SPACE: THE FINAL FRONTIER IN RECYCLING

Recycling and re-use are novel notions for space programmes. Enough old junk has been left orbiting the Earth to create a real collision hazard for expensive new satellites, but the planned new Phoenix mission isn't about cleaning up the skies by bringing it all back home – or minimizing the threat of big lumps falling on us. Instead, it represents the realization that geostationary orbit has become a kind of celestial breaker's yard, a spoil tip in the sky that can be 'mined' for spares.

Why bother? Because all those abandoned solar arrays, antennae and other comms equipment originally cost $300 billion or so, and a lot of it would still work. And putting new payloads into orbit costs around $20,000 per kilo. Re-use in situ could be a whole lot cheaper.

When? How? A first Phoenix mission is planned for 2015, demonstrating the concept of re-use in space by taking a satellite aperture off its defunct 'host' satellite while in orbit, using robotic grappling tools controlled from earth, and reconfiguring it to fly independently. Thereafter, the plan is to develop new tiny 'satlets' to send up in a kind of pod as part of the payload of an 'ordinary' satellite launch. This would link up with an orbiting tender on the Phoenix 'mother ship', equipped with the tools to strip antennae and other things off defunct satellites (with the owners' permission) and couple them up with satlets to make new working systems. Simple to describe, hard to do, robotically, in zero gravity, but that's the basic idea.

Whose idea? It's a US military initiative, but the Defense Advanced Research Projects Agency (DARPA) wants "active participation from the international and non-traditional space communities involved in vital technical areas". Sectors that stand to benefit include micro-electronics, robotics; imaging; connectivity; manufacturing; and memory and data storage.

The space junk industry is not (yet) fully focused on recycling. NASA has projects for zapping debris with earth-based lasers, or sending specialized solar-powered satellites on specific clean-up missions. There could be mileage, too, in a ‘simpler’ mobile repair station, just to get failing comms satellites back on the road. So Phoenix isn’t the only game in town – but it could be the most creative, and spur the development of the most technological solutions. Geo-engineers, for certain, will be watching closely.

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