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SPACE POWER SYMPOSIUM (C3)
Wireless Power Transmission Technologies, Experiments and Demonstrations (2)

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SPACETOSPACE POWER BEAMING - AN EVOLVING COMMERCIAL MISSION TO UNBUNDLE SPACE POWER SYSTEMS TO FOSTER SPACE APPLICATIONS

Abstract

One of many paths forward for hastening the development of viable applications of space solar power technology is through focused incremental technology development efforts. This mission seeks to help mitigate the cost, schedule, and technical risk associated with the short, mid, and long term application of the technology. The development will provide both a capability of demonstrable value to some number of customers coorbiting with the International Space Station (ISS) and a testbed environment for the technology. This presentation and paper provides an update on the status of this commercial mission and the underlying requirements which technology development must support in order for the mission to succeed.

This work exploits a unique opportunity to foster the development of spacetospace power beaming by leveraging International Space Station (ISS) resources to create a spacetospace power beaming testbed environment on and in the vicinity of ISS. The author has hypothesized that unbundling power systems (i.e., the separation of power generation, transmission, control, storage, and loads) can: – reduce spacecraft complexity and thereby reduce cost, schedule, and technical risk – reduce mass and/or volume required to accomplish a given mission – reallocate mass and/or volume to enhance or enable missions – impart additional deltaV along velocity vectors of choice to enhance or enable missions – foster the development of loosely coupled modular structures to enable: * formation flying of multiple spacecraft (e.g., interferometric groups, swarms) * distributed payload and subsystem infrastructure to simplify the accommodation of multiple plugin and plugout interfaces * large scale adaptable space structures that minimize conducted thermal and/or structural loads. The implementation of the cubesat based power beaming testbed demonstrating power beaming from ISS requires the cooperation of NASA, ISS International Partners, academia, and industry. If the necessary confluence of interests is established the results will include the near term demonstration of spacetospace power beaming which satisfies one or more commercial customer requirements, and allows the rapid iteration of designs and experiments.

It is anticipated that establishing a functioning ISS power beaming testbed could allow experimentation and validation of components of larger power beaming systems, and reduce the risk of the development of the larger dedicated systems.

This work can serve as a useful first step toward demonstrating an ability of ISS to support coorbiting freeflyer spacecraft systems.

The enhanced testbed could allow repurposing of some ISS cargo delivery vehicles as crewtended freeflyers for some number of extended duration experiments.