

Velocite

4G LTE / 5G cellular-enabled
aeronautical mobile telemetry system

*Directly extensible to 5G systems and future releases
due to the flexibility of the appliqué approach*



Velocite transceiver specifications

- 3GPP LTE TDD and FDD configurations supported, 20MHz BW
- Supports latest LTE releases
- 1Tx / 2Rx antenna ports
- Operates in custom L, C, S bands
- Environmentally hardened to operate in aeronautical environments, with -40 C to +85 C planned
- Ethernet connection to onboard data sources
- Integrated RF power amplifier for extended range
- Power: 28V DC
- 25 lbs., 11"x13"x6"

Bringing LTE cellular technology to aeronautical mobile telemetry (AMT) between aircraft and ground base stations at any speed

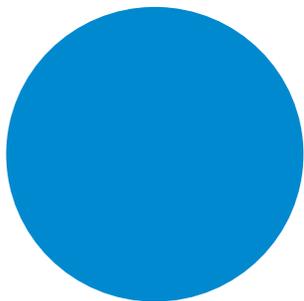
AMT provides crucial data communications for performance evaluation and ensures safety during the testing of manned and unmanned aircraft. Perspecta Labs' Velocite solution harnesses commercial 4G long-term evolution (LTE) cellular technology to well beyond Mach 1 speeds to meet the challenging operational requirements of AMT. Vendor-agnostic and high-bandwidth, Velocite enables multiple simultaneous test missions to be conducted over commercial equipment, saving both time and resources, at lower cost than traditional AMT systems.

How it works

Velocite combines an intelligent LTE network design with groundbreaking innovations to reliably deliver high-bandwidth data communications for test aircraft at speeds of 1,000 kph and above. Velocite's airborne transceiver appliqué provides state-of-the-art Doppler compensation and easily integrates with any standard LTE user equipment (UE) to maintain a robust data link. The appliqué performs high-speed Doppler estimation and real-time frequency compensation functions to synchronize the test aircraft's LTE transceiver in both radio directions with any desired LTE base station. The appliqué substantially extends the standard LTE mobility limit of 350 kph to fighter jet speed. The Velocite appliqué implementation provides real-time processing to keep up with LTE signaling on board the airborne unit. The unit incorporates frequency translation and a high-power radio frequency (RF) amplifier for large area coverage.

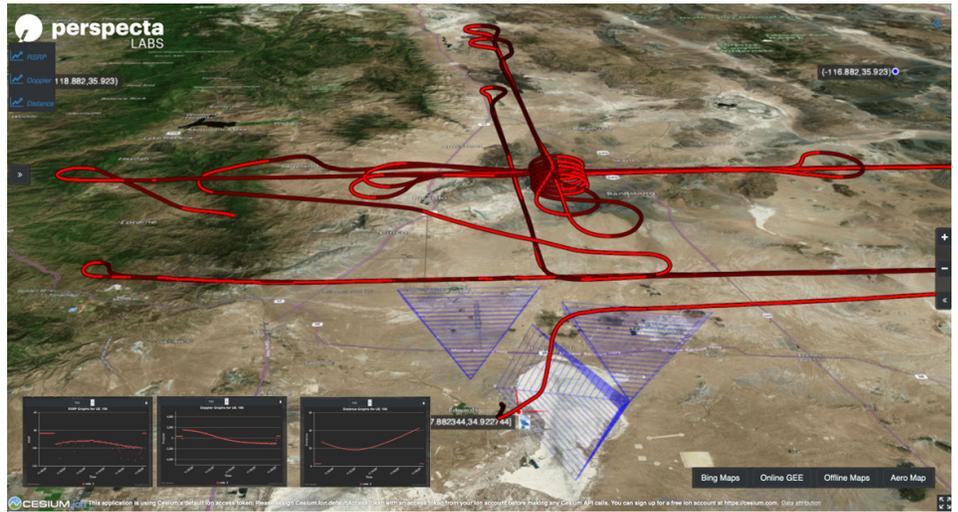
The Velocite network design provides 3D coverage with connection to multiple cells available at most points in the airspace. This provides redundant and reliable coverage for a full duplex radio link, for both base station (eNB) and UE to deliver a nominal 20 megabits per second throughput per link over a large part of the covered airspace.

The Velocite unit can be augmented by a ground-based integrated cellular network control capability (ICNC), which seamlessly takes control of cell-to-cell handovers at LTE base stations when needed. ICNC is a sophisticated management component that collects real-time power, location and timing data, and utilizes advanced analytics to estimate aircraft trajectory and cell signal quality.



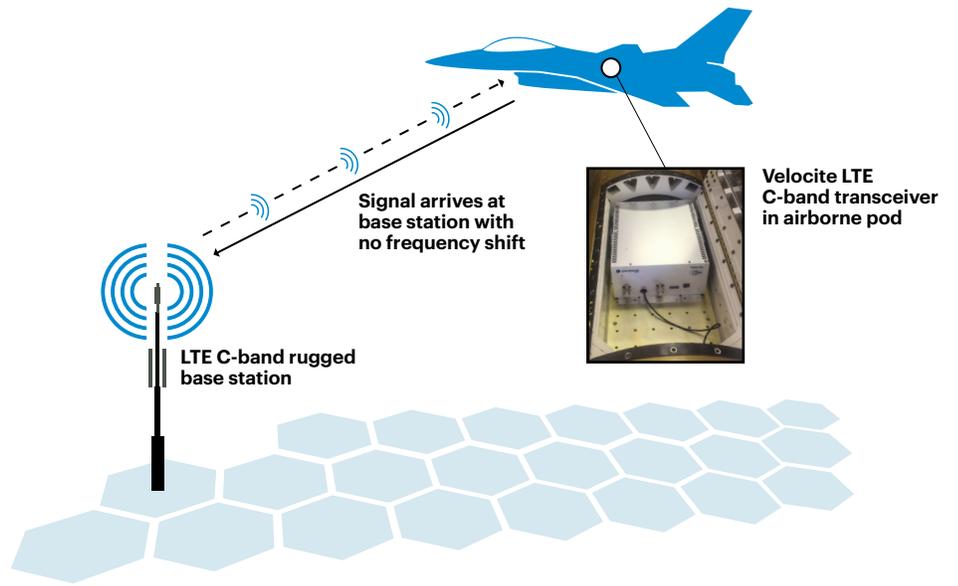
Velocite value and benefits

- Cost effective and RF spectrum efficient
- Handles multiple simultaneous tests with almost no spectrum coordination
- Minimal intervention and oversight needed from testing range ground teams
- Dynamic automatic assignment of spectrum resources based on data rate and coverage needs
- Leverages existing commercial equipment
- Operational in all testing range radio frequency bands and at flexible bandwidths, on demand
- Vendor-agnostic solution that can transfer to different vendor platforms to meet custom operational demands
- Directly extensible to 5G systems and future releases due to the flexibility of the appliqué approach



Visualization from Velocite showing the ground network superimposed on a geographic background and display of key parameters of interest. This view provides real-time tracking of the location of the test device, the quality of the link and the connectivity details with the ground network

Velocite also includes easy to use radio frequency planning tools to support test range operators with 3D coverage analysis and flight trajectory coverage predictions. The ICNC visualization tools are used for supervision of network operation and real-time situational awareness of test status. Velocite components have been integrated with multiple LTE equipment providers' product lines and have been successfully demonstrated in field demonstrations at Edwards Air Force Base.



Doppler compensation appliqué on commercial-off-the-shelf hardware