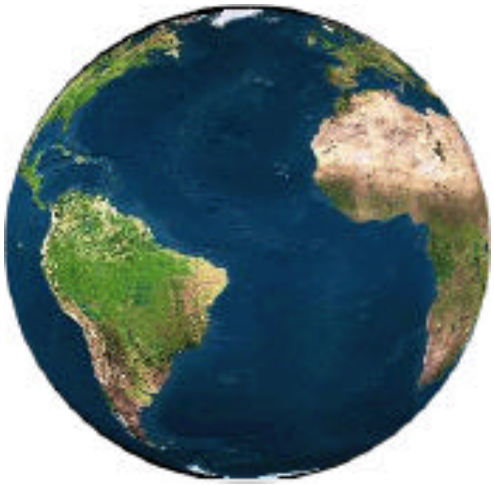
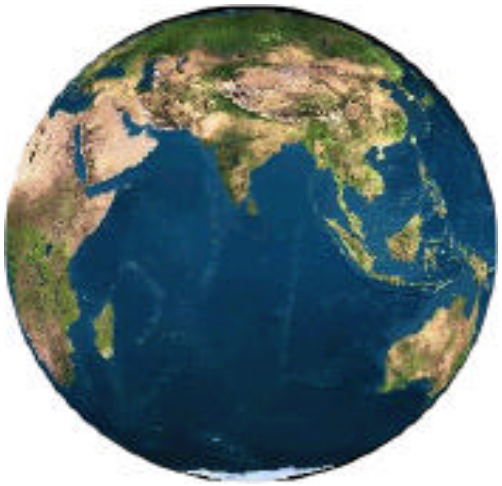
MEDSAT
Project





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The revolution in information technology and telecommunications is transforming the world. It has brought humankind into the digital age and affects every aspect of life; from the way we do the business to the new formats in entertainment; from bringing a quality education in a global auditorium to adding a new dimension in health care.
However, this revolution, which is intended to be global, is bypassing large regions around the globe that lack the necessary telecommunication infrastructure for making the advantages of the digital world accessible and affordable. Currently expanding cable (fiber optic) network is not going to provide access to the most needy in remote areas. The quick and affordable approach requires the use of Space Telecommunications.

MEDSAT is envisioned as a satellite telecommunication system for Disaster Relief, Telemedicine and Distance Learning for Developing World. The system will consist of two small satellites placed on GEO above Atlantic and Indian Oceans. The first satellite will provide communication services for South and Central America and Africa. It will cover also East Cost of the USA and part of Europe. The second satellite will cover Eurasia, part of East Africa as well as Japan and Australia. The ground segment of MEDSAT system is envisioned as the network of VSATs, which could be installed in rural hospitals and when necessary easily delivered by airlift to disaster areas.

The technical aspects of the project have been carefully studied and developed by an international team of experts, assembled by the East-West Space Science Center. Our technical feasibility study of the MEDSAT project, (includes telemedicine applications of small satellite technology), was supported by NASA and the Media Lab of MIT. This proposal is complementary to a UN plan to provide 10,000 Developing World hospitals with access to up-to-date medical information via the Internet.

For healthcare, MEDSAT telecommunication system will provide remote access to diagnostic and treatment protocols and research databases on drug interactions and drug availability, productivity tools such as treatment scheduling at clinics and hospitals, supplies procurement, drug stock management. It will bring competent medical advise in cases of emergency, training courses for healthcare professionals and continuing medical education, among other things.

For education, this project would provide multimedia computer-based programs to allow self-paced learning by students (particularly important in multi-grade environments often found in rural schools), access to supplementary teaching materials, access to Web-based library materials, opportunities to exchange lesson plans and experiences with administrative management systems. The availability of these elements is critical to improving the quality and productivity of education in an era of teacher and funding shortages.

The same system can provide immediate access to telecommunication services for disaster relief operations.

The proposed technical baseline for MEDSAT is small satellites in GEO assisted by plasma propulsion. The advantages are summarized below.

- The use of small satellites provides for a considerably lower financial entry level to orbit. The cost per satellite with six transponders delivered to GEO is expected to be approximately $30 million compared to the cost of a conventional Geo-stationary satellite, starting from $140 million.
- The smaller the satellite (less transponders) the easier its access to orbital slot based on the possibility of co-location next to a regular satellite because the regulations of ITU do not prohibit the co-location of two or more satellites on the same slots if their beams do not interfere. A small GEO satellite with only a few transponders can easily co-locate as long as it doesn't interfere with the existing occupant.

- The critically innovative technological step for the MEDSAT project is the use of a plasma propulsion module in order to replace the Apogee Kick Motor (AKM) for delivering the satellite from Geo Transfer Orbit (GTO) to GEO. The use of plasma thrusters serves for substantial mass saving and, reduces the delivery cost per transponder by up to 50%.

The relatively high cost of an orbital delivery is due to the complicated multi-step launch into GEO. The first stage is a launch into " parking orbit" on LEO (typically 200-300 km altitude) followed by a boost GTO, an elliptical orbit bridging LEO and GEO. The last stage, the final orbital passage, is from GTO to GEO. This last step is implemented with the use of a special rocket stage called an Apogee Kick Motor (AKM). It is here that we plan to implement the cost-saving technology of plasma propulsion. Using an AKM approximately 50% of the mass in GTO can be delivered to GEO. If the AKM is replaced by plasma propulsion approximately 85% of the mass in GTO can be delivered to GEO.

All aspects of the proposed scenario - technical, organizational and financial - are based on a detailed feasibility study. The Project team completed the process of an evaluation of the current state of plasma propulsion technology and models of existing thrusters, available from different manufacturers. We have run a number of topical workshops on the design of small satellites and their integration with plasma thrusters. A lot of technical solutions for MEDSAT satellites were presented on conference "Low-Cost Planetary Missions". The technical analysis carried by the East-West Space Science Center (EWSSC) followed the generally accepted requirements of compatibility with a number of launchers.