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.

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6 May 2011

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

Section	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	Proposed	URA Definition Proposed Text	Rationale
Number		Heading		
621	User Range Accuracy (URA) is a statistical indicator of the GPS ranging accuracy obtainable		User Range Accuracy (LIRA) is a statistical indicator of the GPS ranging accuracy obtainable with a	Rationale #5-
0.2.1	with a specific signal and SV. Whether the integrity status flag is 'off' or 'on'. 4.42 times URA		specific signal and SV. URA provides a conservative RMS estimate of the user range error (URE) in	There are
	bounds instantaneous URE under all conditions with 1 -1e-5 per hour probability. When the		the associated navigation data for the transmitting SV. It includes all errors for which the Space	numerous
	integrity status flag is 'on', 5.73 times URA bounds instantaneous URE under all conditions		and Control Segments are responsible. Whether the integrity status flag is 'off' or 'on', 4.42 times	inconsistencies
	with 1-1e-8 per hour probability. Integrity properties of the URA are specified with respect to		URA bounds the instantaneous URE under all conditions with 1-1e-5 per hour probability ('legacy'	between ICDs
	the upper bound values of the URA index.		level of integrity assurance). When the integrity status flag is 'on', 5.73 times URA bounds the	and
			instantaneous URE under all conditions with 1-1e-8 per hour probability ('enhanced' level of	clarifications
			integrity assurance). Integrity properties of the URA are specified with respect to the scaled	and additions
			(multiplied by either 4.42 or 5.73 as appropriate) upper bound value s of the URA index or to the	that are
			scaled composite of the upper bound values of all component URA indexes.	needed for the
				users to
				compute URA.
				These changes
				resolve the
				inconsistencies
				between the
				ICDS SO that
				properly
				compute URA.
6.2.1	Note #1: URA applies over the curve fit interval that is applicable to the NAV data from which		Note #1: URA applies over the transmission interval that is applicable to the NAV data from which	See Rationale
	the URA is read, for the worst-case location within the intersection of the satellite signal and		the URA is read, for the worst-case location within the satellite footprint.	#5
	the terrestrial service volume.			
6.2.1	Note #2: The URA for a particular signal may be represented by a single parameter in the NAV		Note #2: The URA for a particular signal may be represented by a single index in the NAV data or	See Rationale
	data or by more than one parameter representing components of the total URA. Specific URA		by a composite of more than one index representing components of the total URA. Specific URA	#5
	parameters and formulae for calculating the total URA for a signal are defined in the		indexes and formulae for calculating the total URA for each signal are defined in appendix 20 for	
	applicable Space Segment to Navigation User Segment ICD's.		the LNAV message and appendix 30 for the CNAV message.	
6.2.1	N/A		Note #3: The above integrity assured probability values do not apply if: (a) an alert is issued to the	See Rationale
			users before the instantaneous URE exceeds either of the scaled URA bounds, or (b) an alert is	#5
			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-	

Section Number	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	Proposed Heading	URA Definition Proposed Text	Rationale
			standard code, parity error, etc.	
6.2.1.1	6.2.1.1 Integrity Assured URA.	<delete></delete>		
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.		<delete></delete>	See Rationale #5
6.2.1.1	6.2.1.1 User Differential Range Accuracy.			
6.2.1.1	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
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 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
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 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. 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

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20 2 2 2 1 2	For each LIPA index (N) users may compute a nominal LIPA value (X) as given by:		For each LIPA index (N) users may compute a nominal LIPA value (X) as given by:	GDS antonna
20.3.3.3.1.3	For each ORA index (N), users may compute a nominal ORA value (X) as given by:		For each ora index (N), users may compute a nominal ora value (X) as given by:	GPS antenna
			• If the value of N is 6 or less, $X = 2^{(1 + N/2)}$,	along the
	• If the value of N is 6 or less, $X = 2^{(1 + N/2)}$,		(11.2)	hore-sight
			• If the value of N is 6 or more, but less than 15, $X = 2^{(N-2)}$,	bore-signt
	(N 2)		• $N = 15$ shall indicate the absence of an accuracy prediction and shall advise the standard	discovered
	• If the value of N is 6 or more, but less than 15, $X = 2^{(N-2)}$,		nositioning service user to use that SV at his own risk	through IPI
				analysis
	• $N = 15$ shall indicate the absence of an accuracy prediction and shall advise the		For N = 1, 3, and 5, X should be rounded to 2.8, 5.7, and 11.3 meters, respectively.	
	standard positioning service user to use that SV at his own rick			add SV
	standard positioning service user to use that sv at his own lisk.		For Block IIR/IIR-M SVs in the Autonav mode, the URA shall be defined to mean "no better than X	Antenna
			meters", with "X" as defined above for each URA index.	Arrors to list of
	For N = 1, 3, and 5, X should be rounded to 2.8, 5.7, and 11.3 meters, respectively.		The nominal URA value (X) is suitable for use as a conservative prediction of the RMS signal-in-	errors that
			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	cover
	For Block IIR/IIR-M SVs in the Autonav mode, the URA shall be defined to mean "no better		(FOM) computations). Integrity properties of the URA are specified with respect to the scaled	cover.
	than X meters", with "X" as defined above for each URA index.		(multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URA index (see	
	Integrity properties of the URA are specified with respect to the upper bound values of the		20.5.5.1).	
	URA index (see 20.3.3.1). URA accounts for signal-in-space contributions to user range error		URA accounts for SIS-contributions to user range error which include, but are not limited to, the	
	that include, but are not limited to, the following: the net effect of clock parameter and code		following: LSB representation/truncation error; the net effect of clock correction polynomial error	
	phase error in the transmitted signal for single-frequency L1C/A or single-frequency L2C users		and code phase error in the transmitted signal for single-frequency L1C/A or single-frequency L2C	
	who correct the code phase as described in Section 30.3.3.3.1.1.1. as well as the net effect of		users who correct the code phase as described in Section 30.3.3.3.1.1.1; the net effect of clock	
	clock parameter, code phase, and intersignal correction error for dual-frequency L1/L2 and		parameter, code phase, and inter-signal correction error for dual-frequency L1/L2 and L1/L5 users	
	L1/L5 users who correct for group delay and ionospheric effects as described in Section		who correct for group delay and ionospheric effects as described in Section 30.3.3.1.1.2;	
	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 2 4 4	The start of the transmission interval for each data set corresponds to the beginning of the		The start of the transmission interval for each data set corresponds to the beginning of the surve	See Pationale
20.3.4.4	curve fit interval for the data set. Each data set remains valid for the duration of its curve fit		fit interval for the data set. Each data set remains valid for the duration of its transmission	
	interval		interval and nominally also remains valid for the duration of its curve fit interval. A data set is	π5
			rendered invalid before the and of its surve fit interval when it is superseded by the SV sutting	
			over to the first data set of a new unload	
30.3.3	Each message starts with an 8-bit preamble - 10001011, followed by a 6-bit PRN number of		Each message starts with an 8-bit preamble - 10001011, followed by a 6-bit PRN number of the	See Rationale
	the transmitting SV, a 6-bit message type ID with a range of 0 (000000) to 63 (111111), and		transmitting SV, a 6-bit message type ID with a range of 0 (000000) to 63 (111111), and the 17-bit	#5
	the 17-bit message time of week (TOW) count. When the value of the message TOW count is		message time of week (TOW) count. When the value of the message TOW count is multiplied by 6,	
	multiplied by 6, it represents SV time in seconds at the start of the next 12-second message.		it represents SV time in seconds at the start of the next 12-second message. An "alert" flag, when	

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	An "alert" flag, when raised (bit 38 = "1"), indicates to the user that the SV URA and/or the SV		raised (bit 38 = "1"), indicates to the user that the signal URA
	User Differential Range Accuracy (UDRA) may be worse than indicated in the respective		indicated in the associated message types. For each default
	message types. For each default message (Message Type 0), bits 39 through 276 shall be		through 276 shall be alternating ones and zeros and the mes
	alternating ones and zeros and the message shall contain a proper CRC parity block.		block.
30.3.3			DIRECTION OF DATA FLOW FRC DIRECTION OF DATA FLOW FRC 100 BITS
	DIRECTION OF DATA FLOW FROM SV MSB FIRST		38 1 9 15 21 39 ⁵² 55
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $		PRN MESSAGE TOW COUNT* WNn top 6 6 17 BITS 13 BITS 11 BI
	8 BITS 6 6 6 17 BITS 13 BITS 11 BITS 5 11 BITS 19 MSBs MESSAGE TYPE ID L1 HEALTH - 1 BIT L1 HEALTH - 1 BIT URAge INDEX		MESSAGE TYPE ID PREAMBLE "ALERT" FLAG - 1 BIT L1 HEALTH - 1 BIT L2 HEALTH - 1 BIT L5 HEALTH - 1 BIT
	PREAMBLE "ALERT" FLAG - 1 BIT L5 HEALTH - 1 BIT		DIRECTION OF DATA FLOW FR
	DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS		
	' 101 108 133 150 173		
	?A ?no ?no ?Mon		7 LSBs 25 BITS 17 BITS 23
	7 LSBS 25 BITS 17 BITS 23 BITS 26 MSB s		DIBECTION OF DATA FLOW FR
	DIRECTION OF DATA FLOW FROM SV MSB FIRST MSB FIRST MSB FIRST		← 100 BITS - 4 SECOND
			201 206 239
			M _{0-n} e _n w _n
	33 BITS 33 BITS 24 BTs		33 BITS 33 BITS
	Integrity Status Flag - 1 BIT 5 LSB s		5 LSB s
	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12 SECOND MESSAGE		* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEX
	Figure 20.1 Massage Type 10 Enhamorie 1		
	Figure 30-1. Message Type 10 - Ephemens 1		Figure 30-1. Message Type 10 - E

			Rationale
A compone	nts mav	be worse than	
message (N	, Message	Type 0), bits 39	
ssage shall (contain a	a proper CRC parity	
U		,	
			Dationals #1
DM SV ——— DS ————	- MSB FI		Kationale #1-
	1	eo	URA _{oc} and
	+		URA _{oe} are
5	L _{OE}		redefined into
	11 BITS	19 MSBs	an elevation-
	- URAen INI	DEX	dependent
	00		component
			(URA _{ED}) and a
OM SV	— MSB FI	AST	non-elevation-
S			dependent
	173		component
n _o		M _{0-n}	(URA _{NED}). This
BITS		28 MSBs	will enable
			users to de-
			weight the
			elevation-
OMSV ——— DS ————	- NSB FI		angle-
272	2 277		dependent
		000	component
			with the
	<u>│ </u>	24 BITS	elevation
BUT	-		angle of the
BITs —			SV, resulting in
T 12 SEGOND N	/IESSAGE		a smaller
			composite
- 	1		URA, in many
-phemens.	L		cases. A
			smaller
			composite
			URA means
			higher
			availability for
			applications
			that have

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Rationale
requirements
for a minimum
level of
accuracy
and/or
integrity. In
order to
achieve a
technical
consensus on
how to
proceed
forward with
GPS IIIA
deriving URA
from the
uploaded
covariance,
then the
following
changes were
needed to the
user ICDs.

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30.3.3	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	DIREC 10 21 MESSAGE TOW COUNT* 17 BITS PE ID AG - 1 BIT DIREC 10 BITS 13 BITS DIREC 10 BITS 13 BITS DIREC 10 10 10 1225 233 % βο βι TS 8 BITS 8 BITS 10 10 10 10 10 10 10 10 10 10	CTION OF DATA FI 0 BITS 4 39 50 top 5 11 BITS BITS URAoc IN 0 CTION OF DATA FI 0 0 BITS 4 141 ISCLICA 13 BITS 13 BITS CTION OF DATA FI 4 141 ISCLICA 13 BITS 4 241 249 β2 β 8 BITS 8 BITS	LOW FROM SV SECONDS 55 58 61 S 11 URAcc NDEX LOW FROM SV SECONDS 154 ISCL2C 13 BITS LOW FROM SV SECONDS 257 33 RESE ITS 20	MSE 72 t_oc 1 BITS RA _{oc2} INDEX - 3 BIT MSE MSE MSE MSE MSE MSE MSE 2 ERVED ВITS	B FIRST 26 BITS 3 BITS 3 BITS 3 artm - 3 MS 4 fim - 3 MS 18 FIRST 180 13 BITS 3 BITS 3 BFIRST 277 CRC 24 BITS	98 98 5Bs 5Bs 193 α ₀ 8 BITS			9 1 PRN 6 BITS MESSAC Ξ "ALEF a _{f1-n} LSBs 209 α ₂ 8 BITS	5 21 6 T BITS C TYPE ID AT" FLAG - 118 10 BI 217 α ₃ 8 BITS	MESSAG OW COUI 17 BITS 1 BIT 1 BIT 128 128 175 1 128 175 1 128 175 1 1 128 175 1 1 128 175 1 1 128 175 1 1 128 17 17 17 17 17 17 17 17 17 17 17 17 17	- DIRECT - DIRECT - DIRECT - DIRECT - DIRECT - DIRECT - 100 - 233 β1 8 BITS	ΓΙΟΝ OF D/ BITS 9 top 11 BITS UI ΠΟΝ OF D/ BITS 141 ISCL10 13 BIT ΠΟΝ OF D/ BITS 241 β2 8 BITS	ATA FLOW 50 5 BITS BITS ATA FLOW 4 SEC 154 4 SEC 154 7 4 SEC 249 β ₃ 8 BITS	/ FROM S SONDS - 5 58 6 - 5 58 6 - - - - - - - - - - - - -
	* MESSAGE TOW COUNT =	17 MSB OF ACTUAL TO	ow COUNT AT STA	art of next 1: 0 - Clock, I(2-SECOND ME	essage oup Delay			* MESSAGE	TOW CO	UNT = 17 M F	sb of ac igure 3	ο-3. Με	v count A essage T	t start	of Nex - Clocl

					Rationale
sv -		MSB F	IRST		Rationale #1
51		72		 98	
	t _{oc}		af0-n		
11	BITS		26 BITS		
- UR. RA _{ned}	A _{NED2} IND 1 INDEX)EX - 3 - 3 BITS	BITS S a _{f1-n} – 3 MSI	Bs	
SV -		MSB F	IRST ———		
	167		180	193	
	ISC	L515	ISC _{L5Q5}	α0	
3	13 B	ITS	13 BITS	8 BITS	
sv -		MSB F	-IRST		
		107	7		
ESF	RVED		CBC		
20 E	BITS		24 BITS		
(T 12			SAGE		
ж, Ι		Gro	up Delay		

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30.3.3	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		DIRECTION OF DATA FLOW FROM SV - 100 BITS 4 SECONDS 1 9 15 21 38 38 39 50 55 58 61 100 BITS 5 55 68 61 100 COUNT* 11 BITS BITS 11 B MESSAGE TYPE ID PREAMBLE "ALERT" FLAG - 1 BIT URA _{NED} INDEX 100 BITS 4 SECONDS 100 BITS 4 SECONDS 100 BITS 4 SECONDS 100 BITS 4 SECONDS 101 118 128 141 149 Reduced Alm Packet 1 17 LSBs 10 BITS 13 BITS 8 BITS 31 BITS
	DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS 201 211 Reduced Almanac 273 Packet 3 31 BITS 10 LSBs 31 BITS 31 BITS 31 BITS Reduced Almanac Packet 2 RESERVED * MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE Figure 30-4. Message Type 31 - Clock & Reduced Almanac		DIRECTION OF DATA FLOW FROM SV - 100 BITS 4 SECONDS 201 211 242 Reduced Almanac Packet 3 10 LSBs 31 BITS 31 BITS Reduced Almanac Packet 2 * MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-5 Figure 30-4. Message Type 31 - Clock



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30.3.3	30.3.3 DIRECTION OF DATA FLOW FROM SV MSB FIRST 1 9 15 21 138 100 BITS 4 SECONDS 4 172 1 9 15 21 18 1 9 15 21 18 1 9 15 21 18 1 9 15 21 19 15 11 15 11 17 10 BITS 17 BITS 11 BITS 11 BITS 17 BITS 11 BITS 26 BITS 11 BITS BITS 17 BITS 11 BITS 26 BITS 11 BITS BITS 17 BITS 11 BITS 26 BITS 10 MESSAGE TYPE ID URAoc INDEX 3 BITS attan - 3 MSBs PREAMBLE "ALERT" FLAG - 1 BIT URAoc INDEX 3 BITS attan - 3 MSBs 101 118 128 144 <		B FIRST 26 BITS BITS S a _{t1-n} – 3 MSBs B FIRST 180 PM-Y 21 BITS		DIRECTION OF DATA FLOW FROM SV 100 BITS 4 SECONDS 1 9 15 21 38 39 50 55 58 61 1 9 15 21 t_{op} 5 8 BITS BITS 17 BITS 11 BITS BITS 1 MESSAGE TYPE ID PREAMBLE "ALERT" FLAG - 1 BIT URANED INDEX 100 BITS 4 SECONDS 100 BITS 4 SECONDS 100 BITS 4 SECONDS 100 BITS 21 t_{op} 5 11 BITS BITS 1 11 BITS 1 15 1 1 10 BITS 4 SECONDS 100 BITS 4 SECONDS 101 118 128 144 1 11 BITS 12 1BITS 1 11 BITS 21 BITS 1 11 BITS 21 BITS 1 11 BITS 21 BITS 1 15 1 1 16 BITS 21 BITS 1 17 LSBS 10 BITS 16 BITS 21 BITS 1 10 BITS 21 BITS 1 11 BITS 1 11 BITS 1 10 BITS 21 BITS 1 10	1 		
	₹	DIRECTI	ON OF DATA FLOW FROM S ITS ————————————————————————————————————	V MSE	B FIRST		DIRECTION OF DATA FLOW FROM SV DIRECTION OF DATA FLOW FROM SV 4 SECONDS	/ -
	201 2	216	247	266 2	277		PM-Υ ΔUT1 ΔUT1	+
	PM-Ŷ	ΔUT1	∆UT1	RESERVED	CRC		15 BITS 31 BITS 19 BITS	
	15 BITS	31 BITS	19 BITS	11 BITS	24 BITS			
	* MESSAGE TOW COU	NT = 17 MSB OF ACTUAL TOW	COUNT AT START OF NEXT Message Type 32 - Cl	12-SECOND ME	SSAGE		* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT Figure 30-5. Message Type 32 -	12 C



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30.3.3	1 9 15 21 PRN MESS 6 6 8 BITS BITS BITS MESSAGE TYPE ID PREAMBLE "ALERT" FLAG - 1 BIT 101 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118 111 118	DIRECTION OF DATA FLC 100 BITS 4 SI 38 39 50 SAGE top 5 DIRECTION OF DATA FLC 5 BITS DIRECTION OF DATA FLC 0 0 DIRECTION OF DATA FLC 100 BITS 4 SI 28 144 4 SI 16 BITS 13 BITS 13 BITS DIRECTION OF DATA FLC 100 BITS 4 SI 28 144 4 SI 16 BITS 13 BITS 13 BITS ADIRECTION OF DATA FLC 100 BITS 4 SI	W FROM SV ECONDS 55 58 61 11 UR URA _{oc1} VEX W FROM SV ECONDS 117 Acn Acn <	MSB FIRST 72 toc BITS 26 Aoc2 INDEX - 3 BITS INDEX - 3 BITS INDEX - 3 BITS Acc2 INDEX - 3 BITS INDEX - 10 BITS 1172 tLS 1172 tLS 116 BITS MSB FIRST	98 aton BITS 1-n - 3 MSBs 188 188 WNot 13 BITS		$\begin{array}{c c c c c c c c c c c c c c c c c c c $			
	201 214 218 226 WNLsF DN ΔtLsF 4 13 BITS BITS 8 BITS 8 * MESSAGE TOW COUNT = 17 MSB OF Figure 3	RESERVED 51 BITS F ACTUAL TOW COUNT AT STAR 30-6. Message Typ	RT OF NEXT 12 e 33 - Cloo	277 2-SECOND MESSAGE	CRC 24 BITS		4 SECONDS 201 214 218 226 WNLSF DN ΔtLSF RESERVED 13 BITS BITS 8 BITS 51 BITS * MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12 Figure 30-6.			





				Rationale
				Rationale #1
—— M	ISB FIRST			
72	2	98		
oc	a	f0-n		
ITS	26			
NED2 INDEX INDEX - 3	(- 3 BITS BITS			
	an	-n - 5 Wolls		
—— M	SB FIRST			
		185		
		EDC		
S		16 MSBs		
M	ISB FIRST			
	277			
		CRC		
		24 BITS		
	MESSAG	E		
2-SECOND	MESSAG	E		
Clock &	Differ	ential Correction	า	

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30.3.3	DIRECTION OF DATA FLOW FROM SVMSB FIRST		DIRECTION OF DATA FLOW FROM SV - 100 BITS 4 SECONDS 1 9 15 21 38 39 50 55 58 61 PRN 6 6 TOW COUNT* 8 BITS BITS BITS 17 BITS 11 1 MESSAGE TYPE ID PREAMBLE "ALERT" FLAG - 1 BIT URANED DIRECTION OF DATA FLOW FROM SV - 100 BITS 4 SECONDS 101 118 128 144 157 160 101 118 128 144 157 160 101 118 128 144 157 160 101 118 16 BITS 13 BITS 16 E GNSS ID - 3 BITS 201 RESERVED 76 BITS
	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE Figure 30-8. Message Type 35 - Clock & GGTO		* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12 Figure 30-8. Message Typ



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Number				Heading	
30.3.3	1 9 15 1 9 15 8 BITS BITS MESSAGE PREAMBLE "ALERT 101 ann 17 101 ann 17 201	21 6 TS 17 TYPE ID "FLAG - 1 BI 118 10 BITS TEX1 NT = 17 MSB Fig	DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS SAGE 139 50 55 58 61 72 400-0 11 BITS 26 BITS 11 BITS 26 BITS 4 SECONDS 0 URA _{oc} INDEX - 3 BITS 0 URA _{oc} INDEX - 3 BITS 100 BITS 4 SECONDS 128 128 128 128 128 128 128 128		DIRECTION OF DATA FLOW FROM 100 BITS 4 SECONDS 1 9 15 21 ESSAGE 1 8 BITS BITS 17 BITS 17 BITS 17 BITS MESSAGE TYPE ID PREAMBLE 'ALERT' FLAG - 1 BIT URANED INDEX DIRECTION OF DATA FLOW FROM 100 BITS 4 SECONDS 101 118 128 101 118 73 MS 101 118 128 101 118 73 MS 100 BITS 73 MS 201 TEXT MESSAGE (18 8-BIT CHAR) 71 LSBs TEXT MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NES Figure 30-9. Message Type 36 - C
		Fig	ure 30-9. Message Type 36 - Clock & Text		



Section	on IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces Pro					terfaces	Proposed	URA Definition Proposed Text	Rationale				
Number							пеасілд						
30.3.3		DIRECT	10N OF DATA FLOW	FROM SV -	—— M	SB FIRST		DIRECTION OF DATA FLOW FROM SV —— MSB FIRST ————————————————————————————————————	Rationale #1				
		38	BI 13		1								
	1 9 15 21 PRN	MESSAGE) 50 55 +	5 58 61	+ /2	98		PRN MESSAGE tm tm <thtm< th=""> tm tm <t< td=""><td></td></t<></thtm<>					
		TOW COUNT*	^{lop} 11 DITS BITS	11				6 6 5 8 BITS BITS 17 BITS 11 BITS BITS					
	MESSAGE TYPE I PREAMBLE "ALERT" FLAG	ID - 1 BIT			INDEX-3B	an- 3 MSBs		MESSAGE TYPE ID URA _{NED1} INDEX - 3 BITS PREAMBLE "ALERT" FLAG - 1 BIT URA _{NED} INDEX ar1-n - 3 MSBs					
		DIRECT	10N OF DATA FLOW	FROM SV -	——— M	SB FIRST		← 100 BITS ← 4 SECONDS ←					
								101 118 128 141 149 155 158 169 180 191					
	101 118	128 1-	t DDN	001 P	δ			$a_{i1 \cdot n}$ $a_{i2 \cdot n}$ $WN_{a \cdot n}$ t_{oa} PRN_{a} e δ_{i} $\mathring{\Omega}$ \sqrt{A}					
	17 LSBs 10 B			11 BITS	11 BITS			17 LSBs 10 BITS 13 BITS 8 BITS 6 BITS 11 BITS 11 BITS 11 BITS 10 MSBs					
		L1 H						L1 HEALTH – 1 BIT – L2 HEALTH – 1 BIT –					
	$L1 HEALIH - 1 BII \rightarrow$ $L2 HEALTH - 1 BII \rightarrow$							L5 HEALTH – 1 BIT – – – – – – – – – – – – – – – – – – –					
					N			DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 4 SECONDS					
■ DIFECTION OF DATA FLOW FROM SV = ■ 100 BITS — 4 SECONDS —						201 208 224 240 256 267 277							
	201 208	224	240 2	256	267	277		\sqrt{A} Ω_0 ω M_0 a_{r_0} a_{r_1} CRC					
	$\sqrt{\mathrm{A}}$ Ω_0	ω	Mb	a_{f0}	a_{f1}	CRC		7 LSBs 16 BITS 16 BITS 16 BITS 11 BITS 10 BITS 24 BITS					
	7 LSBs 16 BITS	16 BITS	16 BITS	11 BITS	10 BITS	24 BITS							
								* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE					
	* MESSAGE TOW COUNT = 17	MSB OF ACTUAL TOW	COUNT AT START	OF NEXT 12	2-SECOND N	NESSAGE							
	Figu	ire 30-10. M	essage Type 3	7 - Clock	k & Midi	Almanac		Figure 30-10. Message Type 37 - Clock & Midi Almanac					
20 2 2 1 1	The enhameric param	ators in the me	ccago tupo 10	and two	o 11 doc	criba tha arbit of tha		The ophemoric parameters in the message type 10 and type 11 describe the orbit of the	Pationalo #1				
50.5.5.1.1	transmitting SV during	the curve fit in	ssage type 10	e hours	The no	minal transmission interv	val	transmitting SV during the curve fit interval of three hours. The nominal transmission interval is	Rationale #1, ,				
	is two hours, and shall	coincide with t	the first two h	ours of t	the curv	e fit interval. The period	of	two hours, and shall coincide with the first two hours of the curve fit interval. The predicted					
	applicability for epher	neris data coinc	cides with the	entire tl	hree-hou	ur curve fit interval. Table	e	period of applicability for ephemeris data coincides with the entire three-hour curve fit interval.					
	30-I gives the definition	n of the orbital	parameters u	using ter	minolog	y typical of Keplerian		Table 30-I gives the definition of the orbital parameters using terminology typical of Keplerian					
	orbital parameters; it	is noted, howe	ver, that the t	ransmit	ted para	meter values are express	ed	orbital parameters; it is noted, however, that the transmitted parameter values are expressed					
	such that they provide	the best trajec	ctory fit in Eart	th-Cente	ered, Ear	th-Fixed (ECEF) coordinat	tes	such that they provide the best trajectory fit in Earth-Centered, Earth-Fixed (ECEF) coordinates for					
	for each specific fit interval. The user shall not interpret intermediate coordinate values as					ate coordinate values as		each specific fit interval. The user shall not interpret intermediate coordinate values as pertaining					
	pertaining to any conv	entional coord	inate system.					to any conventional coordinate system.					
30.3.3.1.1	N/A							The t _{oe} term shall provide the user with a convenient means for detecting any change in the	Rationale #1,				
								ephemeris representation parameters. The t_{oe} is provided in both message type 10 and 11 for the					

Section Number	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	Proposed Heading	URA Definition Proposed Text	Rationale
			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 t_{oc} and t_{oe} are defined in paragraph 30.3.4.4.	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} .		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 will assure the t_{oe} value for Block IIR-M/IIF and SS will assure the t_{oe} 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 30.3.4.5 for additional information regarding t_{oe} .	Rationale #1, Rationale #2
	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"		The CNAV messages-contain information that allows users to take advantage of situations when integrity is assured to the enhanced level. This is accomplished using a composite integrity assured URA value in conjunction with an integrity status flag. The composite integrity assured URA (IAURA) value is the RSS of an elevation-dependent function of the upper bound value of the URA _{ED} component and the upper bound 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	
	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.		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 current broadcast IAURA 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 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 current broadcast IAURA 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 _{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 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.		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.	
30.3.3.1.1.4	30.3.3.1.1.4 SV Accuracy.	Elevation- Dependent (ED)		

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					Accuracy				
30.3.3.1.1.4	Bits 66 through 70 of f (URA _{oe}) index of the S the ephemeris-related ephemeris message c ephemeris message c to the maximum URA	message type 10 V for the standa d user range accu urve fit interval. urve fit interval, _{oe} expected over) shall contain the rd positioning ser uracy index of the While the epher the URA _{oe} index the entire curve	e ephemeris User Range Accuracy rvice user. URA _{oe} index shall provide e SV as a function of the current neris-related URA may vary over the (N) in message type 10 shall correspond fit interval.		Bits 66 through 70 c Range Accuracy (UR provide the ED-relat URA may vary over index (N) in message ephemeris curve fit the edge of the SV f the SV along the SV	Rationale #1		
30.3.3.1.1.4	The URA _{oe} index is a si following relationship	e URA _{oe} index is a signed, two's complement integer in the range of +15 to -16 and has the owing relationship to the ephemeris URA:				The URA _{ED} index is a following relationsh	a signed, two's compleme nip to the ED URA:	nt integer in the range of +15 to -16 and has the	Rationale #1
	<u>URA_{oe} Index</u>	<u>URA_{oe} (meter</u>	<u>rs)</u>			<u>URA_{ED} Index</u>	<u>URA_{ED} (mete</u>	ers)	
	15	6144.00	< URA _{oe}			15	6144.00 < L	JRA _{ED} (or no accuracy prediction is available)	
	14	3072.00	< URA _{oe}	≤ 6144.00		14	3072.00 < L	$JRA_{ED} \leq 6144.00$	
	13	1536.00	< URA _{oe}	≤ 3072.00		13	1536.00 < U	JRA _{ED} ≤ 3072.00	
	12	768.00 <	$URA_{oe} \leq$	1536.00		12	768.00 < URA _{ED} ≤	s 1536.00	
	11	384.00 <	$URA_{oe} \leq$	768.00		11	384.00 < URA _{ED} ≤	5 768.00	
	10	192.00 <	$URA_{oe} \leq$	384.00		10	$192.00 < URA_{ED} \leq$	384.00	
	9	96.00 <	$URA_{oe} \leq$	192.00		9	$96.00 < URA_{ED} \leq$	192.00	
	8	48.00 <	$URA_{oe} \leq$	96.00		8	$48.00 < URA_{ED} \leq$	96.00	
	7	24.00 <	$URA_{oe} \leq$	48.00		7	$24.00 < URA_{ED} \leq$	48.00	
	6	13.65 <	$URA_{oe} \leq$	24.00		6	$13.65 < URA_{ED} \leq$	24.00	
	5	9.65 <	$URA_{oe} \leq$	13.65		5	9.65 < URA _{ED} ≤	13.65	
	4	6.85 <	$URA_{oe} \leq$	9.65		4	$6.85 < URA_{ED} \leq$	9.65	
	3	4.85 <	$URA_{oe} \leq$	6.85		3	$4.85 < URA_{ED} \leq$	6.85	
	2	3.40 <	$URA_{oe} \leq$	4.85		2	$3.40 < URA_{ED} \leq$	4.85	

IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces **URA Definition Proposed Text** Section Proposed Number Heading $2.40 < URA_{ED} \leq$ 3.40 1 2.40 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 3.40 1 0 $1.70 < URA_{ED} \leq$ 2.40 0 1.70 < $URA_{oe} \leq$ 2.40 $1.20 < URA_{ED} \leq$ -1 1.70 -1 1.20 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 1.70 -2 $0.85 < URA_{ED} \leq$ 1.20 -2 0.85 < $URA_{oe} \leq$ 1.20 -3 $0.60 < URA_{ED} \leq$ 0.85 0.60 -3 < $URA_{oe} \leq$ 0.85 $0.43 < URA_{ED} \leq$ -4 0.60 0.43 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.60 -4 -5 $0.30 < URA_{ED} \leq$ 0.43 0.30 < $URA_{oe} \leq$ 0.43 -5 -6 $0.21 < URA_{ED} \leq$ 0.30 0.21 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.30 -6 -7 $0.15 < URA_{ED} \leq$ 0.21 0.15 < $URA_{oe} \leq$ 0.21 -7 $0.11 < URA_{ED} \leq$ -8 0.15 0.11 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.15 -8 -9 $0.08 < URA_{ED} \leq$ 0.11 0.08 < $\mathsf{URA}_{\mathsf{oe}} \leq$ -9 0.11 -10 $0.06 < URA_{ED} \leq$ 0.08 0.06 < $URA_{oe} \leq$ 0.08 -10 -11 $0.04 < URA_{ED} \leq$ 0.06 0.04 < $URA_{oe} \leq$ -11 0.06 -12 $0.03 < URA_{FD} \leq$ 0.04 0.03 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.04 -12 -13 $0.02 < URA_{ED} \leq$ 0.03 0.02 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.03 -13 $0.01 < URA_{ED} \leq$ 0.02 -14 0.01 < $URA_{oe} \leq$ 0.02 -14 URA_{ED} ≤ -15 0.01 -15 $URA_{oe} \leq$ 0.01 -16 No accuracy prediction available-use No accuracy prediction available-use at own risk -16 For each URA_{ED} index (N), users may compute a nominal URA • If the value of N is 6 or less, but more than -16, $X = 2^{(1+1)}$ Integrity properties of the URA are specified with respect to the upper bound values of the URA index (see 20.3.3.1). • 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 accura standard positioning service user to use that SV at his own ris

	Rationale
e at own risk	
A _{ED} value (X) as given by:	
N/2)	
) ,	
acy prediction and shall advise the sk.	

Section	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	Proposed	URA Definition Proposed Text	Rationale
Number		Heading		
			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 IAURA _{ED} are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the broadcast URA _{ED} index (see 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 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 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.	

Section Number	IS-GPS-200 Rev	E Navstar GPS Space Segm	nent/Navig	ation Use	r Interface	S	Proposed Heading	URA Definition Proposed Text						Rationale
30.3.3.1.3		Table 30-I. Message Ty	pes 10 and 11	Parameters	(1 of 2)					Rationale #1				
		Parameter	Scale Scale No. of Factor Effective Bits** (LSB) Range***		Units		Parameter		No. of Bits**	Scale Factor (LSB)	Effective Range***	Units		
	WN	Week No.	13	1		weeks		WN	Week No.	13	1		weeks	
	URA _{OE} Index	SV accuracy	5*			(see text)		URA _{ED} Index	ED Accuracy Index	5*			(see text)	
	Signal health (L1/L2/L5)		3	1		(see text)		Signal health (L1/L2/L5)		3	1		(see text)	
	t _{op}	Data predict time of week	11	300	604,500	seconds		t _{op}	Data predict time of week	11	300	604,500	seconds	
	?A****	Semi-major axis difference at reference time	26*	29		meters		?A****	Semi-major axis difference at reference time	26*	2-9		meters	
	• A	Change rate in semi-major axis	25*	2 ⁻²¹		meters/sec		• 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	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		• ?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		M _{0-n}	Mean anomaly at reference time	33*	2-32		semi-circles	
	e _n	Eccentricity	33	2-34	0.03	dimensionless		e _n	Eccentricity	33	2-34	0.03	dimensionless	
	ω _n	Argument of perigee	33*	2-32		semi-circles		ω _h	Argument of perigee	33*	2-32		semi-circles	
	* Para	ameters so indicated are two's com ** See Figure 30-1 for com ss otherwise indicated in this colum indicated bi **** Relative to	plement, with plete bit alloc nn, effective ra t allocation ar $A_{REF} = 26,55$	n the sign bit cation in Mes ange is the m nd scale facto 9,710 meters	(+ or -) occup sage Type 10 aximum rang or. s.	ying the MSB;		* Para *** Unles	ameters so indicated are two's com ** See Figure 30-1 for con ss otherwise indicated in this colum indicated bi **** Relative to	plement, with plete bit alloc nn, effective r it allocation a $0 A_{RFF} = 26,55$	h the sign bit cation in Mes ange is the n nd scale facto 19,710 meters	(+ or -) occup ssage Type 10 naximum rang or. s.	bying the MSB;); re attainable with	10

Section Number	IS-GPS-200 Re	ev E Navstar GPS Space Segment/Na	vigation	User Into		Proposed Heading	URA Definition Proposed Text			
303323		Table 30-III Clock Correcti	ion and Ac	curacy Para	meters				Table 30-III Clock Correct	ion and A
50.5.5.2.5				Scale						
		Parameter	No. of Bits**	Factor (LSB)	Effective Range***	Units			Parameter	No. of Bits**
	t _{oc}	Clock Data Reference Time of Week	11	300	604,500	seconds		t _{oc}	Clock Data Reference Time of Week	11
	URA_{∞} Index	SV Clock Accuracy Index	5*			(see text)		URA _{NED} Index	NED Accuracy Index	5*
	$URA_{\infty 1}$ Index	SV Clock Accuracy Change Index	3			(see text)		писх	NED Accuracy Change Index	3
	$URA_{\infty 2}$ Index	SV Clock Accuracy Change Rate Index	3	(0)		(see text)	URA _{NEDI} Index		3	
	a _{f2-n}	SV Clock Drift Rate Correction Coefficient	10*	2^{-60}		sec/sec ²		URA _{NED2} Index	NED Accuracy Change Rate Index	10*
	a _{fl-n}	SV Clock Drift Correction Coefficient	20*	2		sec/sec		пасх		20*
	a _{f0-n}	SV Clock Bias Correction Coefficient		a _{f2-n}	SV Clock Drift Rate Correction Coefficient	26*				
	*	Parameters so indicated are two's complemen See Figure 30-3 through 30-10 for comple	t, with the	sign bit (+ c		a _{f1-n}	SV Clock Drift Correction Coefficient			
	*** U	Juless otherwise indicated in this column, effec	tive range	is the maxi		a _{f0-n}	SV Clock Bias Correction Coefficient			
						*** [Juless otherwise indicated in this column, effectively indicated bit alloca	tion and s		
30.3.3.2.4	30.3.3.2.4 SV	Clock Accuracy Estimates.					Non- Elevation- Dependent (NED) Accuracy Estimates.			
30.3.3.2.4	Bits 50 throug shall contain t (reference par together with of the SV as a correction pol	h 54, and 55 through 57, and 58 thro he URA _{oc} Index,URA _{oc1} Index, and UF ragraph 6.2.1) for the standard positi URA _{oc1} Index and URA _{oc2} Index shall function of time since the prediction ynomial terms.	ough 60 RA _{oc2} Ind ioning se give the I (t _{op}) use	of messag ex, respec ervice use clock-rela ed to gen	ge types 30 t ctively, of the r. The URA _o ated user rar erate the up	hrough 37 e SV c Index nge accuracy loaded clock		Bits 50 throug contain the no Index, respect The following Index shall giv clock/epheme footprint, the the current clo worst-case loc	h 54, and 55 through 57, and 58 through on-elevation-dependent (NED) compon- ively, of the SV (reference paragraph 6 equations together with the broadcast e the clock-related user range accurace ris fit interval. While the actual NED re IAURA _{NED} calculated using the parameter ock/ephemeris fit interval shall bound action within the satellite footprint at t	gh 60 of ent URA 2.1) for URA _{NEDU} Of-IAUI lated UF ers in m the maxi hat insta

_				
				Rationale
с	curacy Parai	neters		Rationale #1
	Scale Factor (LSB)	Effective Range***	Units	
	300	604,500	seconds	
			(see text)	
			(see text)	
			(see text)	
	2-60		sec/sec ²	
	2 ⁻⁴⁸		sec/sec	
	2-35		seconds	
; c c	ale factor.	ssage types 30 to		
I A _l i 0 R R R R I I I I I I I I I I I I I I I	message ty _{NEDO} Index, I the standa Index, UR, A _{NED} over t A may vary essage type mum IAUR nt.	vpes 30 throu URA _{NED1} Index rd positionin A _{NED1} Index, a the current y over the sat e 10 at each i A _{NED} expected	gh 37 shall k, and URA _{NED2} g service user. Ind URA _{NED2} cellite nstant during d for the	

Section Number	IS-GPS-200 Rev E Nav	vstar GPS Space	Segment/Naviga	tion User Interfaces	Proposed Heading	URA Definitio	on Proposed Text				Rationale		
30.3.3.2.4	The user shall calculat	te the clock-rela	ted URA with the	equation (in meters);		The user shal	I calculate the NED-	related URA	with the	equation (in meters);	Rationale #1		
	URA _{oc} = URA _{or}	_{cb} + URA _{oc1} (t - t _o	_p) for t-t _{op} <	93,600 seconds		IAURA _{NED}	$= URA_{NED0} + URA_{f}$ $= URA_{NED0} + URA_{f}$	_{NED1} (t - t _{op}) _{NED1} (t - t _{op}) +	URA _{NED2} (for t-t _{op} < 93,600 seconds (t - t _{op} - 93,600) ² for t-t _{op} > 93,600 seconds			
	URA _{oc} = URA _{or} seconds	_{cb} + URA _{oc1} (t - t _o	_p) + URA _{oc2} (t - t _{op}	$-93,600)^2$ for $t-t_{op} > 93,600$		where	where						
	where					t	t = GPS time (must account for beginning or end of week crossovers),						
	t = GPS time (t = GPS time (must account for beginning or end of week crossovers),					= time of week o	f the state es	timate u	tilized for the prediction of satellite clock			
	t _{op} = time of v correction parameter	I for the prediction of satellite clock		/ep	/ephemeris parameters.								
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 t 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 c equations, re clock/epheme	The CS shall derive URA _{NED0} , URA _{NED1} , and URA _{NED2} indexes which, when used together in the above equations, results in the minimum IAURA _{NED} that is greater than the predicted IAURA _{NED} during the clock/ephemeris fit interval.						
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 to the clock-related user derived URA _{ocb} :				The user shal signed, two's the URA _{NEDO} v	The user shall use the broadcast URA_{NED0} index to derive 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 relationship to the URA_{NED0} value:							
	<u>URA_{oc} Index</u>	<u>URA_{ocb} (mete</u>	ers)			URA _{NED0} Index	x URA _{NEDO.}	(meters)					
	15	6144.00	< URA _{oct}			15	6144.00	< URA _{NED0}	(or n	o accuracy prediction is available)			
	14	3072.00	< URA _{oct}	, ≤ 6144.00		14	3072.00	< URA _{NED0}	≤ 6144.	00			
	13	1536.00	< URA _{oct}	, ≤ 3072.00		13	1536.00	< URA _{NED0}	≤ 3072.	00			
	12	768.00 <	$URA_ocb \leq$	1536.00		12	768.00	< URA _{NED0}	≤	1536.00			
	11	384.00 <	URA_ocb \leq	768.00		11	384.00	< URA _{NED0}	≤	768.00			
	10	192.00 <	$URA_ocb \leq$	384.00		10	192.00	< URA _{NED0}	≤	384.00			
	9	96.00 <	$URA_{ocb} \leq$	192.00		9	96.00	< URA _{NED0}	≤	192.00			
	8	48.00 <	$URA_{ocb} \leq$	96.00		8	48.00	$< URA_{NED0}$	≤	96.00			
	7	24.00 <	$URA_ocb \leq$	48.00		7	24.00	< URA _{NED0}	≤	48.00			
	6	13.65 <	URA_ocb \leq	24.00		6	13.65	< URA _{NED0}	≤	24.00			

Section	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces		Proposed URA Definition Proposed Text						Rationale			
Number						Heading						
	5	9.65	<	$URA_{ocb} \leq$	13.65		5	9.65	< URA _{NED0}	٤	13.65	
	4	6.85	<	URA_ocb \leq	9.65		4	6.85	< URA _{NED0}	≤	9.65	
	3	4.85	<	$URA_ocb \leq$	6.85		3	4.85	< URA _{NED0}	≤	6.85	
	2	3.40	<	$URA_ocb \leq$	4.85		2	3.40	< URA _{NED0}	≤	4.85	
	1	2.40	<	URA_ocb \leq	3.40		1	2.40	< URA _{NED0}	≤	3.40	
	0	1.70	<	$URA_ocb \leq$	2.40		0	1.70	< URA _{NED0}	≤	2.40	
	-1	1.20	<	$URA_ocb \leq$	1.70		-1	1.20	< URA _{NEDO}	≤	1.70	
	-2	0.85	<	URA_ocb \leq	1.20		-2	0.85	< URA _{NED0}	≤	1.20	
	-3	0.60	<	$URA_{ocb} \leq$	0.85		-3	0.60	< URA _{NED0}	≤	0.85	
	-4	0.43	<	URA_ocb \leq	0.60		-4	0.43	< URA _{NED0}	≤	0.60	
	-5	0.30	<	URA_ocb \leq	0.43		-5	0.30	< URA _{NEDO}	≤	0.43	
	-6	0.21	<	URA_ocb \leq	0.30		-6	0.21	< URA _{NED0}	≤	0.30	
	-7	0.15	<	$URA_{ocb} \leq$	0.21		-7	0.15	< URA _{NED0}	≤	0.21	
	-8	0.11	<	$URA_ocb \leq$	0.15		-8	0.11	< URA _{NEDO}	≤	0.15	
	-9	0.08	<	URA_ocb \leq	0.11		-9	0.08	< URA _{NED0}	≤	0.11	
	-10	0.06	<	URA_ocb \leq	0.08		-10	0.06	< URA _{NEDO}	≤	0.08	
	-11	0.04	<	URA_ocb \leq	0.06		-11	0.04	< URA _{NED0}	≤	0.06	
	-12	0.03	<	URA_ocb \leq	0.04		-12	0.03	< URA _{NED0}	≤	0.04	
	-13	0.02	<	URA_ocb \leq	0.03		-13	0.02	< URA _{NED0}	≤	0.03	
	-14	0.01	<	$URA_{ocb} \leq$	0.02		-14	0.01	< URA _{NED0}	≤	0.02	
	-15			$URA_ocb \leq$	0.01		-15			≤	0.01	
	-16			No accuracy p	prediction available-use at own risk		-16	No accura	icy predictior	n available	-use at own risk	
30.3.3.2.4	The user may use the	upper bo	ound va	llue in the URA _{oc}	, range corresponding to the broadcast		For each URA _{NEDO} ind	lex (N), users	may compute	e a nomina	al URA _{NEDO} value (X) as given by:	Rationale #3-

Section Number	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	Proposed Heading	URA Definition Proposed Text	Rationale
Number		neauing		
	index, thereby calculating the maximum URA_{oc} that is equal to or greater than the CS		• If the value of N is 6 or less, but more than -16, $X = 2^{(1 + N/2)}$,	There is a typo
	predicted URA _{oc} , or the user may use the lower bound value in the range which will provide		• If the value of N is 6 or more, but loss than 15, $X = 2^{(N-2)}$	that needs be
	the minimum URA _{oc} that is equal to or less than the CS predicted URA _{oc} .		• If the value of N is 6 of more, but less than 15, $x = 2^{n}$,	corrected in
			• N = -16 or N = 15 shall indicate the absence of an accuracy prediction and shall advise the	computing
	Integrity properties of the URA are specified with respect to the upper bound values of the		standard positioning service user to use that SV at his own risk.	URA, or all
	URA index (see 20.3.3.1). The transmitted URA _{oc1} Index is an integer value in the range 0 to 7.		For N = 1.3 and 5.X should be rounded to 2.8.5.7 and 11.3 meters respectively.	user URA
	URA _{oc1} Index has the following relationship to the URA _{oc1} :			far too large
	1		The nominal URA _{NEDO} value (X) shall be suitable for use as a conservative prediction of the RMS	Using the
	$URA_{oc1} = 2^{N}$ (meters/second)		NED range errors for accuracy-related purposes in the pseudorange domain (e.g., measurement	erroneous
			de-weighting RAIM, FOM computations). Integrity properties of the IAURA _{NED} are specified with	value will
	where		respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the	result in a
	N = 4 + URA _{oc1} Index.		URA _{NED0} index, URA _{NED1} index, and URA _{NED2} index (see 30.3.3.1.1).	minimum
			URA _{NEDO} accounts for zeroth order SIS-contributions to user range error which include, but are not	value of
	The transmitted URA_{oc2} index is an integer value in the range 0 to 7. URA_{oc2} index has the		limited to, the following: LSB representation/truncation error; the net effect of clock correction	URAoc1 that
	following relationship to the URA _{oc2} :		polynomial error and code phase error in the transmitted signal for single-frequency L1C/A or	will prevent
	$\frac{1}{2^{N}}$ (single-frequency L2C users who correct the code phase as described in Section 30.3.3.3.1.1.1; the	the Space and
	$URA_{oc2} = 2$ (meters/second ²)		net effect of clock parameter, code phase, and inter-signal correction error for dual-frequency	Control
	where		L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section	segments from
	$N = 25 + URA_{oc2}$ Index.		30.3.3.3.1.1.2; radial ephemeris error; anisotropic antenna errors; and signal deformation error.	meeting their
			URA _{NED} does not account for user range contributions due to the inaccuracy of the broadcast	performance
			ionospheric data parameters used in the single-frequency ionospheric model or for other	requirements.
			atmospheric effects.	requirementoi
			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:	Rationale #5
			1	
			$\frac{1}{2^{N}}$	
			$URA_{NED1} = 2$ (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} :	
			$\frac{1}{N}$	
			$URA_{NED2} = 2^{N}$ (meters/second2)	

Section	IS-GPS-200 Rev E Navstar GPS Space Segment/Navigation User Interfaces	Proposed	URA Definition Proposed Text	Rationale
Number		Heading		
			where	
			N = 28 + URA _{NED2} Index.	
30.3.4.4	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 t _{oc} 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 hourly boundaries except for the first data set of a new 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. <u>Normal Operations</u> . The message type 10, 11, and 30-37 data sets are transmitted by the SV for periods of two hours.	Rationale #2- URA components (URA _{ED} and URA _{NED}) from different upload 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	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	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed Heading	URA Definition Proposed Text	Rationale
Section Number 20.3.3	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces 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 6-second message. An "alert" flag, when raised (bit 38 = "1"), indicates to the user that the SV User Range Accuracy (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.	Proposed Heading	URA Definition Proposed Text 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 6-second message. An "alert" flag, when raised (bit 38 = "1"), indicates to the user that the signal-URA components may be worse than indicated in the associated-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.	Rationale Rationale #5- There are numerous inconsistenci es between ICDs and clarifications and additions that are needed for the users to compute URA. These changes resolve the inconsistenci es between the ICDs so that users may properly compute
				compute URA.

Section	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed	URA Definition Proposed Text
Number		Heading	
20.3.3	Image: State of the state		DIRECTION OF DATA FLOW FROM SV 100 BITS 2 SECONDS 1 9 15 21 18 BITS 10 11 BITS 10 10 BITS 12 SECONDS 10 BITS 12 SECONDS 10 BITS 2 SECONDS 10 10 10 BITS 2 SECONDS 10 10 BITS 2 SECONDS 10 10 BITS 2 SECONDS 10 BITS 2 SECONDS 10 10 BITS 2 SECONDS 10 BITS 2 SECONDS 10 10 BITS 2 SECONDS 10 BITS 2 SECONDS 10 10 BITS 2 SECONDS 10 BITS 2 SECONDS 10 10 BITS 2 SECONDS 10 BITS 2 SECONDS 10 10 BITS 2 SECONDS 10 BITS 10

	Rationale
MSB FIRST	Rationale #1-
>	URA _{oc} and
66 71 82	URA _{ce} are
- ^{toe} ΔA	redefined
BITS 19 MSBs	into an
	elevation-
	dependent
	component
MSB FIRST	(URA _{ED}) and
170	a non-
	elevation-
28 MSBs	dependent
2011/020	component
	(URA _{NFD}).
	This will
	enable users
272 277	to de-weight
CRC CRC	the
24 BITS	elevation-
	angle-
	dependent
	component
T 6 SECOND MESSAGE	with the
•	elevation
	angle of the
	SV, resulting
emeris 1	in a smaller
	composite
	URA, in
	many cases.
	A smaller
	composite
	URA means
	higher
	availability
	for
	applications
	that have

Section	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed	URA Definition Proposed Text
Number		Heading	

Rationale
requirement
s for a
minimum
level of
accuracy
and/or
integrity. In
order to
achieve a
technical
consensus
on how to
proceed
forward with
GPS IIIA
deriving URA
from the
uploaded
covariance,
then the
following
changes
were needed
to the user
ICDs.

Section Number	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed URA Definition Proposed Text Heading	Rationale
Number 20.3.3	DIRECTION OF DATA FLOW FROM SVMSB FIRST	DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 2 SECONDS 100 BITS 2 SECONDS 1 9 15 21 38 39 50 55 58 61 72 98 1 9 15 21 00 COUNT* 8 BITS BITS 17 BITS 11 BITS 26 BITS 11 BITS BITS 17 BITS 11 BITS 26 BITS MESSAGE TYPE ID PREAMBLE "ALERT" FLAG - 1 BIT URANED INDEX attan-3 MSBs 100 BITS 2 SECONDS 100 BITS 2 SECONDS 11 BITS 2 C BITS 11 BITS 2 C BITS 15 C C COUNT* 16 C COUNT* 17 DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 2 SECONDS 100 BITS 2 SECONDS	Rationale #1
	aft-n aft2n TGD ISCL1CA ISCL2C ISCL555 ISCL505 α0 17 LSBs 10 BITS 13 BITS 13 BITS 13 BITS 13 BITS 13 BITS 13 BITS 8 BITS	101 118 120 141 154 167 180 193 a _{f1-n} a _{f2-n} T _{GD} ISC _{L1C/A} ISC _{L2C} ISC _{L505} ISC _{L505} α ₀ 17 LSBs 10 BITS 13 BITS	
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
	Figure 20-3. Message type 30 - Clock, IONO & Group Delay	Figure 20-3. Message type 30 - Clock, IONO & Group Delay	

Section	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed URA Definition Proposed Text
Number		Heading
20.3.3	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	DIRECTION OF DATA FLOW FROM 100 BITS 2 SECONDS 1 9 15 21 39 50 55 58 1 9 15 21 39 50 55 58 1 9 15 21 39 50 55 58 1 9 RESSAGE TYPE ID PREAMBLE "ALERT" FLAG - 1 BIT URANED INDEX MESSAGE TYPE ID URANED INDEX 100 BITS 2 SECONDS 100 BITS 2 SECONDS 101 118 128 141 149 101 118 128 141 149 101 118 128 141 149 101 118 128 13 BITS 8 BITS 31 17 LSBs 10 BITS 13 BITS 8 BITS 31
	DIRECTION OF DATA FLOW FROM SV — MSB FIRST 100 BITS 2 SECONDS	DIRECTION OF DATA FLOW FROM DIRECTION OF DATA FLOW FROM 100 BITS 2 SECONDS 201 211 242 Reduced Almanac Reduced Almana Packet 3 Packet 4
	201 211 242 273 277	10 LSBs 31 BITS 31 BITS
	Packet 3 Packet 4 4 4	Reduced Almanac Packet 2
	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 6-SECOND MESSAGE	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NE Figure 20-4. Message type 31 - Clock
	Figure 20-4. Message type 31 - Clock & Reduced Almanac	



Section	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed URA Definition Proposed Text	Rationale
Number		Heading	
20.3.3	DIRECTION OF DATA FLOW FROM SVMSB FIRST 100 BITS2 SECONDSMSB FIRST 100 BITS2 SECONDS 1 9 15 21 39 50 55 58 61 72 98 1 9 15 21 39 50 55 58 61 72 98 1 00 COUNT* top	DIRECTION OF DATA FLOW FROM SVMSB FIRST	Rationale #1
	DIRECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 2 SECONDS		
		$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	
	$a_{f_{1-n}}$ $a_{f_{2-n}}$ t_{EOP} PM-X PM-X PM-Y	17 LSBs 10 BITS 16 BITS 21 BITS 15 BITS 21 BITS	
	17 LSBs 10 BITS 16 BITS 21 BITS 15 BITS 21 BITS		
	◄ DIRECTION OF DATA FLOW FROM SV MSB FIRST	DIRECTION OF DATA FLOW FROM SV MSB FIRST MSB FIRST 100 BITS 2 SECONDS	
		PM-Y AUT1 AUT1 RESERVED CRC	
	201 216 247 266 277	15 BITS 31 BITS 19 BITS 11 BITS 24 BITS	
	PM-Y $\Delta UT1$ RESERVED CRC 15 BITS 31 BITS 19 BITS 11 BITS 24 BITS	* MESSAGE TOW COLINT = 17 MSB OF ACTUAL TOW COLINT AT START OF NEXT 6-SECOND MESSAGE	
	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 6-SECOND MESSAGE	Figure 20-5. Message type 32 - Clock & EOP	
	Figure 20-5. Message type 32 - Clock & EOP		

Section Number	IS-GPS-705 Rev	A L5 SS and	Nav User Segm	ent Interface	Proposed Heading	URA Definition Proposed Text								
								1	incoding					
20.3.3	←		DIRECTI 	ON OF DATA FLC BITS — 2 S		←		DIRECT	ION OF DATA F BITS	LOWIT				
	1 9 PRN 6 8 BITS BITS MES PREAMBLE "/	15 21 6 BITS AGE TYPE ID LERT" FLAG - 1	AESSAGE W COUNT* 17 BITS BIT	38 39 50 55 58 61 72 top top top top top aton 11 BITS BITS 11 BITS 26 BITS URAoc INDEX URAoc INDEX - 3 BITS URAoc INDEX atton - 3 MSBs				98 a _{t0-n} 6 BITS	1 9 15 21 38 50 5 HFRN MESSAGE TOWCOUNT* t _{cr} 5 8 BITS BITS BITS 17 BITS 11 BITS BITS MESSAGE TYPE ID Image: state s					
	▲		DIRECTI 100 B	ON OF DATA FLC										
	101	118 128 144			157 164 172 188			188				URECT	BITS <u>2</u>	SECON
	a _{f1-n} 17 LSE	a _{f2-n} As 10 BITS	A _{0-n} 16 BITS	А _{1-n} 13ВПS	A _{2-n} 7 BITS	Δt _{LS} 8 BITS	t _{ot} 16 BITS	WN _α		101	118	128	144	157
										17 LSBs	an 10 BTS	70-1 16 BITS	13BTS	78
	↓		——— DIRECTI	ON OF DATA FLC	T									
	201	214 218	226				277			 ←		DIRECT	10N OF DATA F	LOWFF
	WN _{LSF}	DN <u>At</u> LSF		RESERVED				CRC		 €		100	BIS 2	SECC1
	13 BITS	BITS 8 BITS		51 BITS				24 BITS		201 2	14 218 1	226		
	* MESSAGE TOW	COUNT = 17 MSI	B OF ACTUAL TOW		13 BITS B	4 ITS 8BITS		51 BITS]					
	Figure 20-6. M	essage type 3	33 - Clock & UT(C		* MESSAGE TOWOO	CUNT=17MSE	BOFACTUALTO/	VCCUNT AT ST.	4rtof				
											F	igure 20-6. I	Message ty	pe 33

						Rationale
						nationale
					1	
RON	1SV —	— M	38 FIRST —			Rationale #1
58	61	72		98		
	t_{∞}		a _{10-r}			
	11 BITS		26 BIT	S		
Ł	- URANED	2 INDEX	-3BITS	t		
– U	Ra _{nedi} IN	DEX-31	BITS	21/60-		
			đ 1-n-			
	19/	M	BARST-		I	
NDS						
7	164	172		188		
4 _{2-n}	Atis		ta	WNL		
	8BITS	14		12 DITC		
	OBIIC	K		130113	,	
RO1	1SV —	— ME	BARST —			
NDS				>		
			277			
				OFIC		
			2	4BITS		
			<u> </u>			
-NE	XT6-SEO	ONDME	SSAGE			
3 - (Clock 8	utc				

Section	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed	URA Definition Proposed Text
Number		Heading	
20.3.3	DIRECTION OF DATA FLOW FROMSV MSBFIRST 100 BITS 2 SECONDS 2 SECONDS 1		DIFECTION OF DATA FLOW FROM 100 BITS 2 SECONDS 1 9 15 21 10 BITS 2 SECONDS 1 9 15 21 10 BITS 2 SECONDS 1 9 15 21 10 BITS 1 7 BITS 1 11 BITS 1 BITS 1 11 BITS 1 BITS 1 11 BITS 1 11 BITS 2 SECONDS 1 00 BITS 2 SECONDS 1 01 1118 128 139 151 1 00 BITS 2 SECONDS 1 01 1118 128 139 151 1 01 1118 128 139 151 1 0 BITS 1 11 BITS 1 11 BITS 2 SECONDS 1 01 1118 128 139 151 1 0 BITS 2 SECONDS 1 01 1118 128 139 151 1 0 BITS 2 SECONDS 1 01 118 128 139 151 1 0 BITS 2 SECONDS 1 01 118 128 139 151 1 0 BITS 2 SECONDS 1 01 118 128 139 151 1 0 BITS 2 SECONDS 2 SECONDS 1 01 118 128 139 151 1 0 BITS 2 SECONDS 2 SECONDS 2 01 EDC 7 6 LSBs * MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF N CDC = Clock Differential Correction EDC = Ephemeris Differential Correction Figure 20-7. Message type 34 - Clock

				Rationale
//sv	MSB FIRST			Rationale #1
)			1	
61 +	72	98		
∞ 11 BITS	261			
	EX - 3 BITS]		
IRA _{NED1} INDEX	- 3BITS			
	di			
//sv	MSB FIRST			
CDC		185 EDC		
34 BITS		16 MSBs		
		TO MICES	J	
//sv	MSB FIRST		4	
;				
	277			
		CRC		
		24 BITS		
JEXT 6-SECON	D MESSAGE	:		
& Difforo	ntial Cor	rection		
& Differe		Tection		

Section	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed URA Definition Proposed Text	Rationale
Number		Heading	
20.3.3	DIRECTION OF DATA FLOW FROM SV	DIRECTION OF DATA FLOW FROM SV — MSB F	Rationale #1
	1 9 15 21 38 39 50 55 58 61 72 98 PRN MESSAGE TOW COUNT* top top top top atom 8 BITS BITS BITS 17 BITS 11 BITS BITS 11 BITS 26 BITS MESSAGE TYPE ID Image: NDEX Image: NDEX - 3 BITS Image: NDEX - 3 BITS Image: NDEX - 3 BITS PREAMBLE "ALERT" FLAG-1 BIT UPAge: NDEX Image: NDEX Image: NDEX Image: NDEX	1 9 15 21 38 39 50 55 58 61 72 PRN MESSAGE TOW COUNT* top toc toc 11 BITS 10 0 <td< th=""><th>98 a_{10-n} 26 BITS BITS S a_{11-n} - 3 MSBs</th></td<>	98 a _{10-n} 26 BITS BITS S a _{11-n} - 3 MSBs
	DIRECTION OF DATA FLOW FROM SV MSB FIRST	Image: Distribution of data flow from sv MSB F Image: Distribution of data flow from sv MSB F Image: Distribution of data flow from sv MSB F Image: Distribution of data flow from sv MSB F Image: Distribution of data flow from sv MSB F Image: Distribution of data flow from sv MSB F Image: Distribution of data flow from sv MSB F Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow flow from sv Image: Distribution of data flow from sv Image: Distribution of data flow flow flow flow flow flow flow flow	-IRST
	101 118 128 144 157 159 176 189 196 art-n are-n t_GGTC WNgGTO AogGTC Aregto AegGTC Aregto Aregdo	att-n att-n t _{GGTO} WN _{GGTO} AoggTO A 17 LSBs 10 BITS 16 BITS 13 BITS 16 BITS 13	Arggto Aggto 3 BITS 7 BITS 5 BITS RESERVED
	GNSSID-3 BITS	GINSS ID – 3 BITS	FIRST
	DIRECTION OF DATA FLOW FROMSV — MSB FIRST — 100 PUTS — 0 CE CONIDO — MSB FIRST — 100 PUTS — 10	201 277	7
		RESERVED 76 BITS	CRC 24 BITS
	RESERVED CRC 76 BITS 24 BITS	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 6-SECOND MESSA	AGE
	* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 6-SECOND MESSAGE	Figure 20-8. Message type 35 - Clock & GGTO	,
	Figure 20-8. Message type 35 - Clock & GGTO		

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Number										Heading						
Number 20.3.3	DIFECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 2 SECONDS 100 BITS 11 BITS 11 BITS 2 SECONDS N ESSAGE TYPE ID URA _{vc} INDEX - 3 BITS MESSAGE TYPE ID URA _{vc} INDEX - 3 BITS MERAMBLE "ALERT" FLAG-1 BIT URA _{vc} INDEX - 3 BITS DIFECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 2 SECONDS 101 118 128 100 BITS 2 SECONDS 101 118 TEXT MESSAGE (18 & BIT CHAR) 101 118 TEXT MESSAGE (18 & BIT CHAR) 101 118 128 101								Heading	1 9 8 BITS 1 9 PREAMBLE 101 17	15 PRN 6 6 BITS BITS VESSAGE TYF "ALERT" FL 118 atim 118 128Bs 1	21 TOW 17 PE ID AG - 1 BT a _{l2n} 0 BITS		ECTION OF D 00 BITS	ATA FLOW FRC 2 SECOND 50 55 58 5 BITS BITS RA _{NED} INDEX ATA FLOW FRC 73 ATA FLOW FRC	
	DIFECTION OF DATA FLOW FROM SV MSB FIRST 100 BITS 2 SECONDS 276 277 TEXT MESSAGE (18 & BIT CHAR) 71 LSBs TEXT PAGE RESERVED - 1 BIT * MESSAGE TOW COUNT = 17 MSBs OF ACTUAL TOW COUNT AT START OF NEXT 6 SECOND MESSAGE Eigure 20-9 Message type 36 - Clock & Text										▲ 201 * MESSAGE 1	°CW COUNT =	TEXT 17 MSBs Fig	MESSAGE (71 LSB: COF ACTUAL	00 BITS 188-BIT CHA 3 TOW COUN 9. Messa	2 SECOND R) TAT START OF age type 36
	Figure 20-9. Mess	age type	30 - CIOCK &	lext												



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20.3.3	DIRECTION OF DATA FLOW FROM SV 100 BITS 2 SECONDS J38	- MSB FIRST		DIRECTION OF DATA FLOW DIRECTION OF DATA FLOW 100 BITS 2 SEC 138
	1 9 15 21 39 50 55 58 61 PRN MESSAGE TOW COUNT* top top top top 11 BITS 11 <td>72 98 ato-n 26 BITS 26 BITS 3 BITS 3 BITS att-n - 3 MSBs</td> <td></td> <td>1 9 15 21 39 50 5 PRN MESSAGE TOW COUNT* top 5 5 8 BITS BITS BITS 17 BITS 11 BITS BITS MESSAGE TYPE ID MESSAGE TYPE ID URANED IND</td>	72 98 ato-n 26 BITS 26 BITS 3 BITS 3 BITS att-n - 3 MSBs		1 9 15 21 39 50 5 PRN MESSAGE TOW COUNT* top 5 5 8 BITS BITS BITS 17 BITS 11 BITS BITS MESSAGE TYPE ID MESSAGE TYPE ID URANED IND
	DIRECTION OF DATA FLOW FROM SV DIRECTION OF DATA FLOW FROM SV DIRECTION OF DATA FLOW FROM SV		DIRECTION OF DATA FLOW DIRECTION OF DATA FLOW 100 BITS 2 SEC	
	101 118 128 141 149 155 158 169 ar1-n ar2-n WNa-n toa PRNa e 111<	180 191 δ Ω √A BITS 11 BITS 10 MSBs		101 118 128 141 149 153 aff-n ar2-n WNa-n toa PRNa 17 LSBs 10 BITS 13 BITS 8 BITS 6 BITS
	L1 HEALTH – 1 BIT – L2 HEALTH – 1 BIT – L5 HEALTH – 1 BIT –		L2 HEALTH – 1 BIT L5 HEALTH – 1 BIT DIRECTION OF DATA FLOW	
	DIRECTION OF DATA FLOW FROM SV	- MSB FIRST		<u>201 208 224 240</u>
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			Ω ₀ ω M ₀ 7 LSBs 16 BITS 16 BITS 16 BITS
	* MESSAGE TOW COUNT = 17 MSBs OF ACTUAL TOW COUNT AT START OF NEXT 6-SECON	ID MESSAGE		* MESSAGE TOW COUNT = 17 MSBs OF ACTUAL TOW COUNT AT STAR Figure 20-10. Message Type 37 - Cloc
	Figure 20-10. Message Type 37 - Clock & Midi Almanac			
20.3.3.1.1	The ephemeris parameters in the message type 10 and type 11 describe SV during the curve fit intervals of three hours. The nominal transmission shall coincide with the first two hours of the curve fit interval. The period ephemeris data coincides with the entire three-hour curve fit interval. Ta of the orbital parameters using terminology typical of Keplerian orbital p however, that the transmitted parameter values are expressed such that trajectory fit in Earth-Centered, Earth-Fixed (ECEF) coordinates for each s	the orbit of the transmitting in interval is two hours, and of applicability for able 20-I gives the definition arameters; it is noted, they provide the best pecific fit interval. The user		The ephemeris parameters in the message type 10 and transmitting SV during the curve fit interval of three h is two hours, and shall coincide with the first two hour predicted period of applicability for ephemeris data co curve fit interval. Table 30-I gives the definition of the typical of Keplerian orbital parameters; it is noted, ho values are expressed such that they provide the best
	shall not interpret intermediate coordinate values as pertaining to any co	nventional coordinate		Fixed (ECEF) coordinates for each specific fit interval

							Rationale
V FRO	MSV -		- MSB	FIRST			Rationale #1
CONDS	S —						
5 58	61		72		98		
	1	t _{oc}		a _{f0-n}			
	11	BITS		26 BITS			
Ĩ.	— UR/		DEX - :	3 BITS	1		
EX	JRANED		- 3 BI	a _{f1-n} – 3 M	1SBs		
	MSV -						
150		100			ا		
100	<u> </u>	109		180	191		
11 F	STR	11 F	RITS	11 BITS	10 MSRc		
					10 10 0005		
V FROI	MSV - 6						
256		267	2	77			
â	a _{f0}	a _{fi}		CRC	;		
11 E	BITS	10 BIT	S	24 Bl	rs		
TOFN	JEXT 6-	SECON	D MES	SSAGE			
.K Q	iviiui						
id tyj	pe 11	desc	ribe	the orbit o	of the		Rationale #1
id typ iours	pe 11 5. The	desci e nom	ribe iinal fit ir	the orbit of transmiss	of the ion interv	al	Rationale #1
id typ iours rs of	pe 11 5. The the	descu e nom curve	ribe iinal fit ir	the orbit of transmiss nterval. The	of the ion intervine he	al	Rationale #1
id typ iours rs of oinci	pe 11 5. The the des v	descu e nom curve vith th	ribe iinal fit ir ne er eter	the orbit of transmiss nterval. Th ntire three s using ter	of the ion intervie ne e-hour	al	Rationale #1
id typ iours irs of oinci e orb weve	pe 11 5. The the des v pital p er, th	descu e nom curve vith th param at the	ribe iinal fit ir ne er eter	the orbit of transmiss nterval. Th ntire three s using ter nsmitted of	of the ion interv e e-hour minology parameter	al	Rationale #1
id typ iours rs of oinci e ork weve traje	pe 11 5. The des v bital p er, th ctorv	descu e nom curve vith th param at the v fit in	ribe iinal fit ir ne er eter e trai Eart	the orbit of transmiss nterval. Th ntire three s using ter nsmitted p ch-Centere	of the ion interv e-hour minology parameter	al	Rationale #1

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	system.		intermediate coordinate values as pertaining to any conventional coordinate system. 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 t_{oc} and t_{oe} are defined in paragraph 20.3.4.4.	
20.3.3.1.1	Any change in the message type 10 and 11 ephemeris data will be accomplished with a simultaneous change in the t_{oe} value (t_{oe} =Ephemeris data reference time of week). The CS (Block IIF) or SV (Block IIIA) will ensure 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 of IS-GPS-200 for additional information regarding t_{oe} .		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 will assure the t_{oe} value for Block IIR-M/IIF and SS will assure the t_{oe} 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 20.3.4.5 for additional information regarding t_{oe} .	Rationale #2- URA components (URA _{ED} and URA _{NED}) from different upload 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.
20.3.3.1.1	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".		The CNAV messages contain information that allows users to take advantage of situations when integrity is assured to the enhanced level. This is accomplished using a composite integrity assured URA value in conjunction with an integrity status flag. The composite integrity assured URA (IAURA) value is the RSS of an elevation-dependent function of the upper bound value of the URA _{ED} component and the upper bound 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.	Rationale #1
20.3.3.1.1	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		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	Rationale #1

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	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 1 x 10 ⁻⁵ per hour.		probability that the instantaneous URE of the conveying signal exceeds 4.42 times the current broadcast IAURA value, for more than 5.2 seconds, without an accompanying alert, is less than 1E-5 per hour.	
20.3.3.1.1	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 1 x 10 ⁻⁸ per hour. The probabilities associated with the nominal and lower bound values of the current broadcast URA index are not defined.		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 current broadcast IAURA 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 _{ED} index, URA _{NED} indexes, and related URA values are not defined.	Rationale #1
20.3.3.1.1	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, the term URA refers to the composite URA, calculated as the root-sum-squared of the individual URA components in the conveying signal.		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.	Rationale #2
20.3.3.1.1 .4	20.3.3.1.1.4 <u>SV Accuracy</u> .	Elevation- Dependent (ED) Accuracy		
20.3.3.1.1 .4	Bits 66 through 70 of message type 10 shall contain the ephemeris User Range Accuracy (URA _{oe}) index of the SV for the unauthorized (non-Precise Positioning Service) user. The 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 elevation-dependent (ED) component User Range Accuracy (URA _{ED}) index for the standard positioning service user. The URA _{ED} index shall provide the ED-related URA index for the current ephemeris curve fit interval. While the ED-related URA may vary over the ephemeris curve fit interval and over the satellite footprint, the URA _{ED} index (N) in message type 10 shall correspond to the maximum URA _{ED} expected over the entire ephemeris curve fit interval for the worst-case location within the SV footprint (i.e., two points at the edge of the SV footprint). At the best-case location within the SV footprint (i.e., directly below the SV along the SV nadir vector), the corresponding URA _{ED} . is zero. The URA _{ED} index is a signed, two's complement integer in the range of +15 to -16 and has the following relationship to the ED URA:	Rationale #1
20.3.3.1.1 .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:		The UR _{ED} index is a signed, two's complement integer in the range of +15 to -16 and has the following relationship to the ED URA:	Rationale #1

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	URA _{ce} Index	URA _{oe} (meters)			URA _{ED} Index		URA _{ED} (meters)		
					15	6144.00	< URA _{ED}	(or no accuracy prediction is available)	
	15	$6144.00 < URA_{oe}$			14	3072.00	< URA _{ED} =	6144.00	
	14	$3072.00 < \text{URA}_{\text{oe}} \leq$	6144.00		13	1536.00	< URA _{ED} =	3072.00	
	13	$1536.00 < URA_{oe} \leq$	3072.00		12	768.00	< URA _{ED} =	1536.00	
	12	$768.00 < \text{URA}_{\text{oe}} \leq$	1536.00		11	384.00		768.00	
	11	$384.00 < \text{URA}_{\text{oe}} \leq$	768.00		10	102.00	$\langle URA_{ED} \rangle =$	284.00	
	10	$192.00 < \text{URA}_{\text{oe}} \leq$	384.00		10	192.00	$< URA_{ED} =$	384.00	
	9	$96.00 < \text{URA}_{\text{oe}} \leq$	192.00		9	96.00	< URA _{ED} =	192.00	
	8	$48.00 < \text{URA}_{\text{oe}} \leq$	96.00		8	48.00	< URA _{ED} =	96.00	
	7	$24.00 < \text{URA}_{\text{oe}} \leq$	48.00		7	24.00	< URA _{ED} =	48.00	
	6	$13.65 < \text{URA}_{\text{oe}} \leq$	24.00		6	13.65	< URA _{ED} =	24.00	
	5	$9.65 < URA_{oe} \leq$	13.65		5	9.65	< URA _{ED} =	13.65	
	4	$0.85 < URA_{oe} \leq$	9.00		4	6.85	< URA _{ED} =	9.65	
	2 2	$4.85 < \text{URA}_{\text{oe}} \leq 2.40 < \text{URA}_{\text{oe}} \leq 100 \text{A}_{\text{oe}}$	0.83		3	4.85	< URA _{ED} =	6.85	
	2	$3.40 < \text{URA}_{\text{oe}} \leq 2.40 < \text{URA}_{\text{oe}} \leq 10.63$	4.03		2	3 40	$\leq \text{URA}_{\text{ED}} =$	4.85	
	0	$1.70 < \text{URA}_{\text{oe}} \leq$	2.40		1	2.40	$\langle UPA \rangle =$	3.40	
	-1	$1.70 < URA_{oe} \leq$ 1.20 < URA <	2.40		1	2.40	$\langle URA_{ED} \rangle =$	2.40	
	2	$0.85 < URA \leq$	1.70		0	1.70	$< URA{ED} =$	2.40	
	-2	$0.60 < \text{URA}_{00} \leq$	0.85		-1	1.20	<ura<sub>ED =</ura<sub>	1.70	
	-4	$0.43 < \text{URA}_{} \leq$	0.60		-2	0.85	< URA _{ED} =	1.20	
	-5	$0.30 < \text{URA}_{\text{oe}} \leq$	0.43		-3	0.60	< URA _{ED} =	0.85	
	-6	$0.21 < \text{URA}_{co} \leq$	0.30		-4	0.43	< URA _{ED} =	0.60	
	-7	$0.15 < \text{URA}_{\text{oe}} \leq$	0.21		-5	0.30	< URA _{ED} =	0.43	
	-8	$0.11 < \text{URA}_{\text{oe}} \leq$	0.15		-6	0.21	< URA _{ED} =	0.30	
	-9	$0.08 < \text{URA}_{\text{oe}} \leq$	0.11		-7	0.15	< URA _{ED} =	0.21	
	-10	$0.06 < \text{URA}_{\text{oe}} \leq$	0.08		-8	0.11		0.15	
	-11	$0.04 < \text{URA}_{\text{oe}} \leq$	0.06		-0	0.11		0.11	
	-12	0.03 < URA _{oe} ≤	0.04		-9	0.06	$\langle URA_{ED} \rangle =$	0.00	
	-13	0.02 < URA _{oe} \leq	0.03		-10	0.06	$< URA_{ED} =$	0.08	
	-14	0.01 < URA _{oe} \leq	0.02		-11	0.04	< URA _{ED} =	0.06	
	-15	$URA_{oe} \leq$	0.01		-12	0.03	< URA _{ED} =	0.04	
	-16	No accuracy prediction avai	lable—use a	own risk	-13	0.02	< URA _{ED} =	0.03	
					-14	0.01	< URA _{ED} =	0.02	
					-15		$URA_{ED} =$	0.01	
					-16	No accur	acy prediction ava	ilable—use at own risk	
	Integrity properties of the LIBA ar	a specified with respect to the upper bour	nd values of t	ne LIRA index			• •		
		e specified with respect to the upper bour			-	()			
	(see 20.3.3.1.1)				For each URA _{ED} index	x (N), users	may compute a	a nominal URA _{ED} value (X) as given by:	

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			• 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 IAURA _{ED} are specified			
			with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound		
			values of the broadcast URA _{ED} index (see 230.3.3.1.1).		
			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 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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20.3.3.1.3		Table 20-I. Message Ty	pes 10 and 11	Parameters	(1 of 2)			Table 20-I. Message Types 10 and 11 Parameters (1 of 2)								
	Parameter Symbol	Parameter Description	No. of Bits**	Scale Factor ([SB)	Effective Range***	Units		Parameter Symbol	Parameter Description	No. of Bits**	Scale Factor (LSB)	Effective Range***	Units			
	WN	Week No.	13	1	Trange	weeks		WN	Week No.	13	1		weeks			
	URA _{ce} INDEX	SV accuracy	5*			(sæ text)		URA _{ED} INDEX	ED accuracy	5*			(sæ text)			
	Signal health $(1.1/1.2/1.5)$		3	1		(see text)		Signal health (L1/L2/L5)		3	1		(sæ text)			
	t _{op}	Data predict time of week	11	300	604,500	seconds		t _{op}	Data predict time of week	11	300	604,500	seconds			
	?A ****	Semi-major axis difference at	26*	2-9		meters		?A****	Semi-major axis difference at reference time	26*	2-9		meters			
		Change rate in semi-maior	25*	2 ⁻²¹		meters/sec		Å	Change rate in semi-major axis	25*	2-21		meters/sec			
	A	axis						?n ₀	Mean Motion difference from computed value at reference	17*	2 ⁻⁴⁴		semi-circles/sec			
	? n ₀	Mean Motion difference from computed value at reference time	17*	2 ⁻⁴⁴		semi-circles/sec		?n ₀	time Rate of mean motion	23*	2 ⁻⁵⁷		semi-circles/sec ²			
	? n ₀	Rate of mean motion difference from computed	23*	2 ⁻⁵⁷		semi-circles/sec ²			value	22.1	- ³²					
		value	20*	c -32				M _{0-n}	Mean anomaly at reference time	33*	252		semi-circles			
	M _{0-n}	Mean anomaly at reference time	33*	252		semi-circles		e _n	Eccentricity	33	2-34	0.03	dimensionless			
	en	Eccentricity	33	2 ⁻³⁴	0.03	dimensionless		ω _h	Argument of perigee	33*	2-32		semi-circles			
	ω _n	Argument of perigee	33*	2 ⁻³²		semi-circles		* Paramet	 Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB; ** See Figure 20.1 for complete bit allocation in message type 10; 							
	* Parame ** See Fig *** Unless	ters so indicated are two's complem ure 20-1 for complete bit allocation otherwise indicated in this colum	nent, with the 1 in message t 11, effective	sign bit (+ c ype 10; range is the	or -) occupying e maximum r	g the MSB; ange attainable with		*** Unless indicate **** Relative	otherwise indicated in this colured bit allocation and scale factor. to $A_{REF} = 26,559,710$ meters.	nn, effective	range is the	e maximum r	ange attainable with			
	indicate **** Relative	ad bit allocation and scale factor. e to $A_{REF} = 26,559,710$ meters.														

IS-GPS-705 Rev	A L5 SS and Nav User Segment Interf	aces				Proposed Heading	URA Definition	Proposed Text					Rationale
	Table 20-III. Clock Correction a	and Accura	cy Paramete	ers					Rationale #1				
Parameter Symbol t_{oc} URA _{oc} Index URA _{ocl} Index URA _{ocl} Index URA _{ocl} Index URA _{ocl} Index af1-n a_{f0-n} ** See Final *** Summary See Final *** Unles	Parameter Description Clock Data Reference Time of Week SV Clock Accuracy Index SV Clock Accuracy Change Index SV Clock Accuracy Change Rate Index SV Clock Drift Rate Correction Coefficient SV Clock Drift Correction Coefficient SV Clock Bias Correction Coefficient SV Clock Bias Correction Coefficient eters so indicated are two's complement, with igures 20-3 through 20-10 for complete bit alk s otherwise indicated in this column, effect	No. of Bits** 11 5* 3 3 10* 20* 26* the sign b boation in p	Scale Factor (LSB) 300 2^{-60} 2^{-48} 2^{-35} it (+ or -) oc message type e is the mat	Effective Range*** 604,500 coupying the MS es 30 to 37; ximum range a	Units seconds (see text) (see text) (see text) sec/sec ² sec/sec seconds		Parameter Symbol t _{cc} URA _{NED} Index URA _{NED1} Index URA _{NED2} Index a _{f2-n} a _{f1-n} a _{f0-n} * Paramet ** See Fig *** Unless indicate	Parameter Description Clock Data Reference Time of Week NED Accuracy Index NED Accuracy Change Index NED Accuracy Change Rate Index SV Clock Drift Rate Correction Coefficient SV Clock Drift Correction Coefficient SV Clock Bias Correction Coefficient ers so indicated are two's complement, with res 20-3 through 20-10 for complete bit allo otherwise indicated in this column, effect d bit allocation and scale factor.	No. of Bits** 11 5* 3 3 10* 20* 26* 26*	Scale Factor (LSB) 300 2^{60} 2^{48} 2^{35} bit (+ or -) oo message type e is the ma	Effective Range**** 604,500 coupying the MS es 30 to 37; ximum range a	Units seconds (see text) (see text) (see text) sec/sec ² sec/sec seconds SB; attainable with	
Bits 50 through contain the UR 6.2.1) for the un give the clock-r used to genera	Slock Accuracy Estimates. Slock Accuracy Estimates. A _{oc} Index, URA _{oc1} Index, and URA _{oc2} Ind nauthorized user. The URA _{oc} Index tog elated user range accuracy of the SV a te the uploaded clock correction polyn	h 60 of n lex, respe gether wi s a funct iomial te	nessage ty ectively, of th URA _{oc1} ion of time rms.	pes 30 throug f the SV (refer Index and UR e since the pr	gh 37 shall rence paragraph A _{oc2} Index shall ediction (top)	Non- Elevation- Dependent (NED) Accuracy Estimates	Bits 50 through shall contain the and URA _{NED2} Ind user. The follow URA _{NED2} Index si clock/ephemeri footbrint the IA	54, and 55 through 57, and 58 through 57, and 58 through 57, and 58 through 57, and 58 through encoded and the set of the SV (referent ving equations together with the benall give the clock-related user ranges fit interval. While the actual NEE	ough 60 compon nce para proadcas nge accur D-relatec	of messa ent URA _{NI} graph 6.2 t URA _{NEDO} racy of-IAI	ge types 30 t _{ED0} Index,UR, .1) for the ur Index, URA _N JRA _{NED} over y vary over t	through 37 A _{NED1} Index, nauthorized _{IED1} Index, and the current he satellite	Rationale #5
	IS-GPS-705 Rev Parameter Symbol t _{oc} URA _{oc} Index URA _{oc1} Index URA _{oc2} Index a _{f2-n} a _{f1-n} a _{f0-n} * Param ** See F *** Unles indica	IS-GPS-705 Rev A L5 SS and Nav User Segment Interf Table 20-III. Clock Correction a Table 20-III. Clock Correction a Parameter Symbol Parameter Description took took Clock Data Reference Time of Week URAcc Index SV Clock Accuracy Index URAcc1 Index SV Clock Accuracy Change Index URAcc2 Index SV Clock Accuracy Change Rate Index af2:n SV Clock Drift Rate Correction Coefficient af0:n SV Clock Drift Correction Coefficient af0:n SV Clock Bias Correction Coefficient * Parameters so indicated are two's complement, with ** See Figures 20-3 through 20-10 for complete bit allow *** Unless otherwise indicated in this column, effect indicated bit allocation and scale factor. 20.3.3.2.4 SV Clock Accuracy Estimates. Bits 50 through 54, and 55 through 57, and 58 throug contain the URAcc Index, URAcc1 Index, and URAcc2 Ind 6.2.1) for the unauthorized user. The URAcc Index tog give the clock-related user range accuracy of the SV a used to generate the uploaded clock correction polyn	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces Table 20-III. Clock Correction and Accurate Table 20-III. Clock Correction and Accurate Symbol Parameter Symbol Parameter Symbol Parameter Clock Data Reference Time of Week 11 URA _{cc1} Index SV Clock Accuracy Index 5* URA _{cc1} Index SV Clock Accuracy Change Index 3 URA _{cc1} Index SV Clock Accuracy Change Rate Index 3 a _{10-n} SV Clock Drift Rate Correction Coefficient 10* a _{10-n} SV Clock Drift Correction Coefficient 20* a _{00-n} SV Clock Bias Correction Coefficient 20* ** See Figures 20-3 through 20-10 for complete bit allocation in in *** Unless otherwise indicated in this column, effective range indicated bit allocation and scale factor. 20.3.3.2.4 SV Clock Accuracy Estimates. Bits 50 through 54, and 55 through 57, and 58 through 60 of n contain the URA _{oc} Index, URA _{oc1} Index, and URA _{oc2} Index, respins 6.2.1) for the unauthorized user. The URA _{oc} Index together wigive the clock-related user range accuracy of the SV as a funct used to generate the uploaded clock correction polynomial te	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces Table 20-III. Clock Correction and Accuracy Parameter Scale Parameter No. of Factor Symbol Parameter Description Bits** (LSB) tvc Clock Data Reference Time of Week 11 300 URAxc Index SV Clock Accuracy Index 5* 1 URAxc1 Index SV Clock Accuracy Change Index 3 3 URAxc2 Index SV Clock Accuracy Change Rate Index 3 3 ag.n SV Clock Drift Correction Coefficient 10* 2 ⁶⁰ ag.n SV Clock Drift Correction Coefficient 20* 2 ⁴⁸ ag.n SV Clock Drift Correction Coefficient 26* 2 ³⁵ * Parameters to indicated are two's complement, with the sign bit (+ or -) or *** See Figures 20-3 through 20-10 for complete bit allocation in message typ *** *** See Figures 20-3 through 20-10 for complete bit allocation in message typ *** See Figures 20-3 through 57, and 58 through 60 of message typ **** See Figures 20-3 through 57, and 58 through 60 of message typ **** Sto	IS-GP5-705 Rev A L5 SS and Nav User Segment Interfaces Table 20-III. Clock Correction and Accuracy Parameters Parameter No. of Scale Factor Effective Range*** Symbol Parameter Description Bits** (LSB) Effective Range*** tc Clock Data Reference Time of Week 11 300 604,500 URAxe Index SV Clock Accuracy Index 5* 0 0 URAxel Index SV Clock Accuracy Change Rate Index 3 0 0 uRAxel Index SV Clock Drift Rate Correction Coefficient 0* 2 ⁴⁸ 0 ag.n SV Clock Drift Correction Coefficient 20* 2 ⁴⁸ 0 ag.n SV Clock Bias Correction Coefficient 20* 2 ⁴⁸ 0 ** See Figures 20-3 through 20-10 for complete bit allocation in message types 30 to 37; *** *** See Figures 20-3 through 20-10 for complete bit allocation in message types 30 to 37; **** Unless otherwise indicated in this column, effective range is the maximum range a indicated bit allocation and scale factor. 20.3.3.2.4 SV Clock Accuracy Estimates. 20.3.3.2.4 SV Clock Accuracy Estimates. 20.3.1 for the unauthorized user. The URA _{xel} Index to	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces Table 20-III. Clock Correction and Accuracy Parameters Table 20-III. Clock Correction and Accuracy Parameters Parameter Parameter Description Scale Effective Effective Ve Clock Data Reference Time of Week 11 300 604.500 seconds URA _{we} Index SV Clock Accuracy Index 5* (sec text) (sec text) URA _{we} Index SV Clock Accuracy Change Index 3 (sec text) uRA _{we} Index SV Clock Accuracy Change Rate Index 3 (sec text) uRA _{we} Index SV Clock Drift Rate Correction Coefficient 20* 2*8 sec/sec ² a _{0-a} SV Clock Drift Correction Coefficient 20* 2*8 sec/sec a _{0-a} SV Clock Drift Correction Coefficient 20* 2*8 sec/sec a _{0-a} SV Clock Drift Correction Coefficient 26* 2*3 sec/sec a _{0-a} SV Clock Bias Correction Coefficient 26* 2*3 sec/sec ** Parameters so indicated are two's complete bit allocation in message types 30 to 37; **** ***	IS-GPS-705 Rev A LS SS and Nav User Segment Interfaces Proposed Heading Table 20-III. Clock Correction and Accuracy Parameters Image: Scale Parameter Description Rev 4: 11 Scale Parameter Description Rev 4: 11 Scale Parameter Description Rev 4: 11 Effective Rerge**** Units: Rerge**** Ve Clock Data Reference Time of Weck 11 300 604.500 seconds URA _{xc} Index SV Clock Accuracy Dange Index 3 (see text) (see text) URA _{xc} Index SV Clock Accuracy Change Rate Index 3 (see text) (see text) uBoa SV Clock Datif Rate Correction Coefficient 20 ^a 2 ^{ad} sec/sec 3 uBoa SV Clock Datif Rate Correction Coefficient 20 ^a 2 ^{ad} sec/sec 3 uBoa SV Clock Datif Rate Correction Coefficient 20 ^a 2 ^{ad} sec/sec 3 ** See Figures 20.3 through 20-10 for complete bit allocation in message types 30 to 37: seconds Seconds ** See Figures 20.3 through 57, and 58 through 60 of message types 30 through 37 shall Contain the URA _{sc} Index, URA _{sc1} Index, and URA _{sc2} Index, respectively, of the SV (reference paragraph 6.2.1) for the unauthorized user. The URA _{sc1} Index, nege accuracy of the Sv as a function of time since the prediction (top)<	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces Proposed Heading URA Definition Table 20-III. Clock Correction and Accuracy Parameters Image: Clock Data Reference Description Bits: State Effective Linis Image: Clock Data Reference Description Reference Description Bits: State Effective Linis Image: Clock Data Reference Description Reference Description Bits: State Effective Linis Image: Clock Data Reference Description Reference Descreference Description Reference Descref	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces Proposed Heading URA Definition Proposed Text Image: Table 21-III. Check Connection and Accuracy Parameters Image: Table 21-III. Check Connection and Accuracy Parameters Image: Table 21-III. Check Connection and Accuracy Parameters Parameter Parameter Description No. of Fack r Bits-M Effective (Still) Effective Table 21-III. Check Connection Value Accuracy Table 21-III. Check Connection and Accuracy Parameters Image: Table 21-III. Check Connection Parameter Description Value Check Data Reference Time of Week II 300 604.200 securacity Value Check Data Reference Time of Week II 300 (sected) (sected) Value Check Data Reference Time of Week 3 (sected) (sected) Value SC Check Data Reac Connectificer 3 (sected) (sected) Value SC Check Data Reac Connectificer 3 (sected) (sected) Value SC Check Data Reac Connectificer 3 (sected) (sected) Value SC Check Data Reac Connectificer 3 (sected) (sected) Value Sc Check Data Reac Connectificer 3 (sected) (sected) Value Sc Check Data Reac Connectificer 3 (sected) (sected) Value Sc Check Data Reac Connectificer 3 (sected)	BS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces Proposed Heading URA Definition Proposed Text Image: Table 20-III. Clock Concession and Accuracy Parameters Table 20-III. Clock Concession and Accuracy Parameters Table 20-III. Clock Concession and Accuracy Parameter Description No. of Bitter [®] (17,87) Feature (17,87) Feature (17,87) Feature (17,87) Feature Parameter Description No. of Bitter [®] (17,87) URA_c Index a_c SV Clock Accuracy Index a_c 5° South (19) Get ext) (sectex) (sectex) URA_c Index a_c SV Clock Accuracy Change Rate Index a_c 3 3° (sectex) ** SV Clock Accuracy Change Rate Index a_c 3° 2° sectors ¹ ** Parameter so indicated are two's complement, with the sign Nit + (or -) cocapying the MNR; ** SV Clock Bit Rate Correction Coefficient accuracy Index are two's complement, with the sign Nit + (or -) cocapying the MNR; ** SV Clock Bit Rate Correction Coefficient accuracy Index are two's complement, with the sign Nit + (or -) cocapying the MNR; ** SV Clock Bit Rate Correction Coefficient accuracy Index are two's complement, with the sign Nit + (or -) cocapying the MNR; ** ** Parameters to indicated are two's complement, with the sign Nit + (or -) cocapying the MNR; ** SV Clock Accuracy Estimates. ** See Figures 0.3 draved, 32 through 50 for complete bit aboution in message types 30 to 37; ** See Figures 0.3 draved, 32 through 50, and 58 through 50 of message types 30 through 37 shall contain	BS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces Proposed Heading URA Definition Proposed Text Image: State S	B-GPS-705 Rev A L5 SS and Nav User Segment Interfaces Proposed Heading URA Definition Proposed Text Table 30-III. Clock Constition and Assuresy Parameters: Dependent Synobid Clock Data (Senser: Thus of Week 1000 Clock Data (Senser: Thus of Week 1000 Clock Data (Senser: Thus of Week 11 300 Clock Data (Senser: Thus of Week 12 Clock Data (Constant Collider: 32¹⁰ 2¹⁰ 2¹⁰ 2¹⁰ 2¹⁰ 2¹¹ 2¹⁰ 2¹¹ 2¹⁰ 2¹¹ 2¹⁰ 2¹¹ 2¹¹	Be-GPS-705 Rev ALS 55 and Nav User Segment Interfaces Proposed Reading URA Definition Proposed Text

Section Number	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed Heading	URA Definition Proposed Text	Rationale
			for the worst-case location within the satellite footprint at that instant.	
20.3.3.2.4	The user shall calculate the clock-related URA with the equation (in meters); $URA_{oc} = URA_{ocb} + URA_{oc1} (t-t_{op}) \qquad for t-t_{op} \le 93,600 \text{ seconds}$ $URA_{oc} = URA_{ocb} + URA_{oc1} (t - t_{op}) + URA_{oc2} (t - t_{op} - 93,600)^2 \qquad for t - t_{op} > 93,600 \text{ seconds}$ where $t = GPS \text{ time (must account for beginning or end of week crossovers),}$ $t_{op} = \text{ time of week of the state estimate utilized for the prediction of satellite clock correction}$ parameters.		The user shall calculate the NED-related URA with the following equations (in meters);IAURA_NED= URA_NED0 + URA_NED1 (t - t_{op})for t-t_{op} < 93,600 seconds	Rationale #1
20.3.3.2.4	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 URA _{NED0} , URA _{NED1} , and URA _{NED2} indexes which, when used together in the above equations, results in the minimum IAURA _{NED} that is greater than the predicted IAURA _{NED} during the /ephemeris fit interval.	Rationale #1
20.3.3.2.4	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 to the clock-related user derived URA _{ocb} :		The user shall use the broadcast URA_{NEDO} index to derive the URA_{NEDO} value. The URA_{NEDO} index is a signed, two's complement integer in the range of +15 to -16 and has the following relationship to the URA_{NEDO} value:	Rationale #1

ection	IS-GPS-705 Rev A L5 SS and Na	av User Segment Interfaces		Proposed	URA Definition Propo	sed Text			Rationale
lumber				Heading					
0.3.3.2.4	URA _{oc} Index	URA _{ocb} (meters)			<u>URA_{NED0} Index</u>		<u>URA_{NED0} (meter</u>	<u>(s)</u>	Rationale #1
	15	$6144.00 < \text{URA}_{\text{och}}$			15	6144.00	< URA _{NED0}	(or no accuracy prediction is available)	
	14	$3072.00 < \text{URA}_{\text{ach}} \leq$	6144.00		14	3072.00	$< URA_{NED0}$	= 6144.00	
	13	$1536.00 < \text{URA}_{\text{ocb}} \leq$	3072.00		13	1536.00	$< URA_{NED0}$	= 3072.00	
	12	$768.00 < \text{URA}_{\text{ocb}} \leq$	1536.00		12	768.00	$< \text{URA}_{\text{NED0}}$	= 1536.00	
	11	$384.00 < \text{URA}_{\text{ocb}} \leq$	768.00		11	384.00	$< URA_{NED0}$	= 768.00	
	10	$192.00 < \text{URA}_{\text{ocb}} \leq$	384.00		10	192.00	$< URA_{NED0}$	= 384.00	
	9	$96.00 < \text{URA}_{\text{ocb}} \leq$	192.00		9	96.00	$< URA_{NED0}$	= 192.00	
	8	48.00 < URA _{ocb} ≤	96.00		8	48.00	< URA _{NED0}	= 96.00	
	7	$24.00 < \text{URA}_{\text{ocb}} \leq$	48.00		7	24.00	< URANEDO	= 48.00	
	6	$13.65 < \text{URA}_{\text{ocb}} \leq$	24.00		6	13.65		- 24.00	
	5	$9.65 < \text{URA}_{\text{ocb}} \le$	13.65		5	0.65	< URA _{NED0}	12.65	
	4	$6.85 < \text{URA}_{\text{ocb}} \le$	9.65		5	9.65	< URA _{NED0}	= 13.05	
	3	$4.85 < \text{URA}_{\text{ocb}} \leq$	6.85		4	6.85	$< URA_{NED0}$	= 9.65	
	2	$3.40 < \text{URA}_{\text{ocb}} \leq$	4.85		3	4.85	$< URA_{NED0}$	= 6.85	
	1	$2.40 < \text{URA}_{\text{ocb}} \leq$	3.40		2	3.40	$< \text{URA}_{\text{NED0}}$	= 4.85	
	0	$1.70 < \text{URA}_{\text{ocb}} \leq$	2.40		1	2.40	$< \text{URA}_{\text{NED0}}$	= 3.40	
	-1	$1.20 < \text{URA}_{\text{ocb}} \leq$	1.70		0	1.70	< URA _{NED0}	= 2.40	
	-2	$0.85 < \text{URA}_{\text{ocb}} \leq$	1.20		-1	1.20	$< URA_{NED0}$	= 1.70	
	-3	$0.60 < \text{URA}_{\text{ocb}} \leq$	0.85		-2	0.85	< URA _{NED0}	= 1.20	
	-4	$0.43 < \text{URA}_{\text{ocb}} \leq$	0.60		-3	0.60		- 0.85	
	-5	$0.30 < \text{URA}_{\text{ocb}} \leq$	0.43		-5	0.00	< URA _{NED0}	- 0.05	
	-6	$0.21 < \text{URA}_{\text{ocb}} \leq$	0.30		-4	0.43	< UKA _{NED0}	= 0.60	
	- /	$0.15 < \text{URA}_{\text{ocb}} \leq$	0.21		-5	0.30	$< URA_{NED0}$	= 0.43	
	-8	$0.11 < \text{URA}_{\text{ocb}} \leq 0.09 < \text{URA}_{\text{ocb}} \leq 100 \text{C}$	0.15		-6	0.21	$< \text{URA}_{\text{NED0}}$	= 0.30	
	-9	$0.08 < \text{URA}_{\text{ocb}} \leq 0.06 < \text{URA}_{\text{ocb}} \leq 0.06 < \text{URA}_{\text{ocb}} \leq 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.06 < 0.$	0.11		-7	0.15	$< \text{URA}_{\text{NED0}}$	= 0.21	
	-10	$0.00 < \text{URA}_{\text{ocb}} \leq$	0.08		-8	0.11	$< URA_{NED0}$	= 0.15	
	-11	$0.04 < \text{URA}_{\text{ocb}} \leq 0.02 < \text{URA}_{\text{ocb}} \approx 0.02 < \text{URA}_{oc$	0.06		-9	0.08	< URA _{NED0}	= 0.11	
	-12	$0.03 < \text{URA}_{\text{ocb}} \leq 0.02 < \text{URA}_{\text{ocb}} \approx 0.02 < \text{URA}_{oc$	0.04		-10	0.06	$< URA_{NED0}$	= 0.08	
	-13	$0.02 < \text{URA}_{\text{ocb}} \leq 0.01 < \text{URA} \leq 0.01 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0$	0.03		-11	0.04	< UR ANEDO	= 0.06	
	-14	$0.01 < 0.00 \leq 0.001 \leq 0.000 \leq 0.000 \leq 0.000 \leq 0.0000 \leq 0.0000 \leq 0.0000 \leq 0.00000 \leq 0.00000 \leq 0.00000 \leq 0.00000000$	0.02		12	0.01		- 0.04	
	-16	No accuracy prediction available	-use at own risk		-12	0.03	< URA _{NED0}	= 0.04	
	10	no accuracy prediction available	use at own fisk		-13	0.02	< URA _{NED0}	= 0.03	
					-14	0.01	$< URA_{NED0}$	= 0.02	
	Integrity properties of the U	RA are specified with respect to the upper	bound values of the UR		-15		URA _{NED0}	= 0.01	
	20 3 3 1 1)				-16	No accur	acy prediction ava	ilable—use at own risk	
	20.3.3.1.1).								
					Integrity properties of	the URA a	are specified wi	th respect to the upper bound values of the UR	A
					20.3.3.1.1).		-		

Section	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed	URA Definition Proposed Text	Rationale
Number		Heading		
20 2 2 2 4	The user may use the upper bound value in the LIPA - range corresponding to the breadcast index		For each LIPA index (N) users may compute a period LIPA value (X) as given by:	Pationalo #2
20.3.3.2.4	thereby calculating the maximum LIPA that is equal to or greater than the CS predicted LIPA or the		For each OKA _{NED0} index (N), users may compute a norminal OKA _{NED0} value (X) as given by:	Thoro is a
	thereby calculating the maximum OKA _{oc} that is equal to of greater than the CS predicted OKA _{oc} , of the		• If the value of N is 6 or less, but more than -16, $X = 2^{(1 + N/2)}$,	tupe that
	to or loss then the CC predicted UDA			
	to or less than the CS predicted URA _{oc.}		• If the value of N is 6 or more, but less than 15, $X = 2^{(N-2)}$,	needs be
			AN 10 or N 15 shall indicate the changes of an accuracy prediction and shall advice	corrected in
	The transmitted URA _{cc1} Index is an integer value in the range 0 to 7. URA _{cc1} Index has the following		• N = -16 or N = 15 shall indicate the absence of an accuracy prediction and shall advise	computing
	relationship to the URA _{sc1} :		the standard positioning service user to use that SV at his own risk.	URA, or all
			For N = 1, 3, and 5, X should be rounded to 2.8, 5.7, and 11.3 meters, respectively.	user URA
				values will
	1		The nominal URA _{NEDO} value (X) shall be suitable for use as a conservative prediction of the	be far too
	$IIRA_{ref} = \overline{2^N}$ (meters/second)		RMS NED range errors for accuracy-related purposes in the pseudorange domain (e.g.,	large. Using
			measurement de-weighting RAIM, FOM computations). Integrity properties of the IAURA _{NED}	the
			are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate)	erroneous
	where		upper bound values of the URA _{NED0} index, URA _{NED1} index, and URA _{NED2} index (see 20.3.3.1.1).	value will
	N = 4 + URA _{oc1} Index			result in a
	The transmitted URA _{oc2} Index is an integer value in the range 0 to 7. URA _{oc2} Index has the following		URA _{NEDO} accounts for zeroth order SIS-contributions to user range error which include, but are	minimum
	relationship to the URA_{oc2} .		not limited to, the following: LSB representation/truncation error; the net effect of clock	value of
			correction polynomial error and code phase error in the transmitted signal for single-	URA _{oc1} that
			frequency L1C/A or single-frequency L2C users who correct the code phase as described in	will prevent
			Section 20.3.3.3.1.1.1; the net effect of clock parameter, code phase, and inter-signal	the Space
	$URA_{oc2} = 2^{N}$ (meters/second/second)		correction error for dual-frequency L1/L2 and L1/L5 users who correct for group delay and	and Control
			ionospheric effects as described in Section 20.3.3.3.1.1.2; radial ephemeris error; anisotropic	segments
	, where		antenna errors; and signal deformation error. URA _{NED} does not account for user range	from
	where		contributions due to the inaccuracy of the broadcast ionospheric data parameters used in the	meeting
			single-frequency ionospheric model or for other atmospheric effects.	their
	$N = 25 + URA_{ac2}$ Index		The transmitted LIPA index is an integer value in the range 0 to 7. The LIPA index has	specified
			the following relationship to the LIPA value:	performance
			the following relationship to the OKA _{NED1} value.	requirement
			1	s.
			$IIPA = -\overline{2^{N}} (meters (second))$	
			$ORA_{NED1} = -$ (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 URANED2:	

Section	IS-GPS-705 Rev A L5 SS and Nav User Segment Interfaces	Proposed	URA Definition Proposed Text	Rationale
Number		Heading		
			$\frac{1}{2N}$	
			$URA_{NED2} = 2^{27}$ (meters/second ²)	
			where	
			Where	
			$N = 28 + URA_{NED2} Index.$	
20.3.4.4		Data Sets		
20.0111	20.3.4.4	Data Seto		
20.3.4.4			The t_{oe} shall be equal to the t_{oc} of the same CNAV data set. The following rules govern the	Rationale #2
			transmission of t_{oe} and t_{oc} values in different data sets: (1) The transmitted t_{oc} will be different	
			from any value transmitted by the SV during the preceding seven days; (2) The transmitted	
			toe 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 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.	
20.3.4.5		Reference		
_	20.3.4.5	Times		
20.3.4.5			The LNAV reference time information in paragraph 20.3.4.5 in IS-GPS-200 also applies to the	Rationale #1
			CNAV reference times.	

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

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

ion nber	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface	Proposed Heading	URA Definition Proposed Text
2	DIRECTION OF DATA FLOW FROM SV MSB FIRST		direction of data flow from s
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		Image: 100 BITS 100 BITS 1 14 12 34 39 50
			13 BITS 8 BITS 11 BITS 5 11 BITS 26
	L1C HEALTH – 1 BIT UHA® INDEX		L1C HEALTH - 1 BIT
	Image: 100 BITS Image: 100 BITS 101 118 141 174		100 BITS 100 BITS
	ΔΠ c ΔΠ c ΔΠ c θ n 17 BITS 23 BITS 33 BITS 27 MSBs		Δn₀ Δn₀ M₀₀ 17 BITS 23 BITS 33 BITS
	DIRECTION OF DATA FLOW FROM SV MSB FIRST		direction of data flow from sv
	↓ 100 BITS ↓ 201 ↓ 207		♦ 100 BITS 100 BITS
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		θn ωn Ωυ·n 6 22 BITS 22 BITS
	301 306 323 338 354 370 394 i₀.n ΔΩ i₀.n C₀.n C₀.n C₀.n C₀.n C₀.n 5 LSBs 17 BITS 15 BITS 16 BITS 16 BITS 24 BITS 7 MSBs		301 306 323 338 354 i₀.n ΔΩ i₀.n C _{is.n} 5 LSBs 17 BITS 15 BITS 16 BITS 10
	↓ 100 BITS ↓ ↓		↓ ↓ </td
	401 416 439 460 403 471 467 Crean Crean		Cre-n Cre-n <th< td=""></th<>
	URA∞1 INDEX - 3 BITS URA∞1 INDEX - 3 BITS URA∞1 INDEX - 3 BITS		UF DIRECTION OF DATA FLOW FROM S
	▲ 100 BITS		↓ 100 BITS ↓ 501 ↓ 517 ↓ 527 ↓ 540 ↓ 553
	atima a _{2.n} T _{GD} ISC _{L1CP} ISC _{L1CD} RESERVED CRC 16 LSBs 10 BITS 13 BITS 13 BITS 13 BITS 13 BITS 10 BITS 24 BITS		att-n atz-n T GD ISC LtcP ISC 16 LSBs 10 BITS 13 BITS 13 BITS 13 E
	Integrity Status Flag		Integrity S
			Figure 3.5-1. Subframe 2 - Clock, Eph

	Rationale
	Rationale #1-
	URA _{oc} and
76	URA _{oe} are
BITS 25 BITS	redefined into
	an elevation-
	dependent
	component
174	(URA _{ED}) and a
en la	non-elevation-
27 MSBs	dependent
	component
MSB FIRST	(URA _{NED}). This
273	will enable
is-n	users to de-
28 MSBs	weight the
	elevation-
MSB FIRST	angle-
370 394	dependent
C _{k-n} C _{rs-n} C _{rc-n}	component
6 BITS 24 BITS 7 MSBs	with the
	elevation
	angle of the
	SV, resulting
60 465 471 497	in a smaller
5 ano a tri-n 4	composite
BITS 26 BITS MSBs 1 1 1 1	URA, in many
RA _{NED} INDEX – 3 BITS	cases. A
MSB FIRST	smaller
<u>567</u> 577	composite
RESERVED CRC	URA means
BITS 10 BITS 24 BITS	higher
	availability for
	applications
	that have
	requirements
meris, ITOW	for a
	minimum

Section	IS-GPS-800 Re	v A Navstar GPS Space Segment/User Segment L1C Interface	Proposed Heading	URA Definition Proposed Text
Number			Including	
	Figure 3.5-1.	Subframe 2 - Clock, Ephemeris, ITOW		

Rationale
level of
accuracy
and/or
integrity. In
order to
achieve a
technical
consensus on
how to
proceed
forward with
GPS IIIA
deriving URA
from the
uploaded
covariance,
then the
following
changes were
needed to the
user ICDs.

Section Number	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface							URA Definition P		Rationale					
3.5.3		Table 3.5-1. Sub	frame 2 Parame	eters (1 of 3	3)				Table 3.5-1. Subframe 2 Parameters (1 of 3)						
		No. of Bits**	Scale Factor (LSB)	Effective Range***	Units			Parameter	No. of Bits**	Scale Factor (LSB)	Effective Range***	Units			
	WN	Week No.	13	1		weeks		WN	Week No.	13	1	Tunge	weeks		
	ITOW	Interval time of week	8		83	(see text)		ITOW	Interval time of week	0		82	(see text)		
	t _{op}	Data predict time of week	11	300	604,500	seconds		110 w	The var time of week	0		0.5	(see lext)		
	L1C health		1			(see text)		t _{op}	Data predict time of week	11	300	604,500	seconds		
	URA _{oe} Index	SV ephemeris accuracy index	5*			(see text)		L1C health		1			(see text)		
	t _{oe}	Ephemeris/clock data reference time of week	11	300	604,500	seconds		URA _{ED} Index	ED accuracy index	5*			(see text)		
	?A ****	Semi-major axis difference at reference time	26*	2-9		meters		t _{oe}	Ephemeris/clock data reference time of week	11	300	604,500	seconds		
	Å	Change rate in semi-major axis	25*	2-21		meters/sec		?A****	Semi-major axis difference at reference time	26*	2-9		meters		
	? n ₀	Mean Motion difference from computed value at reference time	17*	2 ⁻⁴⁴		semi-circles/sec		Å	Change rate in semi-major axis	25*	2 ⁻²¹		meters/sec		
	? n ₀	Rate of mean motion difference from computed value	23*	2 ⁻⁵⁷		semi-circles/sec ²		? n ₀	Mean Motion difference from computed value at reference time	17*	2 ⁻⁴⁴		semi-circle s/sec		
	M _{0-n}	Mean anomaly at reference time	33*	2-32		semi-circles		? n ₀	Rate of mean motion difference from computed	23*	2 ⁻⁵⁷		semi-circle s/sec ²		
	en	Eccentricity	33	2 ⁻³⁴		dimensionless			value						
	ω _n	Argument of perigee	33*	2 ⁻³²		semi-circles		M _{0-n}	Mean anomaly at reference time	33*	2 ⁻³²		semi-circle s		
	* Param ** See Fi	eters so indicated are in two's comp gure 3.5-1 for complete bit allocation or the rules indicated in this solution	olement notation on in Subframe	on; 2;		ottoinghle with		e _n	Eccentricity	33	2 ⁻³⁴		dimensionless		
	ind icat **** Relativ	ed bit allocation and scale factor. ve to $A_{REF} = 26,559,710$ meters.	, encenve rang		tinu in range			ω _n	Argument of perigee	33*	2 ⁻³²		semi-circles		
								* Parame ** See Fig *** Unless indicate **** Relative	ters so indicated are in two's comp ure 3.5-1 for complete bit allocatic otherwise indicated in this column ed bit allocation and scale factor. e to $A_{REF} = 26,559,710$ meters.	lement notatio n in Subframe , effective rang	on; e 2; ge is the max	timum range a	attainable with		

Section Number	IS-GPS-800 Re	v A Navstar GPS Space Segment/Us	er Segm	ent L1C Iı	nterface		Proposed URA Definition Proposed Text R Heading R R									
3.5.3	Table 3.5-1. Subframe 2 Parameters (3 of 3)							Table 3.5-1. Subframe 2 Parameters (3 of 3)								
		Parameter			ScaleNo. ofBits**(LSB)Range***				Parameter	No. of Bits**	Scale Factor	Effective Range***	Unite			
	URA _{oc} Index	SV Clock Accuracy Index	5*			(see text)		URA _{NED0} Index	NED Accuracy Index	5*	(LSD)	Range	(see text)			
	URA _{ocl} Index	SV Clock Accuracy Change Index	3			(see text)		URA _{NED1} Index	NED Accuracy Change Index	3			(see text)			
	URA _{oc2} Index	SV Clock Accuracy Change Rate Index	3			(see text)		URANGO Index		3			(and test)			
	a _{f2-n}	SV Clock Drift Rate Correction Coefficient	10*	2-60		sec/sec ²			NED Accuracy change Rate fildex	5			(see text)			
	a _{fl-n}	SV Clock Drift Correction Coefficient	20*	2 ⁻⁴⁸		sec/sec		a _{f2-n}	SV Clock Drift Rate Correction Coefficient	10*	2-60		sec/sec ²			
	a _{f0-n}	SV Clock Bias Correction Coefficient	26*	2-35		seconds		a _{f1-n}	SV Clock Drift Correction Coefficient	20*	2 ⁻⁴⁸		sec/sec			
	T _{GD} ****	Inter-Signal Correction for L1 or L2 P(Y)	13*	2 ⁻³⁵		seconds		a _{f0-n}	SV Clock Pies Correction Coofficient	26*	2 ⁻³⁵		seconds			
	ISC _{L1CP} ****	Inter-Signal Correction for L1C _P	13*	2-35		seconds		T _{GD} ****	SV Clock Blas Collection Coefficient	13*	2-35		seconds			
	ISC _{LICD} ****	Inter-Signal Correction for L1C _D	13*	13* 2 ⁻³⁵ seconds		ISC _{L1CP} ****	Inter-Signal Correction for L1 or L2 P(Y)	13*	2 ⁻³⁵		seconds					
	* Paran ** See F	heters so indicated are in two's complement no igure 3.5-1 for complete bit allocation in Subfr	tation; rame 2;				-	ISC _{L1CD} ****	Inter-Signal Correction for L1C _P	13*	2 ⁻³⁵		seconds			
	**** Unles indica	ted bit allocation and scale factor.	t the group	e maximum delay value	is not available	e with			Inter-Signal Correction for $L1C_D$							
								* Parameter ** See Figur *** Unless of indicated	rs so indicated are in two's complement no e 3.5-1 for complete bit allocation in Subfr herwise indicated in this column, effective bit allocation and scale factor.	otation; rame 2; range is th	e maximum	range attainable	e with			
								**** The bit st	ring of "1000000000000" will indicate tha	t the group	delay value	e is not available				
3.5.3.5	Bits 34 through 38 of subframe 2 shall contain the ephemeris User Range Accuracy (URA index of the SV. URA _{oe} index shall provide the ephemeris-related user range accuracy in							Bits 34 through 38 c Accuracy (URA _{ED}) in	of subframe 2 shall contain the elevati dex for the unauthorized user. The UI	on-depen RA _{ED} index	dent (ED) o shall prov	component Us vide the ED-rel	er Range ated URA	Rationale #1		
	of the SV as a ephemeris-rel	function of the current ephemeris materian ated URA may vary over the epheme	iessage o eris mess	urve fit ir age curve	nterval. Whil e fit interval,	le the the URA _{oe}		index for the currer ephemeris curve fit	t ephemeris curve fit interval. While the interval and over the satellite footprine the satellite foot	the ED-re nt, the UR	lated URA i A _{ED} index (may vary over N) in subframe	the e 2 shall			

Section Number	IS-GPS-800 Rev A Nav	star GPS Space	Segment/l	Jser Se	gment L1	C Interface	Proposed Heading	URA Definition Propo	osed Text				Rationale	
	index (N) in subframe curve fit interval.	2 shall correspo	nd to the r	naximu	m URA _{oe}	expected over the entire		correspond to the ma case location within t location within the SN URA _{ED} . is zero.	aximum URA _{EE} the SV footprir V footprint (i.e	expecte nt (i.e., tv e., directl	ed over the wo points ly below th	e entire ephemeris curve fit interval for the worst- at the edge of the SV footprint). At the best-case he SV along the SV nadir vector), the corresponding		
	The URA _{oe} index is a tw +15 to -16 and has the	wo's complemer e following relati	nt represer onship to t	ntation o the eph	of a signe emeris U	d integer in the range of RA:		The URA _{ED} index is a signed, two's complement integer in the range of +15 to -16 and has the following relationship to the ED URA:						
	<u>URA_{oe} Index</u>	<u>URA_{oe} (meter</u>	<u>'s)</u>					<u>URA_{ED} Index</u>	<u>UI</u>	RA _{ED} (me	<u>eters)</u>			
	15	6144.00	<	URA _{oe}				15	6144.00	<		(or no accuracy prediction is available)		
	14	3072.00	<	URA _{oe}	≤	6144.00		14	3072.00	<	URA _{ED} ≤	6144.00		
	13	1536.00	<	URA _{oe}	≤	3072.00		13	1536.00	<	URA _{ED} ≤	3072.00		
	12	768.00 <	URA _{oe}	≤	1536.00			12	768.00 <	< URA _{ED}	≤ 1536	5.00		
	11	384.00 <	URA _{oe}	≤	768.00			11	384.00 <	CURA _{ED}	≤ 768	3.00		
	10	192.00 <	URA _{oe}	≤	384.00			10	192.00 <	CURA _{ED}	≤ 384	1.00		
	9	96.00 <	URA _{oe}	≤	192.00			9	96.00 <		≤ 192	2.00		
	8	48.00 <	URA _{oe}	≤	96.00			8	48.00 <		≤ 96	.00		
	7	24.00 <	URA _{oe}	≤	48.00			7	24.00 <	URA _{ED}	≤ 48	3.00		
	6	13.65 <	URA _{oe}	≤	24.00			6	13.65 <		≤ 24	.00		
	5	9.65 <	URA _{oe}	≤	13.65			5	9.65 <		≤ 13	.65		
	4	6.85 <	URA _{oe}	≤	9.65			4	6.85 <		≤ 9	.65		
	3	4.85 <	URA _{oe}	≤	6.85			3	4.85 <		≤ 6	.85		
	2	3.40 <	URA _{oe}	≤	4.85			2	3.40 <		≤ 4	.85		
	1	2.40 <	URA _{oe}	≤	3.40			1	2.40 <		≤ 3	.40		
	0	1.70 <	URA _{oe}	≤	2.40			0	1.70 <	URA _{ED}	≤ 2	.40		
	-1	1.20 <	URA _{oe}	≤	1.70			-1	1.20 <		≤ 1	.70		
								-2	0.85 <	URA _{ED}	≤ 1	.20		

URA Definition Proposed Text Section IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface Proposed Number Heading -3 $0.60 < URA_{ED} \leq$ -2 0.85 $\mathsf{URA}_{\mathsf{oe}} \leq$ 1.20 0.85 < $0.43 < URA_{ED} \leq$ 0.60 -3 0.60 < $URA_{oe} \leq$ 0.85 -4 $0.30 < URA_{ED} \leq$ -5 0.43 -4 0.43 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.60 -6 $0.21 < URA_{ED} \leq$ 0.30 -5 0.30 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.43 $0.15 < URA_{ED} \leq$ -7 0.21 -6 $\mathsf{URA}_{\mathsf{oe}} \ \leq \$ 0.30 0.21 < -8 $0.11 < URA_{ED} \leq$ 0.15 -7 0.15 < $URA_{oe} \leq$ 0.21 -9 $0.08 < URA_{ED} \leq$ 0.11 -8 0.11 < $URA_{oe} \leq$ 0.15 -10 $0.06 < URA_{ED} \leq$ 0.08 0.08 < $\mathsf{URA}_{\mathsf{oe}} \leq$ -9 0.11 -11 $0.04 < URA_{ED} \leq$ 0.06 0.06 < $URA_{oe} \leq$ 0.08 -10 -12 $0.03 < URA_{ED} \leq$ 0.04 0.04 < $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.06 -11 -13 $0.02 < URA_{ED} \leq$ 0.03 $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.04 -12 0.03 < -14 $0.01 < URA_{ED} \leq$ 0.02 $\mathsf{URA}_{\mathsf{oe}} \ \leq \$ -13 0.02 < 0.03 URA_{ED} ≤ -15 0.01 $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.02 -14 0.01 < -16 No accuracy prediction available-use at ov -15 $\mathsf{URA}_{\mathsf{oe}} \leq$ 0.01 For each URA_{ED} index (N), users may compute a nominal URA_{ED} va -16 No accuracy prediction available-use at own risk • 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 pr 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 The nominal URA_{ED} value (X) is suitable for use as a conservative p for accuracy-related purposes in the pseudorange domain (e.g., m computations). Integrity properties of the IAURA_{FD} are specified v by either 4.42 or 5.73 as appropriate) upper bound values of the b For the nominal URA_{ED} value and the IAURA_{ED} value, users may con

	Rationale
wn risk	
lue (X) as given by:	
rediction and shall advise the standard	
ers, respectively.	
prediction of the RMS ED range errors neasurement deweighting, RAIM, FOM with respect to the scaled (multiplied proadcast URA _{ED} index (see 30.3.3.1.1).	
mpute an adjusted URA _{ED} value as a	

Section Number	IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface	Proposed Heading	URA Definition Proposed Text	Rationale
			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 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.	
3.5.3.8	3.5.3.8 SV Clock Accuracy Estimates	Non- Elevation Dependent (NED) Accuracy Estimates		
3.5.3.8	Bits 460 through 470 of subframe 2 shall contain the URA _{oc} Index, URA _{oc1} Index, and URA _{oc2} Index of the SV (reference paragraph 6.2.1) for the 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 460 through 470 of subframe 2 shall contain the URA_{oc} Index, URA_{NED1} Index, and URA_{NED2} Index of the SV (reference paragraph 6.2.1) for the user. The following equations together with the broadcast URA_{NED0} Index, URA_{NED1} Index, and URA_{NED2} Index shall give the clock-related user range accuracy of IAURA_{NED} over the current clock/ephemeris fit interval. While the actual NED-related URA may vary over the satellite footprint, the IAURA_{NED} calculated using the parameters in message type 10 at each instant during the current clock/ephemeris fit interval shall bound the maximum IAURA_{NED} expected for the worst-case location within the satellite footprint at that instant. 	Rationale #1
3.5.3.8	The user shall calculate the clock-related URA with the equation (in meters): $URA_{oc} = URA_{ocb} + URA_{oc1} (t - t_{op}) \text{ for } t - t_{op} \leq 93,600 \text{ seconds}$ $URA_{oc} = URA_{ocb} + URA_{oc1} (t - t_{op}) + URA_{oc2} (t - t_{op} - 93,600)^2 \text{ for } t - t_{op} > 93,600 \text{ seconds}$ where $t = GPS \text{ time (must account for beginning or end of week crossovers),}$ $t_{op} = \text{ time of week of the state estimate utilized for the prediction of satellite clock correction parameters.}$		The user shall calculate the NED-related URA with the equation (in meters); IAURA _{NED} = URA _{NED0} + URA _{NED1} (t - t _{op}) for t-t _{op} < 93,600 seconds IAURA _{NED} = URA _{NED0} + URA _{NED1} (t - t _{op}) + URA _{NED2} (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 /ephemeris parameters.	Rationale #1

Section Number	IS-GPS-800 Rev A Nav	star GPS Space	e Segment/User Segment L1C Interface	Proposed Heading	URA Definition Propo	sed Text			Rationale
3.5.3.8	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 UR equations, results in th clock/ephemeris fit int	A _{-NEDO} , URA _P he minimun terval.	_{NED1} , and URA _{NED2} indexes n IAURA _{NED} that is greate	s which, when used together in the above r than the predicted IAURA _{NED} during the	Rationale #1
3.5.3.8	.8 The user shall use the broadcast URA _{oc} Index to derive URA _{ocb} . The index is a two's complement representation of a signed integer in the range of +15 to -16 and has the following relationship to the clock-related user derived URA _{ocb} :			The user shall use the signed, two's complem URA _{NED0} value: <u>URA_{NED0} Index</u>	broadcast L nent intege <u>L</u>	URA _{NEDO} index to derive t r in the range of +15 to - <u>URA_{NEDO} (meters)</u>	he URA _{NEDO} value. The URA _{NEDO} index is a 16 and has the following relationship to the	Rationale #1	
	<u>URA_{oc} Index</u>	<u>URA_{ocb} (mete</u>	<u>ers)</u>		15 14	6144.00 3072.00	< URA _{NED0} < URA _{NED0} ≤	(or no accuracy prediction is available) 6144.00	
	15	6144.00	< URA _{ocb}		13	1536.00	< URA _{NED0} ≤	3072.00	
	14	3072.00	$<$ URA _{ocb} \leq 6144.00		12	768.00	< URA _{NED0} ≤ 1	536.00	
	13	1536.00	$<$ URA _{ocb} \leq 3072.00		11	384.00	$<$ URA _{NED0} \leq	768.00	
	12	768.00 <	$URA_{ocb} \leq 1536.00$		10	192.00	$<$ URA _{NED0} \leq	384.00	
	11	384.00 <	$URA_{ocb} \leq 768.00$		9	96.00	< URA _{NED0} ≤	192.00	
	10	192.00 <	$URA_{ocb} \leq 384.00$		8	48.00	$<$ URA _{NED0} \leq	96.00	
	9	96.00 <	$URA_{ocb} \leq 192.00$		7	24.00	< URA _{NED0} ≤	48.00	
	8	48.00 <	$URA_{ocb} \leq 96.00$		6	13.65	< URA _{NED0} ≤	24.00	
	7	24.00 <	$URA_{ocb} \leq 48.00$		5	9.65	< URA _{NED0} ≤	13.65	
	6	13.65 <	$URA_{ocb} \leq 24.00$		4	6.85	< URA _{NED0} ≤	9.65	
	5	9.65 <	$URA_{ocb} \leq 13.65$		3	4.85	< URA _{NED0} ≤	6.85	
	4	6.85 <	$URA_{ocb} \leq 9.65$		2	3.40	$<$ URA _{NED0} \leq	4.85	
	3	4.85 <	$URA_{ocb} \leq 6.85$		1	2.40	< URA _{NED0} ≤	3.40	
	2	3.40 <	$URA_{ocb} \leq 4.85$		0	1.70	< URA _{NED0} ≤	2.40	
	1	2.40 <	$URA_{ocb} \leq 3.40$		-1	1.20	< URA _{NED0} ≤	1.70	

Section IS-GPS-800 Rev A Navstar GPS Space Segment/User Segment L1C Interface Proposed **URA Definition Proposed Text** Number Heading 0 1.70 $\mathsf{URA}_{\mathsf{ocb}} \leq$ 2.40 -2 0.85 < URA_{NED0} ≤ 1.20 < $< URA_{NED0} \leq$ -3 0.85 -1 1.20 < $\mathsf{URA}_{\mathsf{ocb}} \leq$ 1.70 0.60 -4 0.43 $< URA_{NED0} \leq$ 0.60 -2 0.85 < $\mathsf{URA}_{\mathsf{ocb}} \leq$ 1.20 -5 $0.30 < URA_{NED0} \leq$ 0.43 -3 0.60 < $\mathsf{URA}_{\mathsf{ocb}} \leq$ 0.85 $< URA_{NED0} \leq$ -6 0.21 0.30 $\mathsf{URA}_{\mathsf{ocb}} \; \leq \;$ 0.60 -4 0.43 < -7 < URA_{NED0} ≤ 0.15 0.21 0.30 < $\mathsf{URA}_{\mathsf{ocb}} \leq$ 0.43 -5 -8 $< URA_{NED0} \leq$ 0.15 0.11 0.21 < $\mathsf{URA}_{\mathsf{ocb}} \leq$ 0.30 -6 -9 0.08 < URA_{NED0} ≤ 0.11 -7 0.15 < $\mathsf{URA}_{\mathsf{ocb}} \leq$ 0.21 -10 0.06 < URA_{NED0} ≤ 0.08 $\mathsf{URA}_{\mathsf{ocb}} \leq$ 0.15 -8 0.11 < -11 0.04 $< URA_{NED0} \leq$ 0.06 -9 0.08 $\mathsf{URA}_{\mathsf{ocb}} \leq$ 0.11 < $< URA_{NED0} \leq$ -12 0.03 0.04 $\mathsf{URA}_{\mathsf{ocb}} \leq$ -10 0.06 < 0.08 -13 0.02 $< URA_{NED0} \leq$ 0.03 $\mathsf{URA}_{\mathsf{ocb}} \; \leq \;$ 0.06 -11 0.04 < 0.01 $< URA_{NED0} \leq$ 0.02 -14 $\mathsf{URA}_{\mathsf{ocb}} \leq$ 0.04 -12 0.03 < -15 URA_{NED0} ≤ 0.01 $\mathsf{URA}_{\mathsf{ocb}} \; \leq \;$ 0.02 < 0.03 -13 -16 No accuracy prediction available-use at ov 0.01 < $\mathsf{URA}_{\mathsf{ocb}} \leq$ 0.02 -14 For each URA_{NED0} index (N), users may compute a nominal URA_{NED0} -15 $\mathsf{URA}_{\mathsf{ocb}} \leq$ 0.01 • If the value of N is 6 or less, but more than -16, $X = 2^{(1 + N/2)}$, -16 No accuracy prediction available-use at own risk • 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 pr positioning service user to use that SV at his own risk. 3.5.3.8 The user may use the upper bound value in the URA_{ocb} range corresponding to the For N = 1, 3, and 5, X should be rounded to 2.8, 5.7, and 11.3 meters broadcast index, thereby calculating the maximum URA_{oc} that is equal to or greater than The nominal URA_{NEDO} value (X) shall be suitable for use as a conser the CS predicted URA_{oc}, or the user may use the lower bound value in the range which will range errors for accuracy-related purposes in the pseudorange do provide the minimum URA_{oc} that is equal to or less than the CS predicted URA_{oc}. weighting RAIM, FOM computations). Integrity properties of the

	Rationale
wo rick	
WIT FISK	
$_{0}$ value (X) as given by:	
rediction and shall advise the standard	
ers, respectively.	Rationale #1
rvative prediction of the RMS NED	
IAURA _{NED} are specified with respect to	

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			the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URA _{NED0} index, URA _{NED2} index, and URA _{NED2} index (see 3.5.3.10.1).	
			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 3.5.3.9; 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 3.5.3.9; 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.	
3.5.3.8	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} :		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:	Rationale #3- There is a typo
	1		1	that needs be
	$\frac{1}{2^{N}}$		$\frac{1}{2^N}$	corrected in
	$URA_{oc1} = 2$ (meters/second)		$URA_{NED1} = 2$ (meters/second)	computing
	where		where	URA, or all
				user URA
	$N = 4 + URA_{oc1}$ Index.		$N = 14 + URA_{NED1}$ Index.	values will be
				far too large.
				Using the
				erroneous
				value will
				result in a
				minimum
				value of
				URA _{oc1} that
				will prevent
				the Space and
				Control
				segments
				from meeting
				their specified
				performance
				requirements.
3.5.3.8	The transmitted URA_{oc2} Index is an integer value in the range 0 to 7. URA_{oc2} Index has the		The transmitted URA_{NED2} index is an integer value in the range 0 to 7. URA_{NED2} index has the following	Rationale #3

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	following relationship to the URA _{oc2} :		relationship to the URA _{NED2} :	
	1		1	
	$URA_{nc2} = \overline{2^{N}}$ (meters/second ²)		$URA_{NED2} = \overline{2^N}$ (meters/second ²)	
	where		where	
	$N = 25 + URA_{oc2}$ Index.		$N = 28 + URA_{NED2}$ Index.	
3.5.5.2	3.5.5.2	Data Sets		
3.5.5.2			The t_{oe} shall be equal to the t_{oc} of the same CNAV data set. The following rules govern the transmission	Rationale #2-
			of t_{oe} and t_{oc} values in different data sets: (1) The transmitted t_{oc} will be different from any value	URA
			transmitted by the SV during the preceding seven days; (2) The transmitted t _{oe} will be different from any	components
			value transmitted by the SV during the preceding six hours.	(URA _{ED} and
			Cutovers to new data sets will occur only on hour boundaries except for the first data set of a new	different
			upload. The first data set may be cut-in (reference paragraph 3.5.5.1) at any time during the hour and	unload or fit
			therefore may be transmitted by the SV for less than one hour.	intervals will
			The start of the transmission interval for each data set corresponds to the beginning of the curve fit	not give a
			interval for the data set. Each data set remains valid for the duration of its transmission interval, and	valid
			nominally also remains valid for the duration of its curve fit interval. A data set is rendered invalid	indication of
			before the end of its curve fit interval when it is superseded by the SV cutting over to the first data set	signal
			of a new upload.	integrity
			Normal Operations. The subframe 2 data sets are transmitted by the SV for periods of two hours. The	These changes
			corresponding curve fit interval is three hours.	provide
				clarification of
				how URA is
				computed by
				the user.
2552		D. f		
3.5.5.3	3.5.5.3	Keterence		
		Times		
3.5.5.3			The LNAV reference time information in paragraph 20.3.4.5 in IS-GPS-200 also applies to the CNAV	
			reference times.	

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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.		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 ('enlanced' 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 value of the URA index or to the scaled composite of the upper bound values of all component URA indexes.	Rationale #5- There are numerous inconsistencie s between ICDs and clarifications and additions that are needed for the users to compute URA. These changes resolve the inconsistencie s 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 transmission interval that is applicable to the NAV data from which the URA is read, for the worst-case location within the satellite footprint.	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. 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.		Note #2: The URA for a particular signal may be represented by a single index in the NAV data or by a composite of more than one index-representing components of the total URA. Specific URA indexes and formulae for calculating the total URA for L1C are defined in Section 3 for the CNAV message.	Rationale #5
6.2.1			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 5.2 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 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.	Rationale #5

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Number		Heading		
6.2.1.1	6.2.1.1 Integrity Assured URA		<delete></delete>	
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 a URA index value. The URA index represents a range of values; for integrity assurance applications, it is prudent to use the RSS of the largest URA index values in the URA index range.		<delete></delete>	Rationale #5
6.2.1.1	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.	Rationale #5

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