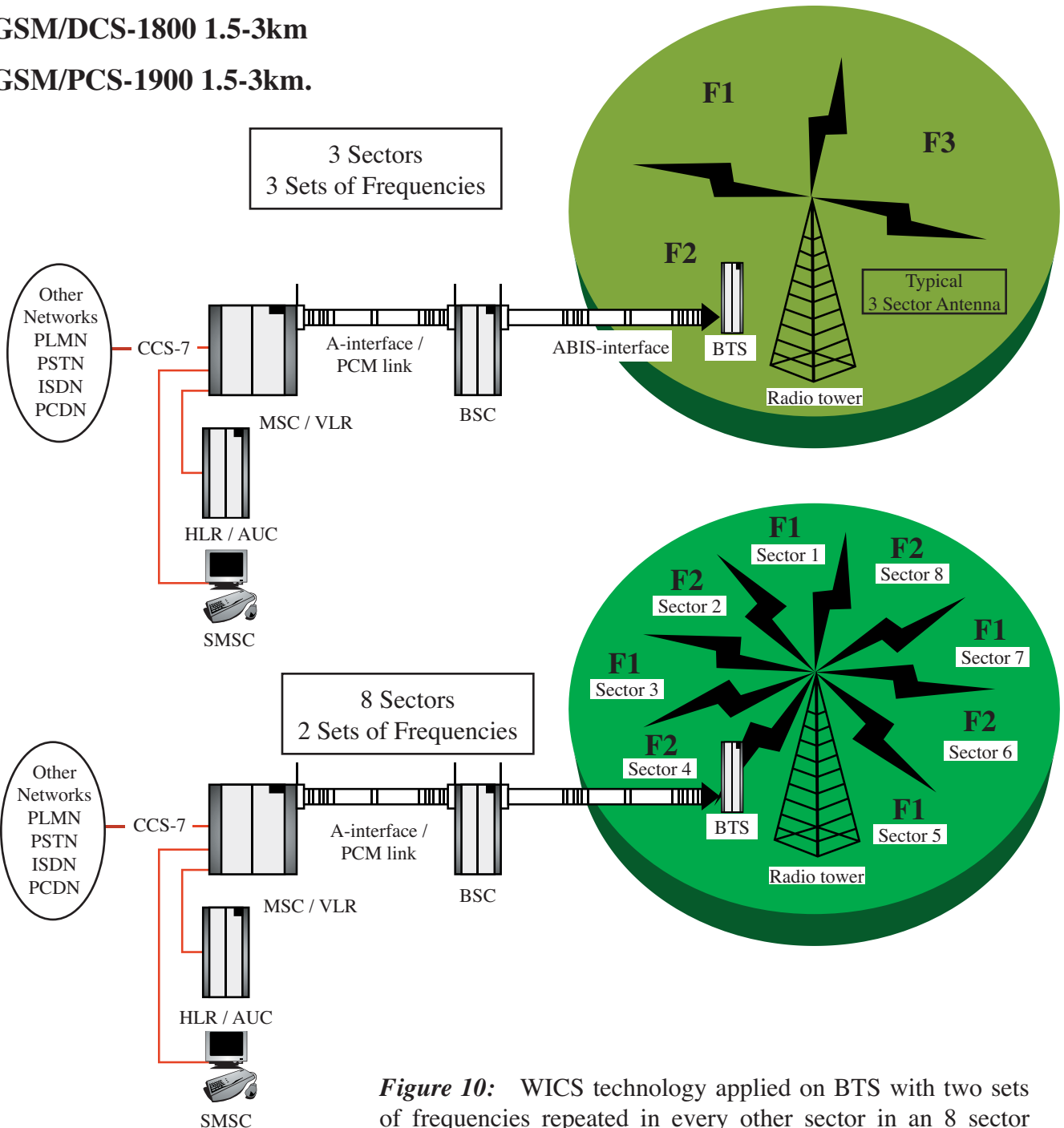


Figure 10: WICS technology applied on BTS with two sets of frequencies repeated in every other sector in an 8 sector configuration and an increase of coverage in harsh environmental conditions and highly congested areas.

Transportation Tracking & Positioning of Vehicles

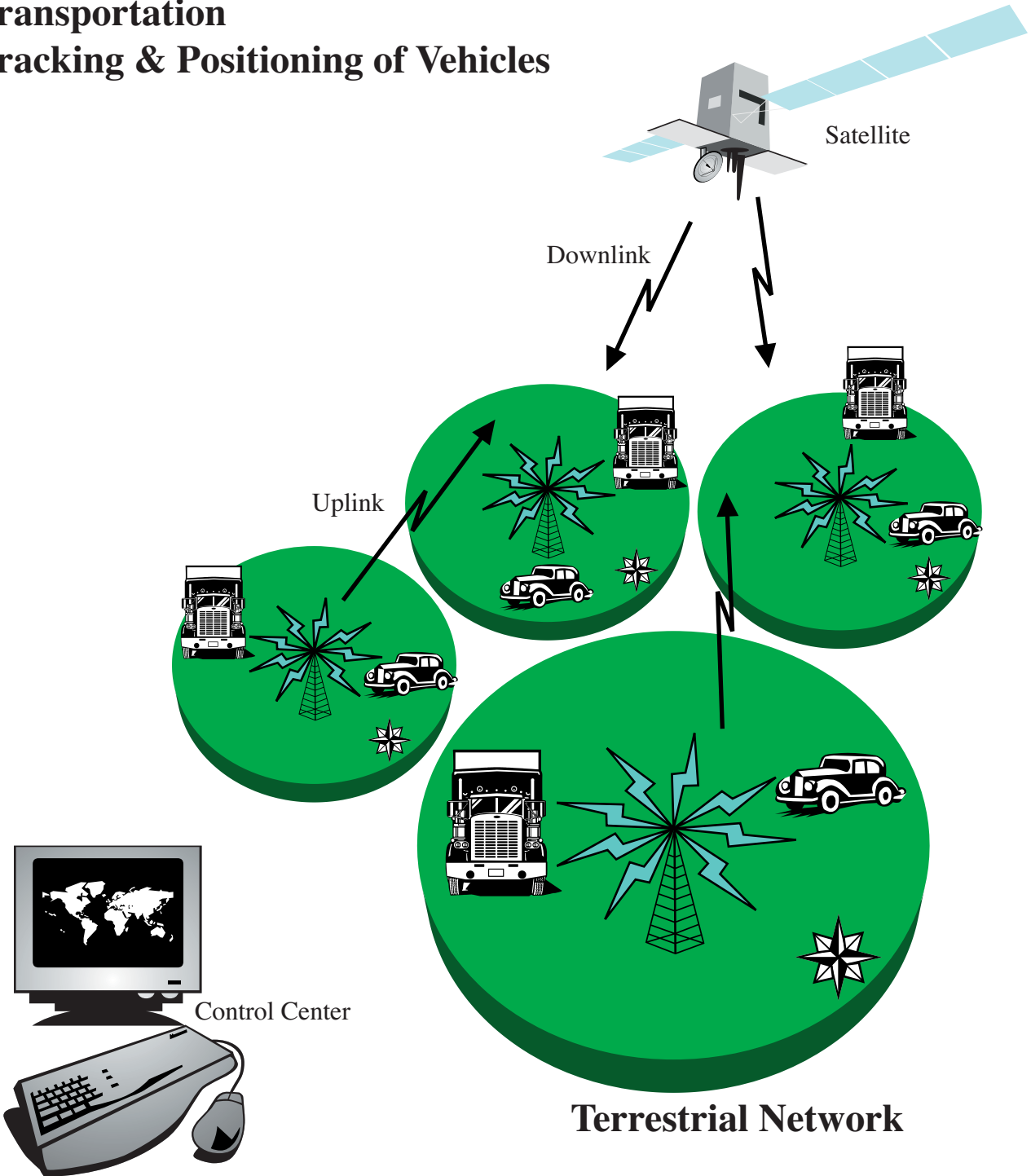


Figure 11

Opportunities for Wire Line ISPs to Become High Speed Broadband Wireless Networks

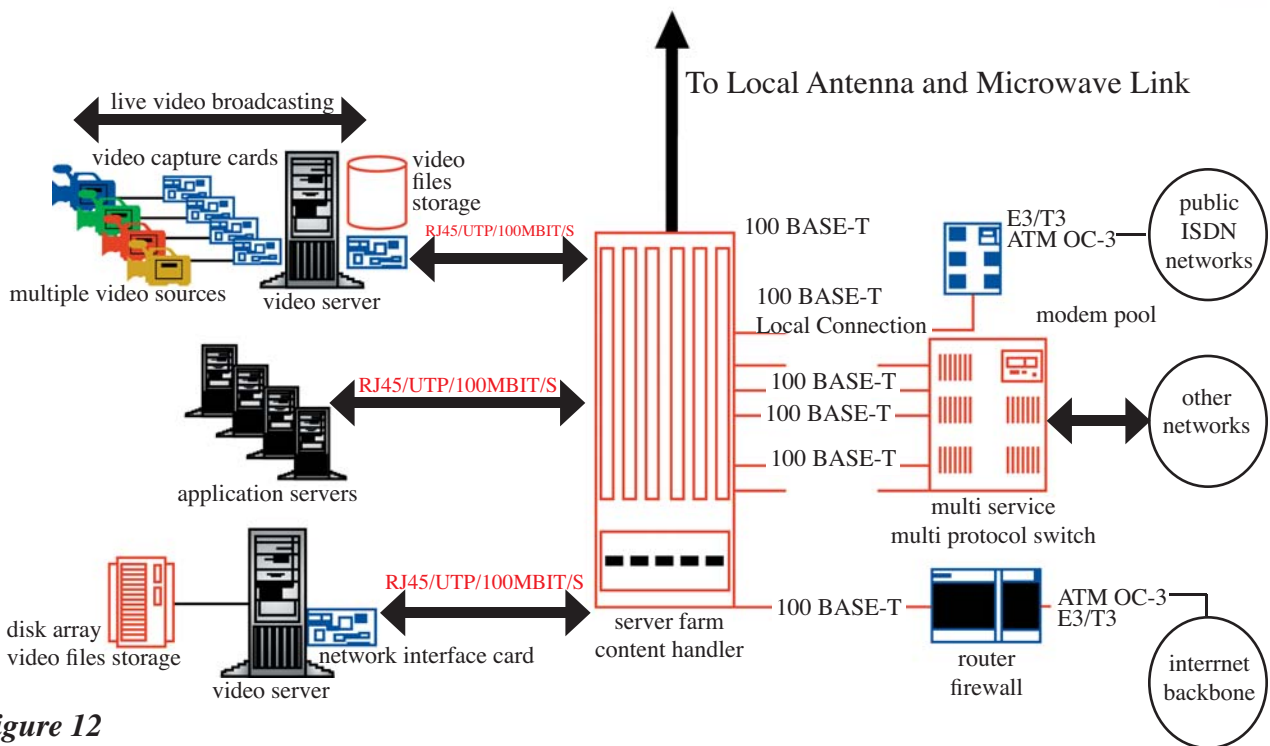
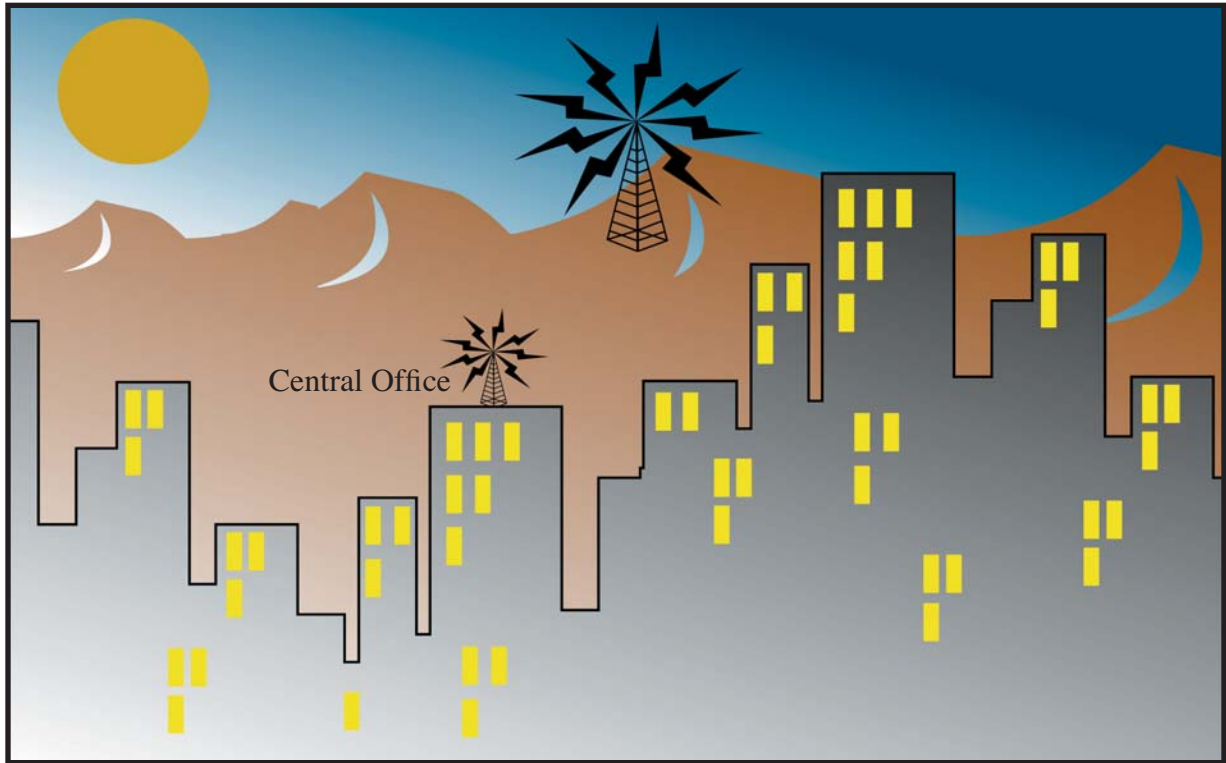


Figure 12

Opportunities for Wire Line ISPs to Become Interactive Multi-Application High Speed Broadband Wireless Networks

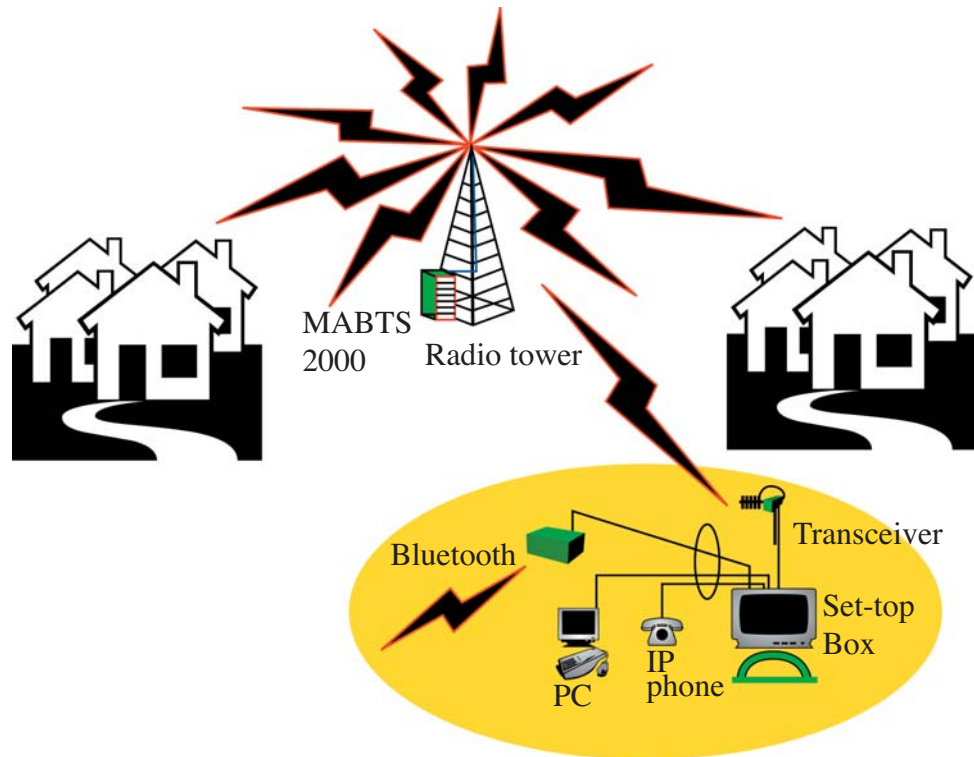
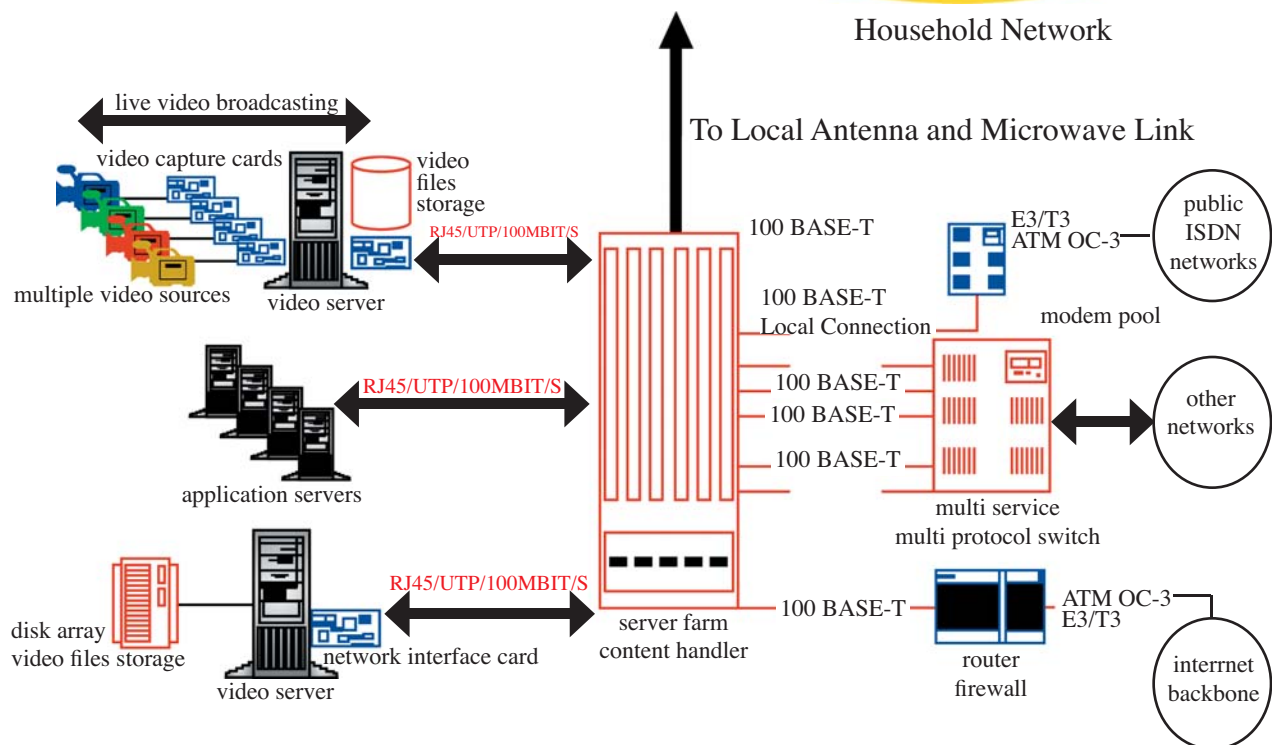


Figure 13





WICS

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