Applications and Innovations for use of High Definition and High Resolution Digital Motion Imagery in Space Operations

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Rodney Grubbs, Mission Operations Lab, Marshall Space Flight Center

The first live High Definition Television (HDTV) from a spacecraft was in November, 2006, nearly ten years before the 2016 SpaceOps Conference. Much has changed since then. Now, live HDTV from the International Space Station is routine. HDTV cameras stream live video views of the Earth from the exterior of the ISS every day on UStream, and HDTV has even flown around the Moon on a Japanese Space Agency spacecraft. A great deal has been learned about the operations applicability of HDTV and high resolution imagery since that first live broadcast.

This paper will discuss the current state of real-time and file based HDTV and higher resolution video for space operations. A potential roadmap will be provided for further development and innovations of high-resolution digital motion imagery, including gaps in technology enablers, especially for deep space and unmanned missions.

Specific topics to be covered in the paper will include:

- An update on radiation tolerance and performance of various camera types and sensors and ramifications on the future applicability of these types of cameras for space operations
- Practical experience with downlinking very large imagery files with breaks in link coverage
- Ramifications of larger camera resolutions like Ultra-High Definition, 6K and 8K in space applications
- Enabling technologies such as the High Efficiency Video Codec, Bundle Streaming Delay Tolerant Networking, Optical Communications and Bayer Pattern Sensors and other similar innovations
- Likely future operations scenarios for deep space missions with extreme latency and intermittent communications links