MISSION-CRITICAL COMMUNICATIONS IN TUNNELS

Going Underground

Tunnels are a key part of many transport infrastructures. Whether for road or rail, public use or service vehicles only, they keep cities moving and communities connected.

They also take a lot of managing. From routine maintenance, inspections and building works, to emergency services, a wide variety of personnel need to be able to work effectively and efficiently in tunnels. This means they not only need the right equipment, from mobile elevating work platforms (MEWPs) to personal protective equipment (PPE) — they also need effective and efficient communications systems.

But communicating underground is rarely straightforward. Cramped environments, lack of light, background noise, inability to connect to public cellular networks — all these factors mean that keeping disparate teams of tunnel workers connected to each other — and the outside world — requires careful planning and management.

THE CHALLENGES

A combination of factors makes communications in tunnels truly mission-critical – and fraught with challenges.

Efficiency

If the flow of transport through that tunnel fails due to a breakdown or accident then the transport backlog can escalate extremely quickly. Congestion and disruption quickly follow. For major transport operators seeking to maintain efficiency, this means that any underground incidents need to be responded to as rapidly and comprehensively as possible. This requires clear and reliable underground communications systems.

Safety

Should an accident take place in a road or rail tunnel, it may become more serious than it would above ground; vehicles are more likely to collide with walls, barriers or other vehicles, and should a fire ignite, then the underground environment can exacerbate the dangers of heat and smoke. Maintenance engineers are required to work in cramped conditions which may also be dangerous.

As such, it is essential for tunnels to have reliable and immediate lines of communication with emergency services, while engineers and maintenance staff must be able to communicate audibly both with each other and a centralised office.

Multiplicity

Beyond the essential communications stakeholders like maintenance staff and emergency services, most tunnels need to incorporate a public address (PA) system, and may additionally want to offer travellers services such as public radio or Wi-Fi access.

All of these disparate stakeholder groups and service options require slightly different communications systems – and these may have been built up over time, using a variety of different technologies. Managing and maintaining these diverse systems places a great burden on staff.

THE SIMOCO APPROACH

Simoco Wireless Solutions specialises in developing bespoke and multi-faceted unified communications systems for use in challenging environments, like tunnels – from system design and planning, through installation and delivery of infrastructure projects, to ongoing maintenance and support.

We understand the diverse and dynamic challenges faced by transport organisations managing tunnels, which means we can help them by ensuring that the various communications systems in place are in optimum working condition and readily available to the tunnel authorities. In turn, they can maintain efficient traffic flows, the highest levels of safety, smooth and centralised management – and even offer new and innovative services.

Our approach combines voice and data transmission across unified resilient networks. We consolidate communications to wider transport networks and third parties such as emergency services with specific tunnel environments. We continually work to meet the robust safety standards and potentially hazardous environmental conditions of tunnels – all over the world.

FEATURES AND BENEFITS

Tunnel operators can pick and choose from a huge variety of features, depending on their precise environment and needs. These include:

A single sophisticated communications network
Bespoke combinations of voice and data are unified across a single sophisticated communications network that can incorporate serial, Ethernet and PMR radio as well as mesh and LTE technologies. The complex multiplicity present in many tunnels' communication networks is streamlined and made simpler.

Remote monitoring services, alarm and broadcast capabilities
These ensure rapid identification and response to emergency situations, including accidents and breakdowns. This ensures that safety of all travellers and response workers is kept to a maximum, helping to meet regulatory requirements, and assists with the fastest possible return to normal traffic flows.

Multiple communications channels
From dedicated PMR channels for use by maintenance operators, to Terrestrial Trunked Radio (TETRA), offering reliability, security and clarity of communications, particularly useful for direct links to emergency services, to fireground radio so that on-site communications for fire and rescue services are always available. We layer up multiple communications channels, ensuring that all stakeholders have the most reliable and appropriate communications available, and a single pane of glass visibility of all channels is achieved.

Public address (PA) loudspeaker systems
Often used for the management of large vehicles through limited-height tunnels, or for playing automated messages, these systems maximise efficient running of all tunnels, whether road or rail, public or service.

Additional services for commuters
Relay equipment for digital radio broadcasting, or data communications that can evolve in line with advancing technology in order to offer add-on services, all helping to generate an improved traveller experience and greater levels of satisfaction.

Rapid identification of any problems on the communications network
The single pane of glass view makes it easy for engineers to identify the source of any communications problems, isolate and fix it as quickly as possible, driving efficiencies and saving maintenance and engineering resource.

24/7/365 maintenance and support services
Always tailored to the precise needs of the organisation in question.

Case Study

London is one of the biggest and busiest cities in the world, with a highly complex road infrastructure looked after by Transport for London (TfL).

There are seven road tunnels within the M25 maintained by Simoco. Keeping the traffic flowing smoothly through these underground networks, even when the city is at its busiest, is critical for keeping London moving.

Three of the largest tunnels: Rotherhithe, Limehouse and Blackwall have been installed with various sets of communications systems over the years, ranging from Public Address (PA) systems to fireground radio, dedicated PMR channels to TETRA radios. The tunnels maintain communications links not only to the emergency services but also to the London Street Tunnels Operations Centre (LSTOC), now based in Palestra at Southwark, the hub of TfL's tunnel network.

Commercial FM (Radio 1, 2, 3 and 4 as well as other commercial radio stations) is also rebroadcast within the tunnels, as well as DAB and cellular services. However, from a safety perspective, it is vital for tunnel controllers to be able to interrupt these services at critical times, speaking directly to the public within their vehicles and efficiently instructing them in the event of their being in the tunnel during an incident. This is known as Voice Break In, or VBI. Similarly, the Radio Data System (RDS) needs to be available for tunnel controllers to display messages on vehicles' commercial FM radio displays in the event of an emergency.

Simoco maintains all the radio and PA systems throughout these tunnels, providing daily, weekly and monthly inspections as well as a a 24/7/365 remote support function. Our highly skilled, trained and experienced engineers are the first port of call for any technical issues across these diverse communications systems, while also providing advice and consultancy on upgrades and additional hardware. Meanwhile, as the LTE-driven Emergency Services Network (ESN) rolls out across the country, we are on hand to ensure that all the communications networks with TfL's tunnels can integrate smoothly with this next-generation network.

Simoco, in short, helps TfL to keep drivers travelling through its road tunnels safely and smoothly – and in turn, keeps London moving.