## 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.

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<th>Affected ICD/IS</th>
<th>PIRN Number</th>
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<tr>
<td>IS-GPS-705 Rev D</td>
<td>PIRN-IS-705D-005</td>
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<tr>
<th>Authority</th>
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<td>RFC-349</td>
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**Document Title:** NAVSTAR GPS Space Segment / User Segment L5 Interfaces

**Reason For Change (Driver):**

Some ambiguous, insufficient, or missing editorial or administrative information exist within the descriptive texts, phrases, and/or references in the public documents.

**Description of Change:**

*Modify public documents to clarify some ambiguous, insufficient, or missing editorial or administrative information to enhance the public document quality (clear and concise communication) as suggested by Public Interface Control Working Group (ICWG) participants, stakeholders, and key members*

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**Checked By:** Amit Patel

**DISTRIBUTION STATEMENT A:** Approved For Public Release; Distribution Is Unlimited
WAS:
For each $\text{URANED}_0$ index ($N$), users may compute a nominal $\text{URANED}_0$ value ($X$) as given by:

- If the value of $N$ is 6 or less, but more than -16, $X = 2^{(1 + N/2)}$,
- If the value of $N$ is 6 or more, but less than 15, $X = 2^{(N - 2)}$,
- $N = -16$ or $N = 15$ shall indicate the absence of an accuracy prediction and shall advise the standard positioning service user to use that SV at his own risk.

For $N = 1$, $3$, and $5$, $X$ should be rounded to 2.8, 5.7, and 11.3 meters, respectively.

The nominal $\text{URANED}_0$ value ($X$) shall be suitable for use as a conservative prediction of the RMS NED range errors for accuracy-related purposes in the pseudorange domain (e.g., measurement de-weighting RAIM, FOM computations). Integrity properties of the IAURA are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the $\text{URANED}_0$ index, $\text{URANED}_1$ index, and $\text{URANED}_2$ index (see 20.3.3.1.1).

$\text{URANED}_0$ 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 20.3.3.1.1.1; the net effect of clock parameter, code phase, and inter-signal correction error for dual-frequency L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section 20.3.3.1.1.2; radial ephemeris error; anisotropic antenna errors; and signal deformation error. $\text{URANED}_0$ does not account for user range contributions due to the inaccuracy of the broadcast ionospheric data parameters used in the single-frequency ionospheric model or for other atmospheric effects.

The transmitted $\text{URANED}_1$ index is an integer value in the range 0 to 7. The $\text{URANED}_1$ index has the following relationship to the $\text{URANED}_1$ value:

$$ URA_{\text{NED}1} = \frac{1}{2^N} \text{ (meters/second)} $$

where

$$ N = 14 + URA_{\text{NED}1} \text{ Index.} $$

The transmitted $\text{URANED}_2$ index is an integer value in the range 0 to 7. $\text{URANED}_2$ index has the following relationship to the $\text{URANED}_2$: 


URANED2 = \frac{1}{2^N} \text{ (meters/second/second)}

where

N = 28 + URANED2 Index.

Redlines:
For each URANED0 index (N), users may compute a nominal URANED0 value (X) as given by:

- If the value of N is 6 or less, but more than -16, X = 2^{(1+N/2)},
- If the value of N is 6 or more, but less than 15, X = 2^{(N-2)},
- N = -16 or N = 15 shall indicate the absence of an accuracy prediction and shall advise the standard positioning service user to use that SV at his own risk.

For N = 1, 3, and 5, X should be rounded to 2.8, 5.7, and 11.3 meters, respectively.

The nominal URANED0 value (X) shall be suitable for use as a conservative prediction of the RMS NED range errors for accuracy-related purposes in the pseudorange domain (e.g., measurement de-weighting RAIM, FOM computations). Integrity properties of the IAURA NED are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the URANED0 index, URANED1 index, and URANED2 index (see 20.3.3.1.1).

URANED0 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 20.3.3.3.1.1.1 and for single-frequency L5 users who correct the code phase as described in Section 20.3.3.3.1.2.1; the net effect of clock parameter, code phase, and inter-signal correction error for dual-frequency L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section 20.3.3.3.1.2; radial ephemeris error; anisotropic antenna errors; and signal deformation error. URANED does not account for user range contributions due to the inaccuracy of the broadcast ionospheric data parameters used in the single-frequency ionospheric model or for other atmospheric effects.

The transmitted URANED1 index is an integer value in the range 0 to 7. The URANED1 index has the following relationship to the URANED value:

URANED1 = \frac{1}{2^N} \text{ (meters/second)}
where

\[ N = 14 + \text{URA}_1 \text{Index}. \]

The transmitted \text{URA}_2 \text{Index} is an integer value in the range 0 to 7. \text{URA}_2 \text{Index} has the following relationship to the \text{URA}_2:

\[ \text{URA}_2 = \frac{1}{2^N} \text{ (meters/second/second)} \]

where

\[ N = 28 + \text{URA}_2 \text{Index}. \]

**IS:**

For each \text{URA}_0 \text{Index} (N), users may compute a nominal \text{URA}_0 \text{value} (X) as given by:

- If the value of N is 6 or less, but more than -16, \( X = 2^{(1 + N/2)} \),
- If the value of N is 6 or more, but less than 15, \( X = 2^{(N - 2)} \),
- \( N = -16 \) or \( N = 15 \) shall indicate the absence of an accuracy prediction and shall advise the standard positioning service user to use that SV at his own risk.

For \( N = 1, 3, \) and 5, \( X \) should be rounded to 2.8, 5.7, and 11.3 meters, respectively.

The nominal \text{URA}_0 \text{value} (X) shall be suitable for use as a conservative prediction of the RMS NED range errors for accuracy-related purposes in the pseudorange domain (e.g., measurement de-weighting RAIM, FOM computations). Integrity properties of the \text{IAURA}_0 are specified with respect to the scaled (multiplied by either 4.42 or 5.73 as appropriate) upper bound values of the \text{URA}_0 \text{index}, \text{URA}_1 \text{index}, and \text{URA}_2 \text{index} (see 20.3.3.1.1).

\text{URA}_0 \text{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 20.3.3.1.1.1 and for single-frequency L5 users who correct the code phase as described in section 20.3.3.1.2.1; the net effect of clock parameter, code phase, and inter-signal correction error for dual-frequency L1/L2 and L1/L5 users.
who correct for group delay and ionospheric effects as described in Section 20.3.3.1.2; radial ephemeris error; anisotropic antenna errors; and signal deformation error. URANED does not account for user range contributions due to the inaccuracy of the broadcast ionospheric data parameters used in the single-frequency ionospheric model or for other atmospheric effects.

The transmitted URANED1 index is an integer value in the range 0 to 7. The URANED1 index has the following relationship to the URANED1 value:

\[
URANED1 = \frac{1}{2^N} \text{ (meters/second)}
\]

where

\[
N = 14 + \text{URANED1 Index}.
\]

The transmitted URANED2 index is an integer value in the range 0 to 7. URANED2 index has the following relationship to the URANED2:

\[
URANED2 = \frac{1}{2^N} \text{ (meters/second/second)}
\]

where

\[
N = 28 + \text{URANED2 Index}.
\]

Rationale:
The proposed changes were recommended by Mr. Dennis Bovet, Thales at the 2015 Public ICWG against IS-GPS-705. Made document clarifications relating to section 20.3.3.2.4. Added a reference for the URANED0 role for single-frequency L5 users. Also corrected a reference of the section number from 20.3.3.1.1.2 to 20.3.3.1.2.