Peraton

VELOCITE™

Affordable telemetry to high-speed aircraft using a novel, proven technology that leverages commercial 4G/5G infrastructure.

Velocite features

- A single Velocite airframe-installed transceiver supports full duplex IP-based connectivity whether the aircraft is in the air, on the ground, taxiing, refueling or in the hangar

- Delivers secure, high-bandwidth communications at any aircraft speed while airborne and within a 100km range from the landing area, with peak data rates above 1Gbps

- Multi-SIM capability for multiple networks can connect with any private or commercial 5G service to support aircraft conducting operations at multiple bases or ranges

- The Velocite transceiver leverages automatic network discovery and configuration to identify the ground network and automatically choose an appropriate channel if many are available

- Supports native automatic sharing of network resources with other aircraft in the coverage area via automatic apportionment of resource (frequency and time) to maintain fair access to wireless resources for each aircraft

- Easy to use radio frequency planning tools to support test range operators with 3D coverage analysis and flight trajectory coverage predictions

- Easy to operate with minimal oversight needed from test range ground teams

- A future-proof solution with easy, native support for perpetual future standards releases implemented into UE to interwork with the separate bolt-on Doppler compensation appliqué

Velocite transceiver specifications

- 3GPP TDD and FDD configurations supported, up to 100MHz BW

- Supports latest LTE & NR 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 (conduction cooled)

- Ethernet connection to onboard data sources

- Integrated RF power amplifier for extended range

- Power: 28V DC

- 24 lbs., 9"x8"x6"

WHAT IS VELOCITE

Velocite addresses the need of military and commercial aircraft for sophisticated aeronautical mobile telemetry (AMT) services for monitoring and transmitting data collected on board during flight testing and to evaluate performance and ensure pilot safety.

Velocite can satisfy the AMT's increasing need for bandwidth to deliver massive amounts of test data generated from highly sophisticated modern aircraft and to take advantage of emerging opportunities for enhanced predictive maintenance applications and cost-savings advances in live, virtual, constructive (LVC) training.
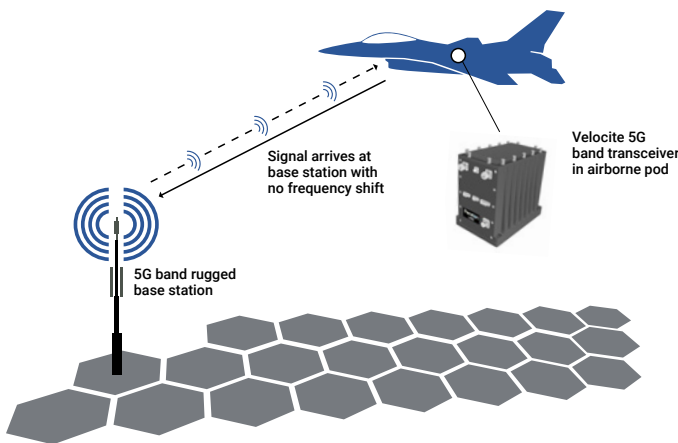
WHY IT'S NEEDED

Velocite is a revolutionary solution that leverages commercial 4G LTE and 5G infrastructure to deliver bidirectional air ground communications in any frequency band and at speeds well above Mach 1. Velocite provides seamless, secure communications at long distances and delivers sophisticated, high-bandwidth, real-time communications for flight testing, training, and operations. It also supports offload of aircraft maintenance, telemetry, and mission data while in flight and it enables real-time, virtualized services for aircraft safety, predictive maintenance, LVC training, and mission readiness.

Unlike current AMT systems that can only handle one test mission at a time, Velocite enables multiple simultaneous test missions conducted over high-bandwidth commercial equipment from any vendor with considerable time and cost savings. Velocite is a patented, proven solution which has been successfully demonstrated in flight testing at Edwards Air Force Base.

Velocite can be utilized by military and commercial users in a variety of aerospace applications including:

- High-bandwidth AMT services on test and training ranges (domestic and international) used by military, safety, rescue and law enforcement agencies

- Airport service providers furnishing communications in an airfield's airspace and on the ground

- Small and medium-sized companies in air and space that do not own spectrum and require communications

- Aircraft manufacturers and suppliers supplying data to support just-in-time maintenance and improve timeliness, efficiency and supply chain workflow

- Emerging applications using on-board virtualization for advances in LVC training that improve mission readiness at lower cost

Velocite testing: 4G/5G base station site installation

Advantages

- Successfully demonstrated in field demonstrations at Edwards Air Force Base

- Cost-effective and RF spectrum-efficient

- Leverages unmodified existing commercial equipment

- Requires only a small fraction of AMT spectrum

- Operational in all testing range RF bands and at flexible bandwidths, on demand

- Vendor-agnostic solution that can transfer to different vendor platforms to meet custom operational needs

- Dynamic automatic assignment of spectrum resources based on data rate and coverage needs

- 5G NR ready and upgradeable to future releases due to flexibility of the appliqué approach

Signal arrives at base station with no frequency shift

Velocite 5G band transceiver in airborne pod

5G band rugged base station

Doppler Compensated 4G/5G Airborne Transceiver

HOW IT WORKS

Velocite combines an intelligent 4G/5G 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 Doppler compensation applique works with any airborne 4G/5G COTS User Equipment (UE). It automatically and intelligently resolves the challenges due to Doppler shift on the mobile transceiver to deliver assured, high-speed air ground communications for any 4G/5G-compliant equipment and without any modifications to the 4G/5G radio access or core network.

The appliqué performs high-speed Doppler estimation and real-time frequency compensation functions to synchronize the test aircraft's 4G/5G transceiver in both radio directions with any UE-desired 4G/5G base station and maintain a robust data link. The Velocite appliqué substantially extends the standard 4G/5G mobility limit of 350 kph to fighter jet speed, providing real-time processing to keep up with 4G/5G signaling on board the airborne unit. It also 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 (gNB/eNB) and UE to deliver a nominal 100 megabits per second (Mbps) throughput per link (20 Mbps in 4G) 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 4G/5G 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 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.

ABOUT PERATON

Peraton drives missions of consequence spanning the globe and extending to the farthest reaches of the galaxy. As the world's leading mission capability integrator and transformative enterprise IT provider, we deliver trusted and highly differentiated national security solutions and technologies that keep people safe and secure. Peraton serves as a valued partner to essential government agencies across the intelligence, space, cyber, defense, civilian, health, and state and local markets. Every day, our employees do the can't be done, solving the most daunting challenges facing our customers.