



City bypass / motorway tunnel equipped with innovative VoIP Tunnel Emergency Call System

## Hornberg Tunnel (D)

# REFERENCE



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Efficient Solutions for Information and Safety

# Innovative Tunnel Project

The Hornberg motorway tunnel, with two lanes and nearly 2 km long, is the most important section of the bypass route around the city of Hornberg. The innovative Tunnel Emergency Call System was the first tunnel project in Germany to be implemented using VoIP technology, and it encompasses 15 emergency call stations divided between two exchange centres. During planning of the Tunnel Emergency Call Sys-

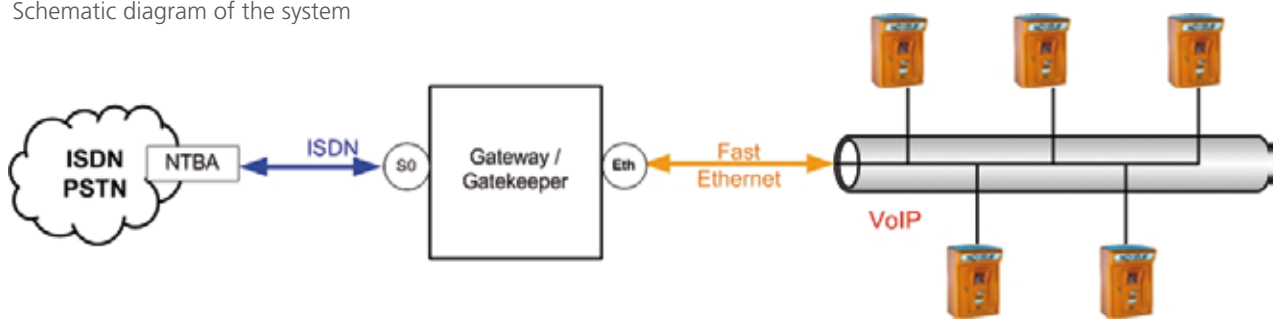
tem, two aspects had to be taken into account: safety standards as per RAPT 2004/54/EG and economic operation of the tunnel.

The "Arbeitsgemeinschaft Tunnel Hornberg" (ATH) [Hornberg Tunnel Working Group] is responsible for execution of the project, and the Federal Republic of Germany is the contract placing authority.



## Innovative Safety Technology: VoIP

Schematic diagram of the system



The entire emergency call system utilises its own fibre optic network (LAN).

VoIP technology is used to transmit voice data between the emergency call stations, the operator / call answering station in the North Works Building, and the exchange centres in the North and South buildings. Fibre optic cabling and fibre optic

switches are used as the physical media for data transmission.

Each of the gateways integrated into the exchange centres connects all VoIP terminal devices of the telephone system to the public switched telephone network (PSTN) via ISDN.



# Emergency Call Stations

The emergency call stations consist of a wall mounted enclosure, a VoIP Hands-Free module (HF) including Talk lever, and a fibre optic switch.

The Talk lever is made of steel-reinforced macrolon plastic and has been designed to withstand high mechanical loads. In the event of an emergency, pressing the lever down automatically makes a connection to a pre-configured destination.

The microphone and loudspeaker openings are covered with metal mesh and a textile splash protection that prevents dust and moisture from entering the enclosure.

The loudspeaker is a weatherproof model with a compact pressure chamber system.

The emergency call stations have been equipped for fibre optic connections.



## Reliability

The system is continuously monitored using functional tests to ensure functional reliability:

### Audio Functional Test

A cyclic self-test of the emergency call stations ensures proper functioning of their audio systems. An audio signal is output over the call station's loudspeaker. If the microphone is able to pick up the signal and subsequent signal analysis is able to recognize the signal, then the self-test was successful. A fault contact signals to the control centre any errors that may have occurred during functional testing.

### Network Integrity Functional Test

Every emergency call station tests its network connection to the exchange centre at regular intervals. The time period of this interval can be configured separately at each emergency call station. Should the network connection test fail, then a fault condition is signalled to the control centre via a voltage-free contact.

## Configuration

The Tunnel Emergency Call System is configured via a Web interface using a standard browser. Once logged in with the correct password, all relevant parameters can be configured according to the customer's requirements. In addition, the system can also be remotely diagnosed and maintained via a VPN tunnel. This functionality is built into the system so that no separate special software is needed.

### Acronyms:

<b>HF</b>	Hands-free module
<b>LAN</b>	Local Area Network
<b>IP</b>	Internet Protocol
<b>VoIP</b>	Voice over Internet Protocol
<b>ISDN</b>	Integrated Services Digital Network; Digital communications network featuring many different services
<b>VPN</b>	Virtual Private Network

## Further References

ms NEUMANN ELEKTRONIK GmbH has already completed many similar projects throughout Europe:

- Burgholz Tunnel, Wuppertal, Germany
- Gotthard Motorway Tunnel, Switzerland and Italy
- Kirchenwald Tunnel, Switzerland
- Roermond and Swalmen Tunnel, Netherlands
- Seelisberg Tunnel, Switzerland
- Rostock Tunnel, Germany
- Westerschelde Tunnel, Netherlands

