

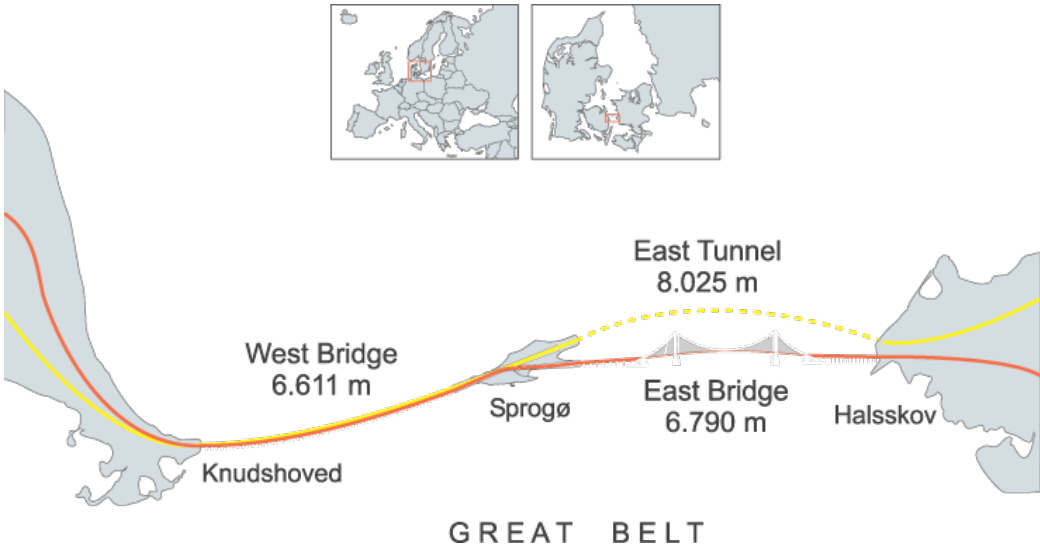
Customer Success Story



Great Belt Bridge

Emergency IP Telephone System

Application



Emergency phone system for Europe's largest suspension bridge

Manufacturer:

Storebælt
Sund ≈ Bælt

Product provider

incom
Quality In Communications

After decades of speculating, a decision was made back in 1986 to start constructing what would become the most important link between the Danish islands of Zealand and Funen. For more than 100 years, the main means of crossing the Great Belt was by ferry.

Today the Great Belt Fixed Link connects half of the Danish population with the rest of the European road and rail network. In 2008 approximately 11 million vehicles and 8,3 million train passengers crossed the bridge.

The construction started in 1988 and in 1997 the connection was first opened for railway traffic. One year later, in 1998, the fixed link was completely finished and opened for road traffic as well. State-owned company A/S Storebælt were tasked to keep the link operational at all times, all year around and in such condition that it could be used for more than a 100 years.

The fixed link consists of a 6.8 km suspension bridge (East Bridge), a 6.6 km box girder bridge (West Bridge) and a railway tunnel. All together, the link is 18 km long. A state-owned structure of this massive scale

calls for extreme commitments when it comes to safety. Alongside the bridge there are numerous CCTV cameras and seven weather stations that constantly report changes in wind and weather and emergency phones can be found in both directions along the motorway at least every 600 metres.

Since the bridge has been in use for more than 10 years, an upgrade to the safety systems were required. The old backbone network had a transmission capacity of 2 Mbit/s, and while this system provided sufficient bandwidth, it could no longer be serviced. A new 2 x 1 Gbit/s fibre backbone network was installed to provide for all the data transmission from the weather stations and CCTV, and a new emergency phone system using IP telephony technology was installed. The old emergency telephone system was insufficient in several ways. First of all the cabinet that held the telephone receiver was not robust enough for the harsh climate out on the bridge. Exposed to all kinds of weather all year around for ten years, the aluminium cabinets were severely corroded, making the phone unusable. Another problem with the old system was that all calls were connected directly to the police alarm centre in the nearby town of Slagelse, regardless of the help needed. 9 out of 10 calls are made because of people running out of fuel, and not real accidents. A vehicle standing still on the bridge could however lead to a serious incident, so the policy is to get any vehicle standing still moving again in the least time possible. In these cases, A/S Storebælt has found that the quickest way of getting a stranded vehicle out of harm's way is to simply provide fuel or a tow for free.

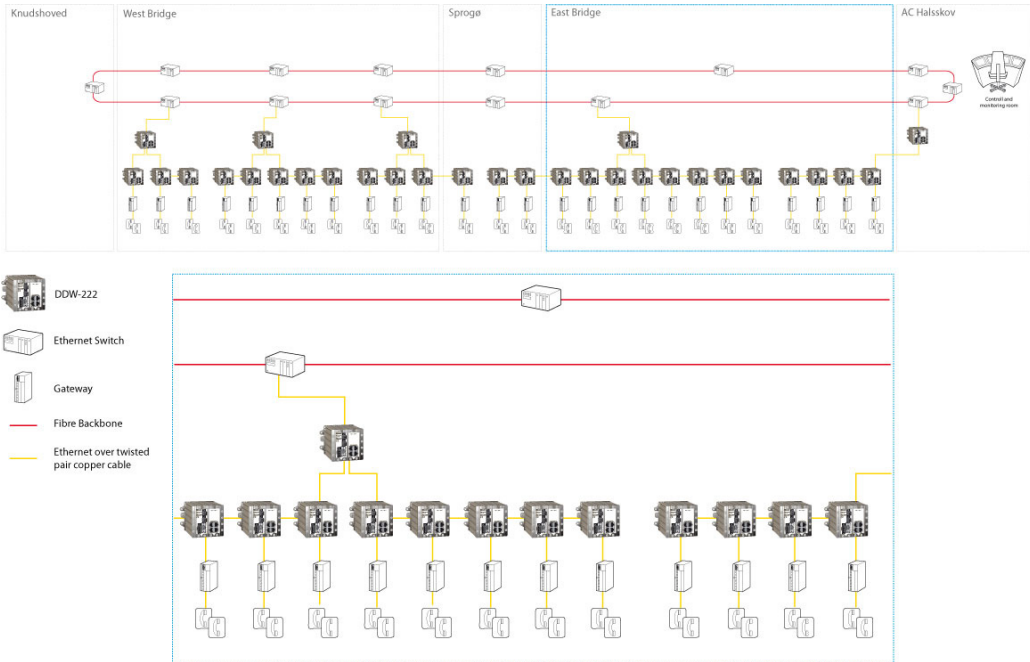
The new IP emergency phone system connects all calls to the A/S Storebælt control centre, so that fuel breakdowns can be taken care of by their own staff, and emergency calls that are made because of an accident can easily be forwarded to the police alarm centre .

Another improvement is that the new system can forward the exact location from where the calls are made, something that was impossible with the old system. This leads to a much faster rescue process and a higher level of security.



The first unit in the chain of DDW-222's are located in the server room at the east side of the bridge.

Application



This drawing display how the IP Telephone system are installed, but the complete data communication system handles more than emergency calls. Other equipment such as CCTV and various types of telemetry is also connected to the network.

After a long project period of evaluating several solutions, A/S Storebælt started replacement of the old system in the fall of 2009 and finished the project in December the same year. New telephones made from a more weather-resistant aluminium alloy were installed, and to provide for the data communication between the telephone and the fibre backbone, A/S Storebælt chose the robust Westermo Ethernet Extender, the DDW-222. The DDW utilises SHDSL technology over many types of twisted pair cables, and can provide data rates of up to 5.7 Mbit/s. Another great benefit that comes with the DDW is that existing cabling can be used, thus making great savings on installation. In this case, the cables from the old telephone system could be used to carry the data for the IP telephone system, resulting in huge financial savings.

31 DDW-222 have been installed along the full length of the bridges, and each DDW connects to two telephones at one end, and to the backbone network at the other:

Besides that the DDW was the perfect fit, the decision to go with a Westermo unit was based on positive results in previous projects, and that the products are considered robust, easy to use and problem-free.




Extend your network far beyond the normal limits of Ethernet



The Wolverine-series is the ideal solution for extending your Ethernet network over copper cables where in the past the only option would have been fibre. At shorter ranges the data rate can be as high as 5.7 Mbit/s in both directions. The technology used suggests transmission distances of up to 10 km (6.2 mi) at lower data rates. In practical applications however much greater distances have been achieved.

The SHDSL transmission technology makes the Wolverine-series perfect for the reuse of existing copper cable installations from older communications networks. It is transparent for multicast addressing, VLAN packets, allows VPN pass-through for IPSec and can be used with protocols like MODBUS/TCP and Profinet I/O. The units will auto negotiate the transmission speed but can also be forced to choose a slower (more reliable) or faster (less reliable) data rate.

- ⌘ G.SHDSL up to 5.7 Mbit/s. Distances up to 15 km (9.3 mi) with extensive line protection.
- ⌘ Built in 10/100BaseT 4 port switch
- ⌘ Serial to IP conversion (RS-232)
- ⌘ <20 ms FRNT ring redundancy on large networks
- ⌘ Transparent for multicast addressing, VLAN and VPN
- ⌘ Made easy configuration and comprehensive diagnostic
- ⌘ Approved for explosive environments (ATEX, Class 1, Div 2)
- ⌘ Extended temperature range (-40 to +70°C), (-40°F to +158°F)
- ⌘ 16 to 60 VDC redundant power input with reversed polarity protection
- ⌘ IP 40 robust metal housing

Product/Art. no	Description	Connectivity
DDW-222 3642-0220  Class I, Div 2	Plug and play industrial Ethernet extender. Data rates up to 5.7 Mbit/s. Built in switch and support for redundant rings. Serial interface with serial to IP conversion.	4 x 10/100BaseT 2 x DSL connectors Serial (RS-232)