Communicating a World of Need

Destination (region of the world)

GPS (Global Positioning System)

Communication services needed
- Data
  - Internet
  - Organization Specific Server Connection
- Dedicated Streaming Data
  - Audio
  - Video
- Voice

International activated USA based Cell Phone Service
- Cingular
- T-Mobile
- Nextel

GSM Unlocked Terrestrial Cell Phone Service
- SIM Card
- Activation
- Renewable Air Time

Satellite Service
- Basic Concepts
  - Low Earth Orbit
  - Medium Earth Orbit
  - Geo-stationary Earth orbit
    - Latency Issues
- Satellite Service Providers
  - Stratos
  - French Telecom
  - Many others
- Voice Only
  - Iridium
  - Global Star
  - Thuraya
- VSAT (very small aperture transmission)
  - Drastic Data and Voice (including Voice over IP)

- INMARSAT
    - Thrane and Thrane
    - NERA
    - Hughes

Iridium
Thuraya

Electrical power issues

Security Issues

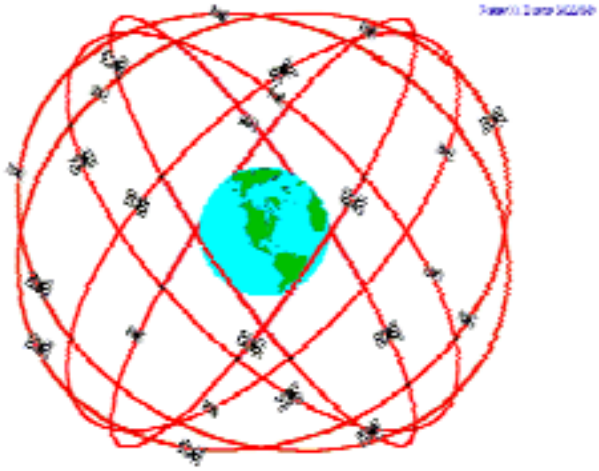
Licensing Issues

Learning Objectives

Where am I? An Overview of Global Positioning System
How do I stay in touch? An overview of communication technology available today
Communicate the need

GPS is a Satellite Navigation System

GPS is Short for Global Position System**.** GPS is funded by and controlled by the U. S. Department of Defense (DOD). While there are many thousands of civil users of GPS world-wide, the system was designed for and is operated by the U. S. military. GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time.

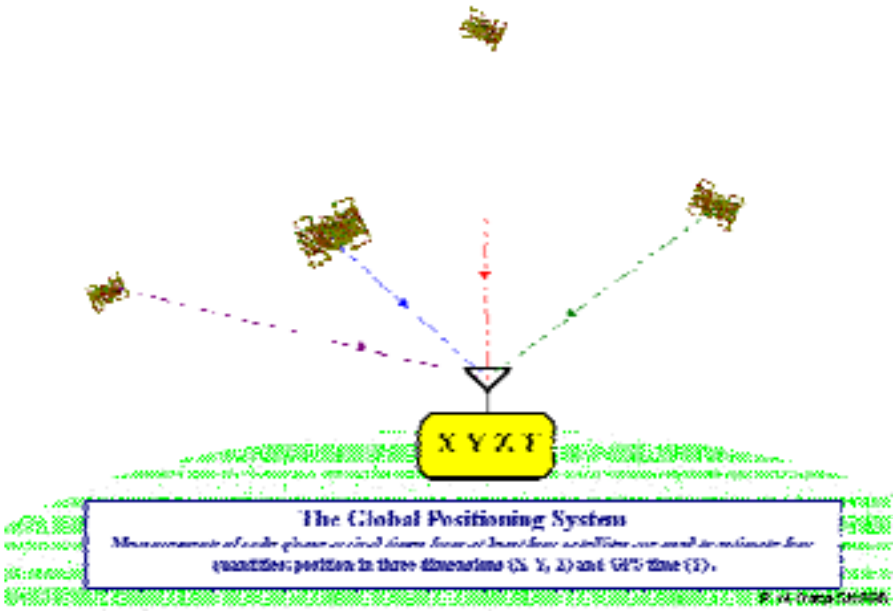


GPS Nominal Constellation
24 Satellites in 6 Orbital Planes
4 Satellites in each Plane
20,200 km Altitudes, 55 Degree Inclination

The nominal GPS Operational Constellation consists of 24 satellites that orbit the earth in 12 hours. There are often more than 24 operational satellites as new ones are launched to replace older satellites. Each of these 3,000- to 4,000-pound solar-powered satellites circles the globe to about 12,000 miles (19,300 km), making two complete rotations every day. The orbits are arranged so that at any time, anywhere on Earth, there are at least four satellites "visible" in the sky. Four GPS satellite signals are used to compute positions in three dimensions and the time offset in the receiver clock. The satellite orbits repeat almost the same ground track (as the earth turns beneath them) once each day. The orbit altitude is such that the satellites repeat the same track and configuration over any point approximately each 24 hours (4 minutes earlier each day). There are six orbital planes (with nominally four SVs in each), equally spaced (60 degrees apart), and inclined at about fifty-five degrees with respect to the equatorial plane. This constellation provides the user with between five and eight SVs (space vehicle) visible from any point on the earth.

The GPS User Segment consists of the GPS receivers and the user community. GPS receivers convert SV signals into position, velocity, and time estimates. Four satellites are required to compute the four dimensions of X, Y, Z (position) and Time. GPS receivers are used for navigation, positioning, time dissemination, and other research. Navigation in three dimensions is the primary function of GPS. Navigation receivers are made for aircraft, ships, ground vehicles, and for hand carrying by individuals.

A GPS receiver's job is to locate four or more of these satellites, figure out the distance to each, and use this information to deduce its own location. This operation is based on a simple mathematical principle called **trilateration**. Trilateration in three-dimensional space can be a little tricky, so we'll start with an explanation of simple two-dimensional trilateration.



The Global Positioning System has a clever, effective solution to this problem. Every satellite contains an expensive atomic clock, but the receiver itself uses an ordinary quartz clock, which it constantly resets. In a nutshell, the receiver looks at incoming signals from four or more satellites and gauges its own inaccuracy. In other words, there is only one value for the "current time" that the receiver can use. The correct time value will cause all of the signals that the receiver is receiving to align at a single point in space. That time value is the time value held by the atomic clocks in all of the satellites. So the receiver sets its clock to that time value, and it then has the same time value that all the atomic clocks in all of the satellites have. The GPS receiver gets atomic clock accuracy "for free."

When you measure the distance to four located satellites, you can draw four spheres that all intersect at one point. Three spheres will intersect even if your numbers are way off, but *four* spheres will not intersect at one point if you've measured incorrectly. Since the receiver makes all its distance measurements using its own built-in clock, the distances will all be **proportionally incorrect**.

The receiver can easily calculate the necessary adjustment that will cause the four spheres to intersect at one point. Based on this, it resets its clock to be in sync with the satellite's atomic clock. The receiver does this constantly whenever it's on, which means it is nearly as accurate as the expensive atomic clocks in the satellites.

In order for the distance information to be of any use, the receiver also has to know where the satellites actually are. This isn't particularly difficult because the satellites travel in very high and predictable orbits. The GPS receiver simply stores an **almanac** that tells it where every satellite should be at any given time. Things like the pull of the moon and

the sun do change the satellites' orbits very slightly, but the Department of Defense constantly monitors their exact positions and transmits any adjustments to all GPS receivers as part of the satellites' signals

GSM Cellular Service - Worldwide

Short for ***G****lobal* ***S****ystem for* ***M****obile Communications,* one of the leading digital cellular systems. GSM uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency. GSM was first introduced in 1991. As of the end of 1997, GSM service was available in more than 100 countries and has become the *de facto* standard in Europe and Asia

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band.

Mobile services based on GSM technology were first launched in Finland in 1991. Today, more than 690 mobile networks provide GSM services across 213 countries and GSM represents 82.4% of all global mobile connections. According to GSM World, there are now more than 2 billion GSM mobile phone users worldwide. GSM World references China as "the largest single GSM market, with more than 370 million users, followed by Russia with 145 million, India with 83 million and the USA with 78 million users."

GSM, together with other technologies, is part of the evolution of wireless mobile telecommunications that includes High-Speed Circuit-Switched Data (HCSD), General Packet Radio System (GPRS), Enhanced Data GSM Environment (EDGE), and Universal Mobile Telecommunications Service (UMTS).

Since many GSM network operators have roaming agreements with foreign operators, users can often continue to use their mobile phones when they travel to other countries. SIM cards (Subscriber Identity Module) holding home network access configurations may be switched to those will meter local access, significantly reducing roaming costs while experiencing no reductions in service.

A SIM card, also known as a subscriber identity module, is a smart card that stores data for GSM cellular telephone subscribers. Such data includes user identity, location and phone number, network authorization data, personal security keys, contact lists and stored text messages. Security features include authentication and encryption to protect data and prevent eavesdropping.

A SIM card and can be switched easily from one phone set to another. The portability of data offers a number of benefits. For example, a user that buys a new phone can install

the current SIM card to associate the new phone with the same number and user preferences as the old one. In another common situation, if a phone's battery runs out of power, the user can easily install the card to another subscriber's phone to borrow it without running up that user's minutes. Some vendors offer prepaid SIM cards that can provide travelers with local numbers, as long as their cell phones are not locked to a specific carrier.

General Packet Radio Services (GPRS) is a packet-based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users. The higher data rates allow users to take part in video conferences and interact with multimedia Web sites and similar applications using mobile handheld devices as well as notebook computers. GPRS is based on Global System for Mobile (GSM) communication and complements existing services such circuit-switched cellular phone connections and the Short Message Service (SMS).

In theory, GPRS packet-based services cost users less than circuit-switched services since communication channels are being used on a shared-use, as-packets-are-needed basis rather than dedicated to only one user at a time. It is also easier to make applications available to mobile users because the faster data rate means that middleware currently needed to adapt applications to the slower speed of wireless systems are no longer be needed. As GPRS has become more widely available, along with other 2.5G and 3G services, mobile users of virtual private networks (VPNs) have been able to access the private network continuously over wireless rather than through a rooted dial-up connection.

GPRS also complements Bluetooth, a standard for replacing wired connections between devices with wireless radio connections. In addition to the Internet Protocol (IP), GPRS supports X.25, a packet-based protocol that is used mainly in Europe. GPRS is an evolutionary step toward Enhanced Data GSM Environment (EDGE) and Universal Mobile Telephone Service (UMTS).

www.tigerdirect.com

www.ustronics.com

Nokia 6010 Price less than $100 USD Dual Band

Cingular Example

Traveling Outside the U.S.

Wireless: The convenient and affordable way to stay in touch internationally

Use our NEW Wireless Travel Guide to see if you'll have coverage based on your device and itinerary. Or use the drop-down boxes below to look-up coverage information.

Getting Started

1. Select your destination country from the list below.
2. Determine if your wireless device will operate in the country you are visiting.
3. Activate international roaming for your account.

More Cingular phones work in more places around the world than any other U.S. carrier – over 190 countries. Stay connected while traveling to over 190 countries, plus get discounted rates in over 80 of those countries when you sign up for Cingular World Traveler. Just look for Cingular World Traveler rates below.

You can use your phone while traveling in Canada, Puerto Rico, and the U.S. Virgin Islands with no additional feature required. Roaming charges may apply dependent upon your rate plan.

Kenya $3.99 SafariCom or Celtel

Communication Satellite

The primary role of a satellite is to reflect electronic signals. In the case of a telecom satellite, the primary task is to receive signals from a ground station and send them down to another ground station located a considerable distance away from the first. Almost everyone in the industry knows that modern communication satellites are at the heart of the high quality telecommunications services provide to millions of people around the world. However we sometimes take for granted just how remarkable these satellites and their associated ground systems have become. Weighing about the same as a full size American car, when these satellites roll out the assembly line their fuel tanks will be filled and then they will be subject to full force fury of a controlled explosion known as a launch vehicle. With several additional pushes from an internal rocket, after two weeks they will finally arrive at the proper orbit slot 22,247 miles above the earth. For the next thirteen to fifteen years, in spite of the continuous push from “solar wind” and the constant pull of gravitational forces, the satellite must be kept in the same position – again using internal rockets under ground control – so that the customer’s antennas will not have to search to find it. After the antenna and solar panels are unfolded and a short period of testing is completed, the satellites will be expected to run 24/7 for 13-15 years with no stops at the dealer for repairs or even routine maintenance. They will also be

expected to provide continuous communications services between points on the earth within the antenna footprints carrying huge volumes of video, voice, and data.

The two most important components of the space craft are the service module with all its electronics and mechanics to keep the satellite on going and the communications of mission payload, which carries out the mission requirements e.g., the communications transponders. Probably the most important part of the telecom satellite is the transponder. The word transponder is a compound from Trans(mitter) and (res)ponder. This piece of electronic equipment inside the satellite acts like a microwave repeater, which receives, amplifies, and re-transmits the incoming signals back to earth into its footprint. A single satellite can have a large number of transponders. Each transponder supports a small portion of the total operational frequency bandwidth (also named space segment) of the satellite. Common transponder bandwidths are 36 MHz and 54 MHz. Space segment on a communications satellite is very expensive (charges are often per KHz per month) and should be planned very carefully. Reusing frequencies can easily enhance satellite capacity.

Communications satellites are usually brought into geostationary orbit which is 22,247 miles or 35800 km above the earth. At this altitude, a satellite has n orbital velocity equal to the earth's rotational speed (one revolution per 24 hours) causing the satellite to appear stationary or motionless above the earth. That is why ground antennas can be aimed easily and stay pointed toward the right place. The satellite's position is expressed in degrees and indicates a point east or west of the prime meridian. The position of the GEO satellite is given in degrees of longitude. Longitude indicates a point east or west of the prime meridian. Position of an earth station is given a longitude and latitude. Latitude indicates a point north or south of the equator.

Geosynchronous systems have several advantages in terms of long satellite life and wide area coverage by a small number of satellites. They have the disadvantages of round trip latencies that exceed a half a second, poor coverage and inadequate elevation angles (to avoid building radio shadows in urban areas) at the high latitudes.

To Transmit and receive a signal entails a delay of approximately half a second while the electromagnetic wave travels to and from the satellite. The delay becomes a more important factor in satellite-delivered internet services because of the effect of internet transmission protocols. Notably, the Transmission Control Protocol (TCP) requires each data packet to be acknowledged as received intact before sending further packets. This limitation of TCP can be overcome in a number of ways by using techniques such as acknowledgments compression and protocol emulation to reduce the amount of acknowledgment traffic.

Transmission from the earth station to the satellite is called uplink, and the system from the satellite to the earth station is called downlink. To avoid mutual interferences, the uplink and downlink frequencies are separated. The downlink frequency is usually lower

than the uplink frequency as it suffers smaller propagation losses from the satellite to the earth, thus requiring less of the satellite's limited power resource.

The footprint is the geographical area towards which a satellite downlink antenna directs its signal or conversely they are from which the satellite is visible from the earth. The measure of the signal strength of this footprint is the Effective Isotropic Radiated Power (EIRP). This is the product of the power supplied to the antenna and the antenna gain, in a given direction, EIRP is expresses in dBW. It is important to note that there is an inverse relationship between EIRP and antenna diameter. The higher the EIRP the smaller the required dish (under the condition that the bandwidth and encoding of the modulated signal remains the same).

V SAT (Very Small Aperture Terminal) are small fixed satellite antennas that provide highly reliable communication means for data, voice and fax between almost any number of geographically dispersed sites.

VSAT technology represents a cost effective solution for users seeking an independent communications network connecting a number of remote sites. VSAT networks offer value-added satellite-based services capable of supporting the Internet, data, LAN, voice/fax communications, and can provide powerful, dependable private and public network communications

VSAT satellite communication provides reliable digital data communication and the use of VSAT provides the ability to expand capacity and system growth, while maintaining a handle on costs which are closely associated with the increase in capacity or system growth.

VSATs are used for a wide variety of telecommunications applications, including

- Internet/Intranet access
- Corporate networks
- SCADA/Line Monitoring
- Rural telecoms
- Environmental Monitoring
- Distance Learning
- Seismic Monitoring
- Telemedicine
- Utility monitoring
- Disaster recovery
- Remote Video Monitoring
- Ship-board communications

Corporate companies are now utilizing both terrestrial and satellite communication to connect to remote offices around the country side. The cost and security advantage of satellite bandwidth compared with some terrestrial circuits ensures that the number and diversity of VSAT networks will continue to grow in the future. The mining, construction and oil gas industries are typical examples of applications which find advantages with VSAT.

Advantages of VSAT Technology

- One single network to all sites
- Full availability - all sites on the same network
- Flexible network topology - easy to add, relocate or delete sites
- Transmission costs not distance dependent as with terrestrial networks
- Predictable costs
- One point of contact for all network issues
- More cost-effective than leased or dedicated phone lines to remote locations
- More robust data networks compared to standard telephone lines
- Performance is insensitive to terrain or distance
- Cost-effective emergency back-up for critical data flow
- Proactive around-the-clock network support from Network Control Centre, located at Australian Satellite Services. Individual applications can be customized to meet specific requirements

The **DRASTIC** network has been designed to satisfy the specific needs of users in the developing
world. The key aspects of the network are:
• Coverage
• Affordability
• Logistics
• Reliability and service

Coverage

As at August 2005, our coverage is approximately as shown on the illustration below. The more
heavily shaded areas simply show coverage from more than one satellite. Additional options are
being developed to give even fuller coverage in the near future. *Please contact us for details of exact*
coverage at your location.

Affordability and Logistics

We have designed our global coverage so that no location will require an antenna (dish) bigger than
2.4m. The weaker signals available from some other satellites require more expensive larger dishes
and higher powered outside electronics. These add considerably to the cost of buying, transporting
and installing a VSAT system. For transportability, we have selected antennas that are available in
sections which will enable transport in light aircraft down to Cessna 206 in size. In many areas, 1.2m
or 1.8m antennas can be deployed successfully. These are smaller, lighter and less costly again.

Reliability and service

Our network is extremely robust and well managed. The network is served by Network Operations
Centers (NOCs) based at four teleports in the USA and Europe. These are staffed by highly
experienced specialists 24 hours a day, every day. Every part of the network is interconnected by
dedicated DS3 high speed internet connections and redundant connections to the Internet. This
means that if any single NOC becomes unavailable, its functions can be immediately and fully
assumed by one of the other NOCs. Power supplies are also fully redundant with multiple generators
and fuel available for at least 100 hours operation independent of national power grids. This is the
infrastructure which ensures reliability and through which excellent service is delivered.
One of the NOCs in the USA
One of the teleports in the USA
32 meter antennas at one of the European
teleports.
For more information about DRASTIC see www.drasticom.org or email us at info@drasticom.org

iDirect 300 satellite transceiver

Globalstar Satellite Guide

Globalstar's constellation of 48 low-earth-orbiting (LEO) satellites, transmits calls from your wireless phone or fixed phone station to a terrestrial gateway, where they are passed on to existing fixed and cellular telephone networks in more than 100 countries on 6 continents.

Welcome to Globalstar Satellite Voice and Data Service

Globalstar provides affordable, dependable high quality satellite voice and data service across North America and to over 120 countries worldwide. When your business centers on remote worksites and working in remote areas beyond cellular and traditional landline service Globalstar is the answer to your requirement for reliable and affordable communications.

Voice and Data

Voice and data services are offered through mobile and fixed units to meet the needs of business and recreational users. Globalstar data services help deliver information from remote areas where key business or operational data is collected, saving time and money for countless companies.

Globalstar Customers
Globalstar voice and data customers include businesses who operate in areas where cellular coverage is poor or non-existent and landline service unavailable. Natural resource companies, long-haul transportation operators, commercial fishermen, government employees, recreational and travel enterprises, geologists, prospectors and public safety organizations all value Globalstar products and services. Outdoor enthusiasts can have the convenience and safety of a Globalstar handset while they fish, hunt and enjoy themselves in remote areas. Globalstar also offers phone rental services for businesses and consumers with short-term and seasonal requirements for continual communications.

Inmarsat Satellite Guide

INMARSAT is the most sophisticated Satellite network in existence. There are several different bands which are divided into separate categories.

Inmarsat I-4: Gateway to Broadband
Eighty-five per cent of the world's total landmass is now covered by Inmarsat's next-generation satellite system - the Inmarsat-4 (I-4) series.

The first two of three I-4 satellites are now in commercial operation in Inmarsat's Indian and Atlantic ocean regions, with coverage extending across North and South America, Europe, Africa, Asia and the Far East.

Inmarsat's fourth-generation I-4 spacecraft are among the largest commercial communications satellites ever launched.

They replace their highly successful predecessors - the Inmarsat-2 and Inmarsat-3 spacecraft - as the pillars of Inmarsat's new Broadband Global Area Network (BGAN) services.

Together they usher in a new era, which we call 'Broadband for a Mobile PlanetTM', delivering simultaneous voice and data at speeds of about half a megabit per second.

Each I-4 is a veritable powerhouse compared with the Inmarsat-3 spacecraft, offering:

- Greater call capacity than all five I-3s put together
- 60 times more power than any one of its predecessors

- 12 times greater efficiency in its use of radio spectrum
- 16 times the capacity
- 25 times the receiver sensitivity.

The I-4 spacecraft have been built largely in the United Kingdom - the bus in Astrium's factory in Stevenage and the payload in Portsmouth. The two halves were then joined together in Toulouse, France, along with the US-built antenna and German-built solar arrays.

The Inmarsat-4s, like their predecessors, are equipped with a single global beam that covers up to one-third of the Earth's surface, apart from the poles.

Each satellite also generates 19 wide spot-beams that provide continuous coverage across the same region for Inmarsat's existing high-end services, including Fleet F77 128kbps, Fleet F55 and F33, and maritime mini-M.

New to the I-4s are an additional 228 narrow spot-beams, designed to form the backbone of Inmarsat's broadband services, including the Broadband Global Area Network (BGAN), which was launched at the end of 2005.

BGAN delivers Internet and intranet content and solutions, video-on-demand, videoconferencing, fax, e-mail, phone and LAN access at speeds of up to 492kbps.

Together the first two I-4s serve about 98 per cent of the global population.

In-orbit operations

The Inmarsat satellites are positioned in geostationary orbit. This means they follow a circular orbit in the plane of the Equator at a height of 35,600km, so they appear stationary relative to a point on the Earth's surface.

Our satellites are controlled from the Satellite Control Centre (SCC) at Inmarsat HQ in London, which is responsible for keeping the satellites in position and for ensuring the onboard systems are fully functional at all times.

Data on the status of the Inmarsat satellites is supplied to the SCC by four tracking, telemetry and control (TT&C) stations located at Fucino, Italy; Beijing in China; Lake Cowichan, western Canada; and Pennant Point, eastern Canada. There are also back-up stations at Eik in Norway and Aukland, New Zealand.

A call from an Inmarsat mobile terminal goes directly to the satellite overhead, which routes it back down to a gateway on the ground called a land earth station (LES). From there the call is passed into the public phone network.

With the launch of BGAN, two new gateways, called Satellite Access Stations (SASs), have been introduced. Both are owned by Inmarsat. The first, in Burum, The Netherlands, is operated by Inmarsat partner Stratos / Xantic, and the other, in Fucino, Italy, by another partner, Telespazio.

BGAN enables users to access data applications at broadband speed and make phone calls at the same time - wherever they are on the planet.

Data

The standard IP service offers access to corporate networks via a secure VPN connection at speeds up to 492kbps. It enables you to access e-mail and other office applications, browse the Internet and send large file attachments.

Streaming IP

For applications where quality of service is paramount, such as live video or videoconferencing, BGAN offers an 'on-demand' Streaming IP service at speeds up to 256kbps. You can choose the data rate on a case-by-case basis depending on your application. BGAN also supports ISDN.

Phone

You can make phone calls at the same time as accessing data applications via a standard desktop phone, custom handset or Bluetooth handset/headset, depending on the BGAN terminal. Voice mail and other standard 3G supplementary services are also available.

Text
BGAN enables you to send and receive text messages via a laptop to or from any mobile phone. The service supports the standard 160 characters.

BGAN LaunchPad™
The BGAN service is accessed via BGAN LaunchPad, a software-based interface on your laptop PC that is standard across all terminals.

Key features:

- Easy to use interface
- Clear step-by-step instructions on pointing the terminal and setting up a satellite connection
- Ability to customize the data connection options to match your application requirements
- Ability to pre-configure user access settings, enabling you to restrict access to Streaming IP services, for example
- Convenient online access to account and billing information
- Personal and corporate versions
- Access to text messaging and telephony features
-

Iridium Phones and Iridium Satellite Phones -- One World, One System Satellite Guide

The Iridium satellite network provides full global communication. With 66 satellites forming a cross-linked grid, this system was the first low-Earth-orbiting network for wireless telephone service. It is possible to place or receive a call, virtually anywhere on the planet.

Iridium is the only satellite network capable of passing data and voice communications from one satellite to another. The network is capable of operation with only one Land Earth Station.

Iridium Satellite LLC (www.iridium.com) is the only provider of truly global satellite voice and data solutions with complete coverage of the earth (including oceans, airways and Polar Regions). Iridium delivers essential communications services to and from remote areas where no other form of communication is available. The Iridium constellation consists of 66 low-earth orbiting (LEO), cross-linked satellites and has multiple in-orbit spares. The constellation operates as a fully meshed network and is the largest commercial satellite constellation in the world. The Iridium service is ideally suited for industries such as maritime, aviation, government/military,

emergency/humanitarian services, mining, forestry, oil and gas, heavy equipment, transportation and utilities. Iridium provides service to the U.S. Department of Defense. The company also designs, builds and sells its services, products and solutions through a worldwide network of more than 150 partners.

9505A Portable Satellite Phone
What is it?
Functionally similar to the Iridium 9505, this latest offering introduces some minor product changes. It is significantly smaller, lighter and more resistant to water, dust and shock than the original Iridium 9500 and is ideal for industrial or rugged conditions, yet appealing to the traveling professional.

- Quick Access Interface
- Water, shock & dust resistant for rugged environments
- Data Capable (use your satellite phone to transmit and receive data with an optional RS232 adapter)
- 21 language choices for prompts
- Headset/Hands-free capability

Talk Time Features
- Provides up to 30 hours of standby time
- Provides up to 3.2 hours of talk time

Display
- 4 x 16 character Illuminated Graphic Display

Calling Features
- Call Barring
- Call Forwarding - Unconditional, mobile subscriber busy, subscriber not reachable
- Clear Last Digit/Clear All Digits
- Fixed Dialing
- International Access Key Sequence (+ key)
- Mailbox for Numeric & Text Messages (160 characters)
- Quick Access Interface
- Selectable Keypad tone (3 choices)
- Selectable Ringer tone (10 choices)
- Keypad Disable
- Two-way SMS capability
- Unanswered Call Indicator
- Volume Adjustment (earpiece or ringer)

Memory
- 100 Alpha and Numeric Memory Storage
- Last 10 Numbers Dialed

- Name Storage
- Memory Scroll by Location
- 32-Digit Number Capacity Phone Book
- 16-Digit Name Tag
- One-Touch Dialing
- Subscriber Identity Module Card (additional memory storage)

Visual/Alert Features

- Signal Strength Meter
- Battery Meter (always shown in display)
- Illuminated Keypad
- Low Battery Warning

Thuraya Dynamic Technology

Thuraya products give you the freedom of movement and the ability to stay connected in more than 110 countries in Europe, North, Central Africa and large parts of Southern Africa, the Middle East, Central and South Asia. This means total coverage whether you are in a village, on a mountain or by the coast.

GSM/SatellitePhone

Thuraya's handheld phones combine three powerful technologies: satellite, GSM and GPS allowing users the flexibility to avail seamless connectivity outside terrestrial network and utilise global positioning overview.

World's Smallest Satellite Phones
SO-2510 & SG-2520

Thuraya's second generation handsets are technological breakthroughs.

Designed to be the smallest and lightest phone in the satellite industry, the Thuraya **SO-2510**, weighs a mere 130gm and is ideal for heavy users who require only satellite service in areas with limited telecom connectivity. The **SG-2520** is the only satellite smartphone in existence; offering satellite service along with the full range of advanced features.

- **System**
  Satellite, GSM Tri-Band (900/1800/1900)
- **Enhanced GPS Feature**
- **Memory**
  Internal – Up to 128 MB
  External – SD memory card
- **Dimensions**
  138.5 x 52 x 18.8 mm (h x w x d)
- **Weight**
  170g
- **Display**
  262,000 colours
- **Resolution**
  176 x 220 pixels (1.9 inch)
- **Camera**
  Integrated 1.3 megapixel
- **Connectivity**
  Bluetooth (1.1), USB (1.1), Infrared Port (1.1)
- **GmPRS capabilities**
  Satellite mode
  Downstream: up to 60 Kbps*
  Upstream: up to 15 Kbps*
  GSM mode:
  Downstream: up to 85.6 Kbps*
  Upstream: up to 42.8 Kbps*
- **Fax and Data at 9.6Kbps**
  (circuit switched)
- **Operating System**
  WinCE 4.2
- **Micro browser**
  HTML, WAP 1.0, WAP 2.0
- **Languages**
  Supports 12 languages
- **Battery**
  Satellite Mode
  Talk Time up to 2.4 hrs**

Standby time up to 40+ hrs**
GSM Mode
Talk time up to 4.0 hrs**
Standby time up to 75 hrs**

ThurayaDSL provides Internet connectivity through a small and mobile terminal the size of a notebook, offering high-speed 144 kbps connectivity anytime and anywhere in Thuraya's coverage area. Especially ideal for corporate customers, government agencies and news-gathering agencies, ThurayaDSL is a cost effective solution for their high-speed data requirements.

Global coverage

BGAN delivers seamless network coverage across most of the world's landmass. Users are able to get broadband wherever they go, not just in major cities or airports. BGAN is currently accessible in Europe, Africa, the Middle East, Asia, North and South America.

Simultaneous voice and broadband data

With a single BGAN device, you can access data applications at broadband speeds and make phone calls at the same time. In a world-first for mobile services, you can also select guaranteed data rates on demand, with a choice of rates to suit your application requirements. And to ensure bandwidth availability, network capacity can be re-directed to areas of heavy usage.

Portable

BGAN terminals are compact, lightweight and designed to be carried as easily as a laptop. The smallest BGAN terminal weighs less than a kilo. A fully functional broadband mobile office can be set up and shut down in minutes.

Flexible

BGAN supports the latest IP services, as well as traditional circuit-switched voice and data. Integrating seamlessly with your corporate networks, it supports legacy applications while providing a smooth upgrade path to IP. There are terminals for single users and small teams, which can be connected to a laptop PC via a wired or wireless connection. For added flexibility, the BGAN LaunchPad can be customized to your requirements.

Email Client Software

SkyFile Mail - e-more, pay less

With the new SkyFile Mail software for mobile satellite communications, the transfer of email, e-fax and SMS messages via Inmarsat, Iridium and Thuraya is more reliable and cost-effective than ever. The new SkyFile Mail is compatible with RBGAN, MPDS and, of course, the new BGAN Service.

Stay in permanent contact with SkyFile Mail! Your main cost-saving advantages:

SkyFile Mail reduces connection times by up to 90% thanks to data compression, shorter connection times and reliable duplex-mode (bi-directional) data transfers

The **SkyFile Mail** software and its usage are **free of charge**; no monthly fees or licence costs for the full version

With built-in “crash recovery”, if a **SkyFile Mail** connection is interrupted, it automatically restarts at the same point at which transmission stopped, saving both time and money. Automatic notification of incoming e-mail avoids having to check the mailbox - another substantial savings feature

SkyFile Mail is compatible with all Windows operating systems (starting with the 95).

StratosNet

Conventional Internet Service Providers typically use networks that were not designed with the needs of modern mobile satellite users in mind. Compared with today’s standard terrestrial Internet access, they tend to use unique protocols and provide relatively low satellite connection speeds. Therefore, Stratos developed StratosNet®—a service that has been optimized for cost-effective Internet Services for satellite phones.

Advantages:
The flexibility of StratosNet means that you can use it with many different satellite services:

- Inmarsat A, B, M, Mini-M, GAN, Fleet, RBGAN and BGAN, including the MPDS services offered on Fleet and GAN
- Iridium
- MSV

Works With Any Data Speed
StratosNet is dynamically engineered to automatically match the data speed of the type of satellite phone placing the data call. StratosNet allows you to connect with ultimate efficiency, whether your sat phone is a mini-M operating at 2400 bps or a Fleet terminal with 128K and MPDS service.

Optional Web Browsing
StratosNet offers Internet e-mail, web access and FTP (File Transfer Protocol) capability. However, we realize that you may not want users of your satellite phones to be able to browse the web. Therefore, Stratos give you the option of disabling web browsing on your StratosNet account.

On-the-Fly Compression of All Information Transmitted
We understand that every minute you’re connected over the satellite costs more money. To increase efficiency and minimize your connection time and costs, on-the-fly client/server compression is included as an integral part of your service. We automatically compress everything transmitted over the StratosNet link, including e-mail, attachments, web browsing and FTP transfers. Like any compression system, the amount of compression depends on the type and size of information transmitted.

WebMail
How do you access your StratosNet e-mail account when you are away from the satellite

terminal? Easily. You can use any Internet service onshore and any web browser to access your StratosNet account via our WebMail service at webmail.stratosnet.com. WebMail access also allows you to configure custom e-mail filters, such as the maximum size of files that can be transmitted or received by a StratosNet mailbox, as well as black and white lists to optionally block or allow specific e-mail addresses and domains to send to the StratosNet account. If a mobile user has chosen the web browsing option, this is also a convenient way to set these parameters from the mobile side.

Pay Only For Satellite Airtime

There are no registration or monthly fees associated with use of the StratosNet service, and the software is free as well. You pay only for the satellite airtime charges incurred to connect to StratosNet, as itemized on your monthly bill.