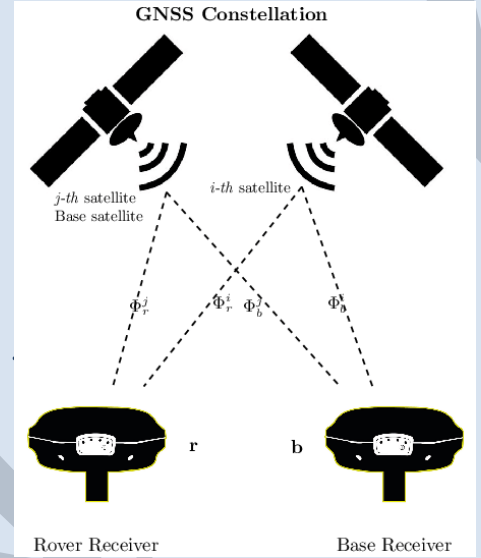


ARES RTK

1/2 degree heading accuracy for ARES Node

With ARES RTK, ARES Node includes a multi-band RTK GNSS module, the u-blox ZED-F9P. This enables two nodes (either a Beamformer pair or two single nodes connected by the CAN-bus) to very accurately measure the heading of a “rover” node relative to true north, thus allowing the detected azimuth and elevation bearings to be interpreted in geospatial coordinates. This is important when combining the bearing estimates from multiple nodes in localization algorithms, or whenever bearing data relative to the accelerometer reference frame must be related to external coordinates.



BASE AND ROVER

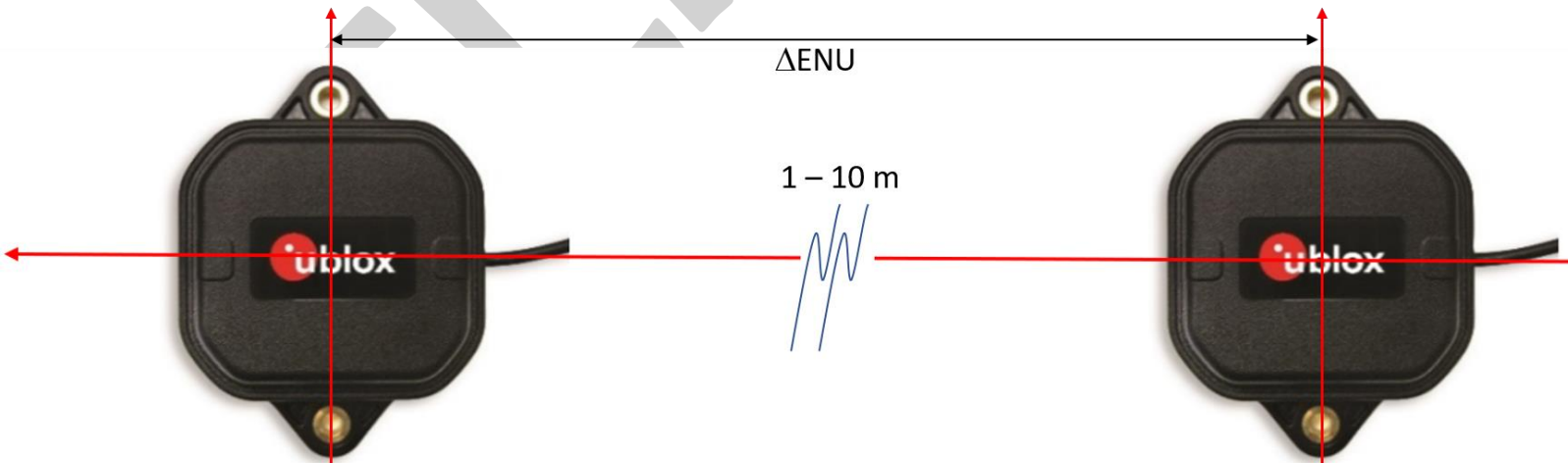
One Ares Node is an RTK base and the other a rover. The base sends a continuous differential correction to the rover via the CAN-FD link, enabling the rover to compute its position relative to the base with high accuracy.

DIFFERENTIAL CORRECTION

Typically, ARES RTK is used during system deployment, after ARES Node is placed in position. Then, raw satellite data passes from base to rover, and the rover invokes a differential RTK (real-time kinematic) correction to deduce the relative Easting, Northing, and Up (ENU) coordinates from the base.

GEOMETRY

The GNSS antenna supplied with each RTK-enabled ARES Node is 5 meters long. Thus, during the precise heading measurement period, the maximum antenna separation distance can be up to 10 meters, plus the distance between the two nodes.



Accuracy	
Horizontal Easting, Northing	< 1 cm
Vertical	< 2 cm
Heading	< 0.5°

Reception	
Receiver	184-channel u-blox F9 engine
Frequency Bands	GPS L1C/A L2C, GLO L1OF L2OF, GAL E1B/C E5b, BDS B1I B2I, QZSS L1C/A L1S L2C, SBAS L1C/A

Fix Time	
Hot start	2 seconds
Cold start	45 seconds

Baseline	
Maximum	10 meters
Minimum	1 meter

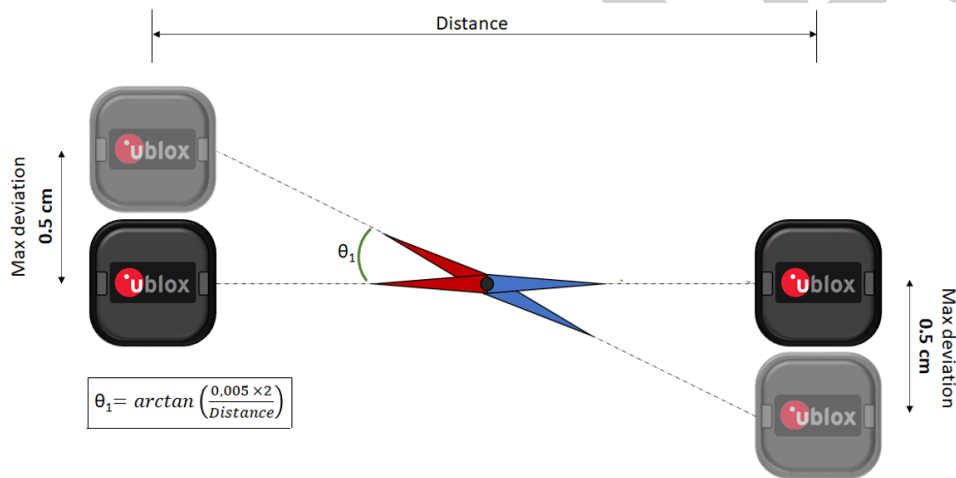


Figure 2. Maximum angular error (θ) when using RTK mode to estimate directional heading, and

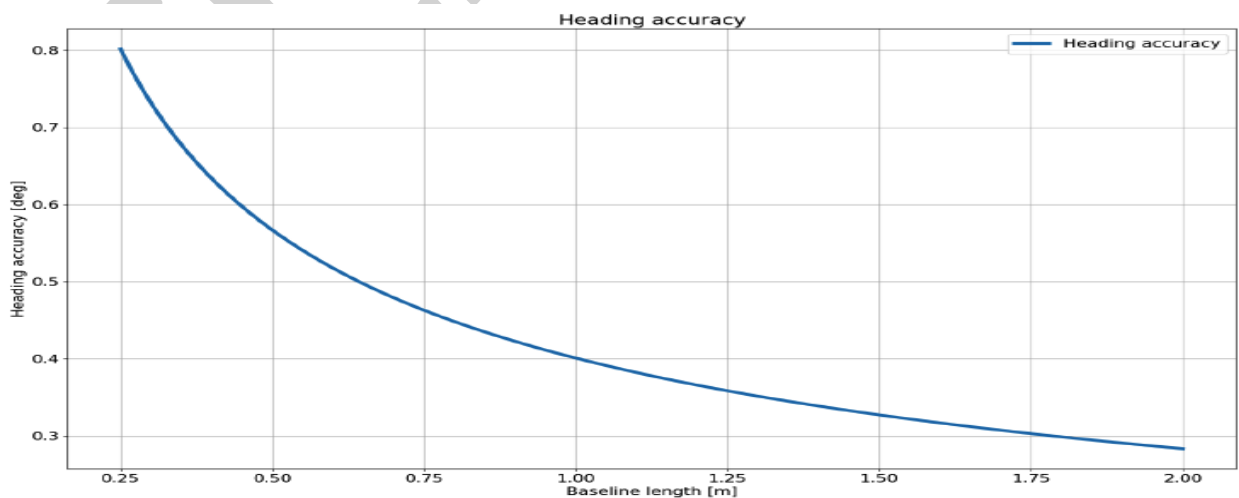


Figure 1. RMS heading accuracy as a function of distance.