

Report Concerning Space Data System Standards

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| Streaming Services over Bundle Protocol REquirements |

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FOREWORD

[Foreword text specific to this document goes here. The text below is boilerplate.]

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# Introduction

## Purpose and scope

The purpose of this document is to record requirements for streaming services over Bundle Protocol, with particular emphasis on streaming digital video over Bundle Protocol. Previous testing of video streams over Bundle Protocol will be documented. A common test configuration for continued testing and benchmarking of video (and other streaming data) will also be documented.

## References

The following documents are referenced in this Report. At the time of publication, the editions indicated were valid. All documents are subject to revision, and users of this Report are encouraged to investigate the possibility of applying the most recent editions of the documents indicated below. The CCSDS Secretariat maintains a register of currently valid CCSDS documents.

[A list of documents referenced in the report goes here. See CCSDS A20.0-Y-4, *CCSDS Publications Manual* (Yellow Book, Issue 4, April 2014) for reference list format.]

# OVERVIEW

Previous testing and real-life experience with streaming video over networks indicates that video streams are particularly susceptible to network jitter and lost packets. Video decoders typically buffer the incoming data stream to reconstitute the frames of video that were encoding using “group of pictures” algorithms that combine frames or disassemble video frames into blocks of pixels. If enough data is missing, even with buffering, or the data arrives jumbled or out of order beyond what the decoder’s buffering can handle, the decoder will either freeze the last good frame video and present it as live video output, or will simply default to a blank or colored screen.

It is likely that as humans endeavor to explore space beyond low Earth orbit, video will be included as important data transmitted back to Earth. Whether it is used for situational awareness, such as proximity of approaching spacecraft during docking and rendezvous, or monitoring an Extra Vehicular Activity, or for public use to allow the rest of us on Earth to “go along for the ride,” successful transmission and reception of video will become an important requirement for mission success. As these missions move beyond the Earth-Moon system, it is very likely the data communications will be over delay tolerant networks.

This Green Book will explore the requirements for video over bundle streaming protocols and document prototyping and testing of video over these protocols.

# Requirements

*Here we document requirements for video over bundle streaming protocols.*

# Methods for transmission of video over bundle streaming protocols

## DLR (need a better title, obviously)

*Here we describe and summarize Jeremy’s brilliant work thus far*

## JPL (need a better title)

*Here we describe and summarize Scott’s brilliant work thus far*

## common test scenarios for future study

*Here we outline common testing configurations for future trail blazers to allow them to add content to this book in the future*

1. [ANNEX TITLE]

[Annexes contain ancillary information. See CCSDS A20.0-Y-4, *CCSDS Publications Manual* (Yellow Book, Issue 4, April 2014) for discussion of the kinds of material contained in annexes.]