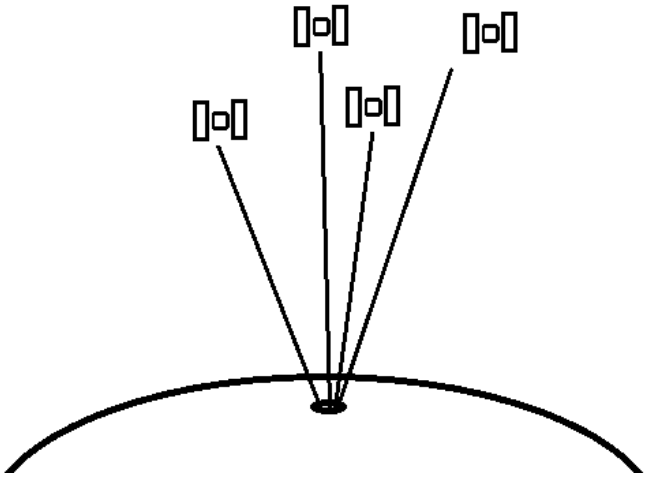
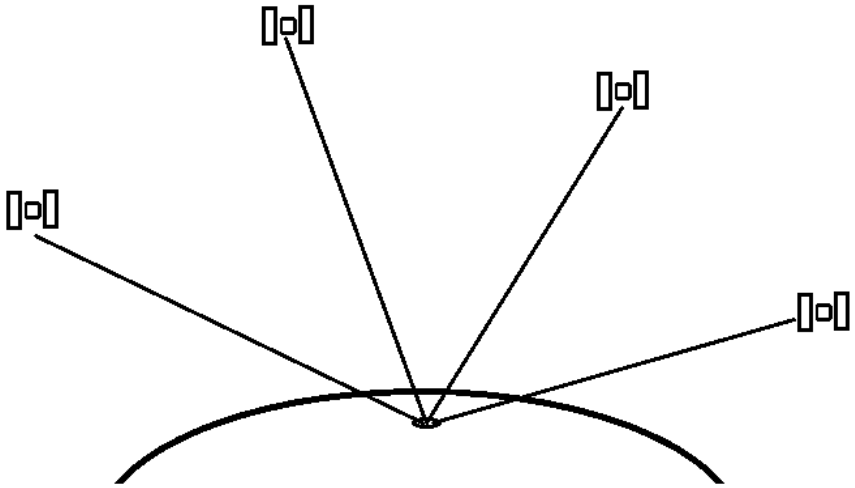
Satellite Geometry

The close apart between satellites to each other in the same part of the sky, the result will produce a poor geometry and a poor accuracy in a GPS position. On the other hand, if the satellites are spread over a large area of the sky, a good geometry is obtained and the accuracy of GPS coordinates is much better. The effect of satellite geometry is assessed in GPS using dilution of precision (DOP) factors – a low DOP factor means the satellite geometry is good and a high DOP means the geometry is poor.

Most receivers used for high-precision surveying are able to compute DOP values from a knowledge of the satellite almanac, the receiver position and the time of observation. GPS processing software can also use to predict what the DOP values will be for a survey area, helping the GPS survey planning process. The DOP factors used in surveying are:



Poor satellite geometry = high DOP



Good satellite geometry = low DOP

VDOP = Vertical Dilution of Precision

HDOP = Horizontal Dilution of Precision

PDOP = Positional Dilution of Precision

GDOP = Geometric Dilution of Precision

All of these indicate the uncertainty in a GPS position that results from the satellite configuration and receiver position at the time of measurement. Perhaps the most useful of these is the GDOP, which indicates the degradation of the full three-dimensional position and time.

Reference : Suveying for Engineers , 5th Edition (John Uren and Bill Price)