



**Recommendation WG 3.91.028**

**SHORT PATH  
DISTANCE AND AZIMUTH CALCULATIONS**

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## RECOMMENDATION

**Subject:** Coordination Rec.WG 3.91.028

**Title:** Short path distance and azimuth calculations

**Background:**

Rounding latitudes and longitudes to the nearest integer second affects the software calculated path distance and azimuth. For a path in the continental United States, the maximum potential error in azimuth is 0.15 degrees for a 10 mile path, 1.48 degrees for a one mile path, and 15.5 degrees for a 500' path. At 1.3 to 1.5 miles, the potential error reaches the FCC limit of one degree for defining a major amendment (Part 21.23). The calculated path distance also incurs potential error, but only creates a significant problem at collocations.

The problem can be solved by specifying latitude and longitude with greater precision than one second; hundredths of a second would be adequate in all cases. It is unlikely that this level of accuracy can be measured, but would instead be calculated from the known path geometry. This technique does not seem reasonable and, furthermore, the FCC will probably not be willing to accept and recognize this coordinate precision.

Accurate determination of coordinates is critical for short paths and locations near other microwave sites. Greater attention to coordinate accuracy is necessary as these distances become small. For very short paths, the actual path azimuths can vary considerably from those calculated from rounded coordinates and, therefore, also need to be supplied.

**Recommendation:**

For paths shorter than two miles, prior coordination notifications should provide footnotes with accurate path azimuths. Extra care should be taken in determining accurate site coordinates for short paths or where other microwave sites are nearby.

**Support:**

Accurate path geometry's must be known in order to correctly plan new paths and then to protect those paths from subsequent new paths. Existing paths and new paths will be equally likely victims of interference resulting from incorrect analyses. Owners of multiple short paths in an area will restrict their own growth and flexibility if the data bases used for planning do not show correct configurations.