The Channel Tunnel
Staying connected under the sea

Case Study
The most important thing we build is trust

Overview
Cobham Wireless provided mobile phone coverage 75m under the sea! This enabled passengers to use their mobile phones while travelling from the UK to France.

Challenge
There were many challenges in this project. They needed a system that could cope with the trains moving very high speeds down a tunnel that spans 50km in length and 75m below the sea. The system also had to comply with both UK and French authorities.

The Challenge
Whenever and wherever we are, we expect to be able to use our smartphones, not only to make calls but to surf the internet and connect with our family and friends via social media. Being underground is no exception – but how about 75m under the sea? This was a very real challenge for us when we helped Alcatel-Lucent supply a wireless coverage system inside the Channel Tunnel.

Providing mobile coverage inside tunnels is something that Cobham Wireless does on a regular basis. But when we started work on kitting-out the Channel Tunnel, the project threw up challenges that even we don’t see in an average tunnel deployment.

As well as being 75m below the sea, the tunnel spans a total of over 50km in length running from Folkestone, Kent in the UK to Coquelles, Pas-de-Calais in France. On top of the challenge of working in a confined, tubular environment, the project needed to result in both a GSM-P and a GSM-R network that could cope with trains moving at very high speeds without any loss of signal and no interference between frequencies. All this within the regulatory confines of UK and French authorities. This was going to be no mean feat.

In 2009 the project kicked-off to replace the obsolete technology that the tunnel had been using, with a new state of the art RF-over-fibre radio network, allowing the staff and drivers of the trains to communicate with one another, but also to enable the travelling public to use their smartphones with the uninterrupted service they have now come to expect.

The Solution
Alcatel Lucent was the organisation tasked with providing GSM-P and GSM-R communication systems throughout the tunnel. They selected Cobham Wireless as their provider of a Distributed Antenna System (DAS) – a network of repeaters and leaky-feeder cable used to propagate coverage throughout the length of the tunnels.

The system starts with two master sites both sited approx. 3km away from either entrance to the tunnel. These master sites – one in France and one in the UK – house the Cobham Wireless optical master units (OMUs) that are fed by base stations close-by. The master sites then take the RF signals and send them over fibre, to the network of repeaters within the tunnel itself. In between each repeater, leaky-feeder cable is installed to maintain coverage.

The Channel Tunnel actually consists of three tunnels in total: two tunnels that house the trains that carry passengers between UK and France (the running tunnels), and a third
service tunnel for service vehicles and staff. A total of 517 repeaters were installed throughout the three tunnels at 750m intervals – 142 repeaters for GSM-P and 375 repeaters for GSM-R.

With a total of 6 cells in each tunnel, the challenge of handover from cell to cell has been overcome using dual-fibre repeaters, with RF levels being controlled to optimise the handover during the journey.

The completed network currently provides the public with 2G and 3G connectivity, with LTE being considered when the parties involved feel the time is right to launch this too.

"While it might appear simple to provide a telephone service, in reality, actually succeeding to do so under the sea is a major technical accomplishment,"

Pascal Homsy, CEO, Alcatel-Lucent
France

The Benefit

Once all contracts were in place, the deployment itself took place in record time with the intention of having the service operating for travellers arriving in the UK for the Olympic and Paralympic Games in the summer of 2012.

With systems like this one, staff and drivers operating trains in such environments are provided with a communications system they can rely upon, and the travelling public have an improved user experience, allowing them to maintain connectivity for the duration of their journey. But then what else would we expect?