



National Aeronautics and
Space Administration



TECHNOLOGY SOLUTION

Communications

Heterogeneous Spacecraft Networks

Multiple spacecraft operating with various platforms use wireless technology to communicate

Heterogeneous Spacecraft Networks (HSNs) are network environments in which spacecraft from different missions and institutions can communicate with each other at a low-cost and with low impact on overall system resources. The technology of heterogeneous wireless networks has yet to be extended to space networks, where multiple spacecraft operating with various platforms use wireless technology to communicate. This communication need is growing given the increasing number of small satellites or nanosats being launched. Enabling such communication is significant, because connecting spacecraft offers a multiplier effect connecting limited capability spacecraft from small countries and institutions with more established networks that offer the possibility of an abundance of useful information for all concerned. In a growing sector where commercial space is ascending, allowing facile data transfer between a wide variety of space hardware and commercial communication platforms will soon be a necessity.

BENEFITS

- Reduced cost
- Universal access
- Extends the capabilities of individual satellite constellations
- Increases efficiency
- Brings the Internet of Things to space
- Facilitates collaboration



THE TECHNOLOGY

Heterogeneous Spacecraft Networks address an emerging need, namely, the ability of satellites and other space-based assets to freely communicate with each other. While it appears that there has been no significant effort to date to address the application, emergence of such a solution is inevitable, given the rapidly-growing deployments of small satellites. These assets need to be able to communicate with each other and with global participants. Extending established global wireless network platforms like Wi-Fi and ZigBee to space-based assets will allow different satellite clusters to assist each other. For example, one cluster could provide images of the earth's surface when another cluster is with out visibility at the needed time and location. More importantly, use of such common platforms will enable collaboration among individuals, institutions, and countries, each with limited assets of its own. Thus, allowing the incorporation of space-based assets into commercial wireless networks, and extending commercial communications into low Earth orbit satellites, access to satellite data will become ubiquitous. Similarly, some global networks will also benefit from the ability of a variety of nodes of different types to communicate with each other. One instance is in the emerging Internet of Things (IoT), where an enormous number of smart objects work together to provide customized solutions.



Cluster of Satellites

APPLICATIONS

The technology has several potential applications:

- Micro and Nanosatellite Systems
- Manufacturing
- Electronic Technology
- Energy Management
- Transportation
- Intelligence Systems

PUBLICATIONS

Patent No: 9,906,291

More Information

National Aeronautics and Space Administration

Agency Licensing Concierge

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