Communication Power Required and Transmission Time

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Chapter 1

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1.1 Types of Global Satellite Systems

The evolution from geo-stationary to low-Earthorbit (LEO) satellites has resulted in a number of proposed global satellite systems, which can be grouped into three distinct types - Little LEOs, Big LEOs, and Broadband LEOs. In the following table we can see the man applications of the different global satellite systems.

Little LEOs	Paging E-mail Fax
Big LEOs	Voice Telephone Low Speed Data
Broadband LEOs	Multimedia Conferencing Internet Access Video Conferencing Video-Telephony High Speed Data

Therefore, the network that Astrea aims to provide would belong to broadband LEOs satellite systems.

1.2 Broadband LEOs

It can be taken as example the Teledesic system (from late nineties). It did not intend to market services directly to end-users, but to provide an open network for delivery of such services by others. This is kind of similar to what Astrea intends to do. Therefore, it is a good example and some figures from it can be taken and analyzed.
Teledesic used small, "earth-fixed" cells both for efficient spectrum utilization and to respect country's territorial boundaries. Within a 53km x 53km, the Network was able to accomodate over 1800 simultaneous 16 Kbps voice channels. Channel bandwiths are assigned dynamically and assymetrically, and range from 16 Kbps to 2 Mbps (uplink), and up to 28 Mbps on the

downlink.
This network was orginised as follows: 21 circular orbit planes, which were staggered in altitude between 695 and 705 km. Each plane used to contain a minimum of 40 operational satellites plus up to four on-orbit spares spaced evenly around the orbit, for a total of 924 satellites. Those planes were at a sun-syncronous inclination (approx. 98.16º), i.e, constant angle relative to the sun.

Webs (sé que falta poner la bibliografía bien, es para no perder los enlaces, pendiente).
goo.gl/pUqga9
http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19960054092.pdf
http://www.satsig.net/latency.htm

1.3 Latency

Latency in satellite communications is the time that the radio signal (wave) takes to travel to and from the satellite in the space.
Example of how to calculate the latency of an orbit 1500 km above Earth:
1500km *1000m/km / 3*$10^8(speedoflight) = .005s * 4s/trip = .02seconds = 20ms$

More data about the designed satellite and power of antennas and so is required to take a study any further.

Bibliography