| **Page** | **Section** | **Line** | **Type** | **Comment/ Rationale** | **Source of Comment (Name/Agency)** | **Suggested Disposition** | **Disposition****(Completed by Principal Editor)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| All | AnnexE | 1 | GE | I recognize that the examples are carryovers from TDM v1 and were not updated for this version of the document. However, what is the rule or guideline for including examples with the original version number, i.e. CCSDS\_TDM\_VERS = 1.0. or <?xml version="1.0" encoding="UTF-8"?>. ? Since the examples starting w Figure E-22 are identified with CCSDS\_TDM\_VERS = 2.0, I suppose having a mix of versions in the examples simply shows that version 1.0 is still a valid protocol and holds up in version 2.0. ?? | C. Gramling.NASA GSFC | Really more of a curiosity as to how these things are handled as documents get updated. I expect that if an original example were no longer valid wrt the updated document, it wouldn’t be included as an example. | Accepted. Two example TDMs with CCSDS\_TDM\_VERS = 1.0 were corrected to CCSDS\_TDM\_VERS = 2.0 |
| 3-27 | 3.5.2.2 |  |  | Some acronyms are defined in the text and others are not. For example, here RTLT is not defined. Have to refer to the acronym list.  | Julie Halverson/NASA | Choose to define each acronym at first use for consistency? | Accepted. Added "round-trip light time" immediately before first instance of the acronym. |
| 3-28 | 3.5.2.4 |  |  | Should there be something defined by the equation? ACTUAL\_COUNTER = (DOPPLER\_COUNT -DOUPLER\_COUNT\_BIAS)/DOPPLER\_COUNT\_SCALE. Sorry, this isn’t my area. Just seeing the calculation without a definition of what is being computed is a bit confusing. | Julie Halverson/NASA | Consider adding the name of the variable the equation is producing. | Fixed. Consulted with Cheryl regarding the needed modifications to the equation. |
| 3-28 | 3.5.2.5 |  |  | There is no range of values specified as with others, just that it is double precision. See PR\_N0, for example. | Julie Halverson/NASA | Make consistent with other definitions. | After checking withj some tracking experts, added ", and may be positive, zero, or negative", as with PR\_N0 (though the case for negative is rare). |
| 3-32 | 3.5.3.2 |  |  | Same comment as above, no range of values provided, only that it is double precision.  | Julie Halverson/NASA | Include for consistency. | Accepted. Added "and may be negative or positive", but the range of values is indeterminate due to the nature of the process. I don;t think a value of zero could be obtained. |
| 3-32 | 3.5.3.3 |  |  | Same comment as above for DOR. | Julie Halverson/NASA | Include for consistency. | Accepted. Added "and may be negative or positive", but the range of values is indeterminate due to the nature of the process. I don;t think a value of zero could be obtained. |
| 3-33 | 3.5.5.2 |  |  | Consider rewording sentence so the acronym RCS is defined before the acronym appears. | Julie Halverson/NASA | Cosmetic. (Can ignore unless you end up changing something else here.) | Accepted. Added "(Radar Cross Section)" right after the first instance of the keyword in the text. |
|  3-34 | 3.5.7.1 |  |  | Same comment for STEC as RCS above. | Julie Halverson/NASA | Cosmetic. (Can ignore unless you end up changing something else here.) | Accepted. Moved the exapansion of the acronym right after the first instance of the keyword in the text. |
| 1-2 | 1.2.5.1 | 4 | Tech | SLR records in supported ILRS formats contain also other types or records than just RANGE (e.g. meteo) | Fran/ESA | Generalise the statement with ‘e.g. RANGE’ or add other types of supported records and then ellipsis. | No change. The first part of the paragraph specifies "‘Fullrate’ and/or ‘Normal Points’ format", and the TDM already accommodates meteo data. |
| 1-2 | 1.2.5.6 | 2 | Tech | Similar to the SLR case, it is conceivable that altimetry data is accompanied of meteo data. | Fran/ESA | Same as SLR (see above) | No change, similar to rationale for SLR. |
| 1-5 | 1.4.3 | 1 | Tech | ‘*Section 4 provides details about the syntax used in the TDM*’ refers to the KVN representation. | Fran/ESA | For consistency and to avoid misinterpretation with requirement 1.4.4 convert to: ‘*Section 4 provides details about the syntax used in the TDM in KVN notation*’ | Accepted. |
| 4-2 | 4.3.2 | 3,4 | Tech | The representation of the integer values range is a limitation to the standard that:* Depends on the hardware architecture and the specific implementation of the processing software
* The provided range is associated to a signed 32-bit integer, ignoring any other integer representation commonly used (e.g. unsigned 64-bit integer)
 | Fran/ESA | Remove reference to integer values range. | No change given that the focus of this review was non-technical proofreading, and we didn't discuss changing this range in meetings. Deferred to TDM V.3. We should discuss this in the context of the next version of TDM. |
| 4-2 | 4.3.4 | 4 | Tech | The standard limits the representation of real number to x.y whereas representation of the type .y or x. are accepted by commonly used computer languages. | Fran/ESA | Remove limitation | No change given that the focus of this review was non-technical proofreading, and we didn't discuss changing this specification in meetings. Deferred to TDM V.3. We should discuss this in the context of the next version of TDM. |
| 4-2 | 4.3.4 | 5 | Tech | The standard limits the representation of real number to 16 digits whereas quad-precision representations may require more digits. | Fran/ESA | Remove limitation | No change given that the focus of this review was non-technical proofreading, and we didn't discuss changing this specification in meetings. Deferred to TDM V.3. We should discuss this in the context of the next version of TDM. Requirements for extended precision should be discussed in an ICD. |
| 4-3 | 4.3.5 | 3 | Tech | Limitation on the range that a real number can support. Similar as previous comments. | Fran/ESA | Remove limitation | No change given that the focus of this review was non-technical proofreading, and we didn't discuss changing this specification in meetings. Deferred to TDM V.3. We should discuss this in the context of the next version of TDM. |
| 5-2 | 5.3.3.3 | All | Tech | The requirement describes the unqualified version of the message but there is no reference to the qualified version. | Fran/ESA | Add missing information on the qualified representation (taking into account the many discussion on the topic) maybe leaving a sentence on the preference for the unqualified representation | No change. This is because the NDM/XML document does not yet support the qualified version. The original (probably flawed) strategy was to produce the ODM, ADM, TDM updates and remove them from the NDM/XML document, then update the NDM/XML to support the qualified schemas, then put corrigenda into the ODM, ADM, and TDM. At this point, the ODM and ADM will be somewhat delayed so the strategy will have to be re-thought. At any rate, after the TDM V.2 comes out, work will start in earnest on the NDM/XML V.2 which will support the qualified versions of the schemas, and then a corrigendum will be filed with the TDM (maybe concurren reviews, I hope). |
| 3-1 | 3.1 | 3.1.1 | ed | Unmatched parens:*The TDM shall consist of digital data represented as ASCII text lines* ***(****see reference [2]****)*** *in KVN format see section 4****)*** *or XML format* ***(****see section 5****)****.* | A. Mancas/ESA | add a ‘(‘ between ‘KVN format’ and ‘see section 4)’ | Accepted. Good catch! |
| 3-2 | 3.1 | 3.1.4 | ed | Unmatched parens:*The TDM shall consist of tracking data for one or more tracking participants* ***(****see 1.3.4.1****)*** *at multiple epochs contained within a specified time range. Thus there may exist Tracking Data Messages for which there is no applicable spacecraft.****)*** *Generally, but not necessarily, the time range of a TDM may correspond to a ‘tracking pass’.* | A. Mancas/ESA | Remove the paren in red. | Accepted. Removed. |
| 3-13-2 | 3.1 | 3.1.1to3.1.7 |  | There seems to be more space between sentences (following a ‘.’) in these two pages than later in the document, as if two spaces were used after each ‘.’. From section 3.2 on (or maybe even from 3.1.7) this appears to be fixed.  | A. Mancas/ESA | ? It might just be an artifact of the justified text ? | Accepted. Another good catch! Corrected. |
| 3-3 | 3.2 | table 3-2 | ed | In the ORIGINATOR line, the ‘Description’ column says:*Creating agency. Value should be an entry from the "Abbreviation" column in the SANA Registry https://sanaregistry.org/r/organizatio ns/organizations.html.* | A. Mancas/ESA | I think ‘SANA registry’ should be replaced by ‘SANA Organizations registry’. The link should be added to references in section 1. | Accepted. |
| 3-4 | 3.2 | 3.2.5 | ed/te | Normative paragraph 3.2.5 makes explicit reference to version 1.0: *Version 1.0 shall be reserved for the initial version accepted by the CCSDS as an official Recommended Standard*. Should we not add a reference to version 2.0? | A. Mancas/ESA | think about | Accepted. Revised statement to read: "Versions x.0, where x>=1, shall be reserved for versions accepted by the CCSDS as an official Recommended Standard (‘Blue Book’). Similar wording should probably go into the ODM, ADM, etc. |
| 3-4 | 3.2 | 3.2.6 | ed | *[…] the value set to the Coordinated Universal Time (UTC) when the data was created (file creation time if in file format, or first data point in stream), as specified in reference [3] (ASCII Time Code A or B).*The Time Code is discussed in 4.3.9 in the TDM Blue Book. | A. Mancas/ESA | point to 4.3.9 rather than reference [3]. 4.3.9 points to reference [3]. | Accepted. |
| 3-53-7 | 3.3.1 | 3.3.1.6table 3-3 | ed | *For normative values, a fully enumerated set of values may be provided, or the contents of table 3-3 may be a sample of values that are fully enumerated in an annex or table. In this latter case, the necessary annex or table is identified.*This is only used for the DATA\_TYPES keyword. I am not sure if this is the best way to deal with the values.The Description column in table 3-3 reads*Comma separated list of data types in the Data Section. The elements of the list are the data types shown in table 3-5, with the exception of the DATA\_START, DATA\_STOP, and COMMENT keywords.*for the DATA\_TYPE keyword. | A. Mancas/ESA | I think it may be better to:* change the value of the ‘N/E’ column for DATA\_TYPES to ‘E’ and provide one or two examples;
* change the description of data types to read: […]*The elements of the list shall be selected from the data types shown in table 3-5* […] *and shall appear in the same order as in table* […]
* remove the latter part of paragraph 3.3.1.6
 | Accepted (all but the restriction on order of the data types). |
| 3-7 | 3.3.1 | table 3-3 | ed | In the TIME\_SYSTEM line description:*The value associated with this keyword must be selected from the full set of allowed values enumerated in the SANA Registry https://sanaregistry.org/r/time\_systems. See Annex B.* | A. Mancas/ESA | ‘SANA registry’ should be replaced by ‘SANA Time Systems registry’. It should also be added to the list of references in section 1 (I am not sure why we still point to Annex B if a SANA registry is available). | Accepted. Regarding Annex B... it's a bit circuitous, but not wrong (a bit of a cop out to avoid having to rename all the other Annexes, which would be caused by deleting Annex B). Apologies. |
| 3-9 | 3.3.1 | table 3-3 | ed | *Also may be specified in ICD if the value is always constant.* | A. Mancas/ESA | ‘ICD’ should be changed to ‘the ICD’ to stay consistent with the rest of the document. | Accepted. "the" added. |
| 3-10 | 3.3.1 | table 3-3 | ed | *Also may be specified in ICD if the value is always constant.* | A. Mancas/ESA | ‘ICD’ should be changed to ‘the ICD’ to stay consistent with the rest of the document. | Accepted. "the" added. |
| 3-12 | 3.3.1 | table 3-3 | ed | In the ANGLE\_TYPE line description:*Other values are possible, but must be defined in* ***an*** *ICD.* |  | ‘an’ should be changed to ‘the’ for consistency with the rest if the document. | No change. There are multiple other instances of "an ICD" in the document, so it's not definitively inconsistent. |
| 3-12 | 3.3.1 | table 3-3 | ed | in the REF\_FRAME line description:*enumerated in the SANA Registry https://sanaregistry.org/r/celestial\_body\_refer ence\_frames . See Annex B.* | A. Mancas/ESA | ‘SANA registry’ should be replaced by ‘SANA Celestial Body Reference Frames registry’. It should also be added to the list of references in section 1 (I am not sure why we still point to Annex B if a SANA registry is available). | Accepted. See note on "TIME\_SYSTEM" above. |
| 3-19 | 3.3.2.6 | 1 | E | Minor nit – suggest rewording. | Oltrogge/NASA | “Angle data is applicable to any scenario where MODE=SEQUENTIAL and the angles to one final participant are measured with respect to another final participant” | Accepted. Changed to "with respect to the two rightmost participants listed in the PATH statement" |
| 3-19 | 3.3.2.7.3 | NOTE | E | Seems that only E-13 and E-16 have this? | Oltrogge/NASA |  | Good catch! The "NOTE" refers to data of types media, weather, and ancillary. Since you pointed this out, I think the note is in the wrong place. The current placement implies that it applies to 3.3.2.7.3, but it really applies to all three data types. So I moved the NOTE right undert the heading 3.3.2.7 . Note that E-16 doesn't have any of these types.  |
| 3-20 | 3.4.4 | 1 | G | (Just curious – is a blank required if you already have the “=” sign? | Oltrogge/NASA | (None – I just wasn’t clear on this requirement. Is that needed in all NAV WG stds?) | No change. With no blank (or other separator... e.g., we could have specified a comma), there would be no way to distinguish the last digit in the timetag from the first digit in the observable. |
| 3.21 | 3.4.7 | 1 | G | Seems self-evident: “(the rationale for including this is that data volumes can be very large, so knowing when the data ends is desirable).” | Oltrogge/NASA | Can omit comment ? | Accepted. Removed. Tom Gannett of the "terse style" will approve! |
| 3-22 | 3.4.15.2 | NOTE | E | “pass-to-pass” | Oltrogge/NASA | Pass to pass, or contact to contact? | Added "or contact-to-contact". In the deep space environment, the term "pass" is generally used and the contacts may last several hours. In Earth orbit, I can see how that terrminology would fall apart. |
| 3-22 | 3.4.15.2 | NOTE |  | Suggest after “pass to pass” it say, “Measurements shall not have these delays removed from them by the message producer, unless the exchange partners expressly agree via an ICD” | Oltrogge/NASA | Suggested. | No change.  |
| 3-23 | 3.4.16 | NOTE | E | NOTE 4: this seems to pave the way for anyone implementing only a portion of a standard in the name of expediency. While I fully understand this, I’m not sure what this comment adds to the standard. Are we looking to authorize them to do that, or to organize as they see fit? | Oltrogge/NASA | Consider. | No change. This is primarily a usage note. Implementers always decide how they will implement standards. And because of the variety of data types used for tracking, my hypothesis is that all the TDM implementations are "partial" (e.g., many tracking networks won't need to implement the DOR or VLBI keywords). |
| 3-25 | 3.5.1 | Table | TE | PR\_N0 Text Link is incorrect | Oltrogge/NASA | Should be 3.5.2.6 | Thanks! Fixed! |
| 3-27 | 3.5.2.2 | 5 | TE | From: “… plasma are accurately applied.” | Oltrogge/NASA | To: “… plasma are accurately applied by the recipient.” | Accepted. Fixed. |
| 3-28 | 3.5.2.4 | 7-8 | TE | From: “process this data type in conjunction with an Orbit Ephemeris Message (OEM, reference [4])” | Oltrogge/NASA | To: “process this data type in conjunction with a suitable Orbit Data Message (ODM, reference [4])” | Accepted. Fixed. I see this looking ahead to the OCM. Nice catch. |
| 3-29 | 3.5.2.7 | 5 | E | From: “The ‘RANGE\_UNITS’ metadata keyword should always be specified, but if it is not, the default (preferred) value shall be ‘km’. If different range units are used by the tracking agency (e.g., ‘DSN range units’), the definition of the range unit should be described in the ICD.” | Oltrogge/NASA | To: “The ‘RANGE\_UNITS’ metadata keyword should always be specified, but if it is not, the default (preferred) value shall be ‘km’ unless specifically overridden by an ICD (e.g., to accommodate ‘DSN range units’).”… if that was your intent. | No change. |
| 3-31 | 3.5.2.9 | ~20 | E | From: Generally the timetag for the TRANSMIT\_FREQ\_n keywords should be the time that the signal was transmitted. | Oltrogge/NASA | To: The timetag for the TRANSMIT\_FREQ\_n keywords should be the time that the signal was transmitted, unless specifically overridden via an ICD. | No change. |
| 3-31 | 3.5.2.11 | 7 | E | From: provide the intermediate frequency. | Oltrogge/NASA | To: obtain the intermediate frequency. | Changed to "should be specified to provide" given that the TDM producer provides the value. "Obtain" sounds consumer oriented. |
| 3-32 | 3.5.4.1 | 1 | G | Question: Why do we say this must be a ground antenna. I’m no OD expert, but couldn’t we have sat2sat? | Oltrogge/NASA | (just a question). | Good question. But no change. We can consider sat2sat more rigorously in TDM V3 if it seems warranted. If we wanted ANGLE data in sat2sat we'd need a lot more info in the TDM (e.g., we'd need to have the S/C attitude and know whether or not the antenna was gimballed, etc. I don't think we're ready for that, at least not in this version of the TDM |
| 3-34 | 3.5.6.1 | ~13 | G | From: “re-set”  | Oltrogge/NASA | To: “reset” or “adjusted” | Accepted. Used "adjusted" |
| 3-34 | 3.5.6.1 | ~15 | TE | From: …by applying the bias; application of the bias is up to the user of the data | Oltrogge/NASA | To: …by applying the bias; the message recipient shall apply the bias to the measurement data. | Accepted. |
| 3-34 | 3.5.6.2 | 7 | TE | Regarding “normally UTC” – how are leap seconds accommodated? | Oltrogge/NASA | Consider | No change. Leap seconds are accommodated by the TDM recipient. |
| 3-35 | 3.5.8.1 | 3-4 | E | From: “practically speaking it is always positive.” | Oltrogge/NASA | To: Anything else that is more better. | No change. It is mostly positive but hits ~zero around 30 miles above the surface of the earth. No air pressure measurement devices used in tracking exist at such levels. We could say it is always positive and be mostly correct.  |
| All | All |  | ed | Update date throughout | Patrick Zimmerman/NASA-JSC | Change to February 2020, or appropriate, throughout, or leave for doc editor | Accepted. There will be an updated P1.6 "Transition to Blue" version created that incorporates all the proofreading changes, and that will have the revised date. |
| 1-8 to 10 |  |  | ed | Figure and Table TOCs have issues | Patrick Zimmerman/NASA-JSC | Adjust or leave for doc editor | No change. Will leave for document editor, who has a macro that is common to all CCSDS docs. |
| 1-1 | 1.2.1 | 3 | Ed | Last sentence does not seem applicable anymore, as the future versions are now in work |  | Delete, or maybe keep first portion of sentence? “It is acknowledged that this version of the Recommended Standard may not apply to every single tracking session or date type.” | Accepted. Second portion of the sentence revised. |
| 1-1 | 1.2.3 | 3 | Ed | ICD already defined in 1.2.2. Redundant | Patrick Zimmerman/NASA-JSC | Use only acronym. | Accepted. Fixed as suggested. |
| 1-2 | 1.2.6.3 | 4 | Ed | At end of sentence, annex is capitalized. | Patrick Zimmerman/NASA-JSC | Annex is predominantly lowercase throughout (with a few exceptions/errors in Table 3-3) | Accepted. Fixed |
| 1-2 | 1.2.6.4 |  | Ed | SANA first use. Not Defined | Patrick Zimmerman/NASA-JSC | Define acronym. | Accepted. Defined here, and removed elsewhere. |
| 1-5 | 1.4.5 |  | Ed | ICS already defined in 1.2.6.3. Redundant | Patrick Zimmerman/NASA-JSC | Use only acronym. | Accepted. Used "ICS" per recommendation. |
| 1-5 | 1.4.7 |  | Ed | SANA second use. Does not need definition. | Patrick Zimmerman/NASA-JSC | Use only acronym. | Accepted. Removed definition. |
| 2-1 | 2.2.3 | 5 | Ed | Appears there might be double spacing between “participants” and “specify” | Patrick Zimmerman/NASA-JSC | If a double space, reduce to single space | Good eye! Removed extra space. |
| 3-7 | Table 3-3 |  | Ed | Time System: annex B is capitalized, and should be lower case. | Patrick Zimmerman/NASA-JSC | Change Annex to annex | Fixed. |
| 3-12 | Table 3-3 |  | Ed | Reference Frame: annex B is capitalized, and should be lower case. | Patrick Zimmerman/NASA-JSC | Change Annex to annex | Fixed |
| 3-30 | 3.5.2.8.2 |  | Ed | Does the Integration\_ref matrix box need to be labeled as a Table? | Patrick Zimmerman/NASA-JSC | Add Table ID if needed | No change. It appeared this way in Version 1 and the Editor didn't call it out as needing a table reference. |
| 4-3 | 4.3.11 |  | Ed | Indicates that the phase value can be ‘any number of digits’, which seems to contradict the 4.3.2 limitations? | Patrick Zimmerman/NASA-JSC | Reconcile if needed | No change. The listed data type is "string representing a real number", which some software can convert to a number that exceeds 4.3.2 constraint. |
| 5-4 | 5.3.5.4 |  | Ed | Indicates keywords ‘specified in 3.3. and 3.5’, but should be ‘specified in tables 3-3 and 3-5’. | Patrick Zimmerman/NASA-JSC | Update to be ‘tables’ | Accepted. Fixed. |
| 5-5 | 5.3.9 |  | Ed | For consistency, this sentence should be similar to that of 4.4 Units in the TDM. “The units associated with values in the TDM are as specified in table 3-5.” | Patrick Zimmerman/NASA-JSC | Suggest updating to something such as: “The units associated with values in the TDM/XML shall be the same units used in the KVN-formatted TDM and are as specified in table 3-5.” | Accepted. Fixed per suggestion. |
| A-1 | A1.1 | 2 | Ed | Book ID 503.0-P-1.1 needs updating | Patrick Zimmerman/NASA-JSC | Update to correct version number | Accepted. Fixed in all places (now "P-1.6" for the "Transition to Blue" version.) |
| A-2 | A1.2 |  | Ed | In “Reference Column” section, book ID 503.0-P-1.1 needs updating | Patrick Zimmerman/NASA-JSC | Update to correct version number | Accepted. Fixed in all places (now "P-1.6" for the "Transition to Blue" version.) |
| A-3 | A2.1.4 |  | Ed | Document ID 503.0-P-1.1 needs updating | Patrick Zimmerman/NASA-JSC | Update to correct version number | Accepted. Fixed in all places (now "P-1.6" for the "Transition to Blue" version.) |
| A-4 | A2.1.5 | 14 | Ed | Path keywords are missing underscore as shown in Table 3-3. | Patrick Zimmerman/NASA-JSC | Update to PATH\_1, PATH\_2 | Fixed. |
| B-1 | B1 |  | Ed | Table 3-3 capitalized, should be lower case. | Patrick Zimmerman/NASA-JSC | Modify to table 3-3. | Fixed. |
| B-1 | B2 |  | Ed | Table 3-3 capitalized, should be lower case. | Patrick Zimmerman/NASA-JSC | Modify to table 3-3. | Fixed. |
| 3.1 | 3.1.1 |  | ed | “The TDM shall consist of digital data represented as ASCII text lines (seereference [2]) in KVN format see section 4)”bracket missing before: “see section 4)”.  | Alain LAMY (CNES) | Add bracket (“(“) before “see section 4)”  | Fixed. |
| 3.1 | 3.1.3 |  | ed | “Each TDM shall have a Header and a Body. The TDM Body …”There seems to be extra spaces at the beginning of each sentence.  | Alain LAMY (CNES) | Remove extra spaces.  | You're right! Fixed! |
| 3.1 | 3.1.4 |  | ed | “Thus there may existTracking Data Messages for which there is no applicable spacecraft.) Generally, but not … “Extra bracket at the end of the sentence (before “Generally”) | Alain LAMY (CNES) | Remove extra bracket | Accepted. Fixed. |
| 3.9 | Table 3.3 |  | ed | “The integers 1, 2, 3,4, 5 used to specify the signal path arecorrelated with the indices of thePARTICIPANT keywords.”PARTICIPANT\_n should be used instead of PARTICIPANTNote : if considered important : may appear in other places in the document.  | Alain LAMY (CNES) | Change PARTICIPANT to PARTICIPANT\_n | Accepted. All instances of PARTICIPANT without indexer were changed as suggested. |