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TETRA

CRITICAL COMMUNICATIONS TODAY

BOS network: entering the final stretch



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BOS network

Germany says ‘Auf wiedersehen analogue’

While Germany is recognised the world over for many things, radio communications probably aren't one of them. However, that trademark German efficiency has seen a high-performing, interoperable TETRA network set up nationwide in just eight years.

Sam Fenwick investigates



The German police were initially sceptical about using the national BOS network

Germany's BOS digital radio network, which began its deployment in August 2007, is nearly complete and currently covers more than 98 per cent of Germany's 348,672 square kilometre territory.

The last 'white spots' without TETRA network coverage are in the Alpine regions of Bavaria. Rolf Krost, president of the Federal Agency for Public Safety Digital Radio (BDBOS), says that it expects "the complete rollout to be finalised by the end of this year" and that the network now has more than 570,000 registered users. According to Krost, more than 170 million short messages are sent by the BOS digital radio network's users each month.

Thomas Buro, programme manager of BOSNET & utility projects at Airbus Defence and Space, says the reason some regions of Bavaria are the last to see full roll-out of the network is due to their remote location and lack of transport infrastructure.

"Sometimes there are maybe 200 to 300 metres between where the road ends and where the site is... It makes life a little bit difficult because several of these places are so remote that you have to walk maybe two hours to get to them, and if you've forgotten something you have to go back.

"For G7 in 2014 and also this year, we supported Bavaria with all kinds of vehicles, with helicopters - most of which are provided by the state as they were already flying other equipment to the sites as well. We supplied all the necessary personnel so that our equipment could be flown to these areas. There are a lot of sites in Bavaria where there's just a trail, so we used special four-wheel drive vehicles to bring equipment to the site."

Buro says that it is adjusting the network to meet users' requirements. "When people report something in the field there is now a task of network fine tuning going on; so changing antennas, putting additional capacity in place, and so on."

In addition, Airbus Defence and Space is working to improve the overall performance and the technical evolution of the infrastructure. This includes adding a secondary control channel and integrating it with the network's monitoring tools. Buro explains that this is necessary for large-scale events, allowing the network to "avoid any kind of overload".

The German TETRA access network deploys a mixture of its own microwave infrastructure and hardened

BOS network



The TETRA BOS network is used to co-ordinate users from multiple agencies

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leased lines (fibre, copper, or microwave) belonging to commercial network providers. Switch sites and major base station sites are provisioned with uninterrupted power supplies for up to 72 hours.

In 2014 Heliocentris upgraded 25 BOS network base stations in the state of Brandenburg with hydrogen fuel cells for back-up power rather than traditional diesel generators as a means of reducing operating costs and carbon emissions.

Until 2014 the interconnection of the TETRA switches was based on leased lines. Early that year the core network was replaced by a fibre network that provides high capacity links to carry additional traffic. It also forms the basis for the BOS net's required TETRA switch redundancy based on specifically provided emergency TETRA switches.

"The police's first reactions regarding BDBOS' roll-out of the BOS digital radio network were very sceptical," says

Anja Ducklaß -Nitschke, the deputy chairwoman of the German Federal Police Union.

"However, the transparency and openness of the BDBOS leadership right from the beginning has helped to overcome this scepticism very quickly. And today I can say that 95 per cent of the users are happy with the possibilities this network offers."

TETRA Today asked both Krost and Buro if they were was anything they would have done differently when it comes to the BOS network.

"BDBOS was founded in 2007 with a small number of employees and supported by external service providers," says Krost. "Last June we reorganised the BDBOS and in the next two years we will increase our staff base and reduce the number of consultants. In my opinion this was a really good decision, but it could have been made sooner. Now we can increase the knowledge in-house and develop the network more independently."

For Buro it comes back to the issue of site selection. "In the beginning there was the idea that there would be one major contractor handling everything: planning, providing all the sites, delivering the infrastructure and ongoing services. When I look back at the development and rollout of the network these things were not in our sphere of influence and it kept adding to the complexity of the project. If it had been totally integrated then that would have been an advantage."

"The BOS digital radio network offers enormous benefits to the security authorities and rescue forces," Krost says. "For example, in 2013 we had a huge flood in Germany, especially in the middle and eastern parts of the country. Rescue teams from all over Germany tried to stop the water and took care of evacuated citizens. To co-ordinate the different rescue teams from all possible organisations we used the TETRA network. They were able to communicate directly with each other and could be managed in a very effective way. This wasn't possible before the TETRA network."

"Another example is the G7 summit in June 2015," he continues. "The meeting was held in luxury spa hotel Schloss Elmau, which is located in a rural Alpine region. More than 30,000 police officers, firefighters and security staff were mobilised to guarantee security at this major international event. The different forces co-ordinated this operation with more than 50,000 group calls. This wasn't possible with analogue radio, but now it is."

On the first day of the summit almost 18,000 radio terminals were in use, and one of the base stations managed radio communication between up to 7,500 terminals simultaneously. Airbus Defence and Space had performed three stress tests prior to the event to determine if the TETRA network could handle these high levels of traffic.

"This large-scale event showed that the BDBOS had done a good job. And not only within the police. All assigned forces, such as the THW [the German Federal Agency for Technical Relief] and emergency services, had no reason to complain... Using the digital radio network at this event was easier than talking by phone," says Ducklaß -Nitschke.

BOS network



Airbus Defence and Space has used helicopters to get base station equipment to remote sites

"A large operation that took place in Berlin around the first of May is also worth mentioning. Several hundred police officers from various German county and federal police forces were deployed. At large-scale operations like this BDBOS employees are always on hand, and can act immediately should any problems arise."

TETRA Today asked Krost about the progress towards cross-border interoperability. "We are working on phase 4 of the TETRA Inter-System Interface (ISI) to be established as a European Telecommunications Standards Institute (ETSI) standard, because this phase allows full roaming from one country to another," he responds. "The problem is that the current phase 3 requires the registration of first responders in the host system of the other country. Since European public safety systems work under quite different security, this entails a prohibitive amount of bureaucracy. In the meantime German agencies and their partners in neighbouring countries - for example Switzerland and the Netherlands - have introduced alternatives for cross-border communications that work very satisfactorily. We are looking forward to the next standardisation phase from ETSI, which might offer more features," he added.

"We are supporting various discussions, and those between Germany and Belgium specifically, to look at how an ISI connection can be established," Buro adds. "The only problem there is a lot of political motivation

is involved. [Agencies] have to decide if they are going to do it who is taking what cost and these kind of things. The development process is quite slow, and we would like [things to be going] a little bit faster because it's definitely something that is already available."

While public safety users on the whole seem satisfied with the BOS network's performance, can the same be said for non-mission-critical applications? "Currently our colleagues, who work for example at train stations or airports, do experience problems with the digital radio network's reception. We have reported these to BDBOS but in these situations its ability to improve the service is restricted," says Ducklaß-Nitschke.

"For example, train stations belong to the German railway company Deutsche Bahn, therefore as the owner Deutsche Bahn would have to act and invest here. Unfortunately private owners look at these kind of investments differently [to organisations in the public sector]."

ISI is not the only feature BDBOS is hoping to add to the network. Airbus Defence and Space is working on a project to introduce pager functionality in Hessen for firefighters and other emergency and rescue services. "In other places in Germany there's interest, sometimes it's only on a very regional level... in some other states there's a growing interest from the firefighter community," says Buro.

According to Buro, the pager has been specifically designed and developed for firefighters' needs and allows them to set a status so that control handlers know who they should page in the event of an incident. Firefighters can also use the device to say whether or not they will respond to requests for assistance, giving the control room instant feedback.

He adds that Airbus Defence and Space has a MVNO offering that can be used in conjunction with Tactilon, its hybrid network solution that allows broadband capacities to be added to PMR networks.

Airbus Defence and Space has contributed its thoughts on the feasibility of integrating the BOS digital radio network and LTE to a Federal Ministry of the Interior study. "We think that adding LTE functionality and data is something that will happen in the future and the most reasonable approach is to use the existing infrastructure and put these kind of things on top of it," Buro says.

"In the start-up of the BOS network the biggest barrier to a very fast roll-out was the availability of base station sites. Now there are roughly 4,500 sites in Germany with back-up power so one very good solution from our point of view would be to put LTE equipment on top - use the existing infrastructure and the existing networks that already transmit TETRA streams. This could provide a very fast deployment of an [LTE] network."

It has been a long journey to get to this point but it seems that it has been well worth the time, effort and investment. With high user satisfaction and a proven ability to provide secure, resilient communications for public safety even during the largest events, BDBOS and Airbus Defence and Space can be justifiably proud of their achievements.