Change Topic: Public Signals-in-Space (SiS) Updates

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.

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

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

Proposed Object Text: Contains proposed changes to baseline text.

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

PROBLEM STATEMENT:
There are seven areas of obsolete/ambiguous language in the Signals-in-Space (SiS) specifications (mean anomaly equation, convolutional encoding, LNAV special messages reference, Universal Coordinated Time Offset Error (UTCOE), User Range Accuracy (URA) Note #3, Right Ascension Angle Language, and the signal health versus navigation data terminology). If this language were interpreted incorrectly it could result in UE developers designing receivers that don't work.
SOLUTION: *(Proposed)*
Resolve the obsolete/ambiguous language in the areas above to avoid the potential for misinterpretation.
Note: For the changes with respect to IS-GPS-200F, IRN-001 there are ***<u>seven</u>*** areas that are being amended: i. Convolutional encoding, (2 proposed changes) ii. Coordinated Universal Coordinated Time Offset Error (UTCOE), (1 proposed change)

iii. User Range Accuracy (URA) Note #3, (1 proposed change)
iv. LNAV special messages reference, (2 proposed changes)
v. Right Ascension Angle Language, (1 proposed change)
vi. Signal health versus navigation data terminology, (1 proposed change)
vii. Mean Anomaly Equation, (1 proposed change)

Start of WAS/IS for IS-GPS-200F, IRN-001 Changes

Section Number	IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces	Proposed Public Signals-in-Space (SiS) Updates Object Text	Proposed Rationale
3.2.3	During the initial period of Block IIR-M SVs operation, prior to Initial Operational Capability of L2 C signal, Block IIR-M may modulo-2 add the NAV data, D(t), to the L2 CM-code instead of CNAV data, DC(t). In such configuration, the data rate of D(t) may be 50 bps (i.e. without convolution encoding) or it may be 25 bps. The D(t) of 25 bps shall be convolutionally encoded resulting in 50 sps.	During the initial period of Block IIR-M SVs operation, prior to Initial Operational Capability of L2 C signal, Block IIR-M may modulo-2 add the NAV data, D(t), to the L2 CM-code instead of CNAV data, D_C(t). ~~In such~~ ~~configuration~~Moreover, the ~~data rate~~NAV ~~of~~data, D(t), ~~may~~can be ~~50~~used ~~bps~~in ~~(i.e.~~one ~~without~~of ~~convolution~~two ~~encoding)~~different ~~or~~data ~~it~~rates ~~may~~which ~~be~~are ~~25~~selectable ~~bps~~by ground command. ~~The~~ D(t) with a data rate of ~~25~~50 bps ~~shall~~can be ~~convolutionally~~commanded ~~encoded~~to ~~resulting~~be ~~in~~modulo-2 ~~50~~added ~~sps~~to the L2 CM-code. The resultant bit-train is combined with L2 CL-code using chip by chip time-division multiplexing method (i.e. alternating between L2 CM ⊕ data and L2 CL chips). This multiplexed bit-train is used to modulate the L2 carrier.	The text "or D(t) with a symbol rate of 50 symbols per second (sps) (rate ½ convolutional encoding of 25 bps NAV data) can be commanded to be modulo-2 added to the L2 CM-code" has been deleted because this mode is no longer valid as a separate mode on Block IIR-M (and subsequent) SVs.
3.2.3			The deletion of the "L2CM ⊕ D'(t) with L2 CL" signal is no longer a valid 'separate' mode and is deleted. In the Notes section, the "D'(t) = NAV Data at 25 bps

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Table 3-III. Signal Configuration

SV Blocks	L1		L2**	
	In-Phase*	Quadrature-Phase*	In-Phase*	Quadrature-Phase*
Block II/IIA/IIR	P(Y) $\oplus$ D(t)	C/A $\oplus$ D(t)	P(Y) $\oplus$ D(t) or P(Y) or C/A $\oplus$ D(t)	Not Applicable
Block IIR-M***	P(Y) $\oplus$ D(t)	C/A $\oplus$ D(t)	P(Y) $\oplus$ D(t) or P(Y)	L2 CM $\oplus$ D(t) with L2 CL or L2 CM $\oplus$ D′(t) with L2 CL or C/A $\oplus$ D(t) or C/A
Block IIR-M/IIF/ and GPS III	P(Y) $\oplus$ D(t)	C/A $\oplus$ D(t)	P(Y) $\oplus$ D(t) or P(Y)	L2 CM $\oplus$ D_C(t) with L2 CL or C/A $\oplus$ D(t) or C/A

Notes: 1) The configuration identified in this table reflects only the content of Section 3.2.3 and does not show all available codes/signals on L1/L2.
2) It should be noted that there are no flags or bits in the navigation message to directly indicate which signal option is broadcast for L2 Civil (L2 C) signal.

$\oplus$ = "exclusive-or" (modulo-2 addition)
D(t) = NAV data at 50 bps
D′(t) = NAV data at 25 bps with FEC encoding resulting in 50 sps
D_C(t) = CNAV data at 25 bps with FEC encoding resulting in 50 sps

* Terminology of "in-phase" and "quadrature-phase" is used only to identify the relative phase quadrature relationship of the carrier components (i.e. 90 degrees offset of each other).
** The two carrier components on L2 may not have the phase quadrature relationship. They may be broadcast on same phase (ref. Section 3.3.1.5).
*** Possible signal configuration for Block IIR-M only during the initial period of Block IIR-M SVs operation, prior to Initial Operational Capability of L2 C signal. See paragraph 3.2.2.

Table 3-III. Signal Configuration

SV Blocks	L1		L2**	
	In-Phase*	Quadrature-Phase*	In-Phase*	Quadrature-Phase*
Block II/IIA/IIR	P(Y) $\oplus$ D(t)	C/A $\oplus$ D(t)	P(Y) $\oplus$ D(t) or P(Y) or C/A $\oplus$ D(t)	Not Applicable
Block IIR-M	P(Y) $\oplus$ D(t)	C/A $\oplus$ D(t)	P(Y) $\oplus$ D(t) or P(Y)	L2 CM $\oplus$ D(t) with L2 CL or C/A $\oplus$ D(t) or C/A
Block IIR-M/IIF/ and GPS III	P(Y) $\oplus$ D(t)	C/A $\oplus$ D(t)	P(Y) $\oplus$ D(t) or P(Y)	L2 CM $\oplus$ D_C(t) with L2 CL or C/A $\oplus$ D(t) or C/A

Notes: 1) The configuration identified in this table reflects only the content of Section 3.2.3 and does not show all available codes/signals on L1/L2.
2) It should be noted that there are no flags or bits in the navigation message to directly indicate which signal option is broadcast for L2 Civil (L2 C) signal.

$\oplus$ = "exclusive-or" (modulo-2 addition)
D(t) = NAV data at 50 bps
D_C(t) = CNAV data at 25 bps with FEC encoding resulting in 50 sps

* Terminology of "in-phase" and "quadrature-phase" is used only to identify the relative phase quadrature relationship of the carrier components (i.e. 90 degrees offset of each other).
** The two carrier components on L2 may not have the phase quadrature relationship. They may be broadcast on same phase (ref. Section 3.3.1.5).

with FEC encoding resulting in 50 sps is also deleted since D'(t) is no longer a separate convolutional encoded signal." is also deleted since D'(t) is no longer a valid signal.

In the Notes section, the verbiage "*** Possible signal configuration for Block IIR-M only during the initial period of Block IIR-M SVs operation, prior to Initial Operational Capability of L2C signal. See paragraph 3.2.2" is deleted since "L2CM $\oplus$ D'(t) with L2 CL" is no longer a valid configuration.

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3.3.4	The NAV data contains the requisite data for relating GPS time to UTC. The accuracy of this data during the transmission interval shall be such that it relates GPS time (maintained by the MCS of the CS) to UTC (USNO) within 90 nanoseconds (one sigma). This data is generated by the CS; therefore, the accuracy of this relationship may degrade if for some reason the CS is unable to upload data to a SV. At this point, it is assumed that alternate sources of UTC are no longer available, and the relative accuracy of the GPS/UTC relationship will be sufficient for users. Range error components (e.g. SV clock and position) contribute to the GPS time transfer error, and under normal operating circumstances (two frequency time transfers from SV(s) whose navigation message indicates a URA of eight meters or less), this corresponds to a 97 nanosecond (one sigma) apparent uncertainty at the SV. Propagation delay errors and receiver equipment biases unique to the user add to this time transfer uncertainty.	The NAV data contains the requisite data for relating GPS time to UTC. ~~The accuracy of this data during the transmission interval shall be such that it relates GPS time (maintained by the MCS of the CS) to UTC (USNO) within 90 nanoseconds (one sigma).~~ This data is generated by the CS; therefore, the accuracy of this relationship may degrade if for some reason the CS is unable to upload data to a SV. At this point, it is assumed that alternate sources of UTC are no longer available, and the relative accuracy of the GPS/UTC relationship will be sufficient for users. Range error components (e.g. SV clock and position) contribute to the GPS time transfer error, and under normal operating circumstances (two frequency time transfers from SV(s) whose navigation message indicates a URA of eight meters or less), this corresponds to a 97 nanosecond (one sigma) apparent uncertainty at the SV. Propagation delay errors and receiver equipment biases unique to the user add to this time transfer uncertainty.	The text "The accuracy of this data during the transmission interval shall be such that it relates GPS time (maintained by the MCS of the CS) to UTC (USNO) within 90 nanoseconds (one sigma)" has been deleted. The rationale is that the time accuracy stated (90ns- one sigma) is not aligned to the PPS PS and the SPS PS (40ns).
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 8.0 seconds after the instantaneous URE exceeds the 4.42 times URA bound, and (c) if the integrity status flag is 'on' and an alert is issued to the users no more than 5.2 seconds after the instantaneous URE exceeds the 5.73 times URA bound. In this context, an "alert" is defined as any indication or characteristic of the conveying signal, as specified elsewhere in this document, which signifies to users that the conveying signal may be invalid or should not be used, such as the health bits not indicating operational-healthy, broadcasting non-standard code, parity error, etc.	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) if the integrity status flag is 'off' and an alert is issued to the users no more than 8.0 seconds after the instantaneous URE exceeds the 4.42 times URA bound~~,~~; ~~and~~or (c) if the integrity status flag is 'on' and an alert is issued to the users both no more than 8.0 seconds after the instantaneous URE exceeds the 4.42 times URA bound and 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.	The (b) and (c) conditions of this requirement have been rewritten since condition (b) and (c) must happen together for the conditions to apply. However,

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			condition (b) states the integrity status flag must be 'on' and condition 'c' states the integrity status flag must be 'off' at the same time for the conditions to apply. The text has been rewritten to reflect the conditions are separate.

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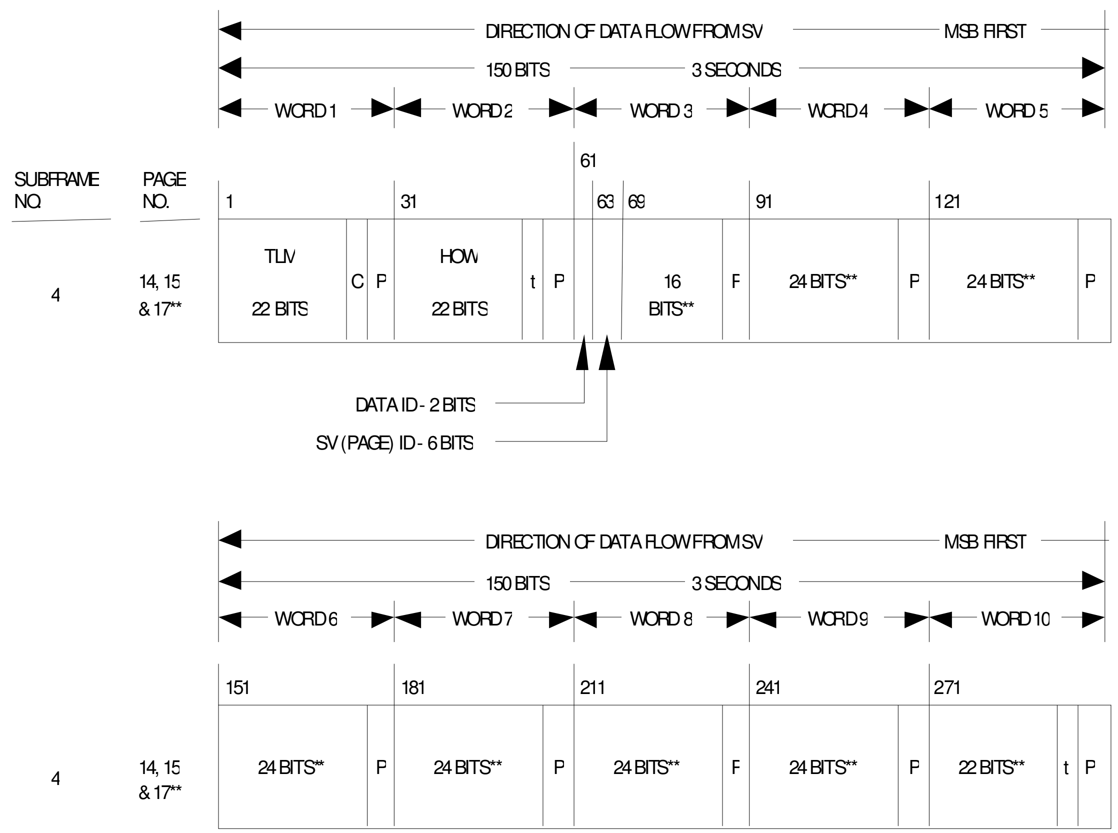
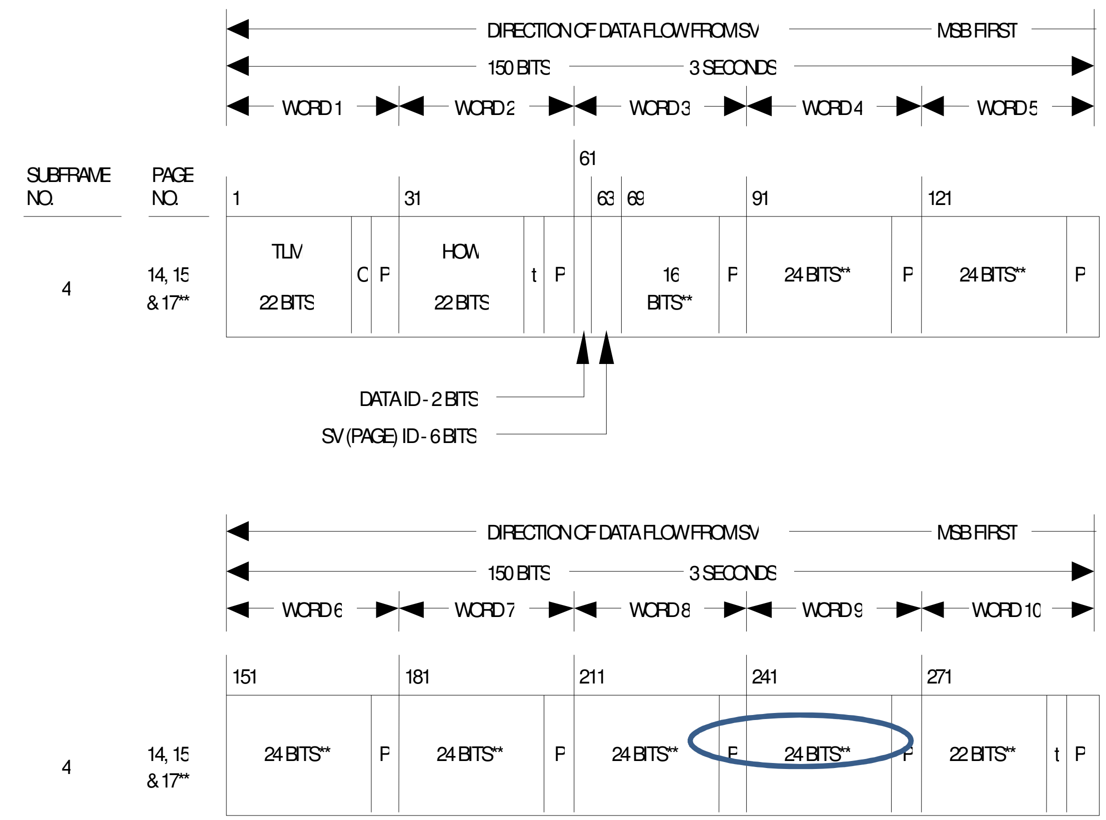
20.3.2	 ** THE INDICATED PORTIONS OF WORDS 3 THROUGH 10 OF PAGES 14 AND 15 ARE RESERVED FOR SYSTEM USE, WHILE THOSE OF PAGE 17 ARE RESERVED FOR SPECIAL MESSAGES PER PARAGRAPH 20.3.3.5.1.10 P = 6 PARITY BITS t = 2 NONINFORMATION BEARING BITS USED FOR PARITY COMPUTATION (SEE PARAGRAPH 20.3.5) C = TLM BITS 23 AND 24. BIT 23 IS THE INTEGRITY STATUS FLAG AND BIT 24 IS RESERVED Figure 20-1. Data Format (sheet 11 of 11)	 ** THE INDICATED PORTIONS OF WORDS 3 THROUGH 10 OF PAGES 14 AND 15 ARE RESERVED FOR SYSTEM USE, WHILE THOSE OF PAGE 17 ARE RESERVED FOR SPECIAL MESSAGES PER PARAGRAPH 20.3.3.5.1.8 P = 6 PARITY BITS t = 2 NONINFORMATION BEARING BITS USED FOR PARITY COMPUTATION (SEE PARAGRAPH 20.3.5) C = TLM BITS 23 AND 24. BIT 23 IS THE INTEGRITY STATUS FLAG AND BIT 24 IS RESERVED Figure 20-1. Data Format (sheet 11 of 11)	The dual asterisked (**) section reference 20.3.3.5.1.10 is an incorrect section reference for Special Messages. The section reference should be 20.3.3.5. 1.8.

<table>
<tr><th>Section Number</th><th>IS-GPS-200 RevF IRN001 (17 Apr 2012) Navstar GPS Space Segment/Navigation User Interfaces</th><th>Proposed Public Signals-in-Space (SiS) Updates Object Text</th><th>Proposed Rationale</th></tr>
<tr>
<td>30.3.3.1.3</td>
<td>
<table>
<tr><th colspan="6">Table 30-I. Message Types 10 and 11 Parameters (2 of 2)</th></tr>
<tr><th colspan="2">Parameter</th><th>No. of Bits**</th><th>Scale Factor (LSB)</th><th>Effective Range***</th><th>Units</th></tr>
<tr><td>t_{oe}</td><td>Ephemeris data reference time of week</td><td>11</td><td>300</td><td>604,500</td><td>seconds</td></tr>
<tr><td>$\Omega_{0\text{-}n}$****</td><td>Reference right ascension angle</td><td>33*</td><td>2^{-32}</td><td></td><td>semi-circles</td></tr>
<tr><td>$\Delta\dot{\Omega}$ *****</td><td>Rate of right ascension difference</td><td>17*</td><td>2^{-44}</td><td></td><td>semi-circles/sec</td></tr>
<tr><td>$i_{0\text{-}n}$</td><td>Inclination angle at reference time</td><td>33*</td><td>2^{-32}</td><td></td><td>semi-circles</td></tr>
<tr><td>$i_{0\text{-}n}$ –DOT</td><td>Rate of inclination angle</td><td>15*</td><td>2^{-44}</td><td></td><td>semi-circles/sec</td></tr>
<tr><td>$C_{is\text{-}n}$</td><td>Amplitude of the sine harmonic correction term to the angle of inclination</td><td>16*</td><td>2^{-30}</td><td></td><td>radians</td></tr>
<tr><td>$C_{ic\text{-}n}$</td><td>Amplitude of the cosine harmonic correction term to the angle of inclination</td><td>16*</td><td>2^{-30}</td><td></td><td>radians</td></tr>
<tr><td>$C_{rs\text{-}n}$</td><td>Amplitude of the sine correction term to the orbit radius</td><td>24*</td><td>2^{-8}</td><td></td><td>meters</td></tr>
<tr><td>$C_{rc\text{-}n}$</td><td>Amplitude of the cosine correction term to the orbit radius</td><td>24*</td><td>2^{-8}</td><td></td><td>meters</td></tr>
<tr><td>$C_{us\text{-}n}$</td><td>Amplitude of the sine harmonic correction term to the argument of latitude</td><td>21*</td><td>2^{-30}</td><td></td><td>radians</td></tr>
<tr><td>$C_{uc\text{-}n}$</td><td>Amplitude of the cosine harmonic correction term to the argument of latitude</td><td>21*</td><td>2^{-30}</td><td></td><td>radians</td></tr>
<tr><td colspan="6">* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;
** See Figure 30-1 and Figure 30-2 for complete bit allocation in Message Types 10 and 11;
*** Unless otherwise indicated in this column, effective range is the maximum range attainable with indicated bit allocation and scale factor.
**** $\Omega_{0\text{-}n}$ is the right ascension angle at the weekly epoch ($\Omega_{0\text{-}w}$) propagated to the reference time at the rate of right ascension {$\dot{\Omega}_{REF}$ Table 30-II }.
***** Relative to $\dot{\Omega}_{REF} = -2.6 \times 10^{-9}$ semi-circles/second.</td></tr>
</table>
</td>
<td>
<table>
<tr><th colspan="6">Table 30-I. Message Types 10 and 11 Parameters (2 of 2)</th></tr>
<tr><th colspan="2">Parameter</th><th>No. of Bits**</th><th>Scale Factor (LSB)</th><th>Effective Range***</th><th>Units</th></tr>
<tr><td>t_{oe}</td><td>Ephemeris data reference time of week</td><td>11</td><td>300</td><td>604,500</td><td>seconds</td></tr>
<tr><td>$\Omega_{0\text{-}n}$****</td><td>Longitude of Ascending Node of Orbit Plane at Weekly Epoch</td><td>33*</td><td>2^{-32}</td><td></td><td>semi-circles</td></tr>
<tr><td>$\Delta\dot{\Omega}$*****</td><td>Rate of right ascension difference</td><td>17*</td><td>2^{-44}</td><td></td><td>semi-circles/sec</td></tr>
<tr><td>$i_{0\text{-}n}$</td><td>Inclination angle at reference time</td><td>33*</td><td>2^{-32}</td><td></td><td>semi-circles</td></tr>
<tr><td>$i_{0\text{-}n}$ –DOT</td><td>Rate of inclination angle</td><td>15*</td><td>2^{-44}</td><td></td><td>semi-circles/sec</td></tr>
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<tr><td>$C_{ic\text{-}n}$</td><td>Amplitude of the cosine harmonic correction term to the angle of inclination</td><td>16*</td><td>2^{-30}</td><td></td><td>radians</td></tr>
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<tr><td>$C_{uc\text{-}n}$</td><td>Amplitude of the cosine harmonic correction term to the argument of latitude</td><td>21*</td><td>2^{-30}</td><td></td><td>radians</td></tr>
<tr><td colspan="6">* Parameters so indicated are two's complement, with the sign bit (+ or -) occupying the MSB;
** See Figure 30-1 and Figure 30-2 for complete bit allocation in Message Types 10 and 11;
*** Unless otherwise indicated in this column, effective range is the maximum range attainable with indicated bit allocation and scale factor.
**** $\Omega_{0\text{-}n}$ is the right ascension angle at the weekly epoch ($\Omega_{0\text{-}w}$) propagated to the reference time at the rate of right ascension {$\dot{\Omega}_{REF}$ Table 30-II }.
***** Relative to $\dot{\Omega}_{REF} = -2.6 \times 10^{-9}$ semi-circles/second.</td></tr>
</table>
</td>
<td>The orbit parameter "Reference right ascension angle $\Omega_{O\text{–}N}$ **** in Table 30-I, is defined as $\Omega_{O\text{–}N}$ is the right ascension angle at the weekly epoch ($\Omega_{O\text{–}w}$) propagated to the reference time at the rate of right ascension." This definition is consistent with the term used in Table 20-II, but the name of the term is inconsistent- "Reference right ascension angle" in Table 30-I and "Longitude of Ascending Node of Orbit Plane at Weekly Epoch" in Table 20-II. Recommend that the</td>
</tr>
</table>

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			identical terms be used since they have identical definitions.
30.3.3.4.4	The three, one-bit, health indication in bits 155, 156, and 157 of message type 37 and bits 29,30 and 31 of each packet of reduced almanac refers to the L1, L2, and L5 signals of the SV whose PRN number is specified in the message or in the packet. For each health indicator, a "0" signifies that all navigation data are okay and "1" signifies that some or all navigation data are bad. The predicted health data will be updated at the time of upload when a new reduced almanac has been built by the CS. The transmitted health data may not correspond to the actual health of the transmitting SV or other SVs in the constellation.	The three, one-bit, health indication in bits 155, 156, and 157 of message type 37 and bits 29,30 and 31 of each packet of reduced almanac refers to the L1, L2, and L5 signals of the SV whose PRN number is specified in the message or in the packet. For each health indicator, a "0" signifies that all ~~navigation~~signals ~~data~~on the associated frequency are okay and "1" signifies that some or all ~~navigation~~signals ~~data~~on the associated frequency are bad. The predicted health data will be updated at the time of upload when a new reduced almanac has been built by the CS.- The transmitted health data may not correspond to the actual health of the transmitting SV or other SVs in the constellation.	The current language states that "For each health indicator, a "0" signifies that all navigation data are okay and "1" signifies that some or all navigation data are bad." This language is misleading in that it implies that one bit designated with a "1" means that all navigation data (L1, L2, and L5) are bad, which may not be true. Recommended text clarifies that a "1" signifies that some or all signals on the associated frequency are

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			bad.
30.3.3.7.4	The user will construct a set of initial (uncorrected) elements by: $A_i = A_0$ $e_i = e_n$ $i_i = i_{0\text{-}n}$ $\Omega_i = \Omega_{0\text{-}n}$ $\alpha_i = e_n \cos(\omega_n)$ $\beta_i = e_n \sin(\omega_n)$ $\gamma_i = M_{0\text{-}n} + \omega_n$ where A_0, e_n, $i_{0\text{-}n}$, $\Omega_{0\text{-}n}$, ω_n and $M_{0\text{-}n}$ are obtained from the applicable SV's message types 10 and 11 data. The terms α_i, β_i, and γ_i form a subset of stabilized ephemeris elements which are subsequently corrected by $\Delta\alpha$, $\Delta\beta$ and $\Delta\gamma$—the values of which are supplied in the message types 34 or 14 - as follows: $\alpha_c = \alpha_i + \Delta\alpha$ $\beta_c = \beta_i + \Delta\beta$ $\gamma_c = \gamma_i + \Delta\gamma$ The quasi-Keplerian elements are then corrected by $A_c = A_i + \Delta A$ $e_c = (\alpha_c^2 + \beta_c^2)^{1/2}$ $i_c = i_i + \Delta i$ $\Omega_c = \Omega_i + \Delta\Omega$ $\omega_c = \tan^{-1}(\beta_c/\alpha_c)$ $M_{0\text{-}c} = \gamma_c - \omega_c + \Delta M_0$ where ΔA, Δi and $\Delta\Omega$ are provided in the EDC data packet of the message type 34 or 14 and ΔM_0 is obtained from $\Delta M_0 = -3 \frac{\sqrt{\mu}}{A_c^2} [(t_{oe}) - (t_{OD})]$. The corrected quasi-Keplerian elements above are applied to the user algorithm for determination	The user will construct a set of initial (uncorrected) elements by: $A_i = A_0$ $e_i = e_n$ $i_i = i_{0\text{-}n}$ $\Omega_i = \Omega_{0\text{-}n}$ $\alpha_i = e_n \cos(\omega_n)$ $\beta_i = e_n \sin(\omega_n)$ $\gamma_i = M_{0\text{-}n} + \omega_n$ where A_0, e_n, $i_{0\text{-}n}$, $\Omega_{0\text{-}n}$, ω_n and $M_{0\text{-}n}$ are obtained from the applicable SV's message types 10 and 11 data. The terms α_i, β_i, and γ_i form a subset of stabilized ephemeris elements which are subsequently corrected by $\Delta\alpha$, $\Delta\beta$ and $\Delta\gamma$—the values of which are supplied in the message types 34 or 14 - as follows: $\alpha_c = \alpha_i + \Delta\alpha$ $\beta_c = \beta_i + \Delta\beta$ $\gamma_c = \gamma_i + \Delta\gamma$ The quasi-Keplerian elements are then corrected by $A_c = A_i + \Delta A$ $e_c = (\alpha_c^2 + \beta_c^2)^{1/2}$ $i_c = i_i + \Delta i$ $\Omega_c = \Omega_i + \Delta\Omega$ $\omega_c = \tan^{-1}(\beta_c/\alpha_c)$ $M_{0\text{-}c} = \gamma_c - \omega_c + \Delta M_0$ where ΔA, Δi and $\Delta\Omega$ are provided in the EDC data packet of the message type 34 or 14 and ΔM_0 is obtained from $\Delta M_0 = \frac{-3}{2}\left(\frac{\mu}{A_0^3}\right)^{\frac{1}{2}}\left(\frac{\Delta A_0}{A_0}\right)[(t_{oe} + WN_{oe} * 604800) - (t_{OD} + WN * 604800)]$	The current mean anomaly equation, ΔM_0, yields a velocity component and is incorrect. The mean anomaly equation should yield 'radians.'

<table>
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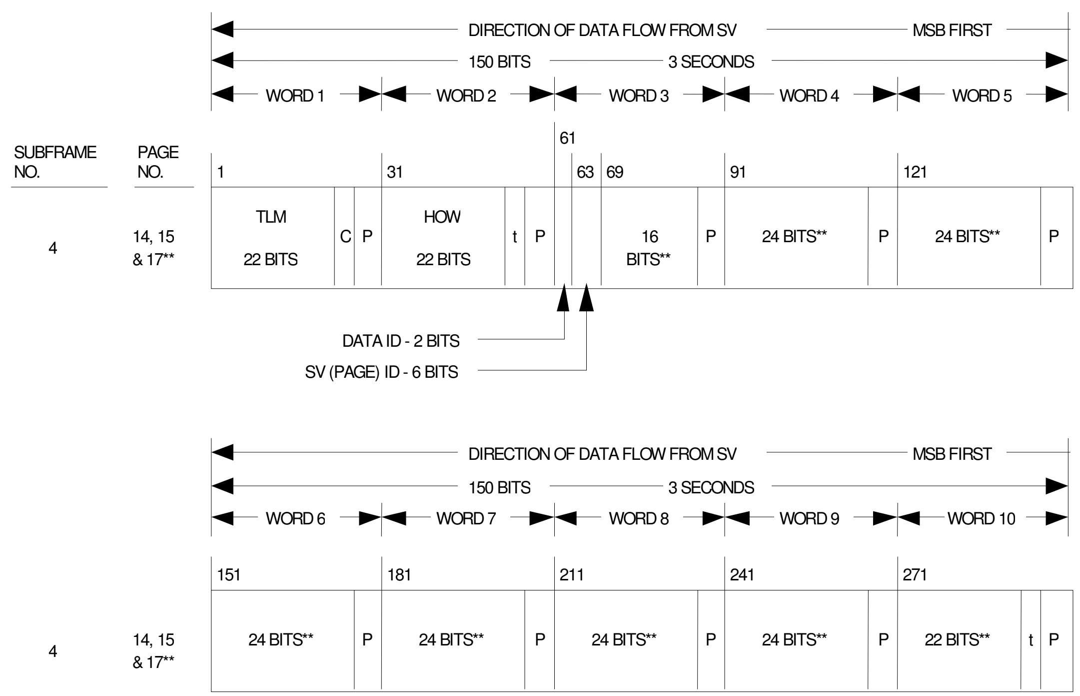
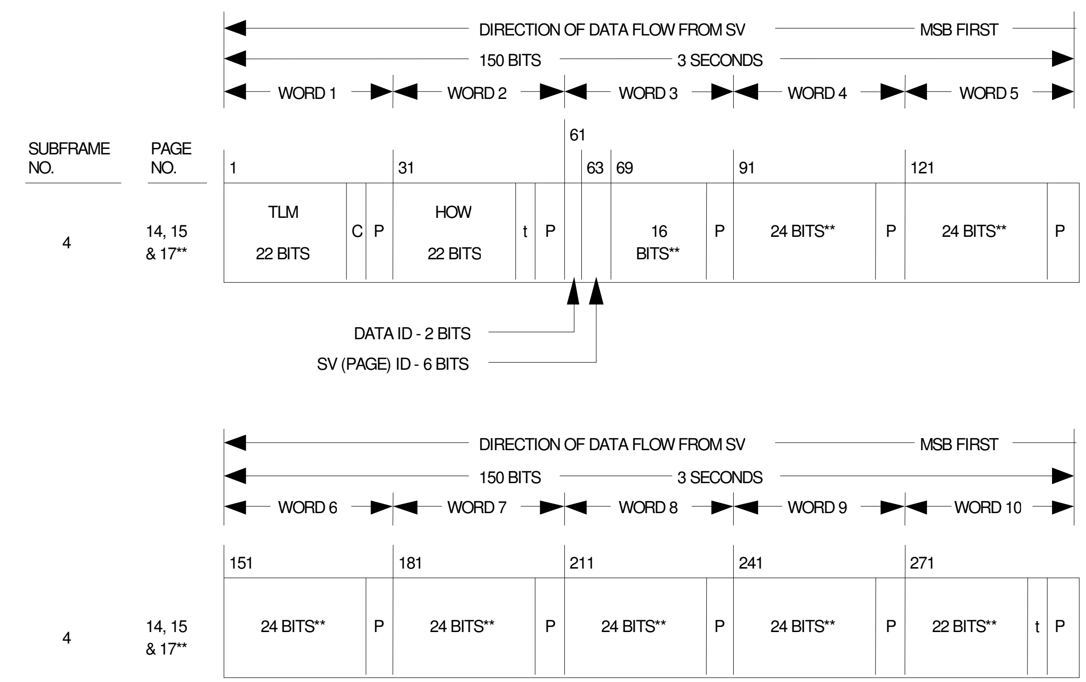
<tr><td></td><td>of antenna phase center position in Section 30.3.3.1.3, Table 30-II.</td><td>The corrected quasi-Keplerian elements above are applied to the user algorithm for determination of antenna phase center position in Section 30.3.3.1.3, Table 30-II.</td><td></td></tr>
<tr><td>40.3.2</td><td>


** THE INDICATED PORTIONS OF WORDS 3 THROUGH 10 OF PAGES 14 AND 15 ARE RESERVED FOR SYSTEM USE, WHILE THOSE OF PAGE 17 ARE RESERVED FOR SPECIAL MESSAGES PER PARAGRAPH 20.3.3.5.1.10
P = 6 PARITY BITS
t = 2 NONINFORMATION BEARING BITS USED FOR PARITY COMPUTATION (SEE PARAGRAPH 20.3.5)
C = TLM BITS 23 AND 24. BIT 23 IS THE INTEGRITY STATUS FLAG AND BIT 24 IS RESERVED

Figure 40-1. Data Format (sheet 11 of 11)</td><td>


** THE INDICATED PORTIONS OF WORDS 3 THROUGH 10 OF PAGES 14 AND 15 ARE RESERVED FOR SYSTEM USE, WHILE THOSE OF PAGE 17 ARE RESERVED FOR SPECIAL MESSAGES PER PARAGRAPH 20.3.3.5.1.8
P = 6 PARITY BITS
t = 2 NONINFORMATION BEARING BITS USED FOR PARITY COMPUTATION (SEE PARAGRAPH 20.3.5)
C = TLM BITS 23 AND 24. BIT 23 IS THE INTEGRITY STATUS FLAG AND BIT 24 IS RESERVED

Figure 40-1. Data Format (sheet 11 of 11)</td><td>The dual asterisked (**) section reference 20.3.3.5.1.10 is an incorrect section reference for Special Messages. The section reference should be 20.3.3.5.1.8.</td></tr>
</table>

End of WAS/IS for IS-GPS-200F, IRN-001 Changes