PROPOSED INTERFACE REVISION NOTICE (PIRN)

Note: This Cover Page is not intended for signature. It is to be used during the document update (pre-ICWG) process.

Affected ICD/IS: IS-GPS-200 Rev H	**PIRN Number:** PIRN-IS-200H-004
Authority: RFC-00312	**PIRN Date:** 22-JUN-2016

CLASSIFIED BY: N/A

DECLASSIFY ON: N/A

Document Title: Navstar GPS Space Segment/ User Segment L5 Interfaces

Reason For Change (Driver): To remove ambiguity in contractor interpretation, the definition of the parameter Time of Predict (T_op) and other timing parameters must be clarified in the GPS technical baseline documentation.

Description of Change: Process the proposed changes with the correct stakeholders and update IS-GPS-200 Rev H for accurate implementation.

Prepared By: **John Buckley** **Checked By:** **Huey Nguyenhuu**

Req ID : IS200-1488

WAS :

AI	-	Availability Indicator
AODO	-	Age of Data Offset
A-S	-	Anti-Spoofing
Autonav	-	Autonomous Navigation
BPSK	-	Bi-Phase Shift Key
CDC	-	Clock Differential Correction
CNAV	-	Civil Navigation
cps	-	cycles per second
CRC	-	Cyclic Redundancy Check
CS	-	Control Segment
DC	-	Differential Correction
dBc	-	Power ratio of a signal to a (unmodulated) carrier signal, expressed in decibels
dBi	-	Decibel with respect to isotropic antenna
dBW	-	Decibel with respect to 1 W
DN	-	Day Number
EAROM	-	Electrically Alterable Read-Only Memory
ECEF	-	Earth-Centered, Earth-Fixed
ECI	-	Earth-Centered, Inertial
EDC	-	Ephemeris Differential Correction
EOE	-	Edge-of-Earth
EOL	-	End of Life
ERD	-	Estimated Range Deviation
FEC	-	Forward Error Correction
GGTO	-	GPS/GNSS Time Offset
GNSS	-	Global Navigation Satellite System

GPS	-	Global Positioning System
GPSW	-	Global Positioning System Wing
HOW	-	Hand-Over Word
ICC	-	Interface Control Contractor
ID	-	Identification
IERS	-	International Earth Rotation and Reference Systems Service
IODC	-	Issue of Data, Clock
IODE	-	Issue of Data, Ephemeris
IRM	-	IERS Reference Meridian
IRP	-	IERS Reference Pole
IS	-	Interface Specification
ISC	-	Inter-Signal Correction
LSB	-	Least Significant Bit
LSF	-	Leap Seconds Future
L2 C	-	L2 Civil Signal
L2 CL	-	L2 Civil-Long Code
L2 CM	-	L2 Civil-Moderate Code
MCS	-	Master Control Station
MSB	-	Most Significant Bit
NAV	-	Navigation
NDUS	-	Nudet Detection User Segment
NMCT	-	Navigation Message Correction Table
NSC	-	Non-Standard C/A-Code
NSCL	-	Non-Standard L2 CL-Code
NSCM	-	Non-Standard L2 CM-Code
NSY	-	Non-Standard Y-code
OBCP	-	On-Board Computer Program
OCS	-	Operational Control System
PPS	-	Precise Positioning Service
PRN	-	Pseudo-Random Noise

RF	-	Radio Frequency
RMS	-	Root Mean Square
SA	-	Selective Availability
SEP	-	Spherical Error Probable
SPS	-	Standard Positioning Service
sps	-	symbols per second
SS	-	Space Segment
SSV	-	Space Service Volume
SV	-	Space Vehicle
SVN	-	Space Vehicle Number
TBD	-	To Be Determined
TBS	-	To Be Supplied
TLM	-	Telemetry
TOW	-	Time Of Week
UE	-	User Equipment
URA	-	User Range Accuracy
URE	-	User Range Error
US	-	User Segment
USNO	-	U.S. Naval Observatory
UTC	-	Coordinated Universal Time
WGS 84	-	World Geodetic System 1984
WN	-	Week Number
WN_e	-	Extended Week Number

IS :

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PRN	-	Pseudo-Random Noise
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RMS	-	Root Mean Square
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SEP	-	Spherical Error Probable
SPS	-	Standard Positioning Service
sps	-	symbols per second

SS	-	Space Segment
SSV	-	Space Service Volume
SV	-	Space Vehicle
SVN	-	Space Vehicle Number
TBD	-	To Be Determined
TBS	-	To Be Supplied
TLM	-	Telemetry
TOW	-	Time Of Week
UE	-	User Equipment
URA	-	User Range Accuracy
URE	-	User Range Error
US	-	User Segment
USNO	-	U.S. Naval Observatory
UTC	-	Coordinated Universal Time
WGS 84	-	World Geodetic System 1984
WN	-	Week Number
WN_e	-	Extended Week Number

Req ID : IS200-1512

WAS : N/A

IS : **Integrity/Clock/Ephemeris (ICE) Data Set.**

Req ID : IS200-1513

WAS : N/A

IS : An Integrity/Clock/Ephemeris (ICE) data set is the collection of SV-specific URA parameters, clock correction polynomial parameters, ephemeris parameters, and related parameters (health flags, time tags, etc.) needed to use the

SV's broadcast signal(s) in the positioning service. ICE data is sometimes also known as the user's 'hot start' data for the SV. Before modernization, an ICE data set was sometimes called a "Subframe 1-2-3 data set".

Req ID : IS200-1514

WAS : N/A

IS : **ICE Data Projection Sequence.**

Req ID : IS200-1515

WAS : N/A

IS : A related time-ordered sequence of ICE data sets in which each successive ICE data set is a time projection of the preceding ICE data set. Special provisions apply to alert users to discontinuities separating one ICE data projection sequence from another ICE data projection sequence (e.g., after an upload occurs). Before modernization, an ICE data projection sequence was sometimes called an "uploaded sequence of Subframe 1-2-3 data sets". Beginning with the Next Generation Operational Control System (OCX), an upload may include multiple, disjoint but contiguous ICE data projection sequences.

Req ID : IS200-355

WAS : Any change in the subframe 2 and 3 data will be accomplished with a simultaneous change in both IODE words. The CS (Block II/Block IIA/IIR/IIR-M/IIF) and SS (GPS III) shall 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 (reference paragraph 20.3.4.5).

IS : Any change in the subframe 2 and 3 data will be accomplished with a simultaneous change in both IODE words. The CS (Block II/Block IIA/IIR/IIR-M/IIF) and SS (GPS III) shall assure that the t_{oe} value, for at least the first data set transmitted by an SV from a new ICE data projection sequence, is different from that transmitted for the prior ICE data projection sequence(reference paragraph 20.3.4.5).

Req ID : IS200-363

WAS : The user shall compute the ECEF coordinates of position for the phase center of the SVs' antennas utilizing a variation of the equations shown in Table 20-IV. Subframes 2 and 3 parameters are Keplerian in appearance; the values of these parameters, however, are produced by the CS (Block II/Block IIA/IIR/IIR-M/IIF) and SS (GPS III) via a least squares curve fit of the predicted ephemeris of the phase center of the SVs' antennas (time-position quadruples; t, x, y, z expressed in ECEF coordinates). Particulars concerning the periods of the curve fit, the resultant accuracy, and the applicable coordinate system are given in the following subparagraphs.

IS : The user shall compute the ECEF coordinates of position for the phase center of the SVs' antennas utilizing a variation of the equations shown in Table 20-IV. Subframes 2 and 3 parameters are Keplerian in appearance; the values of these parameters, however, are produced by the CS (Block II/Block IIA/IIR/IIR-M/IIF) and SS (GPS III) via a least squares curve fit of the projected ephemeris of the phase center of the SVs' antennas (time-position quadruples; t, x, y, z expressed in ECEF coordinates). Particulars concerning the periods of the curve fit, the resultant accuracy, and the applicable coordinate system are given in the following subparagraphs.

Req ID : IS200-463

WAS : 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 20.3.4.1) at any time during the hour and therefore may be transmitted by the SV for less than one hour. During short-term operations, cutover to 4-hour sets and subsequent cutovers to succeeding 4-hour data sets will always occur modulo 4 hours relative to end/start of week. Cutover from 4-hour data sets to 6-hour data sets shall occur modulo 12 hours relative to end/start of week. Cutover from 12-hour data sets to 24-hour data sets shall occur modulo 24 hours relative to end/start of week. Cutover from a data set transmitted 24 hours or more occurs on a modulo 24-hour boundary relative to end/start of week.

IS : Cutovers to new data sets will occur only on hour boundaries except for the first data set of a new ICE data projection sequence. The first data set may be cut-in (reference paragraph 20.3.4.1) at any time during the hour and therefore may be transmitted by the SV for less than one hour. During short-term operations, cutover to 4-hour sets and subsequent cutovers to succeeding 4-hour data sets will always occur modulo 4 hours relative to end/start of week. Cutover from 4-hour data sets to 6-hour data sets shall occur modulo 12 hours relative to end/start of week. Cutover from 12-hour data sets to 24-hour data sets shall occur modulo 24 hours relative to end/start of week. Cutover from a data set transmitted 24 hours or more occurs on a modulo 24-hour boundary relative to end/start of week.

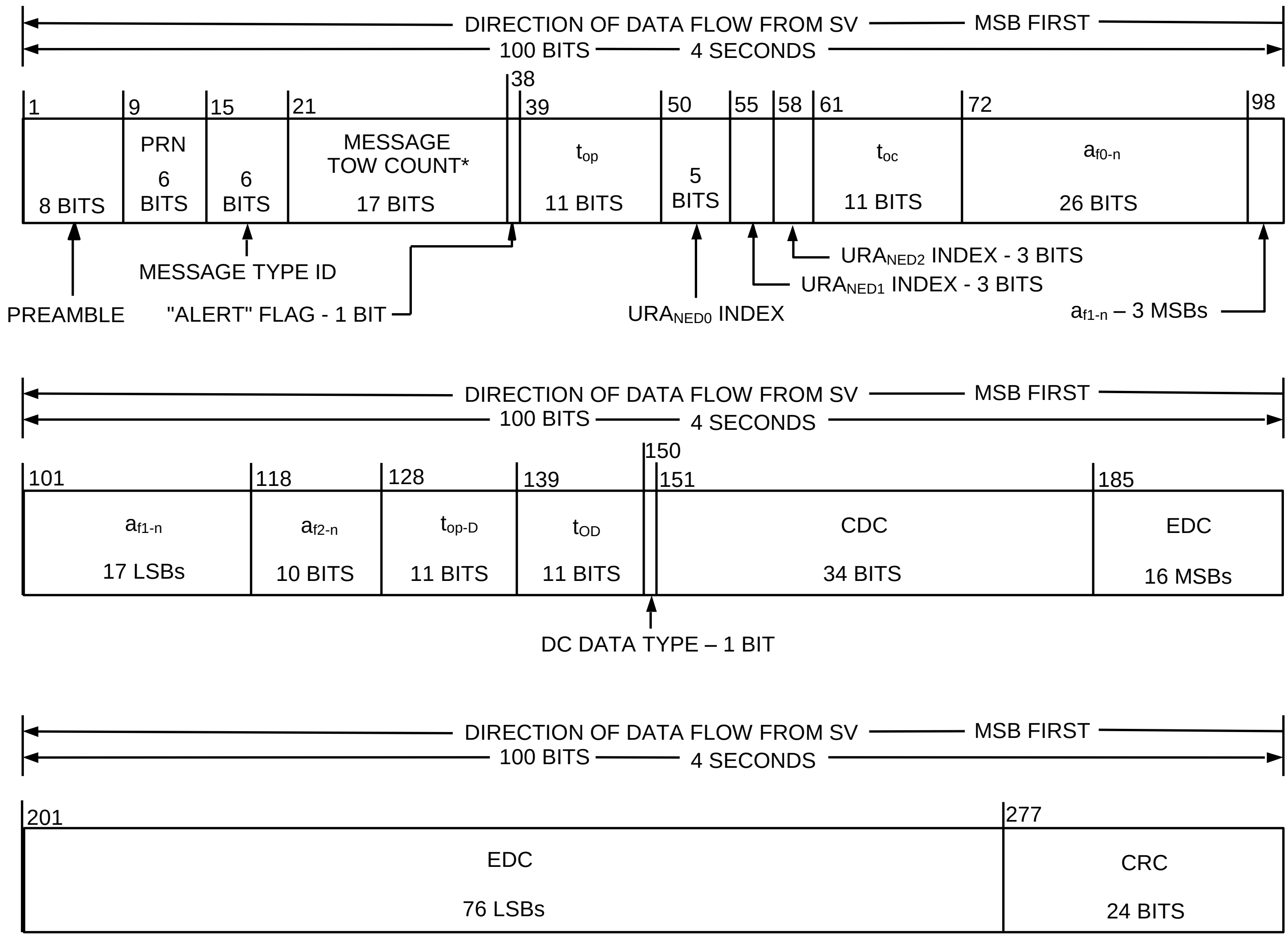
Req ID : IS200-474

WAS : The CS (Block II/IIA/IIR/IIR-M/IIF) and SS (GPS III) shall assure that the t_{oe} value, for at least the first data set transmitted by an SV after a new upload, is different from that transmitted prior to the cutover (see paragraph 20.3.4.4). As such, when a new upload is cutover for transmission, the CS (Block IIA/IIR/IIR-M/IIF) and SS (GPS III) shall introduce a small deviation in the t_{oe} resulting in the t_{oe} value that is offset from the hour boundaries (see Table 20-XIII). This offset t_{oe} will be transmitted by an SV in the first data set after a new upload cutover and the second data set, following the first data set, may also continue to reflect the same offset in the t_{oe}.

IS : The CS (Block II/IIA/IIR/IIR-M/IIF) and SS (GPS III) shall assure that the t_{oe} value, for at least the first data set transmitted by an SV from a new ICE data projection sequence, is different from that transmitted from the prior ICE data projection sequence (see paragraph 20.3.4.4). As such, when a new ICE data projection sequence is cutover for transmission, the CS (Block IIA/IIR/IIR-M/IIF) and SS (GPS III) shall introduce a small deviation in the t_{oe} resulting in the t_{oe} value that is offset from the hour boundaries (see Table 20-XIII). This offset t_{oe} will be transmitted by an SV in the first data set of the-new ICE data projection sequence and the second data set, following the first data set, may also continue to reflect the same offset in the t_{oe}.

Req ID : IS200-522

WAS :

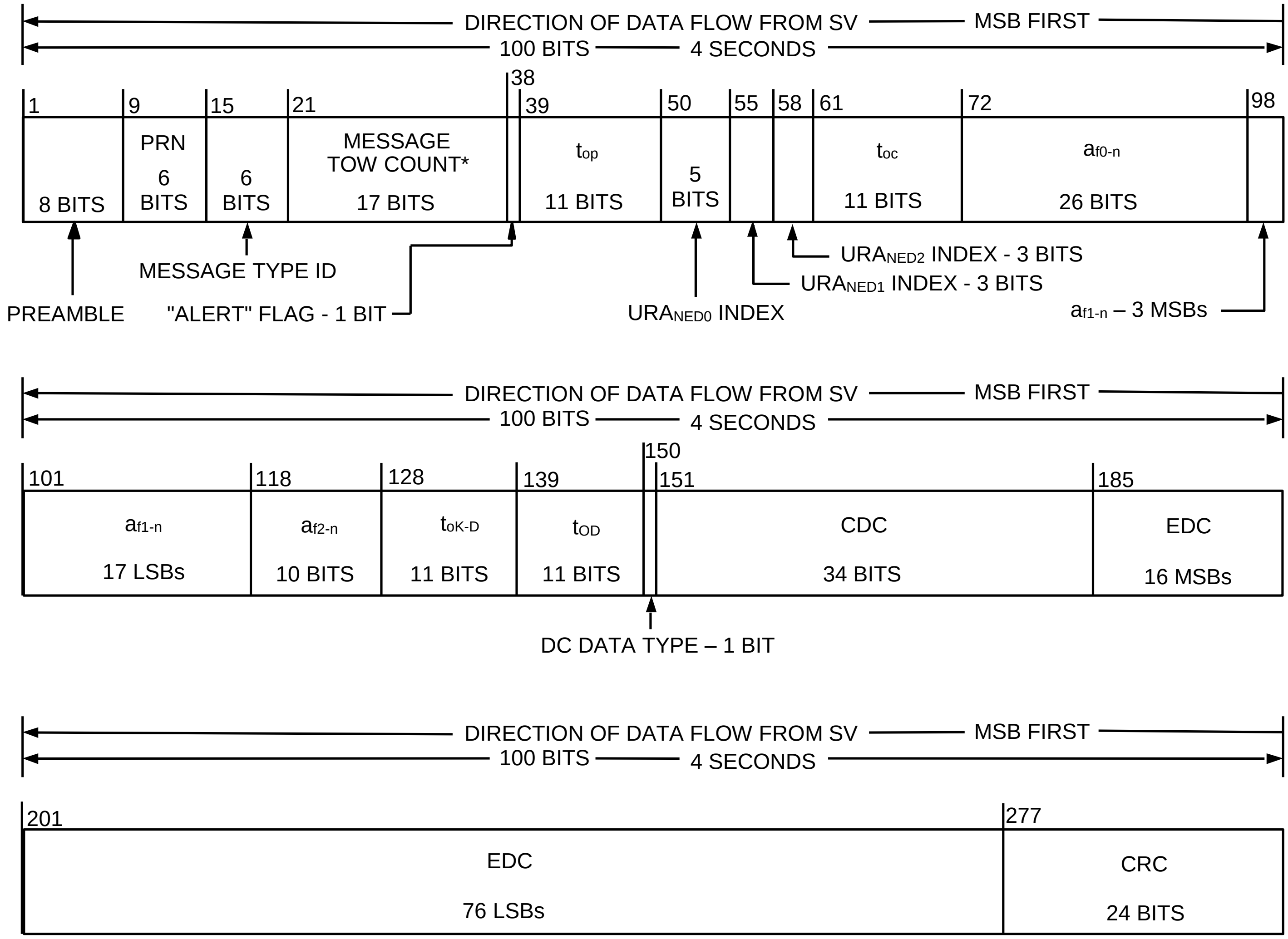


* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE

CDC = Clock Differential Correction
EDC = Ephemeris Differential Correction

Figure 30-7. Message Type 34 - Clock & Differential Correction

IS :

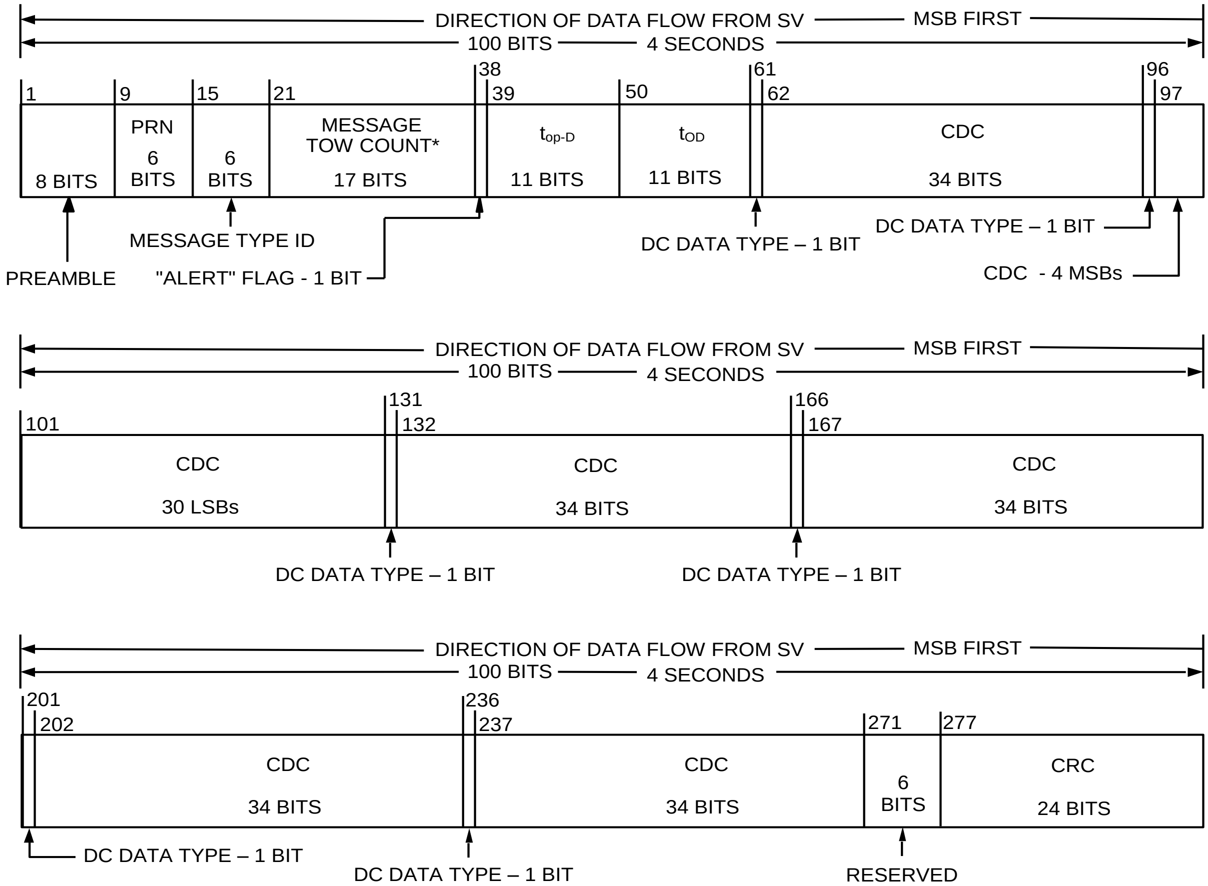


* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE

CDC = Clock Differential Correction
EDC = Ephemeris Differential Correction

Figure 30-7. Message Type 34 - Clock & Differential Correction

Req ID : IS200-527

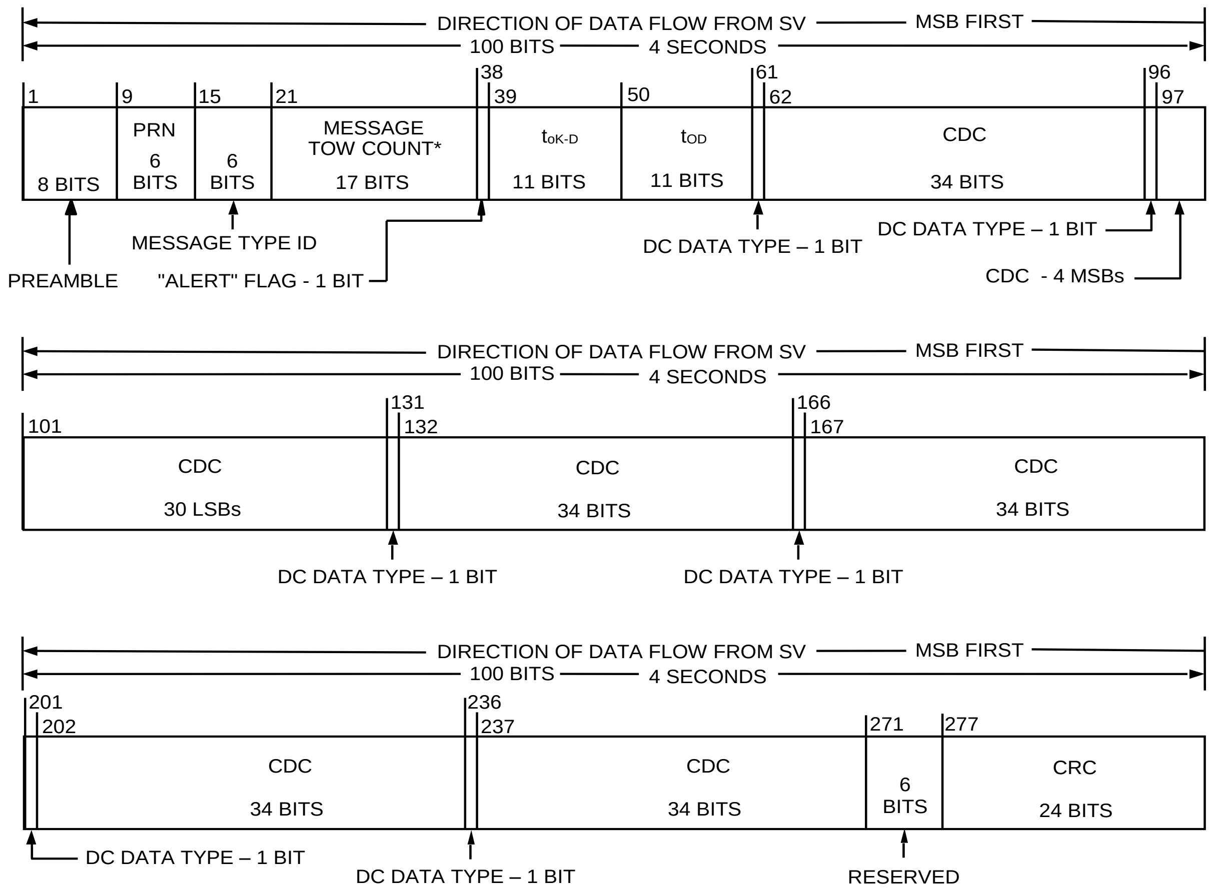


* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE

CDC = Clock Differential Correction

WAS :

Figure 30-12. Message Type 13 - Clock Differential Correction



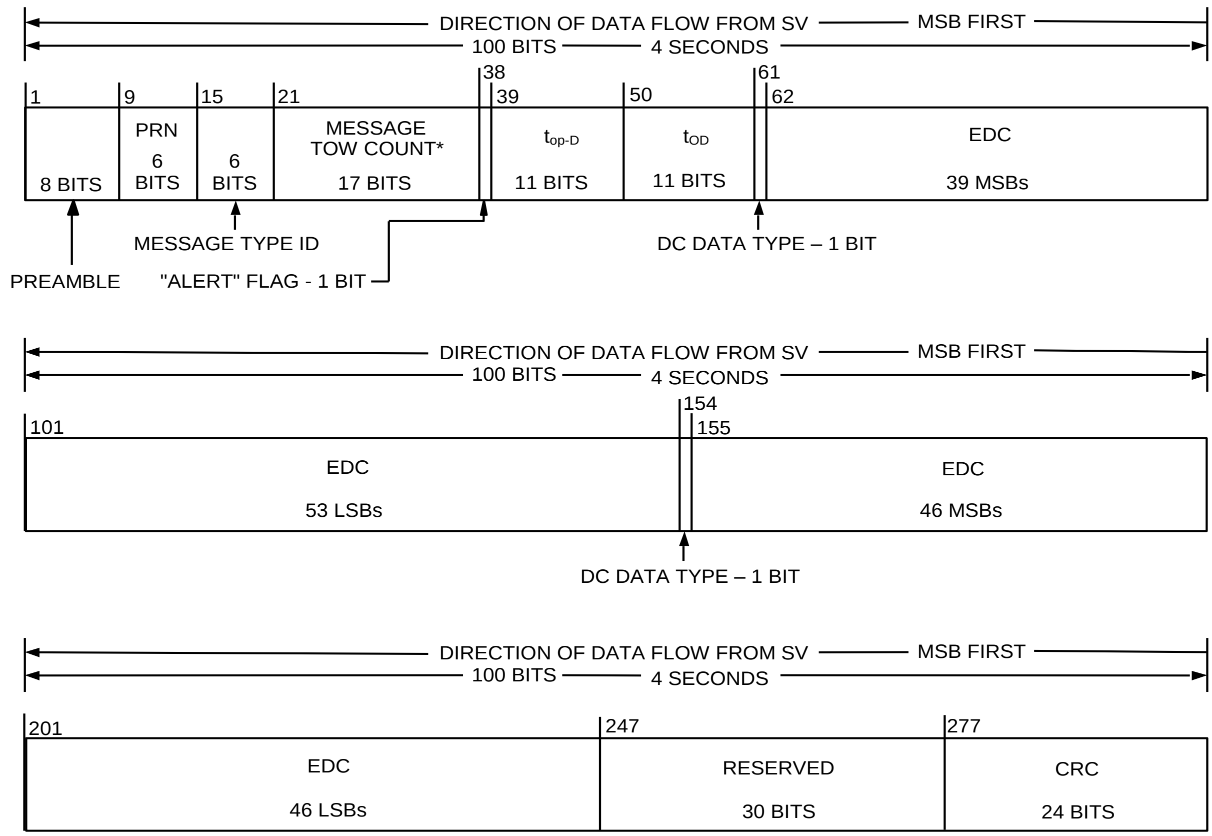
* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE

CDC = Clock Differential Correction

IS :

Figure 30-12. Message Type 13 - Clock Differential Correction

Req ID : IS200-528

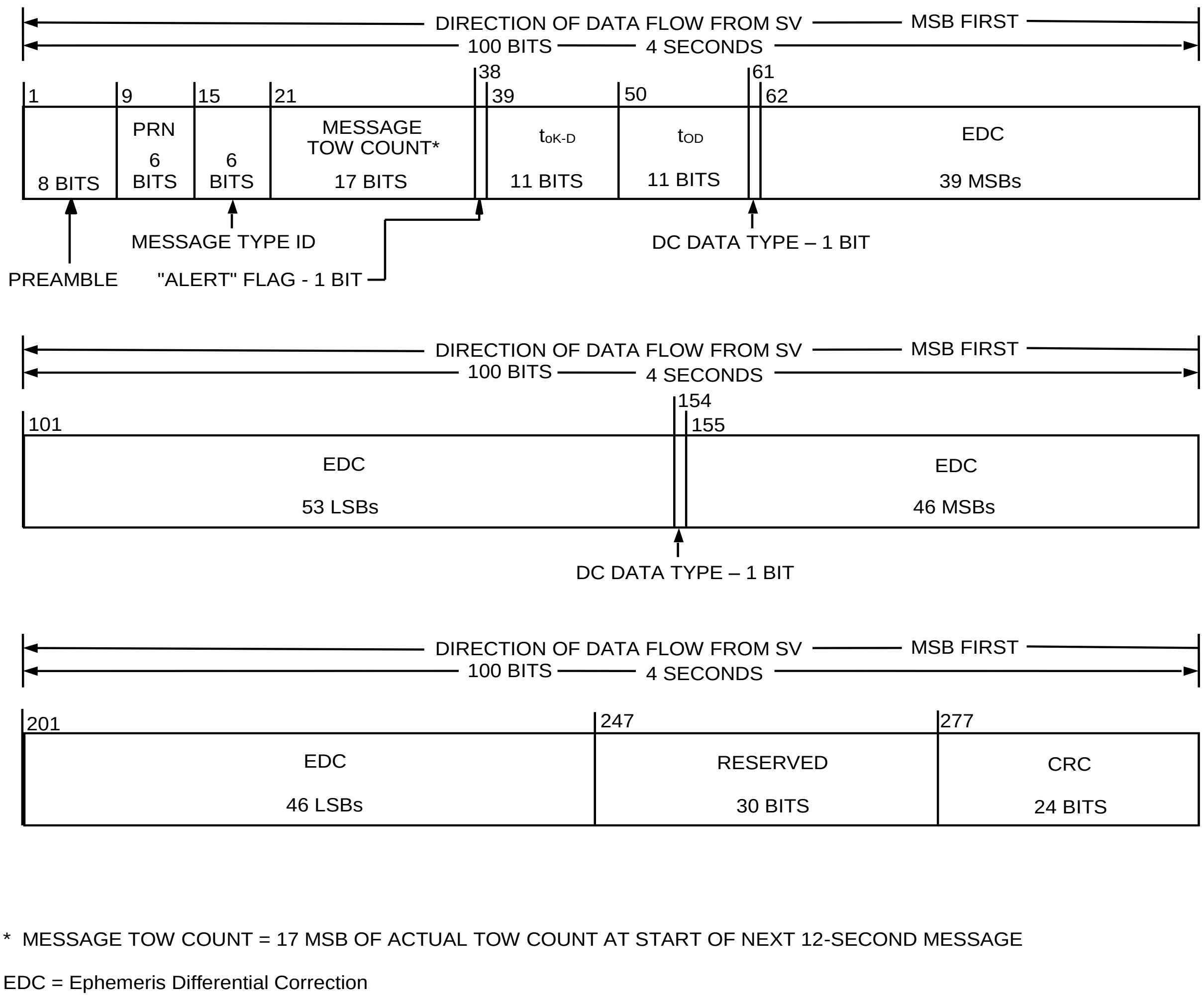


* MESSAGE TOW COUNT = 17 MSB OF ACTUAL TOW COUNT AT START OF NEXT 12-SECOND MESSAGE

EDC = Ephemeris Differential Correction

WAS :

Figure 30-13. Message Type 14 - Ephemeris Differential Correction



IS :

Figure 30-13. Message Type 14 - Ephemeris Differential Correction

Req ID : IS200-542

WAS : **Data Predict Time of Week.**

IS : **ICE Data Projection Sequence Time of Week.**

Req ID : IS200-543

WAS : Bits 55 through 65 of message type 10 shall contain the data predict time of week (t_{op}). The t_{op} term provides the epoch time of week of the state estimate utilized for the prediction of satellite quasi-Keplerian ephemeris parameters.

IS : Bits 55 through 65 of message type 10 shall contain the ICE data projection sequence time of week (t_{op}). The t_{op} term provides the epoch time of week of the state data utilized for the projection of satellite ICE data quasi-Keplerian ephemeris parameters. Users are cautioned to avoid using this parameter to compute age of data for any SV.

Req ID : IS200-550

WAS : The user shall compute the ECEF coordinates of position for the SV's antenna phase center (APC) utilizing a variation of the equations shown in Table 30-II. The ephemeris parameters are Keplerian in appearance; however, the values of these parameters are produced by the CS (Block IIR-M/IIF) and SS (GPS III) via a least squares curve fit of the predicted ephemeris of the SV APC (time-position quadruples: t, x, y, z expressed in ECEF coordinates). Particulars concerning the applicable coordinate system are given in Sections 20.3.3.4.3.3 and 20.3.3.4.3.4.

IS : The user shall compute the ECEF coordinates of position for the SV's antenna phase center (APC) utilizing a variation of the equations shown in Table 30-II. The ephemeris parameters are Keplerian in appearance; however, the values of these parameters are produced by the CS (Block IIR-M/IIF) and SS (GPS III) via a least squares curve fit of the projected ephemeris of the SV APC (time-position quadruples: t, x, y, z expressed in ECEF coordinates). Particulars concerning the applicable coordinate system are given in Sections 20.3.3.4.3.3 and 20.3.3.4.3.4.

Req ID : IS200-552

WAS :

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

Parameter	No. of Bits**	Scale Factor (LSB)	Effective Range***	Units

WN	Week No.	13	1		weeks
URA_{ED} Index	ED Accuracy Index	5*			(see text)
Signal health (L1/L2/L5)		3	1		(see text)
t_{op}	Data predict time of week	11	300	604,500	seconds
ΔA ****	Semi-major axis difference at reference time	26*	2^{-9}		meters
$\dot{A}$	Change rate in semi-major axis	25*	2^{-21}		meters/sec
Δn_0	Mean Motion difference from computed value at reference time	17*	2^{-44}		semi-circles/sec
$\Delta \dot{n}_0$	Rate of mean motion difference from computed value	23*	2^{-57}		semi-circles/sec^2
M_{0-n}	Mean anomaly at reference time	33*	2^{-32}		semi-circles
e_n	Eccentricity	33	2^{-34}	0.03	dimensionless
ω_n	Argument of perigee	33*	2^{-32}		semi-circles

* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;

** See Figure 30-1 for complete bit allocation in Message Type 10;

*** Unless otherwise indicated in this column, effective range is the maximum range attainable with indicated bit allocation and scale factor.

**** Relative to A_{REF} = 26,559,710 meters.

IS :

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

Parameter		No. of Bits**	Factor (LSB)	Valid Range***	Units
WN	Week No.	13	1		weeks
URA_{ED} Index	ED Accuracy Index	5*			(see text)
Signal health (L1/L2/L5)		3	1		(see text)
t_{op}	ICE Data projection sequence time of week	11	300	0 to 604,500	seconds
ΔA ****	Semi-major axis difference at reference time	26*	2^{-9}		meters
$\dot{A}$	Change rate in semi-major axis	25*	2^{-21}		meters/sec
Δn_0	Mean Motion difference from computed value at reference time	17*	2^{-44}		semi-circles/sec
$\Delta \dot{n}_0$	Rate of mean motion difference from computed value	23*	2^{-57}		semi-circles/sec^2
M_{0-n}	Mean anomaly at reference time	33*	2^{-32}		semi-circles
e_n	Eccentricity	33	2^{-34}	0.0 to 0.03	dimensionless
ω_n	Argument of perigee	33*	2^{-32}		semi-circles

* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;

** See Figure 30-1 for complete bit allocation in Message Type 10;

*** Unless otherwise indicated in this column, valid range is the maximum range attainable with indicated bit allocation and scale factor.

**** Relative to A_{REF} = 26,559,710 meters.

Req ID : IS200-563

WAS : **Data Predict Time of Week.**

IS : **ICE Data Projection Sequence Time of Week.**

Req ID : IS200-564

WAS : Bits 39 through 49 of message types 30 through 37 shall contain the data predict time of week (t_{op}). The t_{op} term provides the epoch time of week of the state estimate utilized for the prediction of SV clock correction coefficients.

IS : Bits 39 through 49 of message types 30 through 37 shall contain the ICE data projection time of week (t_{op}). The $_{top}$ term provides the epoch time of week of the state data utilized for projecting the SV clock correction coefficients forward in time.

Req ID : IS200-1503

WAS : **Data Predict Week Number.**

IS : **ICE Data Projection Sequence Week Number.**

Req ID : IS200-1504

WAS : Bits 257-264 of Message Type 30 shall indicate the Data Predict Week Number (WN_{op}) to which the Data Predict Time of Week (t_{op}) is referenced (see 30.3.3.1.1.3 and 30.3.3.2.1.2). The WN_{op} term consists of eight bits which shall be a modulo 256 binary representation of the GPS week number to which the t_{op} is referenced. The user must account for the truncated nature of WN_{op} in all calculations in which WN_{op} is used.

IS : Bits 257-264 of Message Type 30 shall indicate the ICE Data Projection Sequence Week Number (WN_{op}) to which the t_{op} is referenced (see 30.3.3.1.1.3 and 30.3.3.2.1.2). The WN_{op} term consists of eight bits which shall be a modulo 256 binary representation of the GPS week number to which the t_{op} is referenced. The user must account for the truncated nature of WN_{op} in all calculations in which WN_{op} is used.

Req ID : IS200-638

WAS : Each DC data packet contains: corrections to SV clock polynomial coefficients provided in any one of the message types 30 to 37 of the corresponding SV; corrections to quasi-Keplerian elements referenced to t_{OD} of the corresponding SV; and User Differential Range Accuracy (UDRA) and $U\dot{D}RA$ indices that enable users to estimate the accuracy obtained after corrections are applied. Each DC packet is made up of two different segments. The first segment contains 34 bits for the CDC parameters and the second segment contains 92 bits of EDC parameters totaling 126 bits. The CDC and EDC parameters form an indivisible pair and users must utilize CDC and EDC as a pair. Users must utilize CDC and EDC data pair of same $t_{op\text{-}D}$ and of same t_{OD}.

IS : Each DC data packet contains: corrections to SV clock polynomial coefficients provided in any one of the message types 30 to 37 of the corresponding SV; corrections to quasi-Keplerian elements referenced to t_{OD} of the corresponding SV; and User Differential Range Accuracy (UDRA) and $U\dot{D}RA$ indices that enable users to estimate the accuracy obtained after corrections are applied. Each DC packet is made up of two different segments. The first segment contains 34 bits for the CDC parameters and the second segment contains 92 bits of EDC parameters totaling 126 bits. The CDC and EDC parameters form an indivisible pair and users must utilize CDC and EDC as a pair. Users must utilize CDC and EDC data pair of same $t_{oK\text{-}D}$ and of same t_{OD}.

Req ID : IS200-640

WAS : **Differential Correction Data Predict Time of Week.**

IS : **Differential Correction Data Kalman Time of Week.**

Req ID : IS200-641

WAS : The DC data predict time of week ($t_{op\text{-}D}$) provides the epoch time of week, in increments of 300 seconds (i.e. five minutes), at which the prediction for the associated DC data was performed.

IS : The DC data Kalman time of week ($t_{oK\text{-}D}$) provides the epoch time of week, in increments of 300 seconds (i.e. five minutes), at which the kalman estimation for the associated DC data was performed.

Req ID : IS200-649

WAS : The SV PRN code phase offset, uncorrected by clock correction coefficient updates, is given by equation 2 in paragraph 20.3.3.3.3.1 (see para. 30.3.3.2.3). If the matched pair of DC data for the subject SV is available, the user may apply clock correction coefficient update values by;
$\Delta t_{sv} = (a_{f0} + \delta a_{f0}) + (a_{f1} + \delta a_{f1})(t - t_{oc}) + a_{f2}(t - t_{oc})^2 + \Delta t_r$,
where δa_{f0} and δa_{f1}, (see Table 30-X), are given in message types 34 or 13, and all other terms are as stated in paragraph 20.3.3.3.3.1. Clock-related DC data shall not be applied to any SV transmitting clock correction parameters message(s) containing a t_{op} value greater than the $t_{op\text{-}D}$ value of messages types 34 or 13 containing the clock-related DC data.

IS : The SV PRN code phase offset, uncorrected by clock correction coefficient updates, is given by equation 2 in paragraph 20.3.3.3.3.1 (see para. 30.3.3.2.3). If the matched pair of DC data for the subject SV is available, the user may apply clock correction coefficient update values by;
$\Delta t_{sv} = (a_{f0} + \delta a_{f0}) + (a_{f1} + \delta a_{f1})(t - t_{oc}) + a_{f2}(t - t_{oc})^2 + \Delta t_r$,
where δa_{f0} and δa_{f1}, (see Table 30-X), are given in message types 34 or 13, and all other terms are as stated in paragraph 20.3.3.3.3.1. Clock-related DC data shall not be applied to any SV transmitting clock correction parameters message(s) containing a t_{op} value greater than the $t_{oK\text{-}D}$ value of messages types 34 or 13 containing the clock-related DC data.

Req ID : IS200-651

WAS : The DC data packet includes corrections to parameters that correct the state estimates for ephemeris parameters transmitted in the message types 10 and 11 (broadcast by the SV to which the DC data packet applies). The user will update the ephemeris parameters utilizing a variation of the algorithm expressed in the following equations. The user will then incorporate the updated quasi-Keplerian element set in all further calculations of SV position, as represented by the equations in Table 30-II (see para. 30.3.3.1.3). Ephemeris-related DC data shall not be applied to any SV transmitting message types 10 and 11 containing a t_{op} value greater than the t_{op-D} value of message types 34 or 14 containing the ephemeris-related DC data.

IS : The DC data packet includes corrections to parameters that correct the state estimates for ephemeris parameters transmitted in the message types 10 and 11 (broadcast by the SV to which the DC data packet applies). The user will update the ephemeris parameters utilizing a variation of the algorithm expressed in the following equations. The user will then incorporate the updated quasi-Keplerian element set in all further calculations of SV position, as represented by the equations in Table 30-II (see para. 30.3.3.1.3). Ephemeris-related DC data shall not be applied to any SV transmitting message types 10 and 11 containing a t_{op} value greater than the t_{oK-D} value of message types 34 or 14 containing the ephemeris-related DC data.

Req ID : IS200-654

WAS : The $UDRA_{op-D}$ and $U\dot{D}RA$ shall give the differential user range accuracy for the SV. It must be noted that the two parameters provide estimated accuracy after both clock and ephemeris DC are applied. The $UDRA_{op-D}$ and $U\dot{D}RA$ indices are signed, two's complement integers in the range of +15 to -16 and has the following relationship:

Index Value	$UDRA_{op-D}$ (meters)	$U\dot{D}RA$ (10^{-6} m/sec)
15	$6144.00 < UDRA_{op-D}$ 6144.00	
14	$3072.00 < UDRA_{op-D} \leq 6144.00$	3072.00
13	$1536.00 < UDRA_{op-D} \leq 3072.00$	1536.00
12	$768.00 < UDRA_{op-D} \leq 1536.00$	768.00
11	$384.00 < UDRA_{op-D} \leq 768.00$	384.00
10	$192.00 < UDRA_{op-D} \leq 384.00$	192.00
9	$96.00 < UDRA_{op-D} \leq 192.00$	96.00
8	$48.00 < UDRA_{op-D} \leq 96.00$	48.00
7	$24.00 < UDRA_{op-D} \leq 48.00$	24.00
6	$13.65 < UDRA_{op-D} \leq 24.00$	13.65
5	$9.65 < UDRA_{op-D} \leq 13.65$	9.65
4	$6.85 < UDRA_{op-D} \leq 9.65$	6.85
3	$4.85 < UDRA_{op-D} \leq 6.85$	4.85
2	$3.40 < UDRA_{op-D} \leq 4.85$	3.40
1	$2.40 < UDRA_{op-D} \leq 3.40$	2.40
0	$1.70 < UDRA_{op-D} \leq 2.40$	1.70
-1	$1.20 < UDRA_{op-D} \leq 1.70$	1.20
-2	$0.85 < UDRA_{op-D} \leq 1.20$	0.85
-3	$0.60 < UDRA_{op-D} \leq 0.85$	0.60
-4	$0.43 < UDRA_{op-D} \leq 0.60$	0.43
-5	$0.30 < UDRA_{op-D} \leq 0.43$	0.30
-6	$0.21 < UDRA_{op-D} \leq 0.30$	0.21
-7	$0.15 < UDRA_{op-D} \leq 0.21$	0.15
-8	$0.11 < UDRA_{op-D} \leq 0.15$	0.11
-9	$0.08 < UDRA_{op-D} \leq 0.11$	0.08
-10	$0.06 < UDRA_{op-D} \leq 0.08$	0.06
-11	$0.04 < UDRA_{op-D} \leq 0.06$	0.04

-12	$0.03 < UDRA_{op\text{-}D} \leq 0.04$	0.03
-13	$0.02 < UDRA_{op\text{-}D} \leq 0.03$	0.02
-14	$0.01 < UDRA_{op\text{-}D} \leq 0.02$	0.01
-15	$UDRA_{op\text{-}D} \leq 0.01$	0.005
-16	No accuracy prediction available—use at own risk	

For any time, t_k, other than $t_{op\text{-}D}$, UDRA is found by,

$$UDRA = UDRA_{op\text{-}D} + \dot{UDRA}\,(t_k - t_{op\text{-}D})$$

IS : The $UDRA_{op\text{-}D}$ and $\dot{UDRA}$ shall give the differential user range accuracy for the SV. It must be noted that the two parameters provide estimated accuracy after both clock and ephemeris DC are applied. The $UDRA_{op\text{-}D}$ and $\dot{UDRA}$ indices are signed, two's complement integers in the range of +15 to -16 and has the following relationship:

Index Value	$UDRA_{op\text{-}D}$ (meters)	$\dot{UDRA}$ (10^{-6} m/sec)
15	$6144.00 < UDRA_{op\text{-}D}$ 6144.00	
14	$3072.00 < UDRA_{op\text{-}D} \leq 6144.00$	3072.00
13	$1536.00 < UDRA_{op\text{-}D} \leq 3072.00$	1536.00
12	$768.00 < UDRA_{op\text{-}D} \leq 1536.00$	768.00
11	$384.00 < UDRA_{op\text{-}D} \leq 768.00$	384.00
10	$192.00 < UDRA_{op\text{-}D} \leq 384.00$	192.00
9	$96.00 < UDRA_{op\text{-}D} \leq 192.00$	96.00
8	$48.00 < UDRA_{op\text{-}D} \leq 96.00$	48.00
7	$24.00 < UDRA_{op\text{-}D} \leq 48.00$	24.00
6	$13.65 < UDRA_{op\text{-}D} \leq 24.00$	13.65
5	$9.65 < UDRA_{op\text{-}D} \leq 13.65$	9.65
4	$6.85 < UDRA_{op\text{-}D} \leq 9.65$	6.85
3	$4.85 < UDRA_{op\text{-}D} \leq 6.85$	4.85
2	$3.40 < UDRA_{op\text{-}D} \leq 4.85$	3.40
1	$2.40 < UDRA_{op\text{-}D} \leq 3.40$	2.40
0	$1.70 < UDRA_{op\text{-}D} \leq 2.40$	1.70
-1	$1.20 < UDRA_{op\text{-}D} \leq 1.70$	1.20
-2	$0.85 < UDRA_{op\text{-}D} \leq 1.20$	0.85
-3	$0.60 < UDRA_{op\text{-}D} \leq 0.85$	0.60
-4	$0.43 < UDRA_{op\text{-}D} \leq 0.60$	0.43
-5	$0.30 < UDRA_{op\text{-}D} \leq 0.43$	0.30
-6	$0.21 < UDRA_{op\text{-}D} \leq 0.30$	0.21
-7	$0.15 < UDRA_{op\text{-}D} \leq 0.21$	0.15
-8	$0.11 < UDRA_{op\text{-}D} \leq 0.15$	0.11
-9	$0.08 < UDRA_{op\text{-}D} \leq 0.11$	0.08
-10	$0.06 < UDRA_{op\text{-}D} \leq 0.08$	0.06
-11	$0.04 < UDRA_{op\text{-}D} \leq 0.06$	0.04
-12	$0.03 < UDRA_{op\text{-}D} \leq 0.04$	0.03
-13	$0.02 < UDRA_{op\text{-}D} \leq 0.03$	0.02
-14	$0.01 < UDRA_{op\text{-}D} \leq 0.02$	0.01
-15	$UDRA_{op\text{-}D} \leq 0.01$	0.005
-16	No accuracy prediction available—use at own risk	

For any time, t_k, other than t_{oK-D}, UDRA is found by,

$$UDRA = UDRA_{op-D} + \dot{UDRA}\,(t_k - t_{oK-D})$$