

## Kepler Constellation

### Mass Produced Communication Satellites for the Internet of Things

Space Flight Laboratory (SFL) and Kepler Communications have entered into a satellite development and manufacturing agreement that could serve as a blueprint for future collaboration between microspace and newspace organizations.

SFL has designed and built the first fully operational Gen1 nanosatellite in Kepler's constellation of commercial communications satellites. The design of this satellite will be used by Kepler in mass producing 140 satellites. SFL personnel are assisting with the start up of production at a Kepler-owned and operated manufacturing facility where duplicate satellites will be mass produced.

"The key to success for a microspace company has always relied on continuous innovation in an environment that does nothing but constantly design satellites for new applications," explains Dr. Robert E. Zee, SFL Director. "SFL has been developing micro- and nanosatellites for 22 years, and its advantage is that it is completely focused on designing new satellites in rapid succession," he said.

For newspace companies, on the other hand, the business model is bottom-line oriented, driven by the need to offer satellite-derived services at ever-competitive prices. Earth observation and data communications are among the most common. These newspace organizations are not in the satellite manufacturing business per se, but they bring mass production in house as a cost-control measure.

"Our partnership with SFL has enabled us on many fronts, especially ensuring we can reach our required cost and performance targets to provide affordable global connectivity," said Kepler CEO and Co-Founder Mina Mitry.



Providing Global Data Connectivity

Kepler offers two primary communications services. The first is a global data transfer service that will securely relay gigabytes of data in a high-bandwidth store-and-forward solution via a Ku-band high-data-rate communications system aboard each satellite. The second service will provide cellular-quality, standardized Internet of Things (IoT) connections linking sensors and devices anywhere on Earth with their service provider.

"A critical part of our business model is to bring data connectivity to remote and underserved areas – including the polar regions," said Mitry, citing energy exploration, agricultural monitoring, fleet management and maritime transport as example end user markets.

For the Kepler program, SFL is utilizing its new 6U XL nanosatellite platform "SPARTAN" which is part of SFL's new line of high-performance CubeSats along with the THUNDER (3U) and JAEGER (12U/16U) variants. SFL has adapted heritage avionics and attitude control for this new line.

A crucial element in both the satellite design and production workflows is that both are being built in anticipation of disruption. "They are designed to allow for upgrades and changes to the system as the constellation advances," said Kepler's Mitry. This will allow Kepler to leverage microspace advances at SFL to stay ahead of the competition by rapidly reinventing its satellite constellation when necessary.

"From innovation to launch, we are creating an agile satellite production process," said Zee. "We expect our approach will define microspace-newspace collaboration for decades to come."