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# Global Mobile Communication System

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## GLOBAL MOBILE COMMUNICATIONS SYSTEM

### THE NEED

Imagine yourself needing to talk with your field engineer which is attending a job site project schedule inspection, waiting for him to call, the job site is so remote that you can not contact him. You need to inform your engineer that there has been a disruption, and the measures have to be taken immediately. You realize once again, that it is of crucial importance that an excellent system of communications between the job site and the office be established.

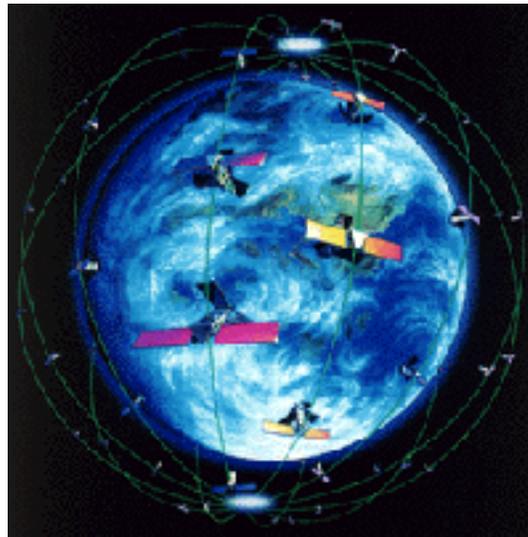


FIGURE 1 INTER-SATELLITE CROSSLINK

No other technology is so versatile, so reliable and so easy to handle and to operate than the Global Mobile Communications System (see Figure1). This network is revolutionizing industry. In addition of providing voice cellular service with only one number around the world, with a telephone small enough to fit in our hands, the subscriber unit can incorporate a one way paging system with a one way messaging capability.

Without any doubt, having a good and well established communications system is increasingly a critical factor in a successful construction project.



## THE TECHNOLOGY

The Global Mobile Communications System is a satellite-based, wireless personal communications network designed to permit any type of telephone transmission -- voice, data, fax, paging -- to reach its destination anywhere on earth, at any time. It is bringing a new dimension of capability to the commercial, rural and mobile sectors by providing universal, portable service (see Figure2).

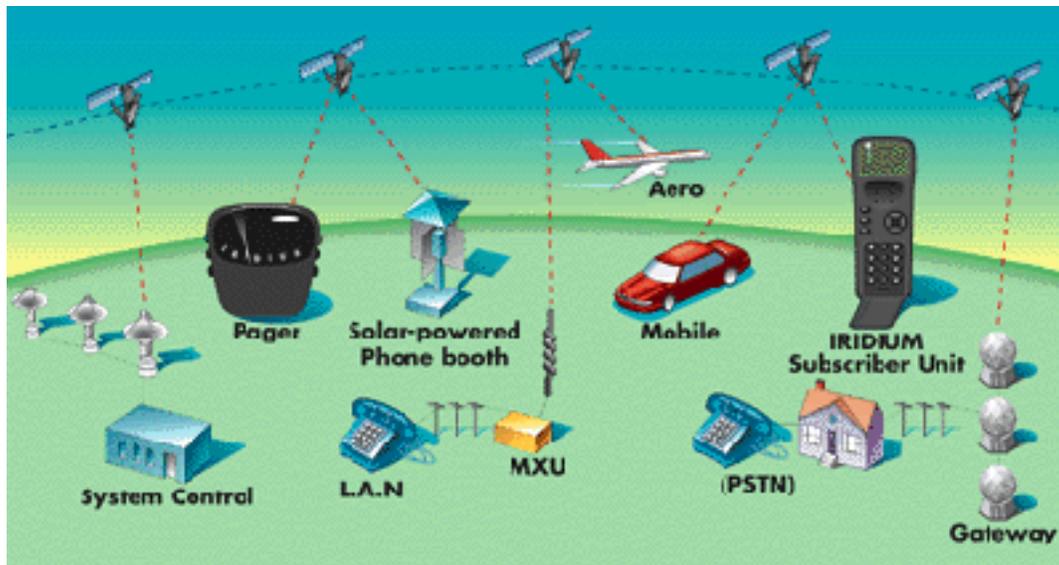


FIGURE 2 SCHEMATIC DIAGRAM

The technology description is best reflected with the Iridium Company system:

It consists of 66 small, smart satellites in low-earth orbit(LEO) which are to be networked together as switched digital communications system. The Constellation of Satellites is primarily intended to provide commercial, low density, via mobile or trans-portable user units, employing low-profile antennas, to millions of servers throughout the world. The sixty six 'small & smart' satellites (they are considered smart because they can switch and route calls in space, and small because they weight 300 kg approx. and are one meter in diameter and two meters tall) are interconnected to the network's backbone. Small battery-powered, telephone subscriber units communicate directly to the satellites. Gateways (Earth Stations) provide interface from the satellites to the local postal telephone(PSTN) and telegraph(PTT) authorities. The system is intended to complement the terrestrial system by first connecting with local cellular networks, then going to space cellular if the terrestrial connectivity is absent. This role handset technology will ensure communication in every part of the world.

The Iridium Satellite constellation enables connection to and from the satellites to the mobile subscriber units with the L-band frequency. This connection between an antenna on the subscriber telephone unit and a satellite at approximately 421 nautical miles in orbit, is achieved by a pattern of 48 contiguous



terrestrial cells projected by appropriate beams from phased array antennas on the spacecraft. This direct link connection is the reason for the low altitude satellites. The hand held subscriber unit is small and low power while the satellites are close and always available.

Space crosslinks at K-band, connecting the 66 satellites nodes of the communications infrastructure, provides paths for telephone calls and control access from the satellite control facilities to the satellite. Eleven spacecrafts will be in each of the six polar circular orbits at 421 nautical miles above the Earth. This particular constellation provides single coverage over the globe with maximum flexibility for coverage and maintenance at the Poles. Similar K-bands antennas will be oriented for connectivity to the individual gateways. These gateways control the billing of the phone charges and the routing of the terrestrial phone calls. This gateway concept is the key to the international aspects of the network, with country-by-country licensing and connections to the public service telephone network(PSTN's).

## **THE BENEFITS**

- The greatest advantage of this system is that it offers a phone or paging system which can be used anywhere and anytime in the world with just one single, consolidated phone bill for all cellular and satellite charges.
- A satellite traveling the network constellation, will cross the sky every 14 minutes. So every call made independent of the remote site will reach its destination with a continues coverage of all the world's landmass.
- In the Construction Industry, the advantage of communicate been as far away as the world can get, gives the companies a higher control over the every day activities of the project schedule.
- Nothing else is so versatile in communications, when you find yourself on your job site in the middle of the world, with a decision that has to be made in the right moment at the right place. This phones and pagers will become a complement to the conventional on-site communications.

## **STATUS**

The IRIDIUM Company is responsible for the development of the satellite network that has been in service since November 1, 1998. The company is a consortium of investors from all over the world, completed 100 % of its 66 satellites with a successful just in time approach.

Other companies such as GLOBALSTAR are also working towards providing service. At present they have launched 20 satellites, they are roughly going to launch four satellites every 30 days. This will result in a total of 32 satellites in orbit for the summer of 1999 and will enable a start of commercial service in September of 1999. Globalstar constellation of satellites will comprise by the end of 1999 a total of 48 satellites in operation an four in orbit spares.

The IRIDIUM phones are been used the Crisis in Kosovo with more than normal results.



## **BARRIERS**

One of the main problems affecting the implementation of the Global Mobile Communications System is the high cost of the handset and the rate per minute. For example, the user has to pay approximately US \$ 3 dollars per minute, and the phone cost is estimated to be between US \$3500-US \$5000 plus taxes for the IRIDIUM system. Global wireless may never be global at all. Any nation can forbid the service within their borders, and especially if they want to be completely isolated from the rest of the world. Therefore, it may come down to a high government decision.

## **POINTS OF CONTACT**

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## **REVIEWERS**

Peer reviewed as an emerging construction technology

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