



IRIDIUM CONNECTED® DRONES DELIVER VACCINES IN REMOTE PARTS OF THE WORLD

Company Swoop Aero uses drones equipped with Iridium transceivers to deliver vaccines and medical supplies to remote islands in the South Pacific Ocean. The Iridium® technology on board helps monitor the location and condition of the precious packages. The on-demand supply of vaccines leads to higher immunization rates of kids in hardly-accessible places and proves to be a more economical transportation method for the delivery of primary health care services.

THE CHALLENGE

Vanuatu is a South Pacific Ocean nation made up of roughly 80 islands that stretch 1,300 kilometers. Dense evergreen forest covers nearly three-quarters of the island. It is a difficult location for the health workers charged with making sure every child is protected from diseases like measles, hepatitis, and tuberculosis. Currently, at least one in five kids in Erromango, Vanuatu is not immunized, and vaccination rates cannot be met due to logistical challenges.

Delivering vaccines to remote islands like Vanuatu can take hours or even days. The lack of road infrastructure makes it very hard for nurses to distribute medical supplies between clinics. Health workers would have to walk across treacherous

COMPANIES

- **Swoop Aero** is an Australian company that provides networks of autonomous drones to transport urgent supplies on demand to people who need them most.
- **Iridium** is the only truly global communications company. Iridium voice and data products provide superior communications solutions that allow global companies, government agencies, and individuals to stay connected everywhere.
- **M2M Connectivity** is an Iridium partner that supplies and designs IoT solutions in Australia and New Zealand. They are a specialist distributor for leading wireless modems and antennas and work on project applications for Smart Cities, Smart Utilities, and Asset Tracking applications.

CHALLENGES

- People in inaccessible sites like the Vanuatu archipelago need urgent access to medical supplies, but often are not able to receive treatment due to logistical challenges
- Transporting vaccines in remote areas is challenging and expensive, and removes necessary personnel from their communities
- Drones can be programmed to deliver medication to Vanuatu, but the spotty 4G networks cannot provide the necessary consistent link of communications for the entire 100 kilometer trip

BENEFITS

- Iridium transceivers provide reliable, continuous over-the-horizon communication essential for drone operations
- Iridium hardware can meet the small form-factor drone requirements, allowing more room for vital medical supplies
- Iridium provides scalable, cost-effective connectivity for the drone, through Short Burst Data® (SBD®) integration with a cloud-based control platform



terrain and take long drives and boat rides carrying vaccines in coolers. Certain vaccines need to be kept cold to maintain their potency. They also have to be administered within a strict time frame and in regular intervals. This means vaccines must be safely stored and readily available for consecutive rounds of immunizations, but in remote villages there isn't reliable power needed for refrigerators to keep vaccines cold for extended periods of time.

It is easy to see that the on-demand delivery of vaccines may be a viable option for the remote Vanuatu island. For example, autonomous drones would allow vaccines to be supplied "just in time". A drone could reach a clinic within minutes, soaring over the sea or rugged landscape where there are no roads or paths. Flying a drone with vaccines, however, presents challenges too.

THE SOLUTION

Since December 2018 Swoop Aero has been running an innovative and ambitious project in collaboration with UNICEF, with the support of the Ministry of Health in Vanuatu. The company delivers vaccines via drones from three main distribution hubs in Vanuatu, serving 33 communities, across nine islands. When nurses in small, outer clinics urgently request vaccines and medical supplies, the hubs send the provisions through on-demand aircraft. Now, a drone with a speed of 110 kilometers per hour can reach South River in Vanuatu in just 20 minutes, carrying enough of the necessary vaccines to immunize up to 50 children.

The life-saving aircraft carrying precious medical package is equipped with Iridium technology, allowing remote operators to monitor and control the drone operations.

When the operation began, the engineers at Swoop Aero used the local 4G network to connect with the drones, but the connectivity was unreliable with frequent disconnects. Swoop Aero engineers also considered using 900 MHz radios, this would have required building new infrastructure, which was impractical and expensive.

Swoop Aero approached M2M Connectivity, an Iridium hardware and integration provider, who recommended using an Iridium Core 9523 transceiver inside the drone, with a lightweight Iridium antenna to provide full, reliable coverage for the drones. M2M then worked with Swoop Aero to begin the integration.

Now, Iridium is the primary link that maintains a consistent connection throughout the whole flight. Thanks to the Iridium Core 9523 transceivers embedded in the drones, operators know the position of the unmanned aircraft, their speed, and the temperature in the refrigerated containers with the vaccines. The modules allow nurses to track the location of the drones and give precise coordinates and timing of the expected delivery to the clinics. The health workers primarily rely on their cell phones to stay in touch, but they also use Iridium GO!®

Partner Product: Swoop Aero Drones

Service Provider: M2M Connectivity

Enabling Product: Iridium 9523 Core Transceiver

Enabling Service: Iridium Short Burst Data® (SBD®)

satellite devices when cellular coverage is not available.

The Iridium transceiver is very small, only 32 grams, allowing more room for the life-saving packages in the drone. In addition, the module consumes very little energy, which is important as the drones need to use most of their battery power for flight and payload refrigeration. According to Josh Tepper, CTO of Swoop Aero, "The Iridium Core 9523 transceiver provides global coverage in a form factor that we could easily and rapidly integrate, by using Iridium data calls as a low-speed serial data link. The ability to use data calls also offered at relatively low latency, which is critical for consistent communication with the aircraft."

To transmit data back and forth, the Iridium transceivers are used once in Swoop Aero's drones and then again as "tracking stations". They "talk" to each other to enable a smooth flight and safe delivery of vaccines. This creative configuration allows for a cost-effective system, eliminating the need for building a terrestrial ground base station. Iridium enabled a scalable solution through SBD integration with Swoop Aero's cloud-based control system.

THE RESULT

The Swoop Aero Iridium Connected drones enable the faster, cheaper, safer, and more environmentally-friendly delivery of vaccines. With Swoop Aero drones, nurses no longer have to traverse rough terrain for days at a time, shortening a previously two-day (minimum) trip to Epi island in Vanuatu to now just 40 minutes by air.

Thanks to Iridium and Swoop Aero, medicine is now available on demand – from delivering life-saving vaccines to a nurse inoculating her community, to sending iron supplements and oxytocin to a woman who has lost a lot of blood during child birth.

"Swoop Aero offers a service to those in some of the hardest to reach places in the world. A key enabler of this service is our ability to communicate with our aircraft and thus Iridium has been a crucial partner to our success to date." Josh Tepper, CTO, Swoop Aero.

"Now that [Swoop Aero] is here, we (the local Nirvan community) can send the medicine out to the clinics instead of having to send the patients all the way here or having the patients miss out on treatment," said Roselinda, regional nurse on Epi Island, Vanuatu.

TAKE AWAY

Iridium enables organizations like Swoop Aero to distribute life-saving support in countries with inaccessible parts, like Vanuatu, increasing the overall public health of the served country. Thanks to Iridium and Swoop Aero, children on the Vanuatu island who previously missed out on vaccinations, have been able to and will continue to get their immunizations, increasing their own protection, as well as the overall vaccination rate and herd immunity on the archipelago. Iridium SBD will continue to be an important component of Swoop Aero's communications strategy as the company expands to offer their services to new communities in developing nations.