Change Topic: User Range Accuracy (URA) Definition

This change package accommodates the text changes to support the proposed solution (see table below) within the public Signals-in-Space (SiS) documents. All comments must be submitted in Comments Resolution Matrix (CRM) form.

The columns in the WAS/IS table following this page are defined below:

Section Number: This number indicates the location of the text change within the document.

(WAS) <Document Title>: Contains the baseline text of the impacted document.

Proposed Heading: Contains proposed changes to existing section titles and/or the titles to new sections

Proposed Text: Contains proposed changes to baseline text.

Rationale: Contains the supporting information to explain the reason for the proposed changes.

PROBLEM STATEMENT:
Administrative errors in the public documents are resulting in incorrect calculations and/or ambiguous definitions relative to User Range Accuracy (URA). Incorrect URA calculations would impact user equipment design and incorrect definitions would impact the interpretation of the URA data from the SV, resulting in erroneous PNT calculations.
SOLUTION: *(Proposed)*
Provide the correct URA equations and more concise definitions of the URA quantity for the users. The improvements provide the correct URA equations as well as include nomenclature that makes the equations easier to interpret for the user.

Start of WAS/IS for IS-GPS-200E Changes

Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
6.2.1		User Range Accuracy (URA) is a statistical indicator of the GPS ranging accuracy obtainable with a specific signal and SV. Whether the integrity status flag is 'off' or 'on', 4.42 times URA bounds instantaneous URE under all conditions with 1 -1e-5 per hour probability. When the integrity status flag is 'on', 5.73 times URA bounds instantaneous URE under all conditions with 1-1e-8 per hour probability. Integrity properties of the URA are specified with respect to the upper bound values of the URA index.	User Range Accuracy (URA) is a statistical indicator of the GPS ranging accuracy obtainable with a specific signal and SV. URA provides a conservative RMS estimate of the user range error (URE) in the associated navigation data for the transmitting SV. It includes all errors for which the Space and Control Segments are responsible. Whether the integrity status flag is 'off' or 'on', 4.42 times URA bounds the instantaneous URE under all conditions with 1-(1e-5) per hour probability ('legacy' level of integrity assurance). When the integrity status flag is 'on', 5.73 times URA bounds the instantaneous URE under all conditions with 1-(1e-8) per hour probability ('enhanced' level of integrity assurance). Integrity properties of the URA are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URA index or to the scaled composite of the upper bound values of all component URA indexes.	Rationale #5- There are numerous inconsistencies between ICDs and clarifications and additions that are needed for the users to compute URA. These changes resolve the inconsistencies between the ICDs so that users may properly compute URA.
6.2.1		Note #1: URA applies over the curve fit interval that is applicable to the NAV data from which the URA is read, for the worst-case location within the intersection of the satellite signal and the terrestrial service volume.	Note #1: URA applies over the curve fit interval that is applicable to the NAV data from which the URA is read, for the worst-case location within the ~~intersection of the~~ satellite ~~signal and the terrestrial service volume~~footprint.	See Rationale #5
6.2.1		Note #2: The URA for a particular signal may be represented by a single parameter in the NAV data or by more than one parameter representing components of the total URA.	Note #2: The URA for a particular signal may be represented by a single ~~parameter~~index in the NAV data or by a composite of more than one ~~parameter~~index representing components of the total URA.	See Rationale #5

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		Specific URA parameters and formulae for calculating the total URA for a signal are defined in the applicable Space Segment to Navigation User Segment ICD's.	Specific URA ~~parameters~~indexes and formulae for calculating the total URA for ~~a~~each signal are defined in appendix 20 for the ~~applicable~~LNAV ~~Space~~message ~~Segment~~and ~~to~~appendix ~~Navigation~~30 ~~User~~for ~~Segment~~the ~~ICD's~~CNAV message.	
6.2.1		N/A	~~N/A~~Note #3: The above integrity assured probability values do not apply if: (a) an alert is issued to the users before the instantaneous URE exceeds either of the scaled URA bounds, or (b) an alert is issued to the users no more than 8.0 seconds after the instantaneous URE exceeds the 4.42 times URA bound, and (c) if the integrity status flag is 'on' and an alert is issued to the users no more than 5.2 seconds after the instantaneous URE exceeds the 5.73 times URA bound. In this context, an "alert" is defined as any indication or characteristic of the conveying signal, as specified elsewhere in this document, which signifies to users that the conveying signal may be invalid or should not be used, such as the health bits not indicating operational-healthy, broadcasting non-standard code, parity error, etc.	See Rationale #5
6.2.1.1	~~Integrity~~6.2.1.1 ~~Assured~~User ~~URA.~~Differential Range Accuracy			
6.2.1.1		When the integrity assurance monitoring is available, as indicated by the "integrity status flag" being set to "1", the URA value is chosen such that the probability of the "actual" URE exceeding a threshold is met (see section 3.5.3.10 for probability values). The URA value is conveyed to the user in the form of URA index values. The URA index represents a range of values; for integrity assurance applications.	~~When the integrity assurance monitoring is available, as indicated by the "integrity status flag" being set to "1", the URA value is chosen such that the probability of the "actual" URE exceeding a threshold is met (see section 3.5.3.10 for probability values). The URA value is conveyed to the user in the form of URA index values. The URA index represents a range of values; for integrity assurance applications.~~<DELETE>	See Rationale #5
6.2.1.2	~~User Differential Range Accuracy.~~			
6.2.1.2		User Differential Range Accuracy (UDRA) is a statistical indicator of the GPS ranging accuracy obtainable with a specific signal and SV after the application of the associated differential corrections (DC parameters).	User Differential Range Accuracy (UDRA) is a statistical indicator of the GPS ranging accuracy obtainable with a specific signal and SV after the application of the associated differential corrections (DC parameters). UDRA provides a conservative RMS estimate of the differential user range errors in the navigation data for that satellite. It includes all errors for which the Space and Control Segments are responsible.	See Rationale #5
6.3.2	Extended Navigation		6.3.2 Extended Navigation Mode (Block IIA)	Block II references

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	Mode (Block II/IIA).			should be deleted since the requirement is obsolete.
6.3.3	*Extended Navigation Mode (Block IIIA).*		6.3.3 Block IIA Mode (Block IIR/IIR-M).	Changed from IIIA to Block IIr/IIRM due to order og SV Generation (IIA, IIR/IIR-M. GPS III)
6.3.3		The Block IIIA SVs shall be capable of being uploaded by the CS with a minimum of 60 days of data to support a 60 day positioning service. Under normal conditions, the CS will provide daily uploads to each SV, which will allow the SV to maintain normal operations as defined in paragraph 6.2.3.1 and described within this IS.	The Block IIIAIIR/IIR-M SVs, shallwhen beoperating capablein ofthe beingBlock uploadedIIA bymode, will perform similarly to the CSBlock withIIA aSVs minimumand have the capability of storing at least 60 days of navigation data, towith supportcurrent amemory 60margins, dayto provide positioning service without contact from the CS for that period (through short-term and long-term extended operations). (Contractual requirements for these SVs specify transmission of correct data for only 14 days to support short-term extended operations while in IIA mode.) Under normal conditions, the CS will provide daily uploads to each SV, which will allow the SV to maintain normal operations as defined in paragraph 6.2.3.1 and described within this IS.	Changed from IIIA to Block IIR/IIRM due to order of SV Generation (IIA, IIR/IIR-M. GPS III)
6.3.3		If the CS is unable to upload the SVs (the CS is unavailable or the SV is unable to accept and process the upload), each SV shall individually transition to short-term extended operations and eventually to long-term extended operations (based on time from each SV's last upload) as defined in paragraph 6.2.3.2 and 6.2.3.3, and as further described throughout this IS. As time from upload continues through these three operational intervals, the user range error (URE) of the SV will increase, causing a positioning service accuracy degradation.	If the CS is unable to upload the SVs (the CS is unavailable or the SV is unable to accept and process the upload), each SV shallwill individually transition to short-term extended operations and eventually to long-term extended operations (based on time from each SV's last upload) as defined in paragraph 6.2.3.2 and 6.2.3.3, and as further described throughout this IS. As time from upload continues through these three operational intervals, the user range error (URE) of the SV will increase, causing a positioning service accuracy degradation.	Changed from 'shall' to 'will.'
6.3.4	Block IIA Mode (Block IIR/IIR-M).		6.3.4 Extended Navigation Mode (GPS III)	Changed from IIIA to Block IIR/IIRM due

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				to order of SV Generation (IIA, IIR/IIR-M. GPS III) Changed from IIIA to GPS III due to GPS Directorate request.
6.3.4		The Block IIR/IIR-M SVs, when operating in the Block IIA mode, will perform similarly to the Block IIA SVs and have the capability of storing at least 60 days of navigation data, with current memory margins, to provide positioning service without contact from the CS for that period (through short-term and long-term extended operations). (Contractual requirements for these SVs specify transmission of correct data for only 14 days to support short-term extended operations while in IIA mode.) Under normal conditions, the CS will provide daily uploads to each SV, which will allow the SV to maintain normal operations as defined in paragraph 6.2.3.1 and described within this IS.	The ~~Block~~GPS ~~IIR/IIR-M~~III SVs~~, when operating in the Block~~shall ~~IIA~~be ~~mode,~~capable ~~will~~of ~~perform~~being ~~similarly~~uploaded ~~to~~by the~~ Block IIA SVs~~ ~~and~~CS ~~have~~with ~~the~~a ~~capability~~minimum of ~~storing at least~~ 60 days~~ of navigation data, with current memory margins, to provide positioning service without contact from the CS for that period (through short-term and long-term extended operations). (Contractual requirements for these SVs specify transmission~~ of~~ correct~~ data~~ for only 14 days~~ to support~~ short-term extended operations~~a ~~while~~60 ~~in~~day ~~IIA~~positioning ~~mode~~service~~.)~~ Under normal conditions, the CS will provide daily uploads to each SV, which will allow the SV to maintain normal operations as defined in paragraph 6.2.3.1 and described within this IS.	Changed from IIIA to Block IIR/IIRM due to order of SV Generation (IIA, IIR/IIR-M. GPS III)
6.3.4		If the CS is unable to upload the SVs (the CS is unavailable or the SV is unable to accept and process the upload), each SV will individually transition to short-term extended operations and eventually to long-term extended operations (based on time from each SV's last upload) as defined in paragraph 6.2.3.2 and 6.2.3.3, and as further described throughout this IS. As time from upload continues through these three operational intervals, the user range error (URE) of the SV will increase, causing a positioning service accuracy degradation.	If the CS is unable to upload the SVs (the CS is unavailable or the SV is unable to accept and process the upload), each SV ~~will~~shall individually transition to short-term extended operations and eventually to long-term extended operations (based on time from each SV's last upload) as defined in paragraph 6.2.3.2 and 6.2.3.3, and as further described throughout this IS.~~-~~ As time from upload continues through these three operational intervals, the user range error (URE) of the SV will increase, causing a positioning service accuracy degradation.	Changed from 'shall' to 'will.'
20.3.3.1		In this context, an "alert" is defined as any indication or characteristic in the conveying signal, as specified elsewhere in this document, which signifies that the conveying signal may be invalid and should not be used, such as, not Operational-Healthy, Non-Standard Code, parity error, etc.	In this context, an "alert" is defined as any indication or characteristic ~~in~~of the conveying signal, as specified elsewhere in this document, which signifies to users that the conveying signal may be invalid ~~and~~or should not be used, such as~~,~~ the health bits not ~~Operational~~indicating operational-~~Healthy~~healthy, ~~Non~~broadcasting non-~~Standard~~standard ~~Code~~code, parity error, etc.	See Rationale #5

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20.3.3.2		Bit 18 is an "alert" flag. When this flag is raised (bit 18 = "1"), it shall indicate to the standard positioning service (SPS) user (unauthorized user) that the SV URA may be worse than indicated in subframe 1 and that he shall use that SV at his own risk.	Bit 18 is an "alert" flag. When this flag is raised (bit 18 = "1"), it shall indicate to the standard positioning service (SPS) user (unauthorized user) that the ~~SV~~signal URA may be worse than indicated in subframe 1 and that he shall use that SV at his own risk.	See Rationale #5
20.3.3.3.1		The clock parameters describe the SV time scale during the period of validity. The parameters are applicable during the time in which they are transmitted. Beyond that time, they are still applicable, however, the most recent data set should be used since the accuracy degrades over time. The timing information for subframes, pages, and data sets is covered in Section 20.3.4.	The clock parameters describe the SV time scale during the period of validity. The parameters are applicable during the time in which they are transmitted. ~~Beyond that time, they are still applicable, however, the most recent data set should be used since the accuracy degrades over time.~~ The timing information for subframes, pages, and data sets is covered in Section 20.3.4.	See Rationale #5
20.3.3.3.1.3		Bits 13 through 16 of word three shall give the URA index of the SV (reference paragraph 6.2.1) for the standard positioning service user. Except for Block IIR/IIR-M SVs in the Autonav mode, the URA index (N) is an integer in the range of 0 through 15 and has the following relationship to the URA of the SV:	Bits 13 through 16 of word three shall give the URA index of the SV (reference paragraph 6.2.1) for the standard positioning service user. While the URA may vary over the ephemeris curve fit interval, the URA index (N) in the LNAV message shall correspond to the maximum URA expected over the entire ephemeris curve fit interval. Except for Block IIR/IIR-M SVs in the Autonav mode, the URA index (N) is an integer in the range of 0 through 15 and has the following relationship to the URA of the SV:	See Rationale #5
20.3.3.3.1.3		For each URA index (N), users may compute a nominal URA value (X) as given by: • If the value of N is 6 or less, $X = 2^{(1 + N/2)}$, • If the value of N is 6 or more, but less than 15, $X = 2^{(N - 2)}$, • N = 15 shall indicate the absence of an accuracy prediction and shall advise the standard positioning service user to use that SV at his own risk. For N = 1, 3, and 5, X should be rounded to 2.8, 5.7, and 11.3 meters, respectively. For Block IIR/IIR-M SVs in the Autonav mode, the URA shall be defined to mean "no better than X meters", with "X" as defined above for each URA index. Integrity properties of the URA are specified with respect to the upper bound values of the URA index (see 20.3.3.1). URA accounts for signal-in-space contributions to user range error that include, but are not limited to, the following: the net effect of clock	For each URA index (N), users may compute a nominal URA value (X) as given by: • If the value of N is 6 or less, X = 2(1 + N/2), • If the value of N is 6 or more, but less than 15, X = 2(N - 2), • N = 15 shall indicate the absence of an accuracy prediction and shall advise the standard positioning service user to use that SV at his own risk. For N = 1, 3, and 5, X should be rounded to 2.8, 5.7, and 11.3 meters, respectively. For Block IIR/IIR-M SVs in the Autonav mode, the URA shall be defined to mean "no better than X meters", with "X" as defined above for each URA index. The nominal URA value (X) is suitable for use as a conservative prediction of the RMS signal-in-space (SIS) range errors for accuracy-related purposes in the pseudorange domain (e.g., measurement de-weighting, receiver autonomous integrity monitoring (RAIM), figure of merit (FOM) computations). Integrity properties of the URA are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URA index (see 20.3.3.1). URA accounts for ~~signal-in-space~~SIS contributions to user range error ~~that~~which include, but are not limited to, the following: LSB representation/truncation error; the net effect of clock ~~parameter~~correction polynomial error and code phase error in the transmitted signal for single-	GPS antenna errors not along the bore-sight have been discovered through JPL analysis. These changes add SV Antenna errors to list of errors that URA must cover.

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		parameter and code phase error in the transmitted signal for single-frequency L1C/A or single-frequency L2C users who correct the code phase as described in Section 30.3.3.3.1.1.1, as well as the net effect of clock parameter, code phase, and intersignal correction error for dual-frequency L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section 30.3.3.3.1.1.2.	frequency L1C/A or single-frequency L2C users who correct the code phase as described in Section 30.3.3.3.1.1.1, as well as; the net effect of clock parameter, code phase, and intersignalinter-signal correction error for dual-frequency L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section 30.3.3.3.1.1.2; ephemeris error; anisotropic antenna errors; and signal deformation error. URA does not account for user range error contributions due to the inaccuracy of the broadcast ionospheric data parameters used in the single-frequency ionospheric model or for other atmospheric effects.	
20.3.4.4		The start of the transmission interval for each data set corresponds to the beginning of the curve fit interval for the data set. Each data set remains valid for the duration of its curve fit interval.	The start of the transmission interval for each data set corresponds to the beginning of the curve fit interval for the data set. Each data set nominally remains valid for the duration of its curve fit interval. A data set may be rendered invalid before the end of its curve fit interval when it is superseded by the SV cutting over to new data.	See Rationale #5
30.3.3		Each message starts with an 8-bit preamble - 10001011, followed by a 6-bit PRN number of the transmitting SV, a 6-bit message type ID with a range of 0 (000000) to 63 (111111), and the 17-bit message time of week (TOW) count. When the value of the message TOW count is multiplied by 6, it represents SV time in seconds at the start of the next 12-second message. An “alert” flag, when raised (bit 38 = “1”), indicates to the user that the SV URA and/or the SV User Differential Range Accuracy (UDRA) may be worse than indicated in the respective message types. For each default message (Message Type 0), bits 39 through 276 shall be alternating ones and zeros and the message shall contain a proper CRC parity block.	Each message starts with an 8-bit preamble - 10001011, followed by a 6-bit PRN number of the transmitting SV, a 6-bit message type ID with a range of 0 (000000) to 63 (111111), and the 17-bit message time of week (TOW) count.- When the value of the message TOW count is multiplied by 6, it represents SV time in seconds at the start of the next 126-second message. An “alert” flag, when raised (bit 38 = “1”), indicates to the user that the SVsignal URA and/or the SV User Differential Range Accuracy (UDRA) components may be worse than indicated in the respectiveassociated message types and that he shall use at his own risk. For each default message (Message Type 0), bits 39 through 276 shall be alternating ones and zeros and the message shall contain a proper CRC parity block.	See Rationale #5

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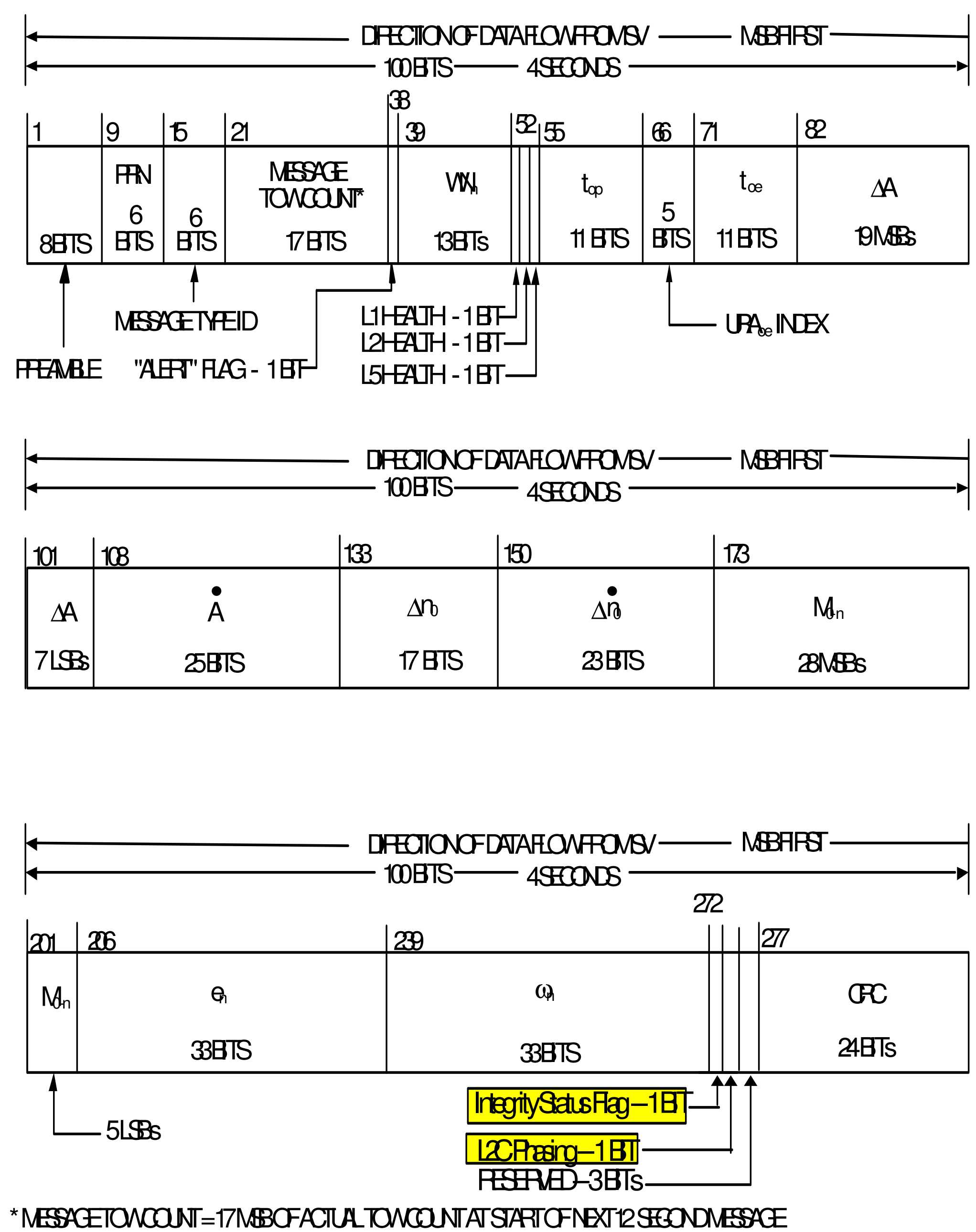
<tr><td>30.3.3</td><td></td><td>

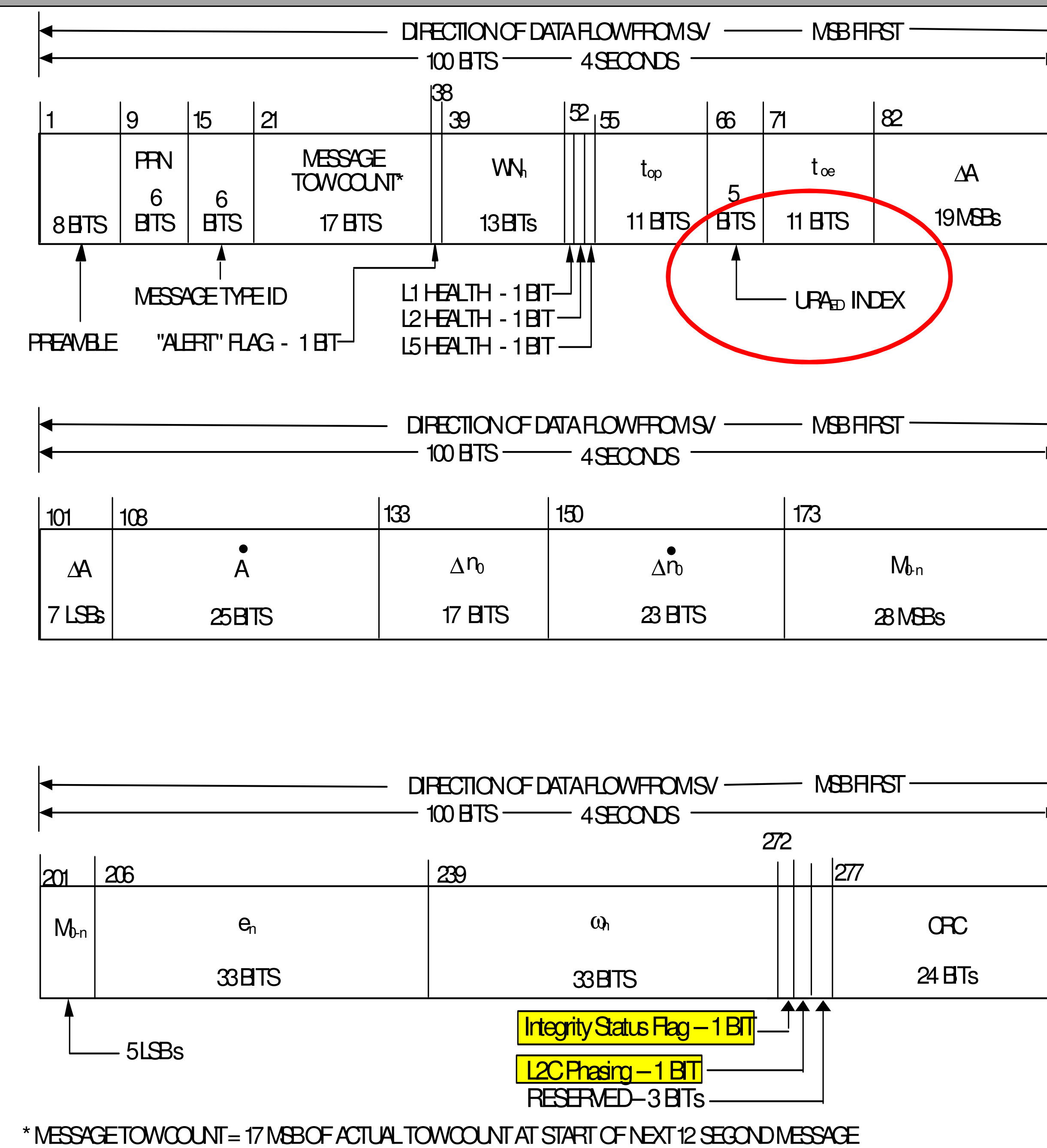
Figure 30-1. Message Type 10 - Ephemeris 1</td><td>
</td><td>Rationale #1- URA_{oc} and URA_{oe} are redefined into an elevation-dependent component (URA_{ED}) and a non-elevation-dependent component (URA_{NED}). This will enable users to de-weight the elevation-angle-dependent component with the elevation angle of the SV, resulting in a smaller composite URA, in many cases. A smaller composite URA means higher availability for</td></tr>
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			Figure 30-1. Message Type 10 - Ephemeris 1	applications that have requirements for a minimum level of accuracy and/or integrity. In order to achieve a technical consensus on how to proceed forward with GPS III deriving URA from the uploaded covariance, then the following changes were needed to the user ICDs.

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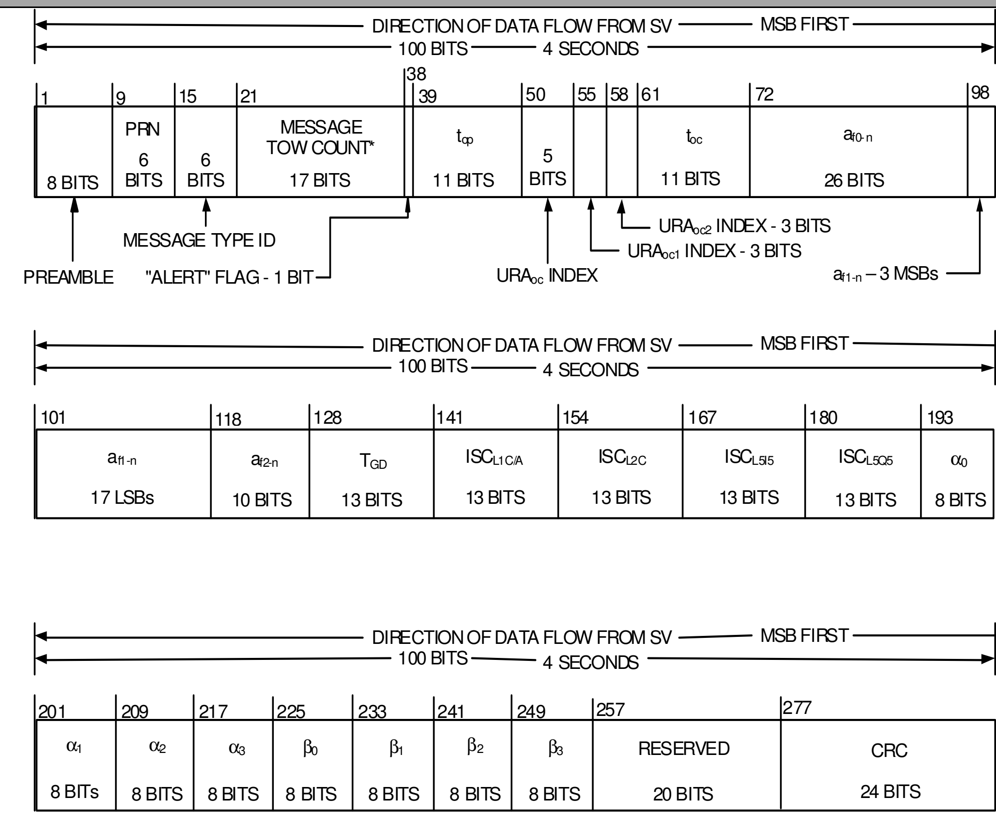
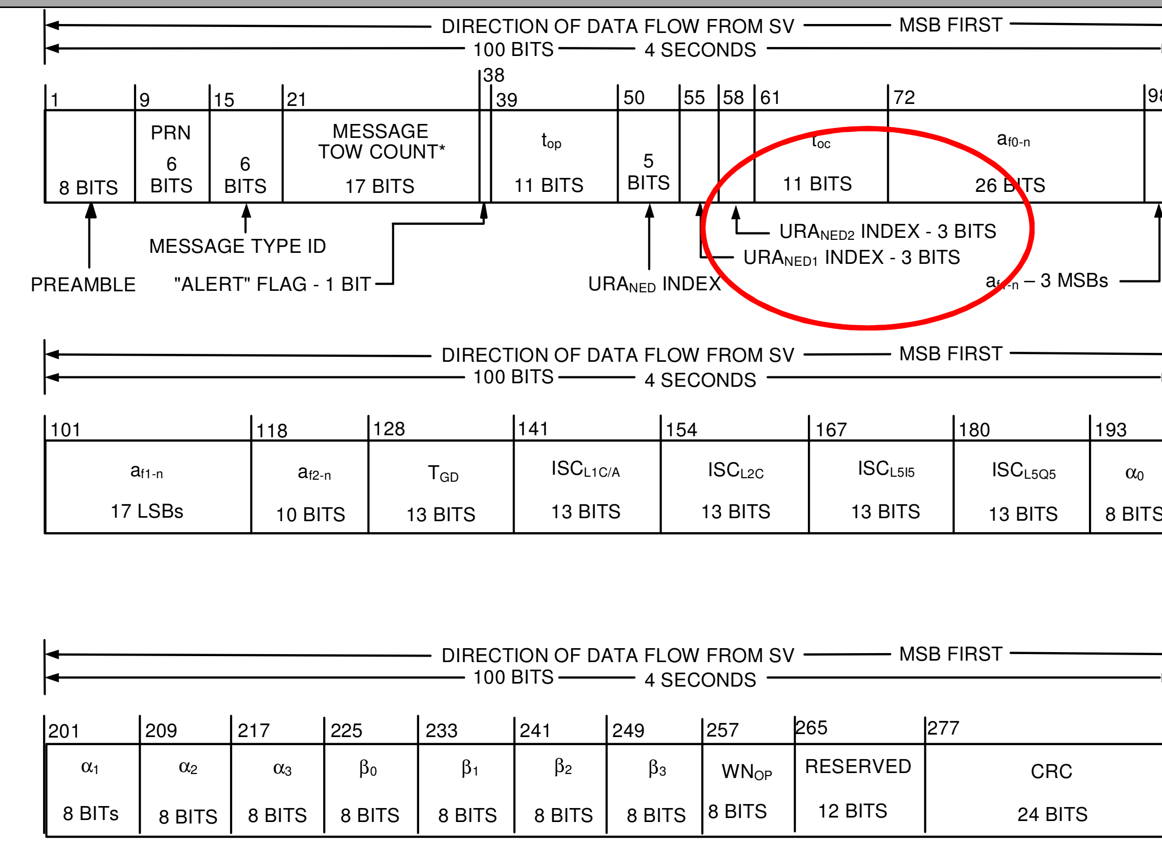
<tr><td>30.3.3</td><td></td><td>


* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE

Figure 30-3. Message Type 30 - Clock, IONO & Group Delay
</td><td>


* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE

Figure 30-3. Message Type 30 - Clock, IONO & Group Delay
</td><td>Rationale #1</td></tr>
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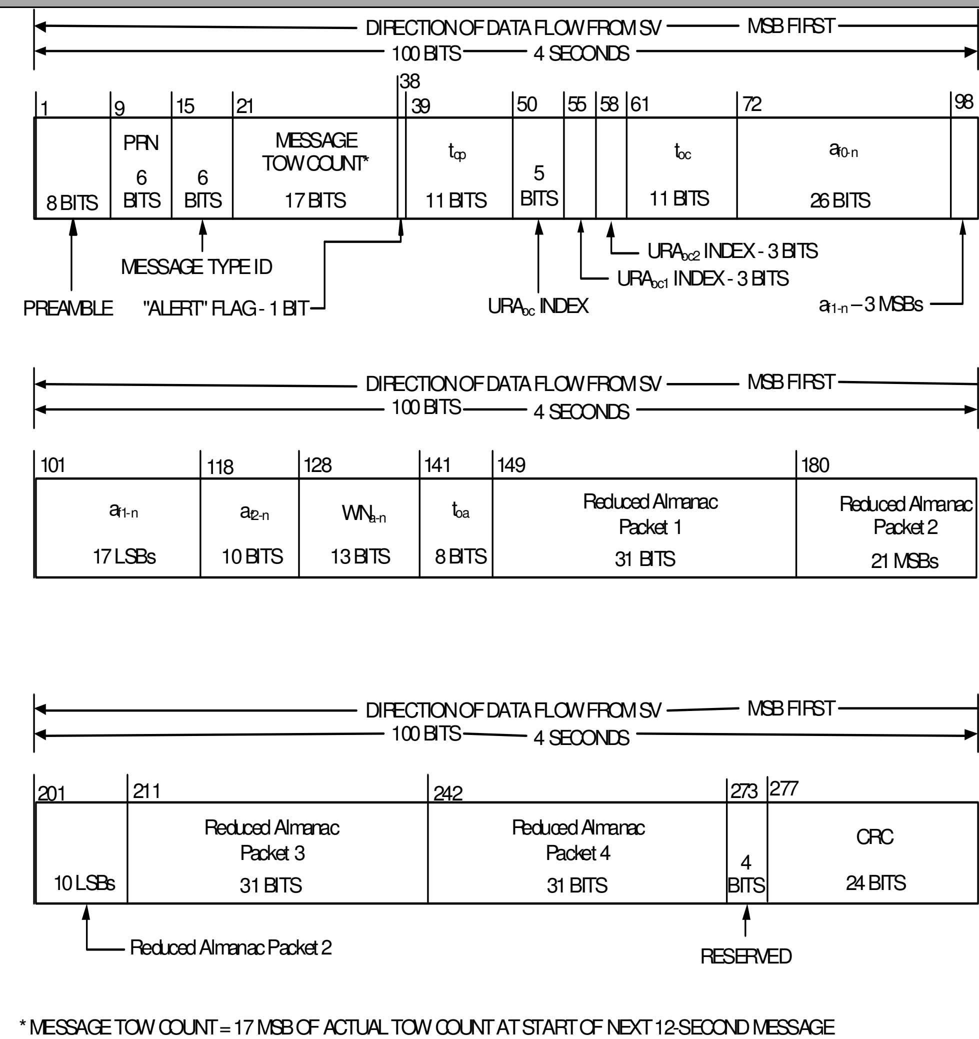
<tr><td>30.3.3</td><td></td><td>


Figure 30-4. Message Type 31 - Clock & Reduced Almanac
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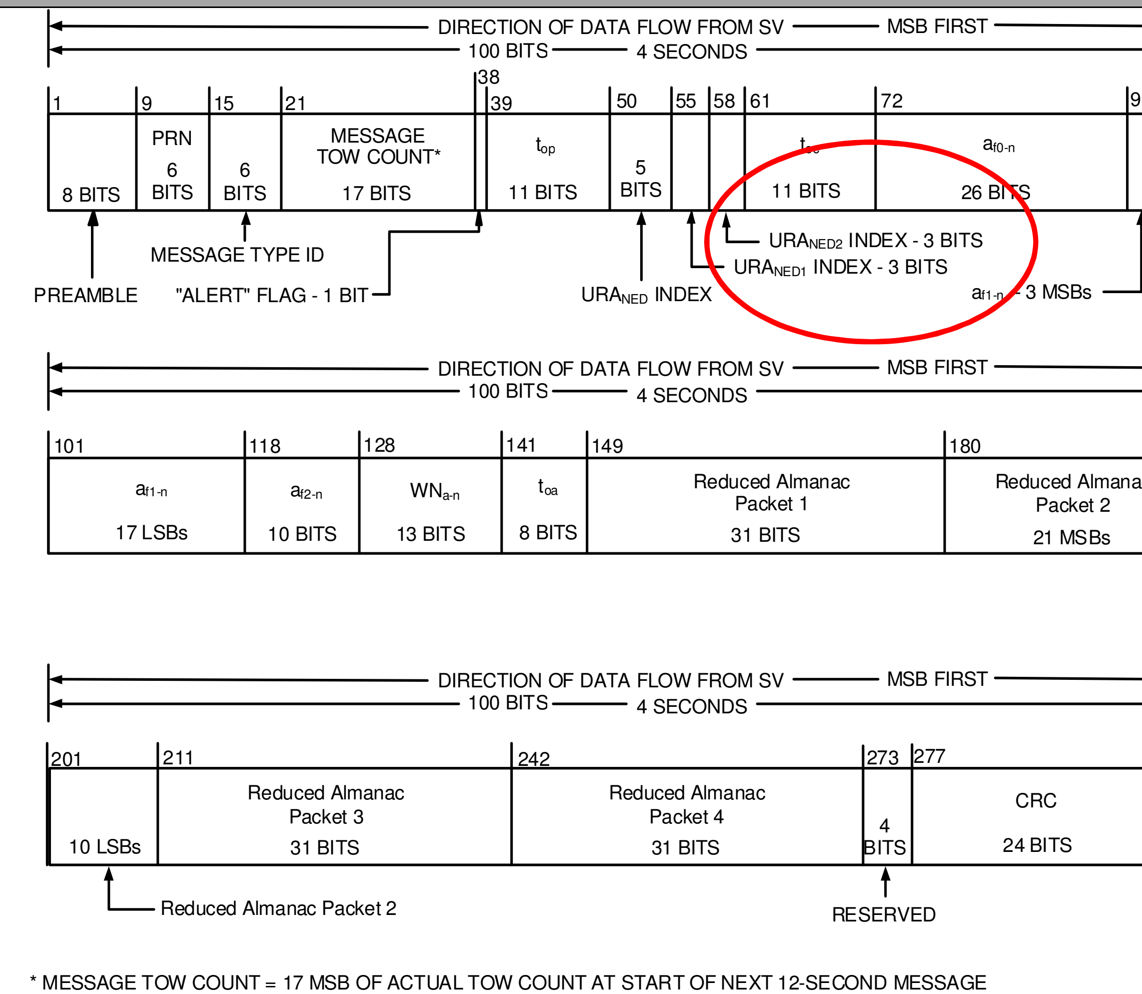

Figure 30-4. Message Type 31 - Clock & Reduced Almanac
</td><td>Rationale #1</td></tr>
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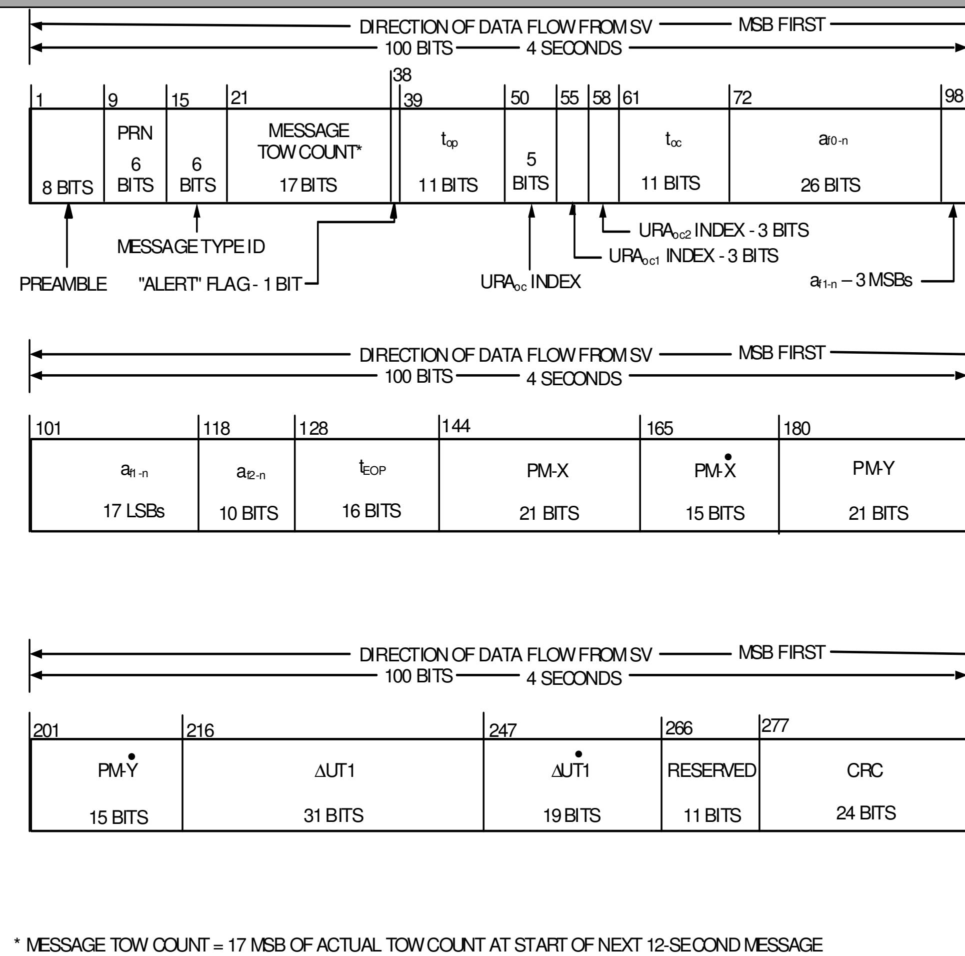
<tr><td>30.3.3</td><td></td><td>


Figure 30-5. Message Type 32 - Clock & EOP
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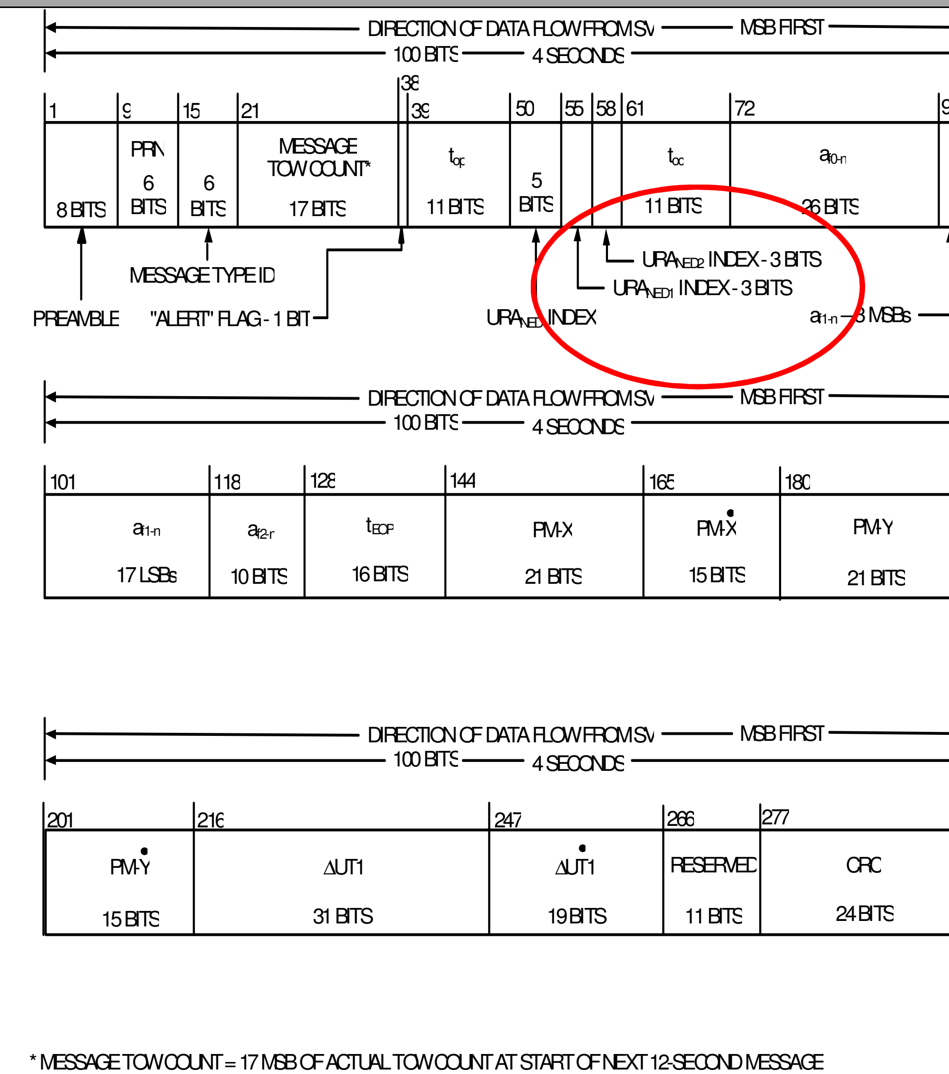

Figure 30-5. Message Type 32 - Clock & EOP
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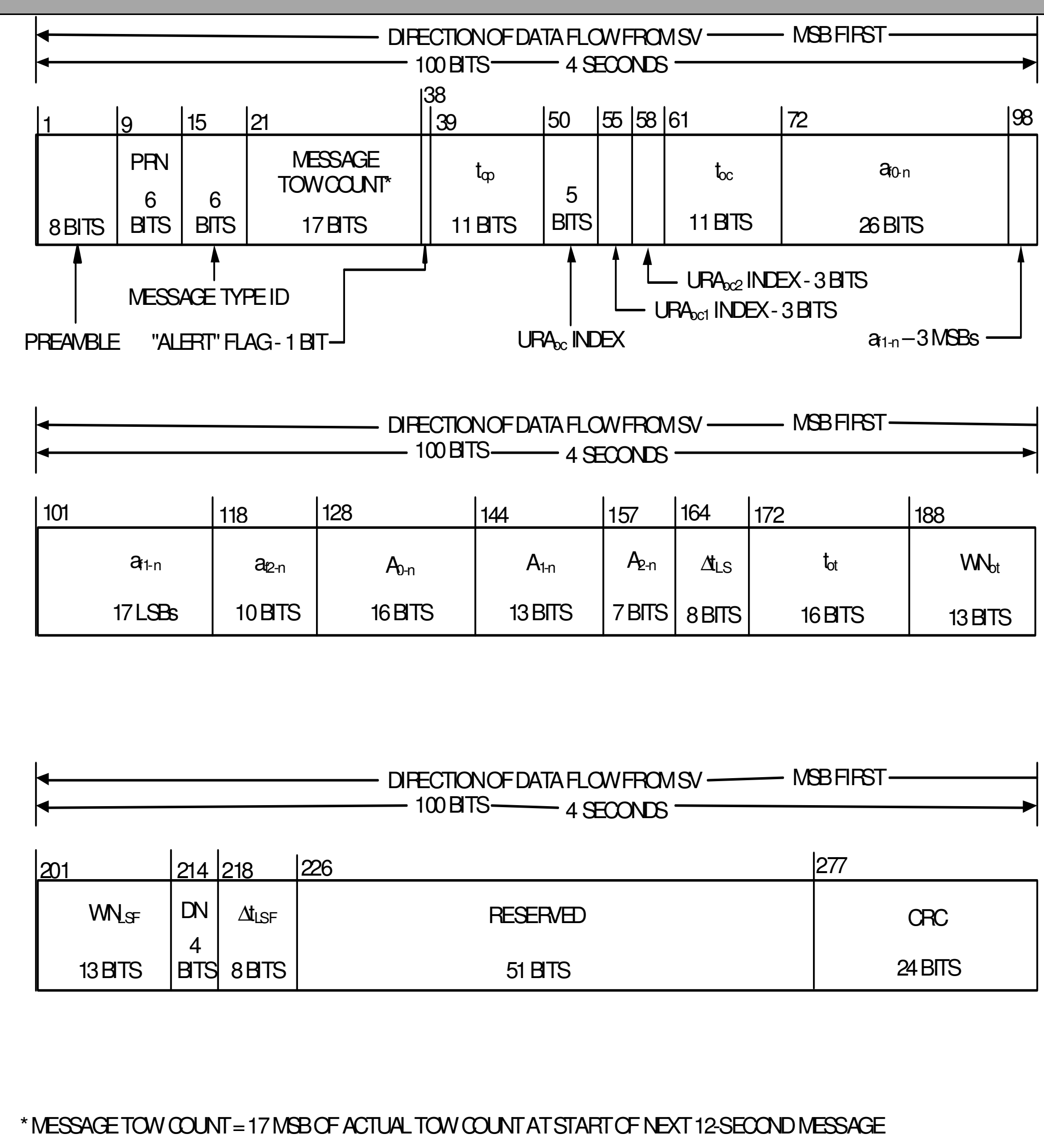

Figure 30-6. Message Type 33 - Clock & UTC
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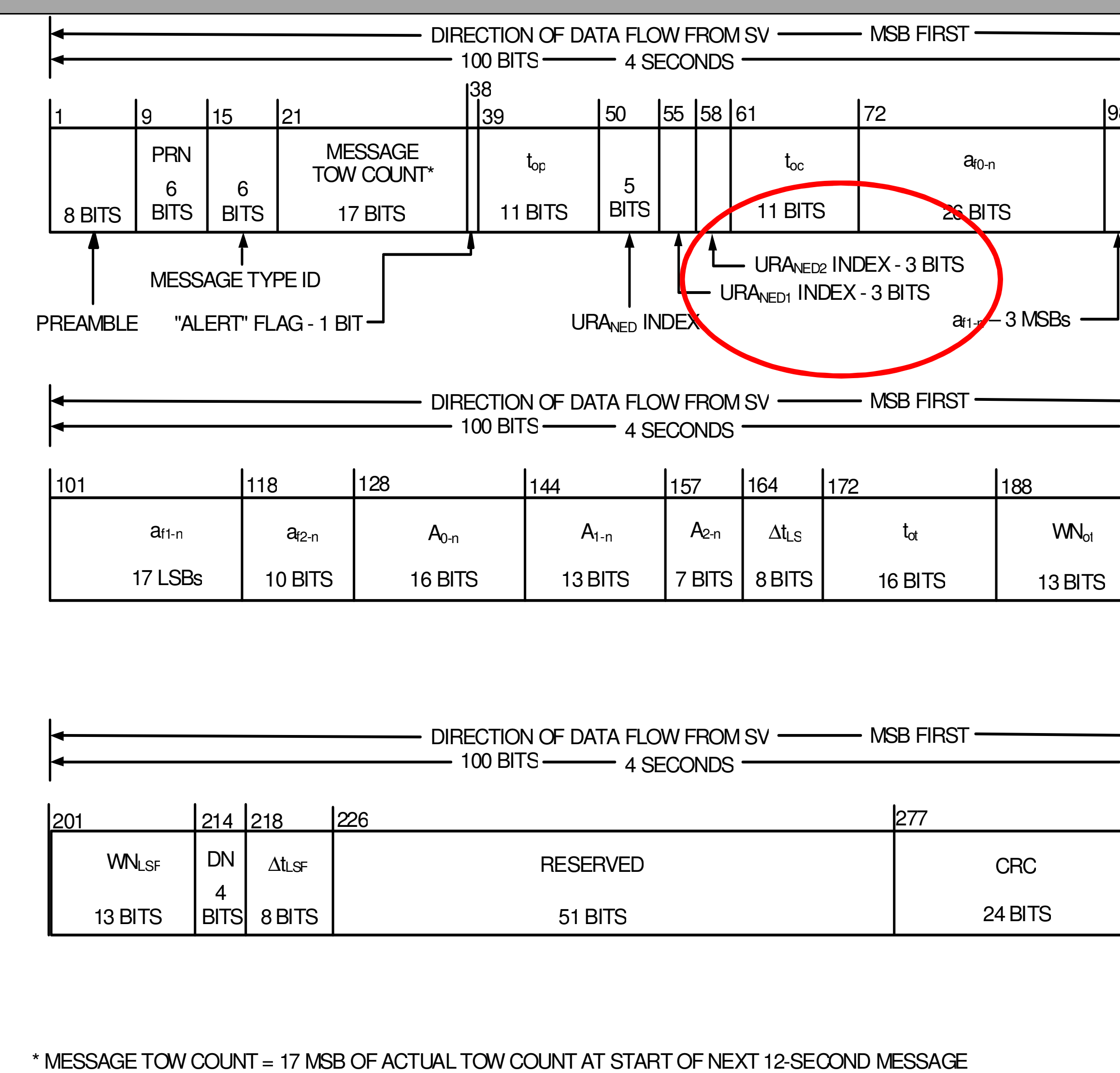

Figure 30-6. Message Type 33 - Clock & UTC
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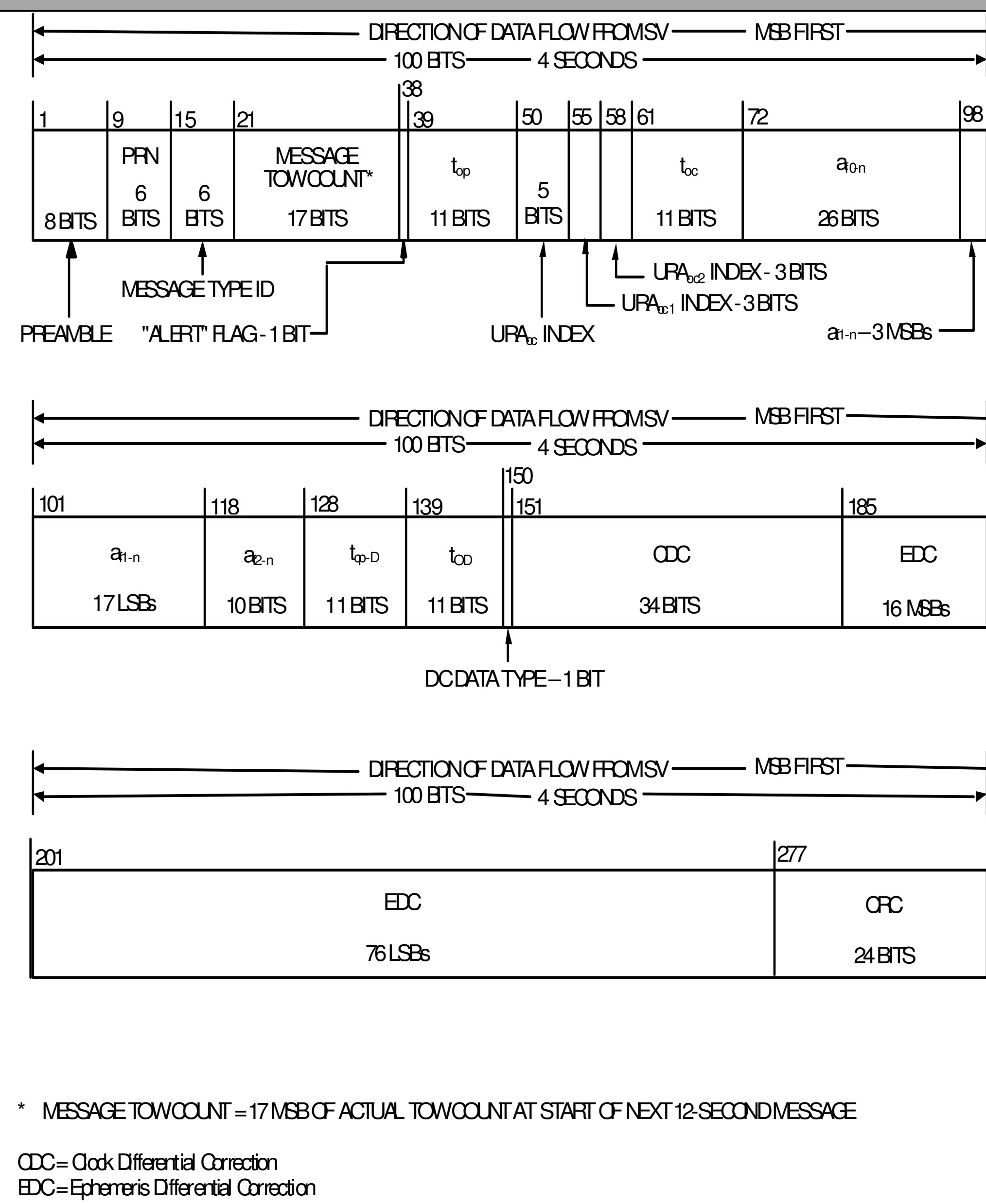
<tr><td>30.3.3</td><td></td><td>

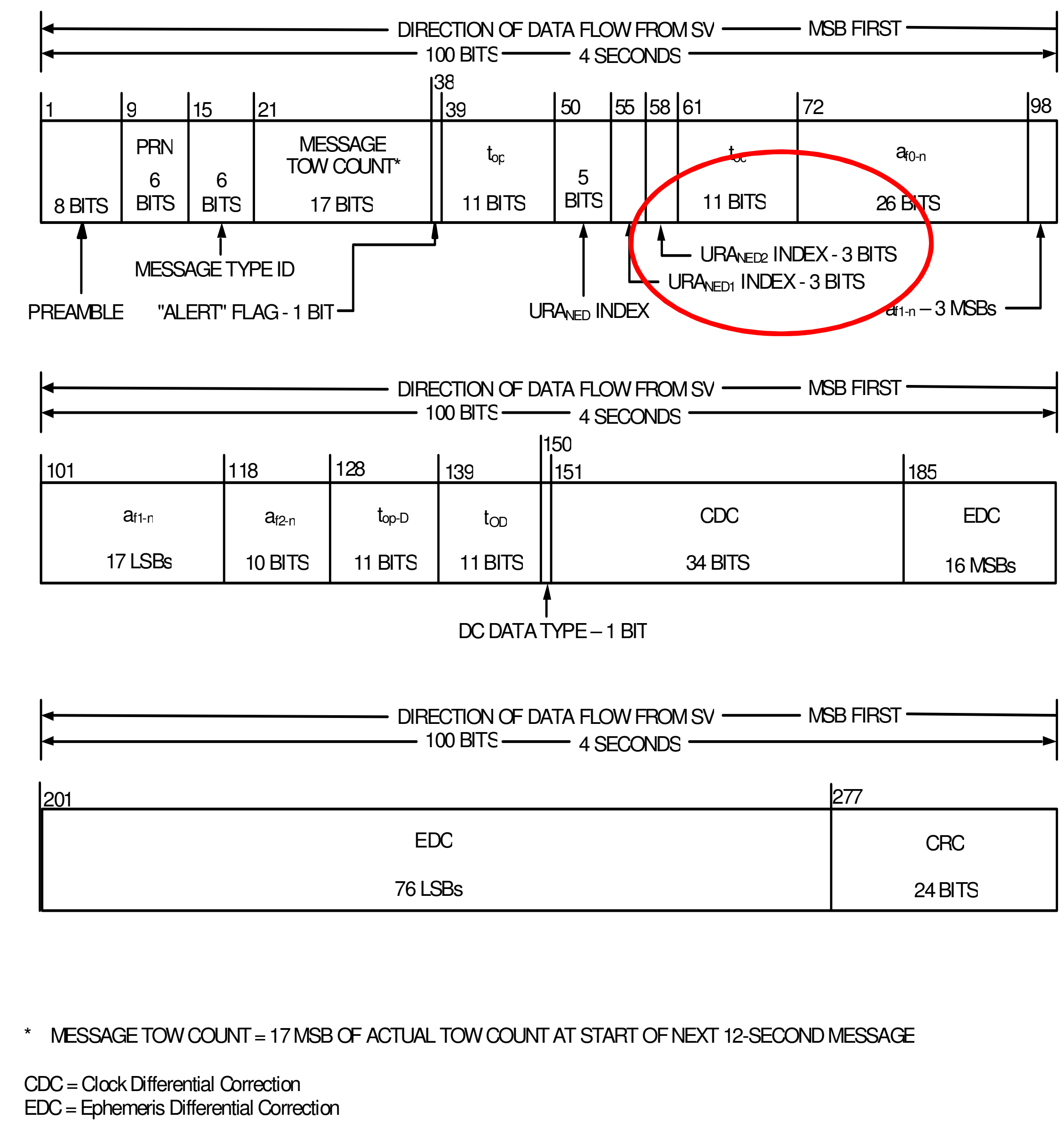
Figure 30-7. Message Type 34 - Clock & Differential Correction</td><td>

Figure 30-7. Message Type 34 - Clock & Differential Correction</td><td>Rationale #1
.</td></tr>
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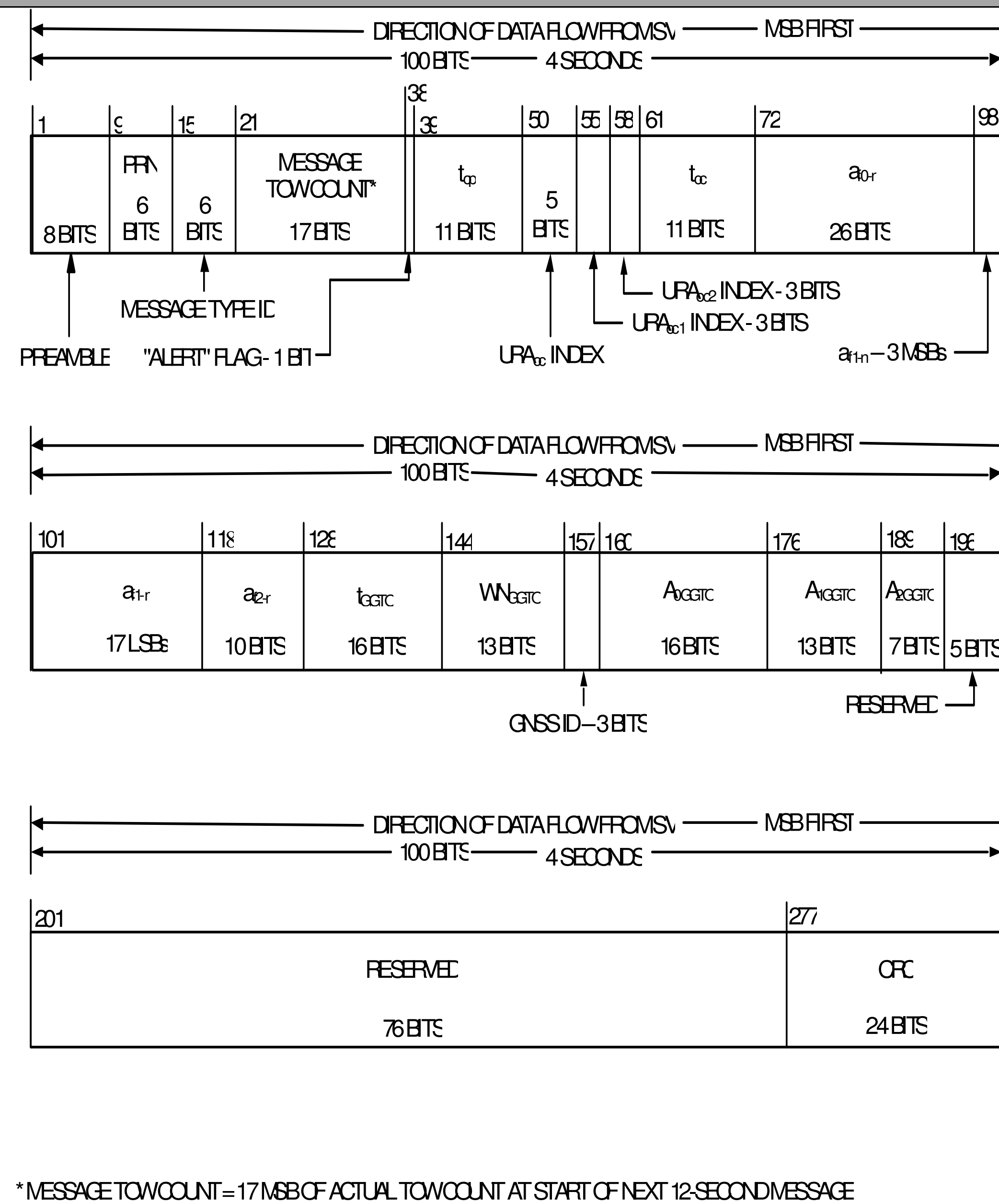
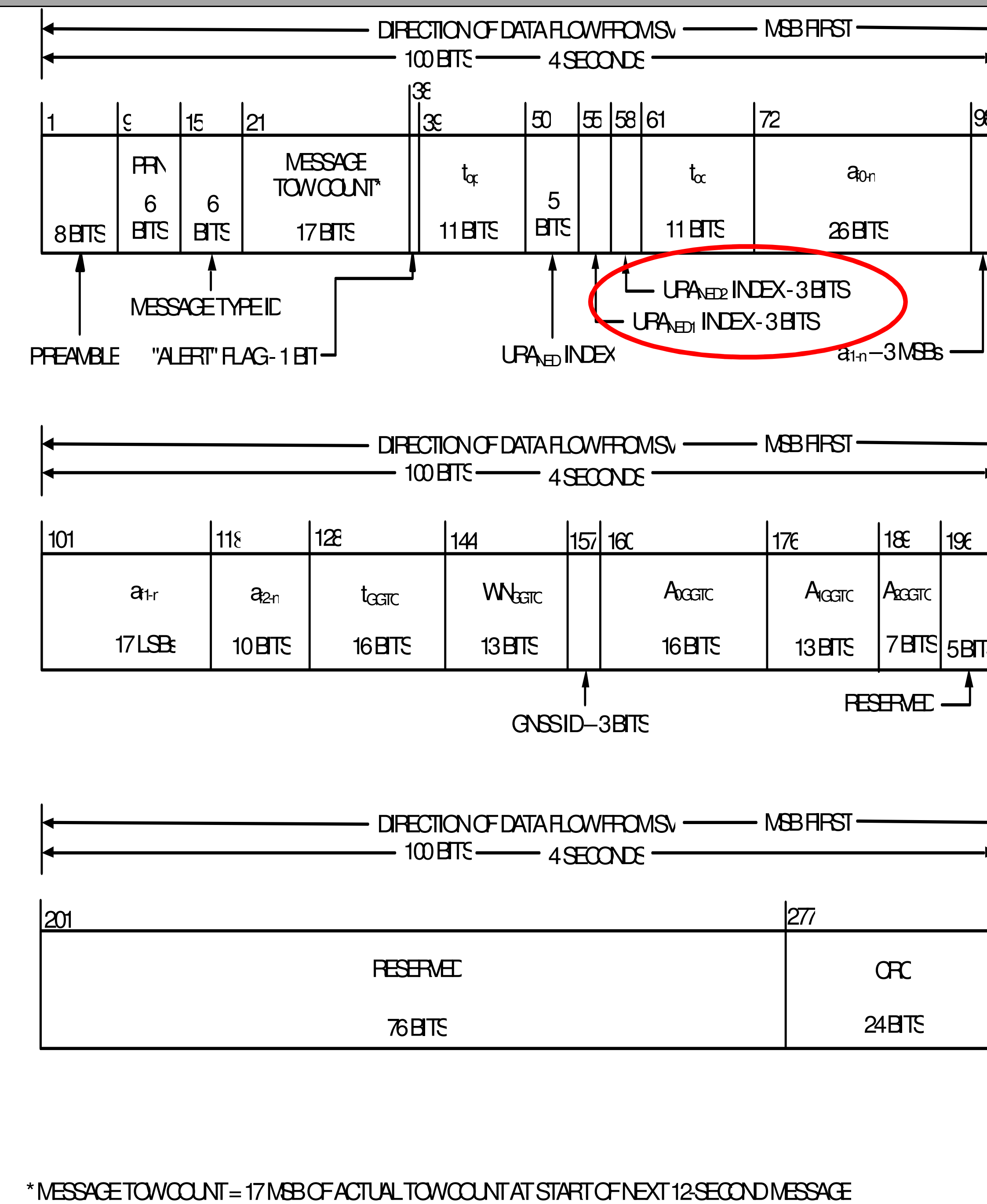
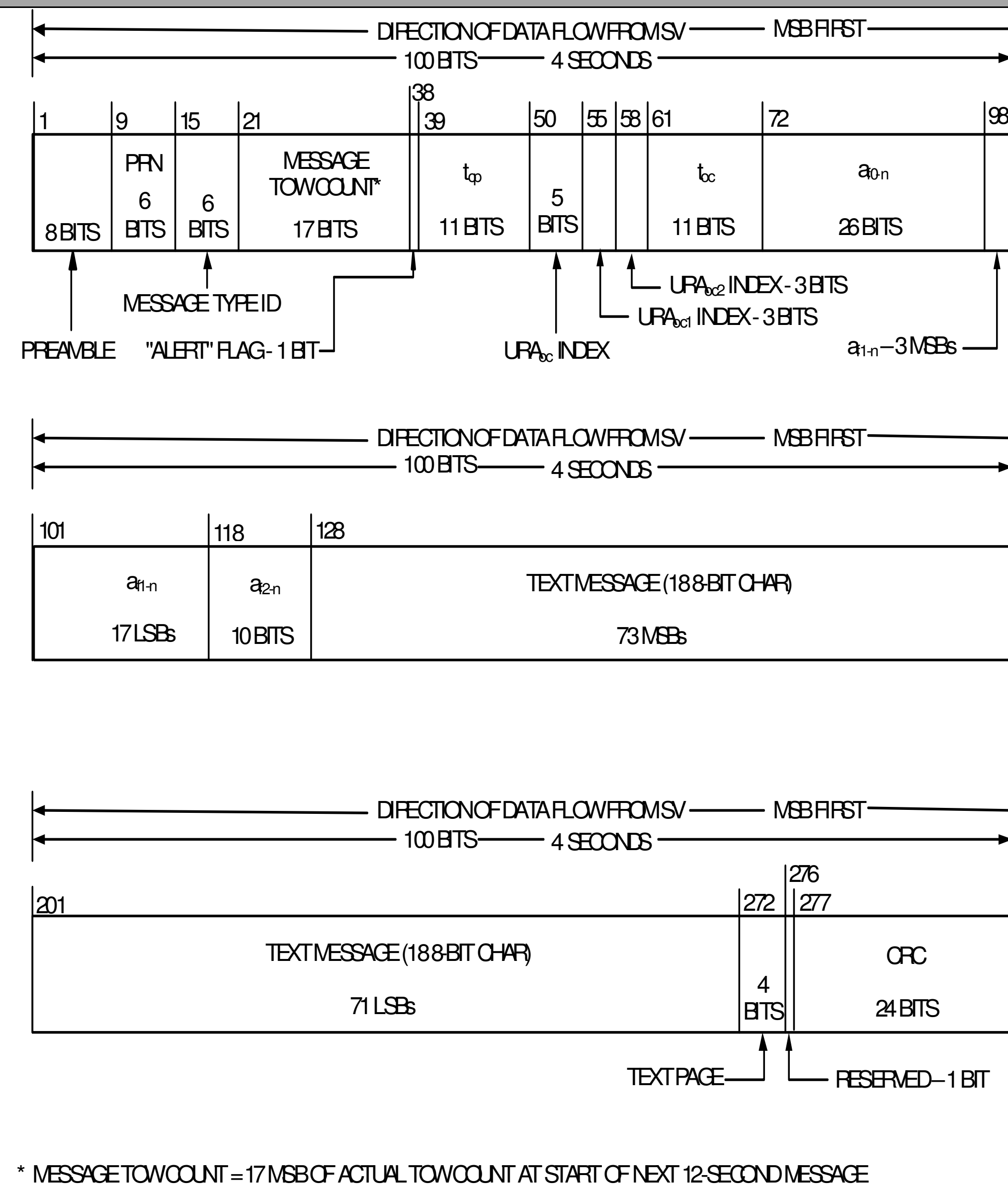
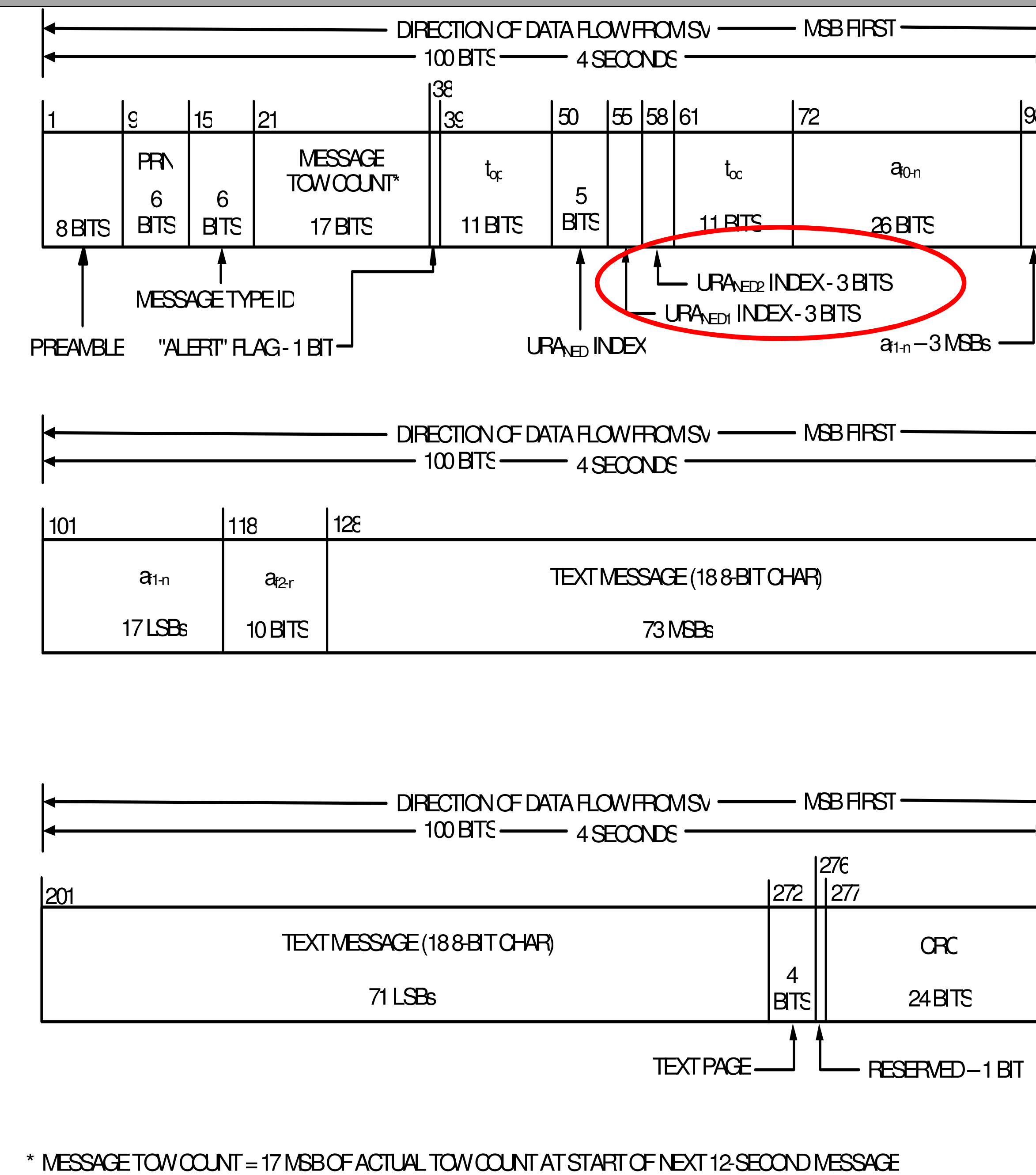
Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
30.3.3		 Figure 30-8. Message Type 35 - Clock & GGTO	 Figure 30-8. Message Type 35 - Clock & GGTO	Rationale #1

<table>
<tr><th>Section Number</th><th>URA Definition Proposed Heading</th><th>IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces</th><th>URA Definition Redlines</th><th>Rationale</th></tr>
<tr><td>30.3.3</td><td></td><td>
</td><td>
</td><td>Rationale #1</td></tr>
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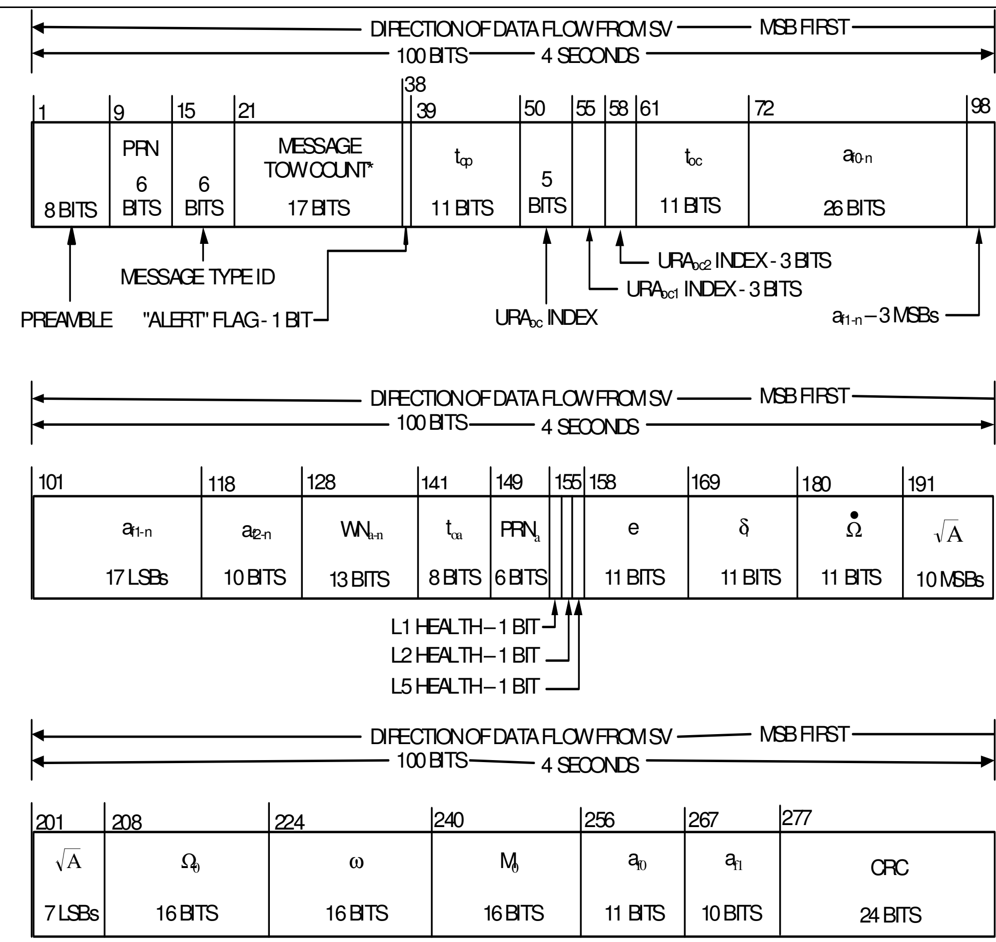
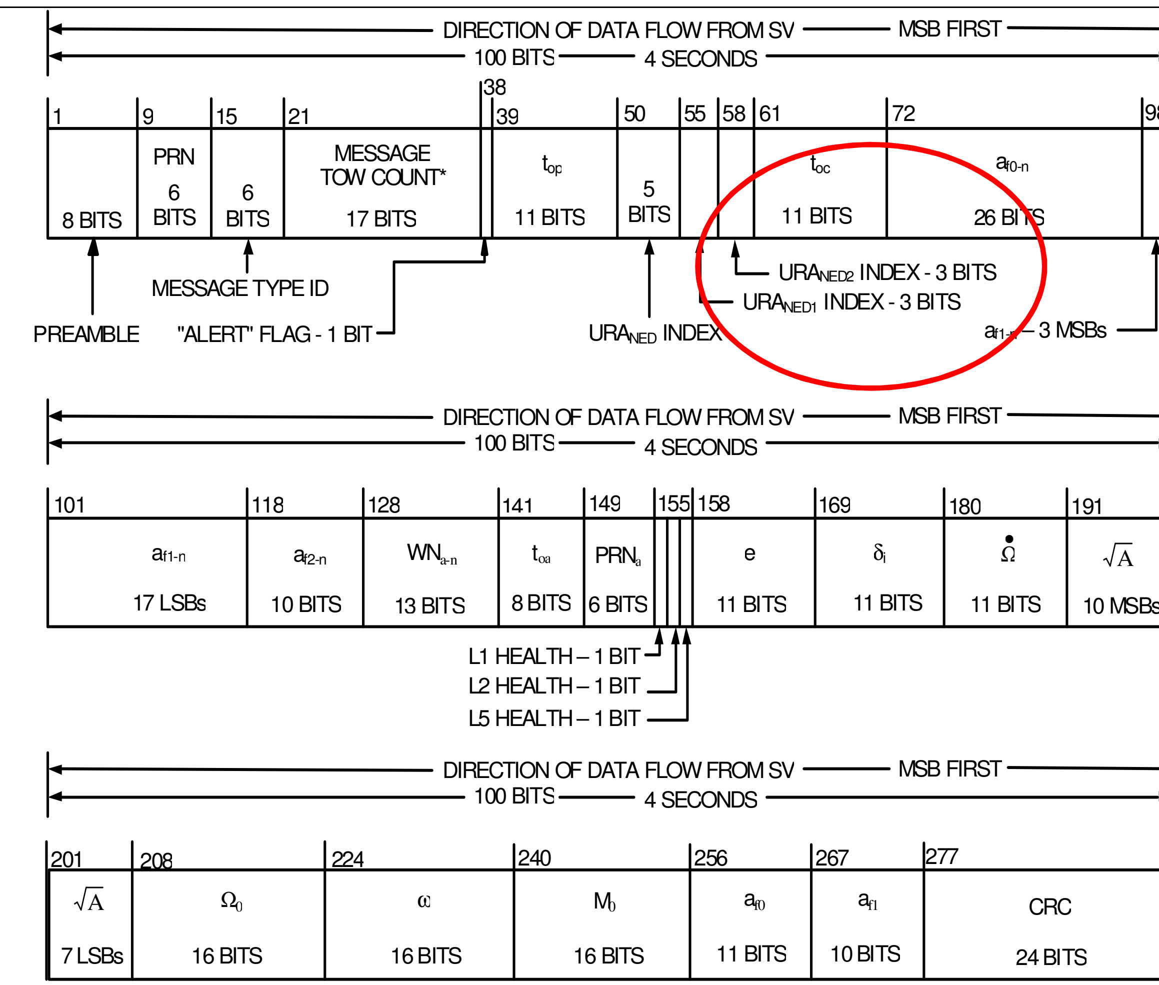
Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
		Figure 30-9. Message Type 36 - Clock & Text	Figure 30-9. Message Type 36 - Clock & Text	
30.3.3		 * MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE Figure 30-10. Message Type 37 - Clock & Midi Almanac	 * MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE Figure 30-10. Message Type 37 - Clock & Midi Almanac	Rationale #1

Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
30.3.3.1.1		The ephemeris parameters in the message type 10 and type 11 describe the orbit of the transmitting SV during the curve fit interval of three hours. The nominal transmission interval is two hours, and shall coincide with the first two hours of the curve fit interval. The period of applicability for ephemeris data coincides with the entire three-hour curve fit interval. Table 30-I gives the definition of the orbital parameters using terminology typical of Keplerian orbital parameters; it is noted, however, that the transmitted parameter values are expressed such that they provide the best trajectory fit in Earth-Centered, Earth-Fixed (ECEF) coordinates for each specific fit interval. The user shall not interpret intermediate coordinate values as pertaining to any conventional coordinate system.	The ephemeris parameters in the message type 10 and type 11 describe the orbit of the transmitting SV during the curve fit interval of three hours. The nominal transmission interval is two hours, and shall coincide with the first two hours of the curve fit interval. The predicted period of applicability for ephemeris data coincides with the entire three-hour curve fit interval. Table 30-I gives the definition of the orbital parameters using terminology typical of Keplerian orbital parameters; it is noted, however, that the transmitted parameter values are expressed such that they provide the best trajectory fit in Earth-Centered, Earth-Fixed (ECEF) coordinates for each specific fit interval. The user shall not interpret intermediate coordinate values as pertaining to any conventional coordinate system.	Rationale #1, Rationale #2
30.3.3.1.1		N/A	~~N/A~~The t_{oe} term shall provide the user with a convenient means for detecting any change in the ephemeris representation parameters. The t_{oe} is provided in both message type 10 and 11 for the purpose of comparison with the t_{oc} term in message type 30 - 37. Whenever these three terms do not match, a data set cutover has occurred and new data must be collected. The timing of the t_{oe} and constraints on the toc and t_{oe} are defined in paragraph 30.3.4.4.	Rationale #1, Rationale #2
30.3.3.1.1		Any change in the Message Type 10 and 11 ephemeris data will be accomplished with a simultaneous change in the t_{oe} value. The CS (Block IIR-M/IIF) and SS (Block III) will assure that the t_{oe} value, for at least the first data set transmitted by an SV after an upload, is different from that transmitted prior to the cutover. See Section 20.3.4.5 for additional information regarding t_{oe}. The CNAV message will contain information that allows users to operate when integrity is assured. This is accomplished using an integrity assured URA value in conjunction with an integrity status flag. The URA value is the RSS of URAoe and URAoc; URA is integrity assured to the enhanced level only when the integrity status flag is “1”. Bit 272 of Message Type 10 is the Integrity Status Flag (ISF). A "0" in bit position 272 indicates that the conveying signal is provided with the legacy level of integrity assurance. That is, the probability that the instantaneous URE of the conveying signal exceeds 4.42 times the upper bound value of the current broadcast URA index, for more than 5.2 seconds, without an accompanying alert, is less than 1E-5 per hour. A "1" in bit-position 272 indicates that the conveying signal is provided with an enhanced level of integrity assurance. That is, the probability that the instantaneous URE of the conveying signal exceeds 5.73 times the upper bound value of the current broadcast URA index, for more than 5.2 seconds, without an accompanying alert, is less than 1E-8 per hour. The probabilities associated with the nominal and lower bound values of the current broadcast URA index are not defined.	Any change in the ~~Message~~message ~~Type~~type 10 and 11 ephemeris data will be accomplished with a simultaneous change in the t_{oe} value. The CS ~~(~~will assure the t_{oe} value for Block IIR-M/IIF~~)~~ and SS ~~(Block III)~~ will assure ~~that~~ the toe value for Block III, for at least the first data set transmitted by an SV after an upload, is different from that transmitted prior to the cutover. See Section ~~20~~30.3.4.5 for additional information regarding t_{oe}. The CNAV ~~message~~ ~~will~~messages contain information that allows users to ~~operate~~take advantage of situations when integrity is assured to the enhanced level. This is accomplished using ~~an~~a composite integrity assured URA value in conjunction with an integrity status flag. The composite integrity assured URA (IAURA) value is the RSS of ~~URAoe~~an elevation-dependent function of the upper bound value of the URA_{ED} component and ~~URAoc;~~the ~~URA~~upper ~~is~~bound ~~integrity~~value of the URA_{NED} component. The composite IAURA value is assured to the enhanced level only when the integrity status flag is “1”; otherwise the IAURA value is assured to the legacy level. Bit 272 of Message Type 10 is the Integrity Status Flag (ISF). A "0" in bit position 272 indicates that the conveying signal is provided with the legacy level of integrity assurance. That is, the probability that the instantaneous URE of the conveying signal exceeds 4.42 times ~~the upper bound value of~~ the current broadcast ~~URA~~IAURA ~~index~~value, for more than 5.2 seconds, without an accompanying alert, is less than 1E-5 per hour. A "1" in bit-position 272 indicates that the conveying signal is provided with an enhanced level of integrity assurance. That is, the probability that the instantaneous URE of the conveying signal exceeds 5.73 times ~~the upper bound value of~~ the current broadcast ~~URA~~IAURA	Rationale #1, Rationale #2

Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
		In this context, an "alert" is defined as any indication or characteristic in the conveying signal, as specified elsewhere in this document, which signifies that the conveying signal may be invalid and should not be used, such as, not Operational-Healthy, Non-Standard Code, parity error, etc. In this context, the term URA refers to the composite URA, calculated as the root-sum-squared of the individual URA components in the conveying signal. Bit 273 of Message Type 10 indicates the phase relationship between L2C and L2P(Y) as specified in section 3.3.1.5.1.	~~index~~value, for more than 5.2 seconds, without an accompanying alert, is less than 1E-8 per hour. The probabilities associated with the nominal and lower bound values of the current broadcast ~~URA~~URA_{ED} index, URA_{NED} indexes, and related URA values are not defined. In this context, an "alert" is defined as any indication or characteristic ~~in~~of the conveying signal, as specified elsewhere in this document, which signifies to users that the conveying signal may be invalid ~~and~~or should not be used, such as~~, not Operational-Healthy, Non-Standard Code, parity error, etc. In this context,~~ the~~ term URA~~ ~~refers~~health ~~to~~bits ~~the~~not ~~composite~~indicating ~~URA~~operational-healthy, ~~calculated as the~~broadcasting ~~root-sum~~non-~~squared of the individual URA components~~standard ~~in~~code ~~the~~parity ~~conveying~~error, ~~signal~~etc. ~~Bit 273 of Message Type 10 indicates the phase relationship between L2C and L2P(Y) as specified in section 3.3.1.5.1.~~	
30.3.3.1.1.4	~~SV~~Elevation-Dependent ~~Accuracy.~~(ED) Accuracy			
30.3.3.1.1.4		Bits 66 through 70 of message type 10 shall contain the ephemeris User Range Accuracy (URA_{oe}) index of the SV for the standard positioning service user. URA_{oe} index shall provide the ephemeris-related user range accuracy index of the SV as a function of the current ephemeris message curve fit interval. While the ephemeris-related URA may vary over the ephemeris message curve fit interval, the URA_{oe} index (N) in message type 10 shall correspond to the maximum URA_{oe} expected over the entire curve fit interval.	Bits 66 through 70 of message type 10 shall contain the ~~ephemeris~~elevation-dependent (ED) component User Range Accuracy (~~URAoe~~URA_{ED}) index~~ of the SV~~ for the standard positioning service user. ~~URAoe~~The URA_{ED} index shall provide the ~~ephemeris~~ED-related~~ user range accuracy~~URA index~~ of the SV as a function of~~or the current ephemeris~~ message~~ curve fit interval. While the ~~ephemeris~~ED-related URA may vary over the ephemeris~~ message~~ curve fit interval and over the satellite footprint, the ~~URAoe~~URA_{ED} index (N) in message type 10 shall correspond to the maximum ~~URAoe~~URA_{ED} expected over the entire ephemeris curve fit interval for the worst-case location within the SV footprint (i.e., nominally two points at the edge of the SV footprint). At the best-case location within the SV footprint (i.e., nominally directly below the SV along the SV nadir vector), the corresponding URA_{ED} is zero.	Rationale #1
30.3.3.1.1.4		The URA_{oe} index is a signed, two's complement integer in the range of +15 to -16 and has the following relationship to the ephemeris URA: URA_{oe} Index URA_{oe} (meters)	The ~~URAoe~~URA_{ED} index is a signed, two's complement integer in the range of +15 to -16 and has the following relationship to the ~~ephemeris~~ED URA: ~~URAoe~~ URA_{ED} Index ~~URAoe~~ URA_{ED} (meters) 15 6144.00 < URA_{ED} ~~URAoe~~(or no accuracy prediction is available) 14 3072.00 < ~~URAoe £~~ URA_{ED} ≤ 6144.00	Rationale #1

Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
		15 6144.00 < URA_{oe}	13 1536.00 < ~~URAoe £~~ URA_{ED} ≤ 3072.00	
		14 3072.00 < URA_{oe} ≤ 6144.00	12 768.00 < ~~URAoe £~~ URA_{ED} ≤ 1536.00	
		13 1536.00 < URA_{oe} ≤ 3072.00	11 384.00 < ~~URAoe £~~ URA_{ED} ≤ 768.00	
		12 768.00 < URA_{oe} ≤ 1536.00	10 192.00 < ~~URAoe £~~ URA_{ED} ≤ 384.00	
		11 384.00 < URA_{oe} ≤ 768.00	9 96.00 < ~~URAoe £~~ URA_{ED} ≤ 192.00	
		10 192.00 < URA_{oe} ≤ 384.00	8 48.00 < ~~URAoe £~~ URA_{ED} ≤ 96.00	
		9 96.00 < URA_{oe} ≤ 192.00	7 24.00 < ~~URAoe £~~ URA_{ED} ≤ 48.00	
		8 48.00 < URA_{oe} ≤ 96.00	6 13.65 < ~~URAoe £~~ URA_{ED} ≤ 24.00	
		7 24.00 < URA_{oe} ≤ 48.00	5 9.65 < ~~URAoe £~~ URA_{ED} ≤ 13.65	
		6 13.65 < URA_{oe} ≤ 24.00	4 6.85 < ~~URAoe £~~ URA_{ED} ≤ 9.65	
		5 9.65 < URA_{oe} ≤ 13.65	3 4.85 < ~~URAoe £~~ URA_{ED} ≤ 6.85	
		4 6.85 < URA_{oe} ≤ 9.65	2 3.40 < ~~URAoe £~~ URA_{ED} ≤ 4.85	
		3 4.85 < URA_{oe} ≤ 6.85	1 2.40 < ~~URAoe £~~ URA_{ED} ≤ 3.40	
		2 3.40 < URA_{oe} ≤ 4.85	0 1.70 < ~~URAoe £~~ URA_{ED} ≤ 2.40	
		1 2.40 < URA_{oe} ≤ 3.40	-1 1.20 < ~~URAoe £~~ URA_{ED} ≤ 1.70	
		0 1.70 < URA_{oe} ≤ 2.40	-2 0.85 < ~~URAoe £~~ URA_{ED} ≤ 1.20	
		-1 1.20 < URA_{oe} ≤ 1.70	-3 0.60 < ~~URAoe £~~ URA_{ED} ≤ 0.85	
		-2 0.85 < URA_{oe} ≤ 1.20	-4 0.43 < ~~URAoe £~~ URA_{ED} ≤ 0.60	
		-3 0.60 < URA_{oe} ≤ 0.85	-5 0.30 < ~~URAoe £~~ URA_{ED} ≤ 0.43	
		-4 0.43 < URA_{oe} ≤ 0.60	-6 0.21 < ~~URAoe £~~ URA_{ED} ≤ 0.30	
		-5 0.30 < URA_{oe} ≤ 0.43	-7 0.15 < ~~URAoe £~~ URA_{ED} ≤ 0.21	
		-6 0.21 < URA_{oe} ≤ 0.30	-8 0.11 < ~~URAoe £~~ URA_{ED} ≤ 0.15	

Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
		-7 0.15 < URA_{oe} ≤ 0.21 -8 0.11 < URA_{oe} ≤ 0.15 -9 0.08 < URA_{oe} ≤ 0.11 -10 0.06 < URA_{oe} ≤ 0.08 -11 0.04 < URA_{oe} ≤ 0.06 -12 0.03 < URA_{oe} ≤ 0.04 -13 0.02 < URA_{oe} ≤ 0.03 -14 0.01 < URA_{oe} ≤ 0.02 -15 URA_{oe} ≤ 0.01 -16 No accuracy prediction available-use at own risk Integrity properties of the URA are specified with respect to the upper bound values of the URA index (see 20.3.3.1).	-9 0.08 < ~~URAoe £~~ URAED ≤ 0.11 -10 0.06 < ~~URAoe £~~ URA_{ED} ≤ 0.08 -11 0.04 < ~~URAoe £~~ URA_{ED} ≤ 0.06 -12 0.03 < ~~URAoe £~~ URA_{ED} ≤ 0.04 -13 0.02 < ~~URAoe £~~ URA_{ED} ≤ 0.03 -14 0.01 < ~~URAoe £~~ URA_{ED} ≤ 0.02 -15 ~~URAoe £~~ URAED ≤ 0.01 -16 No accuracy prediction available-use at own risk For each URA_{ED} index (N), users may compute a nominal URA_{ED} value (X) as given by: • If the value of N is 6 or less, but more than -16, X = 2(1 + N/2), • If the value of N is 6 or more, but less than 15, X = 2(N - 2), • N = -16 or N = 15 shall indicate the absence of an accuracy prediction and shall advise the standard positioning service user to use that SV at his own risk. For N = 1, 3, and 5, X should be rounded to 2.8, 5.7, and 11.3 meters, respectively. The nominal URA_{ED} value (X) is suitable for use as a conservative prediction of the RMS ED range errors for accuracy-related purposes in the pseudorange domain (e.g., measurement deweighting, RAIM, FOM computations). Integrity properties of the ~~URA~~ $IAURA_{ED}$ are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the ~~URA~~ broadcast URA_{ED} index (see ~~20~~30.3.3.1.1). For the nominal URA_{ED} value and the $IAURA_{ED}$ value, users may compute an adjusted URA_{ED} value as a function of SV elevation angle (E) as follows: Adjusted Nominal URA_{ED} = Nominal URA_{ED} (sin(E+90 degrees)) Adjusted $IAURA_{ED}$ = $IAURA_{ED}$ (sin(E+90 degrees)) URA_{ED} and $IAURA_{ED}$ account for SIS contributions to user range error which include, but are not limited to, the following: LSB representation/truncation error, alongtrack ephemeris errors, and crosstrack	

Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
			ephemeris errors. URA_{ED} and $IAURA_{ED}$ do not account for user range error contributions due to the inaccuracy of the broadcast ionospheric data parameters used in the single-frequency ionospheric model or for other atmospheric effects.	

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30.3.3.1.3		(see Table 30-I below, IS-GPS-200 Rev E)	(see Table 30-I below, URA Definition Redlines)	Rationale #1

IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces

Table 30-I. Message Types 10 and 11 Parameters (1 of 2)

Parameter		No. of Bits**	Scale Factor (LSB)	Effective Range***	Units
WN	Week No.	13	1		weeks
URA_{OE} Index	SV accuracy	5*			(see text)
Signal health (L1/L2/L5)		3	1		(see text)
t_{op}	Data predict time of week	11	300	604,500	seconds
?A ****	Semi-major axis difference at reference time	26*	2^{-9}		meters
• A	Change rate in semi-major axis	25*	2^{-21}		meters/sec
$?n_0$	Mean Motion difference from computed value at reference time	17*	2^{-44}		semi-circles/sec
• $?n_0$	Rate of mean motion difference from computed value	23*	2^{-57}		semi-circles/sec^2
M_{0-n}	Mean anomaly at reference time	33*	2^{-32}		semi-circles
e_n	Eccentricity	33	2^{-34}	0.03	dimensionless
ω_n	Argument of perigee	33*	2^{-32}		semi-circles

* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;
** See Figure 30-1 for complete bit allocation in Message Type 10;
*** Unless otherwise indicated in this column, effective range is the maximum range attainable with indicated bit allocation and scale factor.
**** Relative to A_{REF} = 26,559,710 meters.

URA Definition Redlines

Table 30-I. Message Types 10 and 11 Parameters (1 of 2)

Parameter		No. of Bits**	Scale Factor (LSB)	Effective Range***	Units
WN	Week No.	13	1		weeks
URA_{ED} Index	ED Accuracy Index	5*			(see text)
Signal health (L1/L2/L5)		3	1		(see text)
t_{op}	Data predict time of week	11	300	604,500	seconds
?A ****	Semi-major axis difference at reference time	26*	2^{-9}		meters
• A	Change rate in semi-major axis	25*	2^{-21}		meters/sec
$?n_0$	Mean Motion difference from computed value at reference time	17*	2^{-44}		semi-circles/sec
• $?n_0$	Rate of mean motion difference from computed value	23*	2^{-57}		semi-circles/sec^2
M_{0-n}	Mean anomaly at reference time	33*	2^{-32}		semi-circles
e_n	Eccentricity	33	2^{-34}	0.03	dimensionless
ω_n	Argument of perigee	33*	2^{-32}		semi-circles

* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;
** See Figure 30-1 for complete bit allocation in Message Type 10;
*** Unless otherwise indicated in this column, effective range is the maximum range attainable with indicated bit allocation and scale factor.
**** Relative to A_{REF} = 26,559,710 meters.

<table>
<tr><th>Section Number</th><th>URA Definition Proposed Heading</th><th>IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces</th><th>URA Definition Redlines</th><th>Rationale</th></tr>
<tr><td>30.3.3.2.3</td><td></td><td>
<table>
<tr><th colspan="6">Table 30-III. Clock Correction and Accuracy Parameters</th></tr>
<tr><th colspan="2">Parameter</th><th>No of Bits**</th><th>Scale Factor (LSB)</th><th>Effective Range***</th><th>Units</th></tr>
<tr><td>t_{oc}</td><td>Clock Data Reference Time of Week</td><td>11</td><td>300</td><td>604,500</td><td>seconds</td></tr>
<tr><td>URA_{oc} Index</td><td>SV Clock Accuracy Index</td><td>5*</td><td></td><td></td><td>(see text)</td></tr>
<tr><td>URA_{oc1} Index</td><td>SV Clock Accuracy Change Index</td><td>3</td><td></td><td></td><td>(see text)</td></tr>
<tr><td>URA_{oc2} Index</td><td>SV Clock Accuracy Change Rate Index</td><td>3</td><td></td><td></td><td>(see text)</td></tr>
<tr><td>a_{f2-n}</td><td>SV Clock Drift Rate Correction Coefficient</td><td>10*</td><td>2^{-60}</td><td></td><td>sec/sec^2</td></tr>
<tr><td>a_{f1-n}</td><td>SV Clock Drift Correction Coefficient</td><td>20*</td><td>2^{-48}</td><td></td><td>sec/sec</td></tr>
<tr><td>a_{f0-n}</td><td>SV Clock Bias Correction Coefficient</td><td>26*</td><td>2^{-35}</td><td></td><td>seconds</td></tr>
<tr><td colspan="6">* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;</td></tr>
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</td><td>
<table>
<tr><th colspan="6">Table 30-III. Clock Correction and Accuracy Parameters</th></tr>
<tr><th colspan="2">Parameter</th><th>No. of Bits**</th><th>Scale Factor (LSB)</th><th>Effective Range***</th><th>Units</th></tr>
<tr><td>t_{oc}</td><td>Clock Data Reference Time of Week</td><td>11</td><td>300</td><td>604,500</td><td>seconds</td></tr>
<tr><td>URA_{NED} Index</td><td>NED Accuracy Index</td><td>5*</td><td></td><td></td><td>(see text)</td></tr>
<tr><td>URA_{NED1} Index</td><td>NED Accuracy Change Index</td><td>3</td><td></td><td></td><td>(see text)</td></tr>
<tr><td>URA_{NED2} Index</td><td>NED Accuracy Change Rate Index</td><td>3</td><td></td><td></td><td>(see text)</td></tr>
<tr><td>a_{f2-n}</td><td>SV Clock Drift Rate Correction Coefficient</td><td>10*</td><td>2^{-60}</td><td></td><td>sec/sec^2</td></tr>
<tr><td>a_{f1-n}</td><td>SV Clock Drift Correction Coefficient</td><td>20*</td><td>2^{-48}</td><td></td><td>sec/sec</td></tr>
<tr><td>a_{f0-n}</td><td>SV Clock Bias Correction Coefficient</td><td>26*</td><td>2^{-35}</td><td></td><td>seconds</td></tr>
<tr><td colspan="6">* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;
** See Figure 30-3 through 30-10 for complete bit allocation in Message types 30 to 37;
*** Unless otherwise indicated in this column, effective range is the maximum range attainable with indicated bit allocation and scale factor.</td></tr>
</table>
</td><td>Rationale #1</td></tr>
<tr><td>30.3.3.2.4</td><td>~~SV~~Non-Elevation-Dependent ~~Clock~~(NED) Accuracy</td><td></td><td></td><td></td></tr>
</table>

Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
	Estimates.			
30.3.3.2.4		Bits 50 through 54, and 55 through 57, and 58 through 60 of message types 30 through 37 shall contain the URA_{oc} Index,URA_{oc1} Index, and URA_{oc2} Index, respectively, of the SV (reference paragraph 6.2.1) for the standard positioning service user. The URA_{oc} Index together with URA_{oc1} Index and URA_{oc2} Index shall give the clock-related user range accuracy of the SV as a function of time since the prediction (t_{op}) used to generate the uploaded clock correction polynomial terms.	Bits 50 through 54, and 55 through 57, and 58 through 60 of message types 30 through 37 shall contain the ~~URAoc~~non-elevation-dependent (NED) component URA_{NED0} Index,~~URAoc1~~URA_{NED1} Index, and ~~URAoc2~~URA_{NED2} Index, respectively, of the SV (reference paragraph 6.2.1) for the standard positioning service user. The ~~URAoc~~following ~~Index~~equations together with ~~URAoc1~~the broadcast URA_{NED0} Index, URA_{NED1} Index, and ~~URAoc2~~URA_{NED2} Index shall give the ~~clock~~non-~~related~~elevation dependent user range accuracy of $IAURA_{NED}$ over the ~~SV~~current ~~as~~clock/ephemeris ~~a~~fit ~~function~~interval. ~~of~~While ~~time~~the ~~since~~actual NED related URA may vary over the ~~prediction~~satellite ~~(top)~~footprint, ~~used~~the ~~to~~$IAURA_{NED}$ ~~generate~~calculated using the ~~uploaded~~parameters in message type 10 at each instant during the current clock/ephemeris ~~correction~~fit ~~polynomial~~interval ~~terms~~shall bound the maximum $IAURA_{NED}$ expected for the worst-case location within the satellite footprint at that instant.	
30.3.3.2.4		The user shall calculate the clock-related URA with the equation (in meters); $URA_{oc} = URA_{ocb} + URA_{oc1} (t - t_{op})$ for $t - t_{op} < 93{,}600$ seconds $URA_{oc} = URA_{ocb} + URA_{oc1} (t - t_{op}) + URA_{oc2} (t - t_{op} - 93{,}600)^2$ for $t - t_{op} >$ 93,600 seconds where t = GPS time (must account for beginning or end of week crossovers), t_{op} = time of week of the state estimate utilized for the prediction of satellite clock correction parameters.	The user shall calculate the ~~clock~~NED-related URA with the equation (in meters); ~~URAoc~~ $IAURA_{NED}$ = ~~URAocb~~URA_{NED0} + ~~URAoc1~~URA_{NED1} (t - top + 604,800*(WN - WNop)) for t - top ~~<~~+ 604,800*(WN - WNop) £ 93,600 seconds ~~URAoc~~$IAURA_{NED}$ = ~~URAocb~~URA_{NED0} + ~~URAoc1~~ URA_{NED1}*(t - top~~)~~ + ~~URAoc2~~604800*(WN - WNop)) + URA_{NED2}*(t - top + 604800*(WN - WNop) - 93,600)2 for t - top + 604800*(WN - WNop) > 93,600 seconds where t ~~= GPS time~~is ~~(must~~the ~~account~~GPS ~~for~~system ~~beginning~~time WNop ~~or~~-- ~~end~~Data ~~of~~Predict ~~week~~Week ~~crossovers)~~Number, ~~top =~~identifying ~~time~~the ~~of~~GPS week ~~of~~to which the ~~state~~top ~~estimate~~term ~~utilized~~refers. ~~for~~See ~~the~~Section ~~prediction~~30.2.2.2.1.2 ~~of~~(Data ~~satellite~~Predict ~~clock~~Time ~~correction~~of ~~parameters~~Week).	Rationale #1
30.3.3.2.4		The CS shall derive URA_{ocb} at time t_{op} which, when used together with URA_{oc1} and URA_{oc2} in the above equations, results in the minimum URA_{oc} that is greater than the predicted URA_{oc} during the entire duration up to 14 days after t_{op}.	The CS shall derive ~~URAocb~~URA ~~at~~$_{NED0}$, ~~time~~URA_{NED1}, ~~top~~and URA_{NED2} indexes which, when used together ~~with URAoc1 and URAoc2~~ in the above equations, results in the minimum ~~URAoc~~$IAURA_{NED}$ that is greater than the predicted ~~URAoc~~$IAURA_{NED}$ during the ~~entire duration up to 14 days~~clock/ephemeris ~~after~~fit ~~top~~interval.	Rationale #1
30.3.3.2.4		The user shall use the broadcast URA_{oc} Index to derive URA_{ocb}. The index is a signed, two's complement integer in the range of +15 to -16 and has the following relationship	The user shall use the broadcast ~~URAoc~~URA_{NED0} ~~Index~~index to derive ~~URAocb~~the URA_{NED0} value. The URA_{NED0} index is a signed, two's complement integer in the range of +15 to -16 and has the following	Rationale #1

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		to the clock-related user derived URA_{ocb}:	relationship to the ~~clock-related user derived~~ URA_{NED0} ~~URAocb~~ value:	
		URA_{oc} Index URA_{ocb} (meters)	~~URAoc~~ URA_{NED0} Index ~~URAocb~~ $URA_{NED}0$ (meters)	
		15 6144.00 < URA_{ocb}	15 6144.00 < URA_{NED0} ~~URAocb~~ (or no accuracy prediction is available)	
		14 3072.00 < URA_{ocb} ≤ 6144.00	14 3072.00 < ~~URAocb£~~ URA_{NED0} ≤ 6144.00	
		13 1536.00 < URA_{ocb} ≤ 3072.00	13 1536.00 < ~~URAocb£~~ URA_{NED0} ≤ 3072.00	
		12 768.00 < URA_{ocb} ≤ 1536.00	12 768.00 < ~~URAocb£~~ URA_{NED0} ≤ 1536.00	
		11 384.00 < URA_{ocb} ≤ 768.00	11 384.00 < ~~URAocb£~~ URA_{NED0} ≤ 768.00	
		10 192.00 < URA_{ocb} ≤ 384.00	10 192.00 < ~~URAocb£~~ URA_{NED0} ≤ 384.00	
		9 96.00 < URA_{ocb} ≤ 192.00	9 96.00 < ~~URAocb£~~ URA_{NED0} ≤ 192.00	
		8 48.00 < URA_{ocb} ≤ 96.00	8 48.00 < ~~URAocb£~~ URA_{NED0} ≤ 96.00	
		7 24.00 < URA_{ocb} ≤ 48.00	7 24.00 < ~~URAocb£~~ URA_{NED0} ≤ 48.00	
		6 13.65 < URA_{ocb} ≤ 24.00	6 13.65 < ~~URAocb£~~ URA_{NED0} ≤ 24.00	
		5 9.65 < URA_{ocb} ≤ 13.65	5 9.65 < ~~URAocb£~~ URA_{NED0} ≤ 13.65	
		4 6.85 < URA_{ocb} ≤ 9.65	4 6.85 < ~~URAocb£~~ URA_{NED0} ≤ 9.65	
		3 4.85 < URA_{ocb} ≤ 6.85	3 4.85 < ~~URAocb£~~ URA_{NED0} ≤ 6.85	
		2 3.40 < URA_{ocb} ≤ 4.85	2 3.40 < ~~URAocb£~~ URA_{NED0} ≤ 4.85	
		1 2.40 < URA_{ocb} ≤ 3.40	1 2.40 < ~~URAocb£~~ $URA_{NED}0$ ≤ 3.40	
		0 1.70 < URA_{ocb} ≤ 2.40	0 1.70 < ~~URAocb£~~ $URA_{NED}0$ ≤ 2.40	
		-1 1.20 < URA_{ocb} ≤ 1.70	-1 1.20 < ~~URAocb£~~ $URA_{NED}0$ ≤ 1.70	
		-2 0.85 < URA_{ocb} ≤ 1.20	-2 0.85 < ~~URAocb£~~ URA_{NED0} ≤ 1.20	
		-3 0.60 < URA_{ocb} ≤ 0.85	-3 0.60 < ~~URAocb£~~ URA_{NED0} ≤ 0.85	

Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
		-4 0.43 < URA_{ocb} ≤ 0.60 -5 0.30 < URA_{ocb} ≤ 0.43 -6 0.21 < URA_{ocb} ≤ 0.30 -7 0.15 < URA_{ocb} ≤ 0.21 -8 0.11 < URA_{ocb} ≤ 0.15 -9 0.08 < URA_{ocb} ≤ 0.11 -10 0.06 < URA_{ocb} ≤ 0.08 -11 0.04 < URA_{ocb} ≤ 0.06 -12 0.03 < URA_{ocb} ≤ 0.04 -13 0.02 < URA_{ocb} ≤ 0.03 -14 0.01 < URA_{ocb} ≤ 0.02 -15 URA_{ocb} ≤ 0.01 -16 No accuracy prediction available-use at own risk	-4 0.43 < ~~URAocb£~~ URA_{NED0} ≤ 0.60 -5 0.30 < ~~URAocb£~~ URA_{NED0} ≤ 0.43 -6 0.21 < ~~URAocb£~~ URA_{NED0} ≤ 0.30 -7 0.15 < ~~URAocb£~~ URA_{NED0} ≤ 0.21 -8 0.11 < ~~URAocb£~~ URA_{NED0} ≤ 0.15 -9 0.08 < ~~URAocb£~~ URA_{NED0} ≤ 0.11 -10 0.06 < ~~URAocb£~~ URA_{NED0} ≤ 0.08 -11 0.04 < ~~URAocb£~~ URA_{NED0} ≤ 0.06 -12 0.03 < ~~URAocb£~~ URA_{NED0} ≤ 0.04 -13 0.02 < ~~URAocb£~~ URA_{NED0} ≤ 0.03 -14 0.01 < ~~URAocb£~~ URA_{NED0} ≤ 0.02 -15 ~~URAocb£~~ URA_{NED0} ≤ 0.01 -16 No accuracy prediction available-use at own risk	
30.3.3.2.4		The user may use the upper bound value in the URA_{ocb} range corresponding to the broadcast index, thereby calculating the maximum URA_{oc} that is equal to or greater than the CS predicted URA_{oc}, or the user may use the lower bound value in the range which will provide the minimum URA_{oc} that is equal to or less than the CS predicted URA_{oc}. Integrity properties of the URA are specified with respect to the upper bound values of the URA index (see 20.3.3.1). The transmitted URA_{oc1} Index is an integer value in the range 0 to 7. URA_{oc1} Index has the following relationship to the URA_{oc1}: $URA_{oc1} = \frac{1}{2^N}$ (meters/second)	For each URA_{NED0} index (N), users may compute a nominal URA_{NED0} value (X) as given by: • If the value of N is 6 or less, but more than -16, $X = 2^{(1 + N/2)}$, • If the value of N is 6 or more, but less than 15, $X = 2^{(N - 2)}$, • N = -16 or N = 15 shall indicate the absence of an accuracy prediction and shall advise the standard positioning service user to use that SV at his own risk. For N = 1, 3, and 5, X should be rounded to 2.8, 5.7, and 11.3 meters, respectively. The nominal URA_{NED0} value (X) shall be suitable for use as a conservative prediction of the RMS NED range errors for accuracy-related purposes in the pseudorange domain (e.g., measurement de-weighting RAIM, FOM computations). Integrity properties of the $IAURA_{NED}$ are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URA_{NED0} index,	Rationale #3- There is a typo that needs be corrected in computing URA, or all user URA values will be far too large. Using the erroneous value will

Section Number	URA Definition Proposed Heading	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	URA Definition Redlines	Rationale
		where N = 4 + URA_{oc1} Index. The transmitted URA_{oc2} Index is an integer value in the range 0 to 7. URA_{oc2} Index has the following relationship to the URA_{oc2}: $URA_{oc2} = \frac{1}{2^N}$ (meters/second^2) where N = 25 + URA_{oc2} Index.	URA_{NED1} index, and URA_{NED2} index (see 30.3.3.1.1). URA_{NED0} accounts for zeroth order SIS-contributions to user range error which include, but are not limited to, the following: LSB representation/truncation error; the net effect of clock correction polynomial error and code phase error in the transmitted signal for single-frequency L1C/A or single-frequency L2C users who correct the code phase as described in Section 30.3.3.3.1.1.1; the net effect of clock parameter, code phase, and inter-signal correction error for dual-frequency L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section 30.3.3.3.1.1.2; radial ephemeris error; anisotropic antenna errors; and signal deformation error. URA_{NED} does not account for user range contributions due to the inaccuracy of the broadcast ionospheric data parameters used in the single-frequency ionospheric model or for other atmospheric effects. The transmitted URA_{NED1} index is an integer value in the range 0 to 7. The URA_{NED1} index has the following relationship to the URA_{NED1} value: $URA_{NED1} = \frac{1}{2^N}$ (meters/second) where N = 14 + URA_{NED1} Index The transmitted URA_{NED2} index is an integer value in the range 0 to 7. URA_{NED2} index has the following relationship to the URA_{NED2}: $URA_{NED2} = \frac{1}{2^N}$ (meters/second2) where N = 28 + URA_{NED2} Index.	result in a minimum value of URAoc1 that will prevent the Space and Control segments from meeting their specified performance requirements . Rationale #5
30.3.4.4	Data Sets			
30.3.4.4			The t_{oe} shall be equal to the t_{oc} of the same CNAV data set. The following rules govern the transmission of t_{oe} and t_{oc} values in different data sets: (1) The transmitted toc will be different from any value transmitted by the SV during the preceding seven days; (2) The transmitted t_{oe} will be different from any value transmitted by the SV during the preceding six hours. Cutovers to new data sets will occur only on hour boundaries except for the first data set of a new	Rationale #2- URA components (URA_{ED} and URA_{NED}) from different

Section Number	**URA Definition Proposed Heading**	**IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces**	**URA Definition Redlines**	**Rationale**
			upload. The first data set may be cut-in (reference paragraph 30.3.4.1) at any time during the hour and therefore may be transmitted by the SV for less than one hour. The start of the transmission interval for each data set corresponds to the beginning of the curve fit interval for the data set. Each data set remains valid for the duration of its transmission interval, and nominally also remains valid for the duration of its curve fit interval. A data set is rendered invalid before the end of its curve fit interval when it is superseded by the SV cutting over to the first data set of a new upload. Normal Operations. The message type 10, 11, and 30-37 data sets are transmitted by the SV for periods of two hours. The corresponding curve fit interval is three hours.	uploads or fit intervals will not give a valid indication of signal accuracy or integrity. These changes provide clarification of how URA is computed by the user.
30.3.4.5	Reference Times			
30.3.4.5			The LNAV reference time information in paragraph 20.3.4.5 also applies to the CNAV reference times.	Rationale #5

End of WAS/IS for IS-GPS-200E

Start of WAS/IS for IS-GPS-705A Changes

Section Number	**PRN Expansion Proposed Heading**	**IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces**	**PRN Expansion Redlines**	**Rationale**
3.2.2		The L5 CNAV data, $D_5(t)$, includes SV ephemerides, system time, SV clock behavior data, status messages and time information, etc. The 50 bps data is encoded in a rate 1/2 convolution encoder. The resulting 100 symbols per second (sps) symbol stream is modulo-2 added to the I5-code only; the resultant bit-train is used to modulate the L5 in-phase (I) carrier. The content and characteristics of the L5 CNAV data, $D_5(t)$, are given in Appendix II of this document. In general, the data content is very similar to that modulated on the L2 C channel of the SV.	The L5 CNAV data, D5(t), includes SV ephemerides, system time, SV clock behavior data, status messages and ~~time~~C/A to P (or Y) code handover information, etc. The 50 bps data is encoded in a rate 1/2 convolution encoder. The resulting 100 symbols per second (sps) symbol stream is modulo-2 added to the I5-code only; the resultant bit-train is used to modulate the L5 in-phase (I) carrier. The content and characteristics of the L5 CNAV data, D5(t), are given in Appendix II of this document. In general, the data content is very similar to that modulated on the L2 C channel of the SV.	Language inserted here to capture the addition of PRNs 33-63.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
3.2.2		(see Table 3-I below)	(see Table 3-Ia below)	The table has been renamed Table 3-Ia (Sheet 1 of 1) to accommodate the inclusion of Table 3-Ib (PRNs > 37).

IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces:

Table 3-I. Code Phase Assignments (sheet 1 of 2)

GPS PRN Signal No.*	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
1	266	1701	0101011100100	1001011001100
2	365	323	1100000110101	0100011110110
3	804	5292	0100000001000	1111000100011
4	1138	2020	1011000100110	0011101101010
5	1509	5429	1110111010111	0011110110010
6	1559	7136	0110011111010	0101010101001
7	1756	1041	1010010011111	1111110000001
8	2084	5947	1011110100100	0110101101000
9	2170	4315	1111100101011	1011101000011
10	2303	148	0111111011110	0010010000110
11	2527	535	0000100111010	0001000000101
12	2687	1939	1110011111001	0101011000101
13	2930	5206	0001110011100	0100110100101
14	3471	5910	0100000100111	1010000111111
15	3940	3595	0110101011010	1011110001111
16	4132	5135	0001111001001	1101001011111
17	4332	6082	0100110001111	1110011001000
18	4924	6990	1111000011110	1011011100100
19	5343	3546	1100100011111	0011001011011

* PRN sequences 33 through 37 are reserved for other uses (e.g. ground transmitters).

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

PRN Expansion Redlines:

Table 3-Ia. Code Phase Assignments (sheet 1 of 2)

GPS PRN Signal No.	XB Code Advance – Chips*		Initial XB Code State**	
	I5	Q5	I5	Q5
1	266	1701	0101011100100	1001011001100
2	365	323	1100000110101	0100011110110
3	804	5292	0100000001000	1111000100011
4	1138	2020	1011000100110	0011101101010
5	1509	5429	1110111010111	0011110110010
6	1559	7136	0110011111010	0101010101001
7	1756	1041	1010010011111	1111110000001
8	2084	5947	1011110100100	0110101101000
9	2170	4315	1111100101011	1011101000011
10	2303	148	0111111011110	0010010000110
11	2527	535	0000100111010	0001000000101
12	2687	1939	1110011111001	0101011000101
13	2930	5206	0001110011100	0100110100101
14	3471	5910	0100000100111	1010000111111
15	3940	3595	0110101011010	1011110001111
16	4132	5135	0001111001001	1101001011111
17	4332	6082	0100110001111	1110011001000
18	4924	6990	1111000011110	1011011100100
19	5343	3546	1100100011111	0011001011011

* - XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
3.2.2		(Table 3-I, reproduced below)	(Table 3-Ia, reproduced below)	The table has been renamed Table 3-Ia (sheet 2 of 2) to accommodate the inclusion of Table 3-Ib (PRNs > 37).

IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces

Table 3-I. Code Phase Assignments (sheet 2 of 2)

GPS PRN Signal No.*	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
20	5443	1523	0110101101101	1100001110001
21	5641	4548	0010000001000	0110110010000
22	5816	4484	1110111101111	0010110001110
23	5898	1893	1000011111110	1000101111101
24	5918	3961	1100010110100	0110111110011
25	5955	7106	1101001101101	0100010011011
26	6243	5299	1010110010110	0101010111100
27	6345	4660	0101011011110	1000011111010
28	6477	276	0111101010110	1111101000010
29	6518	4389	0101111100001	0101000100100
30	6875	3783	1000010110111	1000001111001
31	7168	1591	0001010011110	0101111100101
32	7187	1601	0000010111001	1001000101010
33	7329	749	1101010000001	1011001000100
34	7577	1387	1101111111001	1111001000100
35	7720	1661	1111011011100	0110010110011
36	7777	3210	1001011001000	0011110101111
37	8057	708	0011010010000	0010011010001

* PRN sequences 33 through 37 are reserved for other uses (e.g. ground transmitters).

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

PRN Expansion Redlines

Table 3-Ia. Code Phase Assignments (sheet 2 of 2)

GPS PRN Signal No.	XB Code Advance – Chips*		Initial XB Code State**	
	I5	Q5	I5	Q5
20	5443	1523	0110101101101	1100001110001
21	5641	4548	0010000001000	0110110010000
22	5816	4484	1110111101111	0010110001110
23	5898	1893	1000011111110	1000101111101
24	5918	3961	1100010110100	0110111110011
25	5955	7106	1101001101101	0100010011011
26	6243	5299	1010110010110	0101010111100
27	6345	4660	0101011011110	1000011111010
28	6477	276	0111101010110	1111101000010
29	6518	4389	0101111100001	0101000100100
30	6875	3783	1000010110111	1000001111001
31	7168	1591	0001010011110	0101111100101
32	7187	1601	0000010111001	1001000101010
33	7329	749	1101010000001	1011001000100
34	7577	1387	1101111111001	1111001000100
35	7720	1661	1111011011100	0110010110011
36	7777	3210	1001011001000	0011110101111
37	8057	708	0011010010000	0010011010001

* XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
3.2.2		N/A	Table 3-Ib. Additional Code Phase Assignments (sheet 1 of 1)	The table has been renamed Table 3-Ib to accommodate the inclusion of (PRNs > 37). This table was previously located in Section 6 of IS-GPS-705. An additional caveat has been added to this table to denote that PRNs > 37 are NOT a requirement unless the receiver has been built to read PRNs > 37.

Table 3-Ib. Additional Code Phase Assignments (sheet 1 of 1)

PRN Signal No.*	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
38	5358	4226	0101100000110	1111110011101
39	3550	5604	1001001100101	0101010011111
40	3412	6375	1100111001010	1000110101010
41	819	3056	0111011011001	0010111100100
42	4608	1772	0011101101100	1011000100000
43	3698	3662	0011011111010	0011001011001
44	962	4401	1001011010001	1000100101000
45	3001	5218	1001010111111	0000001111110
46	4441	2838	0111000111101	0000000010011
47	4937	6913	0000001000100	0101110011110
48	3717	1685	1000101010001	0001001000111
49	4730	1194	0011010001001	0011110000100
50	7291	6963	1000111110001	0100101011100
51	2279	5001	1011100101001	0010100011111
52	7613	6694	0100101011010	1101110011001
53	5723	991	0000001000010	0011111101111
54	7030	7489	0110001101110	1100100110111
55	1475	2441	0000011001110	1001001100110
56	2593	639	1110111011110	0100010011001
57	2904	2097	0001000010011	0000000001011
58	2056	2498	0000010100001	0000001101111
59	2757	6470	0100001100001	0101101101111
60	3756	2399	0100101001001	0100100001101
61	6205	242	0011110011110	1101100101011
62	5053	3768	1011000110001	1010111000100
63	6437	1186	0101111001011	0010001101001

* PRN sequences 38 through 63 are reserved for GPS.

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE #1: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

NOTE #2: PRNs 38-63 are required per this Table if a manufacturer chooses to include these PRNs in their receiver design.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
3.3.2.1		The $I5_i(t)$ pattern (I5-code) and the $Q5_i(t)$ pattern (Q5-code) are both generated by the modulo-2 summation of two PRN codes, XA(t) and $XBI_i(n_{Ii}, t)$ or $XBQ_i(n_{Qi}, t)$, where n_{Ii} and n_{Qi} are initial states of XBI_i and XBQ_i for satellite i. There are over 4000 unique L5 codes generated using different initial states of which 74 are currently assigned and identified in Table 3-I using the same basic code generator. Section 6.3.4 provides a selected subset of additional L5-code sequences with assigned PRN numbers.	The I5i(t) pattern (I5-code) and the Q5i(t) pattern (Q5-code) are both generated by the modulo-2 summation of two PRN codes, XA(t) and XBIi(nIi, t) or XBQi(nQi, t), where nIi and nQi are initial states of XBIi and XBQi for satellite i. There are over 4000 unique L5 codes generated using different initial states of which ~~74~~128 are currently assigned and identified in Table 3-~~I~~Ia and Table 3-Ib using the same basic code generator. Section 6.3.4 provides a selected subset of additional L5-code sequences with assigned PRN numbers.	This change was made from 74 unique codes to 128 codes due to the 37 * 2 = 74 unique codes. However, due to PRN expansion there are 54 additional unique codes to account for PRNs 38-63. This results in 74 + 54 = 128 unique codes.
3.3.3		The content and format of the L5 CNAV data, $D_5(t)$, are given in Appendix II of this document.	~~The content and format of the L5 CNAV data, D5(t), are given in Appendix II of this document.~~<DELETE>	
6.3.4		Among all unique L5-code sequences that could be generated using different initial states as described in Section 3.2.1.1, 74 sequences (37 I5 and 37 Q5) are selected and assigned in Table 3-I. An additional 346 sequences (173 I5 and 173 Q5) are selected and assigned with PRN numbers in the below Table 6-II. Any assignment of an L5 PRN number and its code sequence for any additional SV and/or other L5 signal applications, such as Satellite Based Augmentation System (SBAS) satellite signals, will be selected from the sequences of Table 6-II.	Among all unique L5-code sequences that could be generated using different initial states as described in Section 3.2.1.1, ~~74~~126 sequences (~~37~~63 I5 and ~~37~~63 Q5) are selected and assigned in Table 3-~~I~~Ia and Table 3-Ib. An additional ~~346~~294 sequences (~~173~~147 I5 and ~~173~~147 Q5) are selected and assigned with PRN numbers in the below Table 6-II. Any assignment of an L5 PRN number and its code sequence for any additional SV and/or other L5 signal applications, such as Satellite Based Augmentation System (SBAS) satellite signals, will be selected from the sequences of Table 6-II.	The quantities in this text have been updated to reflect the shift of Table 6-II (Sheet 1 of 6) to Section 3 as Table 3-Ib

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
				(PRNs 38-63). The PRNs listed here now are PRNs 64-210 leaving 147 additional sequences. To account for both I5 and Q5 it is 147 * 2 = 294 additional sequences.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
6.3.4		Table 6-II. Additional Code Phase Assignments (sheet 1 of 6)	<DELETE>	This table has been promoted to Section 3 as Table 3-Ib.

Table 6-II. Additional Code Phase Assignments (sheet 1 of 6)

PRN Signal No.*	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
38	5358	4226	0101100000110	1111110011101
39	3550	5604	1001001100101	0101010011111
40	3412	6375	1100111001010	1000110101010
41	819	3056	0111011011001	0010111100100
42	4608	1772	0011101101100	1011000100000
43	3698	3662	0011011111010	0011001011001
44	962	4401	1001011010001	1000100101000
45	3001	5218	1001010111111	0000001111110
46	4441	2838	0111000111101	0000000010011
47	4937	6913	0000001000100	0101110011110
48	3717	1685	1000101010001	0001001000111
49	4730	1194	0011010001001	0011110000100
50	7291	6963	1000111110001	0100101011100
51	2279	5001	1011100101001	0010100011111
52	7613	6694	0100101011010	1101110011001
53	5723	991	0000001000010	0011111101111
54	7030	7489	0110001101110	1100100110111
55	1475	2441	0000011001110	1001001100110
56	2593	639	1110111011110	0100010011001
57	2904	2097	0001000010011	0000000001011
58	2056	2498	0000010100001	0000001101111
59	2757	6470	0100001100001	0101101101111
60	3756	2399	0100101001001	0100100001101
61	6205	242	0011110011110	1101100101011
62	5053	3768	1011000110001	1010111000100
63	6437	1186	0101111001011	0010001101001

* PRN sequences 38 through 63 are reserved for GPS.

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
6.3.4		Table 6-II. Additional Code Phase Assignments (sheet 2 of 6) (see below)	Table 6-II. Additional Code Phase Assignments (sheet 1 of 5) (see below)	Change made here to denote now Sheet 1 of 5 (to accommodate promotion of Sheet 1 of 6 to Section 3).

IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces:

Table 6-II. Additional Code Phase Assignments (sheet 2 of 6)

PRN Signal No.	XB Code Advance – Chips*		Initial XB Code State**	
	I5	Q5	I5	Q5
64	7789	5246	1000100010001	1001101001111
65	2311	4259	0001000101111	0001100100010
66	7432	5907	0001100111111	0000111111000
67	5155	3870	1010101100001	0011100100111
68	1593	3262	0101011111001	0000001010010
69	5841	7387	0101101100001	1100111111001
70	5014	3069	1000101111011	0111111110010
71	1545	2999	0111011001111	0101011111111
72	3016	7993	0001011011000	1100001111011
73	4875	7849	1110000111000	1110100110101
74	2119	4157	0111010010001	1010010110101
75	229	5031	0001101111000	0101111101111
76	7634	5986	1111001010100	1010110110010
77	1406	4833	1011101110100	1101110110001
78	4506	5739	0000100110000	1010000100100
79	1819	7846	1100010000111	0100110101010
80	7580	898	0001101111111	1000011100011
81	5446	2022	1100110101101	1100111011010
82	6053	7446	1101011001011	0010110001111
83	7958	6404	1100001101100	1101101110110
84	5267	155	1011110110001	1101111001001
85	2956	7862	0111010110101	1100100000000
86	3544	7795	1100101101101	1001101000100
87	1277	6121	1100111011111	1111011010001
88	2996	4840	1011111111011	0110101110111
89	1758	6585	1110100100111	0000100111111
90	3360	429	1111110010100	1101101001110
91	2718	6020	0101001111110	1100111001011
92	3754	200	0010100100101	1010111000011
93	7440	1664	0001111000011	1110110010110
94	2781	1499	1100111000000	1110100011111
95	6756	7298	1110010101000	0001101100011
96	7314	1305	0111000101001	0001011010110
97	208	7323	1111101010101	0000001000111
98	5252	7544	1010111001101	1010011000000
99	696	4438	1100101001011	1000111101101

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

PRN Expansion Redlines:

Table 6-II. Additional Code Phase Assignments (sheet 1 of 5)

PRN Signal No.	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
64	7789	5246	1000100010001	1001101001111
65	2311	4259	0001000101111	0001100100010
66	7432	5907	0001100111111	0000111111000
67	5155	3870	1010101100001	0011100100111
68	1593	3262	0101011111001	0000001010010
69	5841	7387	0101101100001	1100111111001
70	5014	3069	1000101111011	0111111110010
71	1545	2999	0111011001111	0101011111111
72	3016	7993	0001011011000	1100001111011
73	4875	7849	1110000111000	1110100110101
74	2119	4157	0111010010001	1010010110101
75	229	5031	0001101111000	0101111101111
76	7634	5986	1111001010100	1010110110010
77	1406	4833	1011101110100	1101110110001
78	4506	5739	0000100110000	1010000100100
79	1819	7846	1100010000111	0100110101010
80	7580	898	0001101111111	1000011100011
81	5446	2022	1100110101101	1100111011010
82	6053	7446	1101011001011	0010110001111
83	7958	6404	1100001101100	1101101110110
84	5267	155	1011110110001	1101111001001
85	2956	7862	0111010110101	1100100000000
86	3544	7795	1100101101101	1001101000100
87	1277	6121	1100111011111	1111011010001
88	2996	4840	1011111111011	0110101110111
89	1758	6585	1110100100111	0000100111111
90	3360	429	1111110010100	1101101001110
91	2718	6020	0101001111110	1100111001011
92	3754	200	0010100100101	1010111000011
93	7440	1664	0001111000011	1110110010110
94	2781	1499	1100111000000	1110100011111
95	6756	7298	1110010101000	0001101100011
96	7314	1305	0111000101001	0001011010110
97	208	7323	1111101010101	0000001000111
98	5252	7544	1010111001101	1010011000000
99	696	4438	1100101001011	1000111101101

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
6.3.4		(Table 6-II, sheet 3 of 6, below)	(Table 6-II, sheet 2 of 5, below)	Change made here to denote now Sheet 2 of 5 (to accommodate promotion of Sheet 1 of 6 to Section 3).

IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces:

Table 6-II. Additional Code Phase Assignments (sheet 3 of 6)

PRN Signal No.	XB Code Advance – Chips*		Initial XB Code State**	
	I5	Q5	I5	Q5
100	527	2485	0010100000110	1101101011100
101	1399	3387	1101000010001	1000010110011
102	5879	7319	0111011010011	0010001110001
103	6868	1853	1101110101111	0010100100110
104	217	5781	0111011011111	0100000111111
105	7681	1874	1010101001100	1000001111101
106	3788	7555	1011010000011	1010101111010
107	1337	2132	0101100000000	1111010101010
108	2424	6441	0000111101000	1101010111100
109	4243	6722	0110000111011	1111100001010
110	5686	1192	1101100100000	1111000010001
111	1955	2588	0011011101111	1101111011101
112	4791	2188	1001111101100	0010000100001
113	492	297	0100011000110	1100100111100
114	1518	1540	0111000101110	1100111100011
115	6566	4138	0100010110000	1001100001111
116	5349	5231	0110111100100	1110011001001
117	506	4789	0001110010010	0111110110011
118	113	659	1110110110101	1111011010110
119	1953	871	1101110111100	1000111011110
120	2797	6837	1101001100010	1101001011001
121	934	1393	1100011001100	0010001111001
122	3023	7383	1000011000101	1111110011111
123	3632	611	1111011011011	1000110000001
124	1330	4920	0000001100100	0000111100011
125	4909	5416	1101110000101	0111011011100
126	4867	1611	1100001000010	0101101010100
127	1183	2474	0001101001101	0000101010111
128	3990	118	1010100101011	1010111101101
129	6217	1382	1111011110100	0100010000010

* XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

PRN Expansion Redlines:

Table 6-II. Additional Code Phase Assignments (sheet 2 of 5)

PRN Signal No.	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
100	527	2485	0010100000110	1101101011100
101	1399	3387	1101000010001	1000010110011
102	5879	7319	0111011010011	0010001110001
103	6868	1853	1101110101111	0010100100110
104	217	5781	0111011011111	0100000111111
105	7681	1874	1010101001100	1000001111101
106	3788	7555	1011010000011	1010101111010
107	1337	2132	0101100000000	1111010101010
108	2424	6441	0000111101000	1101010111100
109	4243	6722	0110000111011	1111100001010
110	5686	1192	1101100100000	1111000010001
111	1955	2588	0011011101111	1101111011101
112	4791	2188	1001111101100	0010000100001
113	492	297	0100011000110	1100100111100
114	1518	1540	0111000101110	1100111100011
115	6566	4138	0100010110000	1001100001111
116	5349	5231	0110111100100	1110011001001
117	506	4789	0001110010010	0111110110011
118	113	659	1110110110101	1111011010110
119	1953	871	1101110111100	1000111011110
120	2797	6837	1101001100010	1101001011001
121	934	1393	1100011001100	0010001111001
122	3023	7383	1000011000101	1111110011111
123	3632	611	1111011011011	1000110000001
124	1330	4920	0000001100100	0000111100011
125	4909	5416	1101110000101	0111011011100
126	4867	1611	1100001000010	0101101010100
127	1183	2474	0001101001101	0000101010111
128	3990	118	1010100101011	1010111101101
129	6217	1382	1111011110100	0100010000010

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
6.3.4		Table 6-II. Additional Code Phase Assignments (sheet 4 of 6) (see below)	Table 6-II. Additional Code Phase Assignments (sheet 3 of 5) (see below)	Change made here to denote now Sheet 3 of 5 (to accommodate promotion of Sheet 1 of 6 to Section 3).

IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces:

Table 6-II. Additional Code Phase Assignments (sheet 4 of 6)

PRN Signal No.	XB Code Advance – Chips* I5	XB Code Advance – Chips* Q5	Initial XB Code State** I5	Initial XB Code State** Q5
130	1224	1092	1111111101100	1010111011111
131	1733	7950	0000010000111	0110001000010
132	2319	7223	1111110000010	1011000011010
133	3928	1769	0011100111011	1000100000111
134	2380	4721	1101100010101	1001011110110
135	841	1252	0101011111011	1000001011000
136	5049	5147	0001100011011	0000110010111
137	7027	2165	0001101110111	0010101101011
138	1197	7897	1110011110000	0011100001100
139	7208	4054	0111100011111	0100011001011
140	8000	3498	0011101110000	1010101001111
141	152	6571	1111001001000	0100001000101
142	6762	2858	0001101110010	0000001111100
143	3745	8126	0101100111100	1101001110111
144	4723	7017	0010010111101	1110111110001
145	5502	1901	1101110110011	1110111010001
146	4796	181	0011110011111	0001010110011
147	123	1114	1001010101111	0111111000101
148	8142	5195	0111111101111	0100010011100
149	5091	7479	0000100100001	1110000010011
150	7875	4186	1110001101011	0110010101000
151	330	3904	1111010010001	0000100000100
152	5272	7128	1011010111101	0100100101011
153	4912	1396	0001101110000	1000010001111
154	374	4513	0000010111100	1110101000010
155	2045	5967	0100101111100	1110000111011
156	6616	2580	1110110111010	1110110010010
157	6321	2575	1101110101011	1001001001000
158	7605	7961	1101000110001	0011100001101
159	2570	2598	0100100010100	0000111101110

* XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

PRN Expansion Redlines:

Table 6-II. Additional Code Phase Assignments (sheet 3 of 5)

PRN Signal No.	XB Code Advance – Chips** I5	XB Code Advance – Chips** Q5	Initial XB Code State*** I5	Initial XB Code State*** Q5
130	1224	1092	1111111101100	1010111011111
131	1733	7950	0000010000111	0110001000010
132	2319	7223	1111110000010	1011000011010
133	3928	1769	0011100111011	1000100000111
134	2380	4721	1101100010101	1001011110110
135	841	1252	0101011111011	1000001011000
136	5049	5147	0001100011011	0000110010111
137	7027	2165	0001101110111	0010101101011
138	1197	7897	1110011110000	0011100001100
139	7208	4054	0111100011111	0100011001011
140	8000	3498	0011101110000	1010101001111
141	152	6571	1111001001000	0100001000101
142	6762	2858	0001101110010	0000001111100
143	3745	8126	0101100111100	1101001110111
144	4723	7017	0010010111101	1110111110001
145	5502	1901	1101110110011	1110111010001
146	4796	181	0011110011111	0001010110011
147	123	1114	1001010101111	0111111000101
148	8142	5195	0111111101111	0100010011100
149	5091	7479	0000100100001	1110000010011
150	7875	4186	1110001101011	0110010101000
151	330	3904	1111010010001	0000100000100
152	5272	7128	1011010111101	0100100101011
153	4912	1396	0001101110000	1000010001111
154	374	4513	0000010111100	1110101000010
155	2045	5967	0100101111100	1110000111011
156	6616	2580	1110110111010	1110110010010
157	6321	2575	1101110101011	1001001001000
158	7605	7961	1101000110001	0011100001101
159	2570	2598	0100100010100	0000111101110

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
6.3.4		(Table 6-II, sheet 5 of 6, below)	(Table 6-II, sheet 4 of 5, below)	Change made here to denote now Sheet 4 of 5 (to accommodate promotion of Sheet 1 of 6 to Section 3).

IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces:

Table 6-II. Additional Code Phase Assignments (sheet 5 of 6)

PRN Signal No.	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
160	2419	4508	1110100011001	0100001001100
161	1234	2090	1101000100111	0010111011110
162	1922	3685	0101101110111	0110011011010
163	4317	7748	0010111010000	1101011000010
164	5110	684	0000111011000	1100010001101
165	825	913	1001110111011	1010111011001
166	958	5558	0110100011111	0100001001010
167	1089	2894	0111011111100	0111000111010
168	7813	5858	1010010011010	0000000110000
169	6058	6432	0010011010110	1100101111100
170	7703	3813	0111100110011	0001100100111
171	6702	3573	0000011011011	0011010111001
172	1714	7523	1001010011010	0001000011100
173	6371	5280	1101010101111	1100101010110
174	2281	3376	1110111001010	1101110010010
175	1986	7424	0010011110110	1111111111001
176	6282	2918	0011110101001	0110000001010
177	3201	5793	1111010000111	0100101001010
178	3760	1747	0010010010100	1111110100100
179	1056	7079	0100101110010	1100010101011
180	6233	2921	1101110110000	1100110000001
181	1150	2490	1000111111011	0111111011010
182	2823	4119	0101101110000	0111000011101
183	6250	3373	0001110101011	1110010010110
184	645	977	1111000100010	0011111111000
185	2401	681	0101001000011	0010001101101
186	1639	4273	0011101111100	0001100110011
187	2946	5419	1011010111010	0100111011011
188	7091	5626	0000001010011	0110111000101
189	923	1266	0010011111101	1101011100011

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

PRN Expansion Redlines:

Table 6-II. Additional Code Phase Assignments (sheet 4 of 5)

PRN Signal No.	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
160	2419	4508	1110100011001	0100001001100
161	1234	2090	1101000100111	0010111011110
162	1922	3685	0101101110111	0110011011010
163	4317	7748	0010111010000	1101011000010
164	5110	684	0000111011000	1100010001101
165	825	913	1001110111011	1010111011001
166	958	5558	0110100011111	0100001001010
167	1089	2894	0111011111100	0111000111010
168	7813	5858	1010010011010	0000000110000
169	6058	6432	0010011010110	1100101111100
170	7703	3813	0111100110011	0001100100111
171	6702	3573	0000011011011	0011010111001
172	1714	7523	1001010011010	0001000011100
173	6371	5280	1101010101111	1100101010110
174	2281	3376	1110111001010	1101110010010
175	1986	7424	0010011110110	1111111111001
176	6282	2918	0011110101001	0110000001010
177	3201	5793	1111010000111	0100101001010
178	3760	1747	0010010010100	1111110100100
179	1056	7079	0100101110010	1100010101011
180	6233	2921	1101110110000	1100110000001
181	1150	2490	1000111111011	0111111011010
182	2823	4119	0101101110000	0111000011101
183	6250	3373	0001110101011	1110010010110
184	645	977	1111000100010	0011111111000
185	2401	681	0101001000011	0010001101101
186	1639	4273	0011101111100	0001100110011
187	2946	5419	1011010111010	0100111011011
188	7091	5626	0000001010011	0110111000101
189	923	1266	0010011111101	1101011100011

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
6.3.4				Change made here to denote now Sheet 5 of 5 (to accommodate promotion of Sheet 1 of 6 to Section 3).

Table 6-II. Additional Code Phase Assignments (sheet 6 of 6)

PRN Signal No.	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
190	7045	5804	1111100011000	1001110110001
191	6493	2414	1101101101100	0001100110110
192	1706	6444	1101010010110	1101101010111
193	5836	4757	0110000101110	1001110000111
194	926	427	0110010011111	0110100111010
195	6086	5452	1000111001100	0110001100110
196	950	5182	1111101110001	0000100001100
197	5905	6606	0011111100001	0101000101101
198	3240	6531	0000001110001	1000001010111
199	6675	4268	1010110100100	0011001110001
200	3197	3115	0100001110110	0100011100110
201	1555	6835	0111110100011	0100101100101
202	3589	862	0001111001011	1110001010111
203	4555	4856	1010100011011	1010110110100
204	5671	2765	1001101110011	1111101101000
205	6948	37	0010111000001	1000001110100
206	4664	1943	1101100001111	1000010101100
207	2086	7977	1110111101001	1100001001101
208	5950	2512	0110110101101	1111111000011
209	5521	4451	0111110110010	0001011110011
210	1515	4071	1000101110111	1001000100001

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

Table 6-II. Additional Code Phase Assignments (sheet 5 of 5)

PRN Signal No.	XB Code Advance – Chips**		Initial XB Code State***	
	I5	Q5	I5	Q5
190	7045	5804	1111100011000	1001110110001
191	6493	2414	1101101101100	0001100110110
192	1706	6444	1101010010110	1101101010111
193	5836	4757	0110000101110	1001110000111
194	926	427	0110010011111	0110100111010
195	6086	5452	1000111001100	0110001100110
196	950	5182	1111101110001	0000100001100
197	5905	6606	0011111100001	0101000101101
198	3240	6531	0000001110001	1000001010111
199	6675	4268	1010110100100	0011001110001
200	3197	3115	0100001110110	0100011100110
201	1555	6835	0111110100011	0100101100101
202	3589	862	0001111001011	1110001010111
203	4555	4856	1010100011011	1010110110100
204	5671	2765	1001101110011	1111101101000
205	6948	37	0010111000001	1000001110100
206	4664	1943	1101100001111	1000010101100
207	2086	7977	1110111101001	1100001001101
208	5950	2512	0110110101101	1111111000011
209	5521	4451	0111110110010	0001011110011
210	1515	4071	1000101110111	1001000100001

** XB Code Advance is the number of XB clock cycles beyond an initial state of all 1s.

*** In the binary notation for the first 13 chips of the I5 and Q5 XB codes as shown in these columns. The rightmost bit is the first bit out. Since the initial state of the XA Code is all 1s, these first 13 chips are also the complement of the initial states of the I5 or Q5-codes.

NOTE: The code phase assignments constitute inseparable pairs, each consisting of a specific I5 and a specific Q5-code phase, as shown above.

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
6.4	Operational Protocols			

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
6.4.1	Lower PRN Numbers Versus Upper PRN Numbers			
6.4.1			See IS-GPS-200.	Language to clarify the prioritization of the lower PRNs numbers versus the higher PRN numbers. Backwards compatibility to PRNs 1-32 remains the top priority.
6.4.2	PRN Number Consistency			
6.4.2			For a given satellite, the same PRN number will be assigned to all operational signals (signals modulated by standard PRN code with data that indicates the signal health is OK).	Language inserted to align the signals with the proper native SV.
6.4.3	PRNs 33 and 37			
6.4.3			See IS-GPS-200.	Language addressing

Section Number	PRN Expansion Proposed Heading	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	PRN Expansion Redlines	Rationale
				the use of PRNs 33 and 37.
6.4.4	PRNs 33 and 63			
6.4.4			See IS-GPS-200.	Language explicitly stating that SVs assigned PRNs 33-63 are synchronized to GPS time to avoid conflict with specialized ground applications.

End of WAS/IS for IS-GPS-705A

Start of WAS/IS for IS-GPS-800A Changes

Section Number	PRN Expansion Proposed Heading	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface	PRN Expansion Redlines	Rationale
3.2.2.1.2				Note is being inserted to make users aware the users if a PRN is NOT listed in the almanac they are not search the unlisted PRN.

IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface

Table 3.2-2. L1C Ranging Codes Parameter Assignments (sheet 1 of 3)

GPS PRN Signal No.	$L1C_P$				$L1C_D$			
	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)
1	5111	412	05752067	20173742	5097	181	77001425	52231646
2	5109	161	70146401	35437154	5110	359	23342754	46703351
3	5108	1	32066222	00161056	5079	72	30523404	00145161
4	5106	303	72125121	71435437	4403	1110	03777635	11261273
5	5103	207	42323273	15035661	4121	1480	10505640	71364603
6	5101	4971	01650642	32606570	5043	5034	42134174	55012662
7	5100	4496	21303446	03475644	5042	4622	00471711	30373701
8	5098	5	35504263	11316575	5104	1	32237045	07706523
9	5095	4557	66434311	23047575	4940	4547	16004766	71741157
10	5094	485	52631623	07355246	5035	826	66234727	42347523
11	5093	253	04733076	15210113	4372	6284	03755314	12746122
12	5091	4676	50352603	72643606	5064	4195	20604227	34634113
13	5090	1	32026612	63457333	5084	368	25477233	47555063
14	5081	66	07476042	46623624	5048	1	32025443	01221116
15	5080	4485	22210746	35467322	4950	4796	35503400	37125437
16	5069	282	30706376	70116567	5019	523	70504407	32203664
17	5068	193	75764610	62731643	5076	151	26163421	62162634
18	5054	5211	73202225	14040613	3736	713	52176727	35012616
19	5044	729	47227426	07750525	4993	9850	72557314	00437232
20	5027	4848	16064126	37171211	5060	5734	62043206	32130365
21	5026	982	66415734	01302134	5061	34	07151343	51515733

NOTES:

* PRN sequences 33-37 are reserved for other uses (e.g., ground transmitters)

PRN Expansion Redlines

Table 3.2-2. L1C Ranging Codes Parameter Assignments (sheet 1 of 3)

GPS PRN Signal No.	$L1C_P$				$L1C_D$			
	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)
1	5111	412	05752067	20173742	5097	181	77001425	52231646
2	5109	161	70146401	35437154	5110	359	23342754	46703351
3	5108	1	32066222	00161056	5079	72	30523404	00145161
4	5106	303	72125121	71435437	4403	1110	03777635	11261273
5	5103	207	42323273	15035661	4121	1480	10505640	71364603
6	5101	4971	01650642	32606570	5043	5034	42134174	55012662
7	5100	4496	21303446	03475644	5042	4622	00471711	30373701
8	5098	5	35504263	11316575	5104	1	32237045	07706523
9	5095	4557	66434311	23047575	4940	4547	16004766	71741157
10	5094	485	52631623	07355246	5035	826	66234727	42347523
11	5093	253	04733076	15210113	4372	6284	03755314	12746122
12	5091	4676	50352603	72643606	5064	4195	20604227	34634113
13	5090	1	32026612	63457333	5084	368	25477233	47555063
14	5081	66	07476042	46623624	5048	1	32025443	01221116
15	5080	4485	22210746	35467322	4950	4796	35503400	37125437
16	5069	282	30706376	70116567	5019	523	70504407	32203664
17	5068	193	75764610	62731643	5076	151	26163421	62162634
18	5054	5211	73202225	14040613	3736	713	52176727	35012616
19	5044	729	47227426	07750525	4993	9850	72557314	00437232
20	5027	4848	16064126	37171211	5060	5734	62043206	32130365
21	5026	982	66415734	01302134	5061	34	07151343	51515733

NOTES:

Section Number	PRN Expansion Proposed Heading	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface	PRN Expansion Redlines	Rationale
3.2.2.1.2		(table below)	(table below)	Note is being inserted to make users aware the users if a PRN is NOT listed in the almanac they are not search the unlisted PRN.

IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface

3.2-2 L1C Ranging Codes Parameter Assignments (sheet 2 of 3)

GPS PRN Signal No.	L1C$_P$				L1C$_D$			
	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)
22	5014	5955	27600270	37672235	5096	6142	16027175	73662313
23	5004	9805	66101627	32201230	4983	190	26267340	55416712
24	4980	670	17717055	37437553	4783	644	36272365	22550142
25	4915	464	47500232	23310544	4991	467	67707677	31506062
26	4909	29	52057615	07152415	4815	5384	07760374	44603344
27	4893	429	76153566	02571041	4443	801	73633310	05252052
28	4885	394	22444670	52270664	4769	594	30401257	70603616
29	4832	616	62330044	61317104	4879	4450	72606251	51643216
30	4824	9457	13674337	43137330	4894	9437	37370402	30417163
31	4591	4429	60635146	20336467	4985	4307	74255661	20074570
32	3706	4771	73527653	40745656	5056	5906	10171147	26204176
33*	5092	365	63772350	50272475	4921	378	12242515	07105451
34*	4986	9705	33564215	75604301	5036	9448	17426100	31062227
35*	4965	9489	52236055	52550266	4812	9432	75647756	36516016
36*	4920	4193	64506521	15334214	4838	5849	71265340	07641474
37*	4917	9947	73561133	53445703	4855	5547	74355073	35065520
38	4858	824	12647121	71136024	4904	9546	45253014	03155010
39	4847	864	16640265	01607455	4753	9132	12452274	34041736
40	4790	347	11161337	73467421	4483	403	07011213	20162561
41	4770	677	22055260	54372454	4942	3766	35143750	01603755
42	4318	6544	11546064	11526534	4813	3	26442600	40541055

NOTES:

* PRN sequences 33-37 are reserved for other uses (e.g., ground transmitters)

PRN Expansion Redlines

3.2-2 L1C Ranging Codes Parameter Assignments (sheet 2 of 3)

GPS PRN Signal No.	L1C$_P$				L1C$_D$			
	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)
22	5014	5955	27600270	37672235	5096	6142	16027175	73662313
23	5004	9805	66101627	32201230	4983	190	26267340	55416712
24	4980	670	17717055	37437553	4783	644	36272365	22550142
25	4915	464	47500232	23310544	4991	467	67707677	31506062
26	4909	29	52057615	07152415	4815	5384	07760374	44603344
27	4893	429	76153566	02571041	4443	801	73633310	05252052
28	4885	394	22444670	52270664	4769	594	30401257	70603616
29	4832	616	62330044	61317104	4879	4450	72606251	51643216
30	4824	9457	13674337	43137330	4894	9437	37370402	30417163
31	4591	4429	60635146	20336467	4985	4307	74255661	20074570
32	3706	4771	73527653	40745656	5056	5906	10171147	26204176
33	5092	365	63772350	50272475	4921	378	12242515	07105451
34	4986	9705	33564215	75604301	5036	9448	17426100	31062227
35	4965	9489	52236055	52550266	4812	9432	75647756	36516016
36	4920	4193	64506521	15334214	4838	5849	71265340	07641474
37	4917	9947	73561133	53445703	4855	5547	74355073	35065520
3	4858	824	12647121	71136024	4904	9546	45253014	03155010
39	4847	864	16640265	01607455	4753	9132	12452274	34041736
40	4790	347	11161337	73467421	4483	403	07011213	20162561
41	4770	677	22055260	54372454	4942	3766	35143750	01603755
42	4318	6544	11546064	11526534	4813	3	26442600	40541055

NOTES:

Section Number	PRN Expansion Proposed Heading	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface	PRN Expansion Redlines	Rationale
3.2.2.1.2		(table below)	(table below)	

IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface:

3.2-2 L1C Ranging Codes Parameter Assignments (sheet 3 of 3)

GPS PRN Signal No.	L1C_P				L1C_D			
	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)
43	4126	6312	24765004	16522173	4957	684	67214123	64750626
44	3961	9804	14042504	74053703	4618	9711	62274362	72550016
45	3790	278	53512265	52211303	4669	333	23371051	36130364
46	4911	9461	15317006	72655147	4969	6124	25121057	25236175
47	4881	444	16151224	01212152	5031	10216	20362622	43732204
48	4827	4839	67454561	10410122	5038	4251	33050463	02316015
49	4795	4144	47542743	22473073	4740	9893	65334051	00212370
50	4789	9875	65057230	63145220	4073	9884	65523456	35163655
51	4725	197	77415771	65734110	4843	4627	53741004	33771603
52	4675	1156	75364651	25167435	4979	4449	66360341	41161255
53	4539	4674	75664330	17524136	4867	9798	34421651	76257261
54	4535	10035	44600202	47064764	4964	985	04530741	33512503
55	4458	4504	23211425	14016156	5025	4272	12621031	16237466
56	4197	5	51504740	11723025	4579	126	62330452	24120336
57	4096	9937	47712554	76760325	4390	10024	67510404	11103121
58	3484	430	67325233	04724615	4763	434	00726605	36467526
59	3481	5	61517015	72504743	4612	1029	00200154	66444010
60	3393	355	43217554	51215201	4784	561	37533004	70455364
61	3175	909	52520062	00630473	3716	289	73771510	26726105
62	2360	1622	77073716	71217605	4703	638	44071707	63663333
63	1852	6284	56350460	50200707	4851	4353	34665654	42142704

NOTES:

* PRN sequences 33-37 are reserved for other uses (e.g., ground transmitters)

PRN Expansion Redlines:

3.2-2 L1C Ranging Codes Parameter Assignments (sheet 3 of 3)

GPS PRN Signal No.	L1C_P				L1C_D			
	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)	Weil Index (*w*)	Insertion Index (*p*)	Initial 24 Chips (Octal)	Final 24 Chips (Octal)
43	4126	6312	24765004	16522173	4957	684	67214123	64750626
44	3961	9804	14042504	74053703	4618	9711	62274362	72550016
45	3790	278	53512265	52211303	4669	333	23371051	36130364
46	4911	9461	15317006	72655147	4969	6124	25121057	25236175
47	4881	444	16151224	01212152	5031	10216	20362622	43732204
48	4827	4839	67454561	10410122	5038	4251	33050463	02316015
49	4795	4144	47542743	22473073	4740	9893	65334051	00212370
50	4789	9875	65057230	63145220	4073	9884	65523456	35163655
51	4725	197	77415771	65734110	4843	4627	53741004	33771603
52	4675	1156	75364651	25167435	4979	4449	66360341	41161255
53	4539	4674	75664330	17524136	4867	9798	34421651	76257261
54	4535	10035	44600202	47064764	4964	985	04530741	33512503
55	4458	4504	23211425	14016156	5025	4272	12621031	16237466
56	4197	5	51504740	11723025	4579	126	62330452	24120336
57	4096	9937	47712554	76760325	4390	10024	67510404	11103121
58	3484	430	67325233	04724615	4763	434	00726605	36467526
59	3481	5	61517015	72504743	4612	1029	00200154	66444010
60	3393	355	43217554	51215201	4784	561	37533004	70455364
61	3175	909	52520062	00630473	3716	289	73771510	26726105
62	2360	1622	77073716	71217605	4703	638	44071707	63663333
63	1852	6284	56350460	50200707	4851	4353	34665654	42142704

NOTES:

Section Number	PRN Expansion Proposed Heading	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface	PRN Expansion Redlines	Rationale
3.2.2.1.2		(Table 3.2-3, sheet 2 of 3, below)	(Table 3.2-3, sheet 2 of 3, redlined, below)	A note has been inserted here that states that PRNs 38-63 are required per this Table if a manufacturer chooses to include these PRNs in their receiver design.

IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface

3.2-3 L1C$_O$ Overlay Code Parameter Assignments (sheet 2 of 3)

GPS PRN Signal No.	S1 Polynomial Coefficient (Octal) * (m_{ij})	Initial 11 Bits (Octal †) **	Final 11 Bits (Octal †)
22	6747	1774	0176
23	4475	0546	0244
24	4225	2213	1027
25	7063	3707	1753
26	4423	2051	3502
27	6651	3650	0064
28	4161	1777	2275
29	7237	3203	0044
30	4473	1762	2777
31	5477	2100	0367
32	6163	0571	0535
33	7223	3710	3776
34	6323	3535	2677
35	7125	3110	0102
36	7035	1426	2520
37	4341	0255	2444
38	4353	0321	3770
39	4107	3124	1517
40	5735	0572	1133
41	6741	1736	3754
42	7071	3306	0033

NOTES:

* The polynomial coefficient is given as 1, $m_{10}, \ldots, m_1$, 1. Thus octal 5111 corresponds to the generator polynomial $P_1(x) = 1 + x^3 + x^6 + x^9 + x^{11}$.

** The initial 11 bits also represent the initial condition, $n_{11}, \ldots, n_1$, for each PRN signal number. (See Figure 3.2-2)

† The initial and the final bit values are obtained after dropping the initial bit value 0.

PRN Expansion Redlines

3.2-3 L1C$_O$ Overlay Code Parameter Assignments (sheet 2 of 3)

GPS PRN Signal No.	S1 Polynomial Coefficient (Octal) * (m_{ij})	Initial 11 Bits (Octal †) **	Final 11 Bits (Octal †)
22	6747	1774	0176
23	4475	0546	0244
24	4225	2213	1027
25	7063	3707	1753
26	4423	2051	3502
27	6651	3650	0064
28	4161	1777	2275
29	7237	3203	0044
30	4473	1762	2777
31	5477	2100	0367
32	6163	0571	0535
33	7223	3710	3776
34	6323	3535	2677
35	7125	3110	0102
36	7035	1426	2520
37	4341	0255	2444
38***	4353	0321	3770
39***	4107	3124	1517
40***	5735	0572	1133
41***	6741	1736	3754
42***	7071	3306	0033

NOTES:

* The polynomial coefficient is given as 1, $m_{10}, \ldots, m_1$, 1. Thus octal 5111 corresponds to the generator polynomial $P_1(x) = 1 + x^3 + x^6 + x^9 + x^{11}$.

** The initial 11 bits also represent the initial condition, $n_{11}, \ldots, n_1$, for each PRN signal number. (See Figure 3.2-2)

*** Note: PRNs 38-63 are required per this Table if a manufacturer chooses to include these PRNs in their receiver design.

† The initial and the final bit values are obtained after dropping the initial bit value 0.

Section Number	PRN Expansion Proposed Heading	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface	PRN Expansion Redlines	Rationale
3.2.2.1.2		(see Table 3.2-3 below, as printed)	(see redlined Table 3.2-3 below)	

IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface:

3.2-3 $L1C_O$ Overlay Code Parameter Assignments (sheet 3 of 3)

GPS PRN Signal No.	S1 Polynomial Coefficient (Octal) * (m_{ij})	Initial 11 Bits (Octal †) **	Final 11 Bits (Octal †)
43	4563	1307	1170
44	5755	3763	1567
45	6127	1604	3534
46	4671	1021	2515
47	4511	2624	0104
48	4533	0406	3343
49	5357	0114	1510
50	5607	0077	2170
51	6673	3477	0710
52	6153	1000	3375
53	7565	3460	2650
54	7107	2607	3307
55	6211	2057	2262
56	4321	3467	2161
57	7201	0706	2076
58	4451	2032	1200
59	5411	1464	0643
60	5141	0520	2000
61	7041	1766	3377
62	6637	3270	1605
63	4577	0341	1552

NOTES:

* The polynomial coefficient is given as 1, m_{10}, … , m_1, 1. Thus octal 5111 corresponds to the generator polynomial $P_1(x) = 1 + x^3 + x^6 + x^9 + x^{11}$.

** The initial 11 bits also represent the initial condition, n_{11}, ……, n_1, for each PRN signal number. (See Figure 3.2-2)

† The initial and the final bit values are obtained after dropping the initial bit value 0.

PRN Expansion Redlines:

3.2-3 $L1C_O$ Overlay Code Parameter Assignments (sheet 3 of 3)

GPS PRN Signal No.	S1 Polynomial Coefficient (Octal) * (m_{ij})	Initial 11 Bits (Octal †) **	Final 11 Bits (Octal †)
43	4563	1307	1170
44	5755	3763	1567
45	6127	1604	3534
46	4671	1021	2515
47	4511	2624	0104
48	4533	0406	3343
49	5357	0114	1510
50	5607	0077	2170
51	6673	3477	0710
52	6153	1000	3375
53	7565	3460	2650
54	7107	2607	3307
55	6211	2057	2262
56	4321	3467	2161
57	7201	0706	2076
58	4451	2032	1200
59	5411	1464	0643
60	5141	0520	2000
61	7041	1766	3377
62	6637	3270	1605
63	4577	0341	1552

NOTES:

* The polynomial coefficient is given as 1, m_{10}, … , m_1, 1. Thus octal 5111 corresponds to the generator polynomial $P_1(x) = 1 + x^3 + x^6 + x^9 + x^{11}$.

** The initial 11 bits also represent the initial condition, n_{11}, ……, n_1, for each PRN signal number. (See Figure 3.2-2)

"*** Note: PRNs 38-63 are required per this Table if a manufacturer chooses to include these PRNs in their receiver design.

† The initial and the final bit values are obtained after dropping the initial bit value 0.

Section Number	PRN Expansion Proposed Heading	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface	PRN Expansion Redlines	Rationale
6.4	Operational Protocols			
6.4.1	Lower PRN Numbers Versus Upper PRN Numbers			
6.4.1			See IS-GPS-200.	Language to clarify the prioritization of the lower PRNs numbers versus the higher PRN numbers. Backwards compatibility to PRNs 1-32 remains the top priority.
6.4.2	PRN Number Consistency			
6.4.2			For a given satellite, the same PRN number will be assigned to all operational signals (signals modulated by standard PRN code with data that indicates the signal health is OK).	Language inserted to align the signals with the proper native SV.
6.4.3	PRNs 33			

Section Number	PRN Expansion Proposed Heading	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface	PRN Expansion Redlines	Rationale
	and 37			
6.4.3			See IS-GPS-200.	Language addressing the use of PRNs 33 and 37.
6.4.4	PRNs 33 through 63			
6.4.4			See IS-GPS-200.	Language explicitly stating that SVs assigned PRNs 33-63 are synchronized to GPS time to avoid conflict with specialized ground applications.

End of WAS/IS for IS-GPS-800A