WIRELESS RELAY INSTALLATION CREATES COST-EFFECTIVE COMMUNICATION LINK



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A long range wireless link has been established connecting the Princess Elisabeth Antarctica Research Station to the new Perseus Intercontinental Airstrip - and it runs on renewable solar power!

To improve communications, reduce costs, and ensure the safety of flights landing and departing from the Perseus Intercontinental Airstrip with the DROMLAN logistics network, members of the IPF team installed a communication relay atop Vesthaugen Nunatak, located about halfway in between the Princess Elisabeth Antarctica Research Station and the new airstrip.

This new relay creates a wireless extension of the network at the Princess Elisabeth Antarctica out to Perseus Airstrip, making communication via Internet from the remote airstrip possible.

It sits on the summit of Vesthaugen Nunatak, 31.5 km north of the Princess Elisabeth Antarctica and 27.5 km south of Perseus Airstrip. The top of the nunatak is at an altitude of 1200 metres above sea level, which allows it to have a clear line of sight between the station, which sits at a higher elevation of 1365 metres above sea level, and the airstrip, which is located at only 794 metres above sea level.

The communications relay consists of phased-array relay antennas (antennas that create a beam of radio waves that can be electronically pointed in specific directions without moving them) powered by four 130Wp solar photovoltaic panels and two 97Ah battery storage units. This makes it possible to have up to 10 days full speed wireless communication without sunlight and more than three months of autonomy when no data is transferred over the link.

The relay station is also equipped with a SEN-LINK modem (an ESA – SENHIVE product).

"SEN-LINK is the world's first multi-carrier Low Earth Orbit (LEO) satellite modem," said Thomas Petracca, the Head of the Princess Elisabeth Antarctica Engineering Team and CEO of Senhive, a Belgian firm specialized in mission critical communication and sensors.

"By combining multiple future Low Earth Orbit (LEO) satellite providers such as Hiber, Astrocast, Irridium, etc., it's possible to have up to five years of autonomy and guarantee mission-critical redundant communication. SEN-LINK modems will also be deployed to provide data repatriation on remote science and mission-critical systems."

A unique challenge

"Building an autonomous communication relay on the top of the Vesthaugen Nunatak to deliver wireless Internet to the remote Perseus airstrip, 70km away from PEA, was an exciting challenge," according to Benoît Verdin, an IPF technician working the station team. "We were asked to build the first long-range wireless network in Antarctica."

It was not the easiest of tasks.

"We had to carry heavy batteries and bulky solar panels up the steep slopes of the nunatak in stormy winds and blowing snow. Luckily, we found a sheltered spot near the top of the nunatak where we could install all of the equipment. It took more than ten ascents over a period of two days bring all the materials to the top and install them."

However, after hard work came the reward.

"While configuring the link on top of the nunatak, I took ten minutes to Skype my girlfriend in Belgium. It was a surreal moment, calling her from the middle of nowhere in Antarctica."

After the setup was installed at Vesthaugen Nunatak, the team of technicians headed to Perseus Airstrip to finalize the connection and contact their family back home.

Proof of concept

The new wireless link between the Princess Elisabeth Antarctica and the Perseus Intercontinental Airstrip is a proof of concept that Thomas Petracca devised before going to Antarctica this season. He couldn't be happier now that the system is up and running.

"This shows that it's possible to reduce costs of communicating over longer distances in Antarctica for relatively little up-front cost," Thomas explained. "What we've constructed at Vesthaugen could have applications elsewhere in Antarctica, at other research stations or logistical waypoints, for example."

Thomas also sees unique possibilities for improving communications between Antarctic stations in the future.

“Combining renewable power, LEO satellites and phased-array antennas will allow us to have extremely long, high bandwidth (gigabit) connections between Antarctic stations. The possibilities are endless! These kinds of setups will have a significant impact on all kidns of future Antarctic operations."