Atlas® aRTK™

Satellite-Based RTK Augmentation

Overview

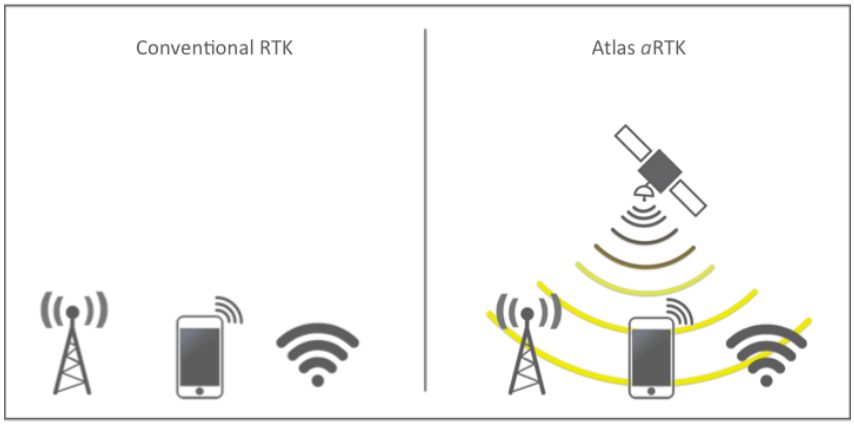
This document provides a brief overview on Hemisphere GNSS' *Atlas aRTK* feature.

What is *aRTK*?

One of the most popular positioning techniques used in the GNSS industry is RTK (real-time kinematic). When using the RTK technique, users receive correction data from a nearby GNSS reference station or GNSS reference network in real-time. The reference data is typically transmitted over internet or radio. In the case of internet connectivity, cell modem connection is a typical option, as most modern GNSS receivers or controllers offer that capability.

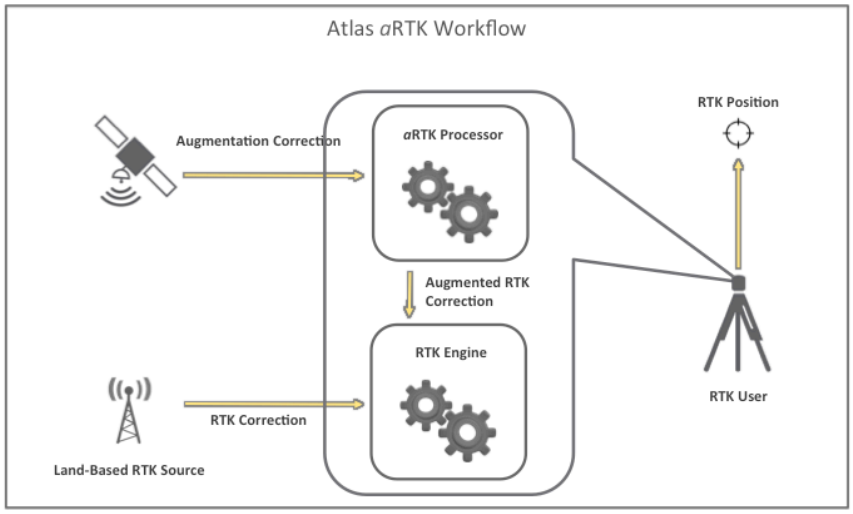
One of the limitations in modern RTK systems lies exactly on the connectivity need of the system. In most cases, the user's receiver needs to obtain correction data with virtually zero data interruption in order to maintain a reasonable position accuracy. For instance, certain systems in the GNSS market only allow as much as 10 to 20 seconds of signal interruption before RTK level accuracy completely stops being provided to the user.

aRTK is an innovative feature available in Hemisphere receiver products that greatly mitigates the impact of land-based communication instability. Powered by Hemisphere's Atlas L-band service, aRTK provides an additional layer of communication redundancy to RTK users, assuring that productivity is not impacted by intermittent data connectivity.



How does it work?

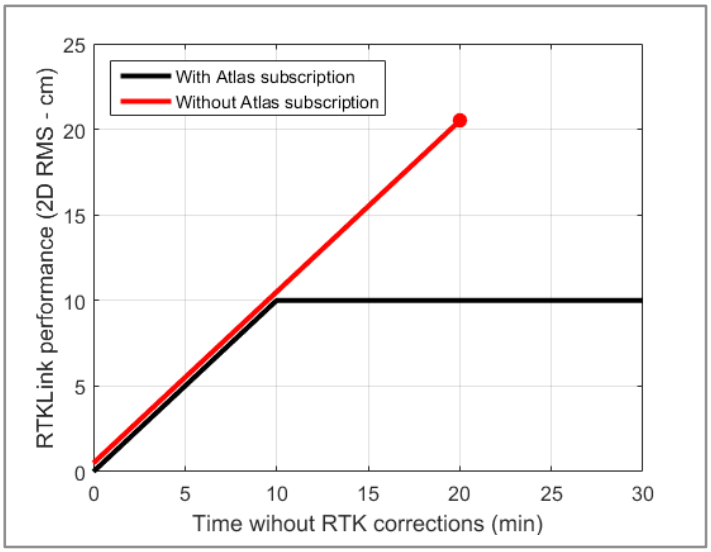
The workflow of the aRTK feature is very simple. The user's equipment receives the aRTK augmentation correction data via satellite, while also receiving the land-based RTK correction data. With this, the receiver internally operates with two sources of RTK correction, creating one additional layer of correction redundancy as compared to typical RTK systems. Once that process is established (which takes as little as a few seconds), the receiver is able to operate in the absence of either correction source, or in other words, the receiver is able to continue generating RTK positions in case the land-based RTK correction source becomes unavailable for a period of time.



The table below shows some performance aspects associated with the aRTK operation.

aRTK		
Specification	Atlas subscription	
	No	Yes
Accuracy (when not receiving RTK corrections)	1.0 cm/minute 2D RMS 2.0 cm/minute Vertical RMS	**Initial 10 minutes:** 1.0 cm/minute 2D RMS 2.0 cm/minute Vertical RMS **After 10 minutes:** 10 cm 2D RMS 20 cm Vertical RMS
Accuracy after 10 minutes (with Atlas subscription)	10 cm 2D RMS 20 cm Vertical RMS	10 cm 2D RMS 20 cm Vertical RMS
Required RTK time (before function is available for use)	1 minute	1 minute
Reference frame	Same as RTK	Same as RTK
Maximum operation time	20 minutes	Unlimited

As it can be seen above, having an Atlas subscription activated in the receiver adds further capability to the aRTK feature, providing extended performance robustness for RTK users in the field. Not only does the Atlas subscription provide extended accuracy, it also allows aRTK to operate for an unlimited amount of time after the land-based RTK corrections stop being received by the user. The plot below illustrates the difference in nominal performance depending on the Atlas subscription availability in the receiver.



The plot below shows an example of real-time aRTK performance. This data was collected in Beijing, China, and a receiver without an Atlas subscription was used in the test.