



*Train antenna system - the system allows a train to travel through a tunnel without degradation of the signal. Photo Orbit.*

## Planes, trains & automobiles

We are no longer content with accessing the Internet in our own homes and in the office. We now want to be connected when we travel. Satellite communication companies are working to ensure that easy access to Internet, email, and voice services is available even when we are travelling. Satellite antennas form a key part of these developments. Helen Jameson explores the antennas available and in development.

**It's a 24-hour, 7 days-a-week society.** There's no time to be wasted, so when you are travelling from one business meeting to another it's never been more important to keep in touch, to check urgent email messages, make all-important calls. And it's not just business requirements. No longer happy with a book, many people wish to be entertained on longer journeys. The phenomenon of the Internet and related broadband applications is now filtering into public and private transport – and satellite is proving to be the ideal method of delivery. It's anywhere, anytime connectivity and its scalability and versatility equals an excellent communications solution for transportation.

### **Antennas that fit the bill**

The type of antenna used to provide services to a moving vehicle, train or aircraft must be designed to cope with speed and jolts and the peculiarities of the different types of transport. They must firstly stay firmly attached to the mode of transport and must also be aerodynamically designed with a low-profile.

Here, we take a brief look at the antennas that are, and will be, available for entertainment and useful for both business and leisure.

### **Technology on the train**

It is becoming more and more the norm to discover that a broadband



and higher quality telephone connections are available on trains, especially in Europe. The emphasis is placed on the business customer, a key client of the railway companies, who can be assured that they will not miss any important calls or emails whilst en route to various meetings and appointments.

The UK-based company ERA Technology is in the process of developing a next-generation low-profile 'on-the-move' satellite communications broadband antenna for rail applications. The programme is backed by the European Space Agency's ARTES-4 initiative.

The antenna is called G2 and is built upon the foundations of ERA's first low profile product focused on the automotive market in the United States. G2 is initially aimed at providing broadband for rail passengers, offering data rates of up to several Mbps; far higher than those available using 3G. A key benefit is that ERA's system will be compatible with the existing European Ku-band satellites and DVB standards. The antenna has attracted great interest and as a result ERA has concluded supply agreements with a number of systems integrators in the rail industry.

Initial deployments of Ku-Band satellite communications on trains have used conventional antennas, which are typically 300-700mm tall. In many cases, structural modifications to the train roof are required to meet the tight gauging requirements imposed by bridges and overhead cables on rail lines across Europe. This has substantial implications in terms of installation cost and train certification. ERA's low-profile technology adds less than 100mm to the height of the train, which means it can be fitted without modifying the roof. It is projected that 50 percent of trains in Europe will require low-profile antennas to meet gauging requirements and many others will opt for this solution simply because of its aesthetic appeal.

Dr Robert Pearson, Head of Antenna Systems, at ERA explained: "We have seen significant success with our first generation product and the G2 project will build upon this. Our progress to date has been extremely rapid and I believe we have come up with the right technology at the right time. We look forward to working with our partners to take products to market in the rail sector over the next 18 months."

ERA is also actively pursuing the commercial airline market, where maximising fuel efficiency by minimising the drag of a fuselage-mounted antenna is the key driver. Here, ERA's DTI-sponsored SPITFIRE programme has attracted considerable interest from major aircraft manufacturers and systems integrators.

### Orbit turns attention to trains

The Israel-based Orbit Technology Group have been working on the development of an antenna system specifically for the rail market that works in conjunction with Wi-Fi to ensure constant communications even when the train is travelling at high speed through tunnels. Dr. Ehud Netzer told Satellite Evolution about the new system: "Yes, we are very excited about this. As far as we know, we are the very first company to come up with this solution. This is a system that we have developed together with an Italian company. A major European company has been using the system for several months along with other customers too. We have had great feedback from the market.

"People are using the Internet on board the trains and that is down to our system. When you go into a tunnel you will lose the connection to the satellite so we have developed a system where, once the train emerges from the tunnel, the satellite signal is re-acquired in about 3-10 seconds. In addition, on entering the tunnel, a Wi-Fi signal is employed via a stationary antenna at the mouth of the tunnel.

"Therefore, the passenger retains the Internet connection and there is no loss of signal but as soon as the train emerges from the tunnel the satellite signal is re-acquired very quickly. We are very proud of this system. The antenna is very low-profile and sleek. We are looking forward to increased roll-out of this system and we believe that this system will be a world leader for on-board communications for trains."

### Access in the air

Those longhaul flights will never be the same again. There will be no need to be cut off from family, friends or business associates. You will have access to email, to web surfing, to video - no more boring, endless flights. Satellite companies are constantly innovating to provide antenna systems that can support the applications in the air.

KVH Industries, a provider of in-motion satellite TV and communications systems for mobile platforms, announced earlier this year that it is entering the commercial aviation market following the award of a US\$20.1 million contract from a leading in-flight entertainment supplier. Under the terms of the multi-year contract, KVH will design, develop, and manufacture new DIRECTV-compatible satellite TV antennas to be used on narrowbody commercial aircraft operating in the United States.

"This new endeavour marks a significant and logical step in KVH's evolution as a leading source for innovative mobile broadband technology on land, sea, and now in the air," said Martin Kits van Heyningen, KVH's Chief Executive Officer. "As KVH has demonstrated in boats and vehicles around the globe over the last 15 years, live satellite television content like sporting events and breaking news is a compelling product for consumers." KVH will be building upon its award-winning TracVision mobile satellite TV technology, currently used on vessels, cars, recreational vehicles, and trucks. With this technology as a foundation, KVH will develop a new, low-profile antenna designed to mount on the fuselage of commercial aircraft.

"In the aviation market, passenger demand for premier in-flight entertainment and the recognition by airlines that live programming offers competitive and financial benefits is driving significant growth. We look forward to working with our customer to meet that demand and foster the expansion of this market in the future," concluded Mr. Kits van Heyningen.

KVH is not the only company exploring the concept of TV and communications on board aircraft. There are many plans in place. iDirect is currently looking at the airborne market and is working in partnership with Panasonic to bring their broadband connection to aircraft. Connexion by Boeing may have discontinued due to a lack of interest, but the market is now receptive to the idea of connectivity on board aircraft. iDirect will be focusing its efforts on bandwidth efficiency and will be working with very small antennas.

The Orbit Technology Group is also looking closely at the commercial and business jet market. Orbit has supplied hundreds of systems for TV reception on commercial and business aeroplanes. In the last few years Orbit has been working towards a two-way broadband solution. Two approaches were taken in the development of the system. Firstly, a prototype of a circular antenna to be tail mounted was developed and successfully tested during flight. Secondly, several versions of a flat antenna were built and tested in cooperation with Starling - another Israeli company. These are designed to be fuselage mounted. These include versions for both commercial and business jets.

### TV in transit!

No-one need miss their favourite television programme again with a new product from Thaicom. The company launched its new product called "Wiworld" at the end of January 2008. Wiworld is a mobile satellite antenna that is used to receive digital TV signals from a moving vehicle.

The company had already soft-launched Wiworld two months previously and received very positive feedback from the market. Wiworld will target individuals, families and executives who spend a significant amount of time in their vehicles. In addition, Wiworld will target public transportation such as VIP coaches.

Wiworld is a mobile satellite auto-tracking antenna used to receive digital television signals in a Ku-Band spectrum. It has a sleek and modern design and can be installed on the roof of any vehicle using a magnet and easily be removed when parking. This magnet is capable of attaching the antenna to the roof even with vehicle



speeds of up to 180 kilometers per hour. In addition, the Wiworld system allows connection with any Ku-band satellite TV receiver (set-top-box) such as DTV or other Pay-TV set top boxes. Users will experience clear digital TV signals in their moving vehicles.

Mr. Krajang Lojnsirasilp, Sales and Marketing Manager of Thaicom said, "Wiworld is one of our premium products this year. It is a unique product that will help enhance the satellite broadcasting market in Thailand. This is because you can bring your own set-top-box, either subscription or free TV, anywhere you go in Thailand without hesitation. With its special auto-tracking feature, Wiworld is suitable for customers who are on the road a lot but don't want to miss their favourite programs. Also, Wiworld is easy to install and no modifications are needed with your car. As for the distribution channel of Wiworld, we have authorised dealers throughout the country. This year we are targeting 2,000 sets of Wiworld to be sold."

### Constant connectivity – careful configuration

The migration of communications-on-the-move from the military to the commercial sector is happening at quite a rate. The antenna configuration is vitally important to any comms-on-the-move system. In terms of requirements for antennas that enable broadband communications from a moving vehicle, train or aircraft, the antennas will

have to be small. This is particularly important on aircraft or trains. The antenna must also be very stable and possibly phased array. It is easy to think that the smaller the antenna is, the more limitations it will have. Larger antennas have more capability don't they? This is what you would think, but advancements in the technology by designers and manufacturers are using techniques such as Forward Error Correction to overcome these limitations. There is also the question of potential satellite interference from small antennas but this has been addressed through spread spectrum technology. Antenna systems today also have the built-in ability to switch from one satellite to another when crossing from region to region and different satellite footprints.

Satellite is enabling people on the move to retain connectivity no matter where they are or what mode of transport they choose to take. The antenna systems available today (and those in development) continue to offer higher data rates, more applications and therefore, more choice. As we move on through this year and into next, we are sure to see a range of antennas emerge onto the market that are smaller, more powerful, more stable, more aerodynamic and offer more features than ever before, ensuring that our journeys don't mean that we need to be cut off from the technology we rely on most.



*Wiworld is a mobile satellite antenna that is used to receive digital TV signals from a moving vehicle. Photo courtesy of THAI.COM.*