



● ● Dr. Leslie Klein, Founder and CEO,
C-COM Satellite Systems

Satellite Evolution Global

Q&A

From on-the-pause to on-the-move ● ●

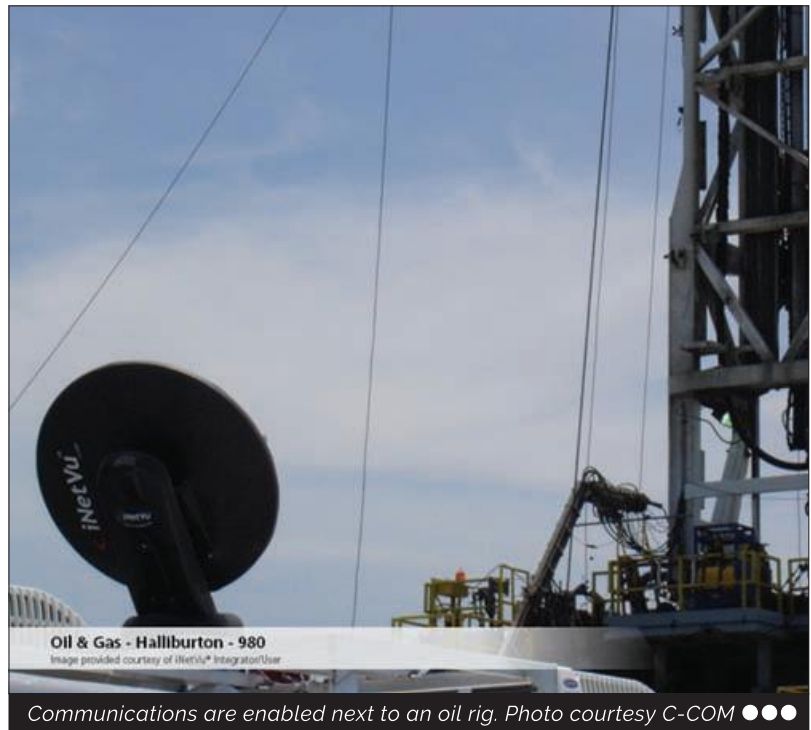
Ahead of its time as a developer of mobile satellite-based internet connectivity, C-COM has paid out about US\$19 million in dividends over the course of its 25-year history. Founder and CEO, Dr. Leslie Klein delves into the company's origins, evolution, and future plans. He also reveals the "secret sauce" that differentiates C-COM from competitors.

Crispin Littlehales, Executive Editor, Satellite Evolution Group

Question: What prompted you to found C-COM and how have you managed to stay at the forefront of the transportable and mobile satellite-based antenna business for all these years?

Dr. Leslie Klein: 25 years ago, Bilal Awada, our Chief Technology Officer, and I decided that perhaps, one day, connectivity to the internet will be required by vehicles—similar to the way that radio made its way into automobiles as a standard product. As it turned out, we were way ahead of our time as the satellite industry was not yet ready, either in terms of price or availability, to deliver that type of connectivity.

It took us some time to develop the technology and make a system that was capable of delivering high-speed internet to vehicles while on-the-pause. Using our technology required that you stop your vehicle, but you could then deploy an antenna automatically and find the satellite that delivered access to the internet at a relatively affordable price. Back then, we thought our market was recreational vehicles, but we soon



Communications are enabled next to an oil rig. Photo courtesy C-COM ● ● ●



Mobile emergency operations center. Photo courtesy C-COM ●●●

#Softbank #CellularBackhaul #Antennas

The systems are also durable and reliable enough to provide communication in the middle of the desert or on top of a mountain, or wherever the customer was going and needed to be able to connect to a satellite. Some of the systems are still operating after 14 or 15 years. That, and the fact that they are priced right was the "secret sauce" that made our products so popular.

Our systems are life-saving devices. We sold 400 of our systems to Softbank in Japan during the tsunami when all of their cell towers were lost. These antennas became instant cell tower replacements making it possible to communicate within hours after the cell towers were lost.

learned those customers were not prepared to spend the money either for our hardware or for airtime, which was awfully expensive.

So, we had to quickly switch over to the commercial market which turned out to be a very fortuitous move. Our initial adaptors were oil and gas companies, disaster management customers, the military, and other vertical market users. Today, C-COM has a presence in 106 countries. We only sell through resellers, and we now have about six hundred system integrators and resellers who buy the product from us, install it for the end user, provide connectivity and offer support maintenance and warranties. In all, there are more than 10,000 C-COM antennas deployed around the world.

Question: What have been the key drivers for product development?

Dr. Leslie Klein: From the get-go, we decided to make a product that was extremely easy to use. As you can imagine, pointing the satellite antenna 25 years ago was not a simple task. Even today, you need a knowledgeable person, quite often a technician, who will spend a half hour to an hour to accurately point the antenna to the appropriate satellite. Our technical challenge was to make our products idiot-proof so that the user could just push a button and the system would do the rest. We designed all the hardware, the software, and the robotics to make a system that anybody—a bus driver, a rig worker, an emergency services provider—could use. That allowed the system to travel very rapidly from point to point and within minutes be able to connect.

Today our systems work with many different modalities and satellite services. They come in varied sizes from a small 74-centimeter antenna all the way up to 2.4 meters. We have more than 30 different products that do various things for different users using different frequencies. So, the systems have evolved over the years, but they use the same technology, the same controller, the same software, and require the same know-how.

Question: What would you say are the most popular applications?

Dr. Leslie Klein: The largest segment of the market initially was oil and gas exploration and also disaster management and cellular backhaul. We also have a large number of mobile banks and ATM machines that allow people to

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Mobile bank offers ATM services to customers in the Hawaiian Islands. Photo courtesy C-COM ●●●

withdraw and deposit money in remote areas. We also have a number of E-commerce type of applications for governments such as passport printing and ID verification. There was even a mobile jail in South Africa at one point where the unit would check weapons and those who carried them and didn't have a permit would be immediately incarcerated. Obviously, the offenders were not given internet access, but they were in the same unit where the checking was being done.

Another interesting application in South Africa was used to address the poaching of rhinos. The antenna was used to provide video of a very large segment of a park to monitor the poachers 24/7. The drone-based system would transmit information to our antenna which would then broadcast the imagery to officials who could dispatch either the military or local volunteers to stop the poachers from killing the animals.

Question: Is there a big difference between the demands of the commercial market versus the government/military?

Dr. Leslie Klein: The military market, especially NATO, US, and Canadian forces very often require MIL-SPEC products, which we do not manufacture. Nonetheless, a growing number of military organizations around the world, including NATO forces in both Canada and Europe, have recognized the reliability of our antennas and have been purchasing them for communications. They can buy two or three of our antennas for the price of one MIL-SPEC antenna plus they have the latest and greatest internal pointing technology. They also purchase our Manpack antennas which a single soldier can carry and deploy within minutes by pressing a button.

Both military and commercial customers appreciate the fact that C-COM has an extensive inventory of about US\$7 million worth of products which we can ship almost immediately. We do not ask our resellers to stock products because we can deliver large quantities of antennas within weeks, rather than months.

Question: How have supply chain issues affected your ability to manufacture products?

Dr. Leslie Klein: Our plan has always been to build exceptionally large quantities of products and in 2019 we ramped up in anticipation of orders to come. When COVID happened, many companies were unable to function at full capacity, but we had a great inventory that stretched into 2021. Then, knowing the supply chain was going to be an issue, we started buying and building products more than a year before we needed them for fulfillment.

The unfortunate part of the whole thing was that we used to pay US\$15 and US\$20 for an integrated circuit. Now those circuits are US\$300 unless you want to wait for 52 weeks to get them.

More than a year ago, we started to scour the market for all these long lead items and did our best to buy them at the lowest possible price—still not what we used to pay, but not at the outrageous prices that are going on today.



Emergency vehicle enables on-site communications. Photo courtesy C-COM ●●●



Officials can check for weapons permits and incarcerate offenders. Photo courtesy C-COM ●●●

That has enabled us to stay one step ahead and keep our cost to customers within reason.

Question: Tell us about the C-COM Electronically Steered Phased Array antenna that you exhibited at Satellite 2022. What kind of feedback are you getting from the industry on this product and where are you now in terms of testing and validation?

Dr. Leslie Klein: The antenna that we displayed in March was a 1000-element, fully functional antenna system that we tested over Telesat just to verify that the design works

as expected, which it did. Our ultimate production is a 4000-element antenna which is, at this moment, being completed and should be tested before the end of this year. Hopefully, we will be in production in 2023 with a number of beta units being distributed.

We anticipate that this technology will make it possible to develop new and interesting shapes and sizes of antennas. Because the antenna is conformal, it will be possible to use it in many different applications and over LEO and MEO as well as GEO satellites in the Ka-band frequency range. That means these antennas will be fully mobile and therefore ideal for use in vehicles, unmanned aerial vehicles (UAV's), aircraft, boats, trains, and military applications, among others.

Question: What can we expect to see from C-COM over the next several years?

Dr. Leslie Klein: The phased array antenna market is predicted to be a US\$17 billion market over the next three to five years and even a small segment of that market would make a huge impact on our business. The introduction of the phased array antenna will change the direction of the company from an on-the-pause parabolic antenna system manufacturer to an on-the-move phased array antenna manufacturer. We would still be using the distributors that we have, and hopefully adding many new ones, but they will be selling an antenna that will have a tremendous impact on the satellite-based cellular communications market around the world. ●

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