



Deep Space Network

DSN Telecommunications Link Design Handbook

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Document Change Log

| Rev. | Issue Date | Modules Affected | Change Summary |
|-------------|-------------------|-------------------------|--|
| Initial | 3/1/70 | All | New document. |
| A | 10/1/70 | All | Complete revision. |
| B | 4/15/72 | All | Complete revision. |
| C | — | All | Complete revision. |
| D | 2/15/75 | All | New modular format first appeared. |
| E | 1/15/2001 | All | Title changed from DSN Flight Project Interface Design Handbook; all modules renumbered and revised or reformatted. Volume 2 deleted as proposed capabilities are now led within the modules of this revision. Modules not related to telecommunications link design have been deleted from this document and will be incorporated in a new document, 810-007, DSMS Mission Interface Design Handbook. |
| Change 1 | 2/10/2003 | 105, 202, 205 | Added monthly weather statistics for all frequency bands to module 105, Added discussion of one-way Doppler error and X-Up/Sdown Solar Phase Scintillation errors to module 202. Provided characteristics of new DSMS command equipment in module 205. |
| Change 2 | 6/13/2003 | 207, 301 | Added concatenated codes, QPSK/OQPSK, and improved turbo code information to module 207, Identified 11-m subnet as non-operational, expressed geodetic coordinates in WGS84 ellipsoid and added DSS 55 to module 301. |
| Change 3 | 8/18/2003 | 101, 305, 901 | Documents new feedcone at DSS 63, L-band at all 70-m stations, and S-band low noise cone at DSS 43. Provided information on test support. Added information and corrected Glossary. |
| Change 4 | 2/10/2004 | 104, 301 | Provided latest capability and performance information for all BWG stations. Corrected locations of DSS-26, 54, and 55. Provides final receive and transmit masks for DSS-55. |
| Change 5 | 3/31/2004 | 101A, 208, 214, 304 | Corrects Figures 1 and 5 in module 101, Rev. A. Corrects Figures 3 and 17 in module 208. Adds module 214, Pseudo-noise and Regenreative Ranging, and module 304, Frequency and Timing. |
| Change 6 | 7/15/2004 | 210 | Provides capabilities of Delta Differential One-way Ranging in the DSN. |

Document Change Log (Continued)

| Rev. | Issue Date | Modules Affected | Change Summary |
|-------------|-------------------|-----------------------------|---|
| Change 7 | 10/7/2004 | 206, 302, 901A | Adds overview of telemetry and antenna positioning capability. Revises Glossary to accommodate new and revised modules. |
| Change 8 | 5/9/05 | 212 | Provides capabilities of telemetry equipment installed in the DSN 26-m subnet stations. |
| Change 9 | 8/10/05 | 104, 106 | Provides revised X-band and new Ka-band capability for DSS-34. Adds module 106, Solar Corona and Solar Wind Effects. |
| Change 10 | 10/21/05 | 106, 301B, 901B | Corrects errors in module 106, provides revised location, coverage and horizon mask for recently relocated DSS-65, and updates Glossary. |
| Change 11 | 2/20/06 | 203 | Incorporate changes resulting from improvements in sequential ranging implementation. |
| Change 12 | 5/26/06 | 105B, 107, 305A | Provides new weather models and methods of calculating system temperature, Adds a radio source catalog. Updates capabilities of test facilities. |
| Change 13 | 8/25/06 | 101B, 211 | Revises 70-m module to be consistent with module 105B and to delete DSS-43 S-band Ultracone. Adds description of wideband VLBI capabilities. |
| Change 14 | 4/2/07 | 103A, 203A | Revises 34-m HEF module to be consistent with module 105B and to delete DSS-45 & DSS-65 S-band uplink capability. Restores information on recommended range of <i>Pr/N0</i> to module 203. |
| Change 15 | 9/15/08 | 103A, 104B, 201, 206A, 301C | Revises 34-m HEF module to provide measured S-band uplink performance. Modifies 34-m BWG module to document current status of K and Ka-band implementation, Modifies frequency assignments module to include 26-GHz band. Modifies Coverage and Telemetry General Information modules to document effects of decommissioned antennas and 26GHz. |
| Change 16 | 9/18/08 | 104C, 208 | Adds antenna performance at 26 GHz. Revises coding module and deletes obsolete code types. |
| Change 16.5 | 5/18/2009 | 104D, 208A | Revises antenna performance at 26 GHz for DSS 24, -34, and 54. Adds Low Density Parity-Check (LDPC) codes as a proposed capability. |
| Change 17 | 8/1/2009 | 105C | Updates weather models for the 26-GHz support capability. Removes references to all 26-m stations. |

Document Change Log (Continued)

| Rev. | Issue Date | Modules Affected | Change Summary |
|-------------|-------------------|--|--|
| Change 18 | 9/15/2009 | 101C, 102, 104E, 105D, 204, 212, 213 | Updates the 400-kW S-band uplink capability and its supported frequency range. Revises DSS-54 and DSS-55 G and T information. Removes the document modules and all references to the decommissioned 26-m stations. |
| Change 19 | 10/31/2009 | 203C, 206B, 305B, 901D | Revises these document modules to reflect organizational changes and to eliminate references to the 26-m subnet stations. |
| Change 20 | 12/15/2009 | 201B, 205B, 301E, 302A | Revises these document modules to reflect organizational changes and to eliminate references to the 26-m subnet stations. |
| Change 21 | 4/1/2010 | Introductory Materials, 001A | Revises introductory materials (Cover & Title pages, Change Log, Foreword, Table of Contents) and Module 001A with up-to-date information and to reflect organizational changes. |
| Change 22 | 6/1/2010 | Introductory Materials, 104F, 205C, 209A, 301F, 302B | Revises these document modules to reflect organizational changes. |
| Change 23 | 9/30/2010 | Introductory Materials, 106B, 202B, 304A | Revises these document modules to reflect organizational changes. |
| Change 24 | 4/29/2011 | Introductory Materials, 101D, 107A, 211A, 901E | Revises introductory materials and Module 101D, 107A, 211A with up-to-date information. |
| Change 25 | 3/22/2012 | Introductory Materials, 301G, 901F | Revises introductory materials and Module 301G with updated information. Revises the abbreviation list on Module 901F. |
| Change 26 | 10/17/2012 | Introductory Materials, 301H | Revises introductory materials and Module 301H with updated information for DSS-54 and DSS-55. |
| Change 27 | 03/12/2013 | Introductory Materials, 104G, 208B | Revises introductory materials. Revises 104G and 208B with up-to-date information. |
| Change 28 | 04/08/2013 | Introductory Materials, 107B | Revises introductory materials. Revises 107B with up-to-date information. |
| Change 29 | 09/18/2013 | Introductory Materials, 101E | Revises introductory materials. Revises 101E with up-to-date information. |
| Change 30 | 06/12/2014 | Introductory | Revises introductory materials. Revises 301I with up-to-date information. |

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| | | Materials, 301I | |
| Change 31 | 08/01/2014 | Introductory Materials, 103C | Revises introductory materials. Revises 103C with up-to-date information. |
| Change 32 | 09/10/2014 | Introductory Materials, 301J | Revises introductory materials. Revises 301J with up-to-date information. |
| Change 33 | 12/15/2014 | Introductory Materials, 107C, 201C, 205D, 304B | Revises introductory materials. Revises 107C, 201C, 205D, 304B with up-to-date information. |
| Change 34 | 02/09/2015 | Introductory Materials, 209B, 210A, 211B, 302C | Revises introductory materials. Revises 209B, 210A, 211B, and 302C with up-to-date information. |
| Change 35 | 04/01/2015 | Introductory Materials, 104H | Revises introductory materials. Revises 104H with up-to-date information. |
| Change 36 | 08/05/2015 | Introductory Materials, 101F | Revises introductory materials. Revises 101F with up-to-date information. |
| Change 37 | 10/22/2015 | Introductory Materials, 105E, 107D | Revises introductory materials. Revises 105E and 107D with up-to-date information. |
| Change 38 | 10/28/2015 | Introductory Materials, 214A | Revises introductory materials. Revises 214A with up-to-date information. |
| Change 39 | 09/13/2016 | Introductory Materials, 301K | Revises introductory materials. Revises 301K with up-to-date information. |
| Change 40 | 11/17/2016 | Introductory Materials, 205E, 209C | Revises introductory materials. Revises 205E and 209C with up-to-date information. |
| Change 41 | 02/10/2017 | Introductory Materials, 104I, 210B, 211C, 302D, 901G | Revises introductory materials. Revises 104I, 210B, 211C, 302D, and 901G with up-to-date information. |
| Change 42 | 05/03/2017 | Introductory Materials, 206C | Revises introductory materials. Revises 206C with up-to-date information. |
| Change 43 | 0/12/2018 | Introductory Materials, 104J | Revises introductory materials. Revises 104J with up-to-date information. |
| Change 44 | 07/03/2018 | Introductory Materials, | Revises introductory materials. Revises 211D with up-to-date information. Revises 301L with up-to-date information. |

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| | | 211D, 301L | |
| Change 45 | 01/22/2019 | Introductory Materials, 202C | Revises introductory materials. Revises 202C with up-to-date information. |
| Change 46 | 02/14/2019 | Introductory Materials, 209D | Revises introductory materials. Revises 209D with up-to-date information. |
| Change 47 | 06/06/2019 | Introductory Materials, 210C | Revises introductory materials. Revises 210C with up-to-date information. |
| Change 48 | 07/17/2019 | Introductory Materials, 104K, 203D, 214B | Revises introductory materials. Revises 104K, 203D, 214B with up-to-date information. |
| Change 49 | 09/04/2019 | Introductory Materials, 101G | Revises introductory materials. Revises 101G with up-to-date information. |
| Change 50 | 10/16/2019 | Introductory Materials, 104L | Revises introductory materials. Revises 104L with up-to-date information. |
| Change 51 | 12/23/2019 | Introductory Materials, 211E | Revises introductory materials. Revises 211E with up-to-date information. |
| Change 52 | 09/04/2020 | Introductory Materials, 201D, 301M | Revises introductory materials. Revises 201D and 301M with up-to-date information. |
| Change 53 | 11/12/2020 | Introductory Materials, 108 | Revises introductory materials. Initial version for 108 |
| Change 54 | 02/05/2021 | Introductory Materials, 201E, 209E, 210D, 304C, 901H | Revises introductory materials. Revises 201E, 209E, 210D, 304C, and 901H with up-to-date information. |
| Change 55 | 04/02/2021 | Introductory Materials, 104M, 107E, 205F | Revises introductory materials. Revises 104M, 107E, and 205F with up-to-date information. |
| Change 56 | 06/07/2021 | Introductory Materials, 104N | Revises introductory materials. Revises 104N with up-to-date information. |
| Change 57 | 09/01/2021 | Introductory Materials, 202D, 206D | Revises introductory materials. Revises 202D and 206D with up-to-date information. |
| Change 58 | 04/15/2022 | Introductory Materials, 301N | Revises introductory materials. Revises 301N with up-to-date information. |
| Change 59 | 05/04/2022 | Introductory Materials, 201F | Revises introductory materials. Revises 201F with up-to-date information. |

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| Change 60 | 06/07/2022 | Introductory Materials, 211F | Revises introductory materials. Revises 211F with up-to-date information. |
| Change 61 | 07/19/2022 | Introductory Materials, 202E | Revises introductory materials. Revises 202E with up-to-date information. |
| Change 62 | 08/09/2022 | Introductory Materials, 104O | Revises introductory materials. Revises 104O with up-to-date information. |

Foreword

This modular handbook has been approved by the Deep Space Network (DSN) Project Office and is provided as a source of technical information for all flight projects using the DSN. It provides information useful to flight projects contemplating the design of hardware and software, with reasonable assurance that the resulting project telecommunications interfaces will be compatible with the established or planned DSN configurations.

The handbook is primarily concerned with performance parameters of equipment that supports the forward and return telecommunications link interfaces between spacecraft and the DSN. The handbook consists of modules that present technical information applicable to the current DSN configuration and preliminary information applicable to future DSN configurations. The modules will be revised to reflect new capabilities when these new capabilities have been planned and budgeted for by the DSN Project Office.

For matters of interpretation or questions concerning this handbook, contact the Deep Space Network Project Office, Organization 920, Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, California, 91109.