The following table describes the common GPS accuracy measures and their respective definition.

Table 1: Common GPS accuracy measures.

| Dimension | Accuracy measure | Probability % | Typical Usage | Definition |
|---|---|---|---|---|
| 1 | rms | 68 | Vertical | Square root of the average of the squared errors. |
| 2 | CEP | 50 | Horizontal | A circle's radius, centered at the true antenna position, containing 50% of the points in the horizontal scatter plot. |
| 2 | rms | 63-68 | Horizontal | Square root of the average of the squared errors |
| 2 | R95 | 95 | Horizontal | A circle's radius, centered at the true antenna position, containing 95% of the points in the horizontal scatter plot. |
| 2 | 2drms | 95-98 | Horizontal | Twice the rms of the horizontal errors. |
| 3 | rms | 61-68 | 3-D | Square root of the average of the squared errors |
| 3 | SEP | 50 | 3-D | A sphere's radius, centered at the true antenna position, containing 50% of the points in the 3-dimensional scatter plot. |

*Reference:* "GPS Accuracy: Lies, Damn Lies, and Statistics", Frank van Diggelen, GPS World January 1998.

**Table 2** shows the cross scale factors among GPS accuracy measures. The number in yellow shade (2) is not from the original reference.

Table 2: Theoretical equivalent accuracies for GPS accuracy measures.

| rms (vertical) | CEP | rms (horizontal) | R95 (hor 95%) | 2drms | rms (3-D) | SEP | |
|---|---|---|---|---|---|---|---|
| 1 | 0.44 | 0.53 | 0.91 | 1.1 | 1.1 | 0.88 | **rms (vertical)** |
| | 1 | 1.2 | 2.1 | 2.4 | 2.5 | 2.0 | **CEP** |
| | | 1 | 1.7 | 2 | 2.1 | 1.7 | **rms (horizontal)** |
| | | | 1 | 1.2 | 1.2 | 0.96 | **R95 (hor 95%)** |
| | | 2 | | 1 | 1.1 | 0.85 | **2drms** |
| | | | | | 1 | 0.79 | **rms (3-D)** |
| | | | | | | 1 | **SEP** |

*Reference:* "GPS Accuracy: Lies, Damn Lies, and Statistics", Frank van Diggelen, GPS World January 1998.

The following is from http://www.mercat.com/QUEST/Accuracy.htm:

## *2drms*

2drms is now the more commonly used term, and is often seen within previous Federal Radionavigation Plans. It refers to twice the drms (distance root mean square error) and not, as many people seem to believe, to the two-dimensional rms. In order to compute the drms from a set of data it is simply necessary to compute the rms of the radial errors, i.e. the linear distances between the measure and known (or mean) positions, and double the result. It can be predicted using covariance analysis by multiplying the HDOP, a measure of the satellite geometry, by the standard deviation of the observed pseudoranges and it is largely this predictability that makes it a much more convenient measure in practice.

A disadvantage of the 2drms measure is that is does not have a constant probability attached to it. This point is rather complex and has been analysed in detail by Chin (1987). Essentially the associated probability is a function of the ellipticity of the relevant error ellipse resulting from a particular satellite geometry. On the assumption that the pseudorange errors are normally distributed this probability will be in the range of 95.4% to 98.2%.