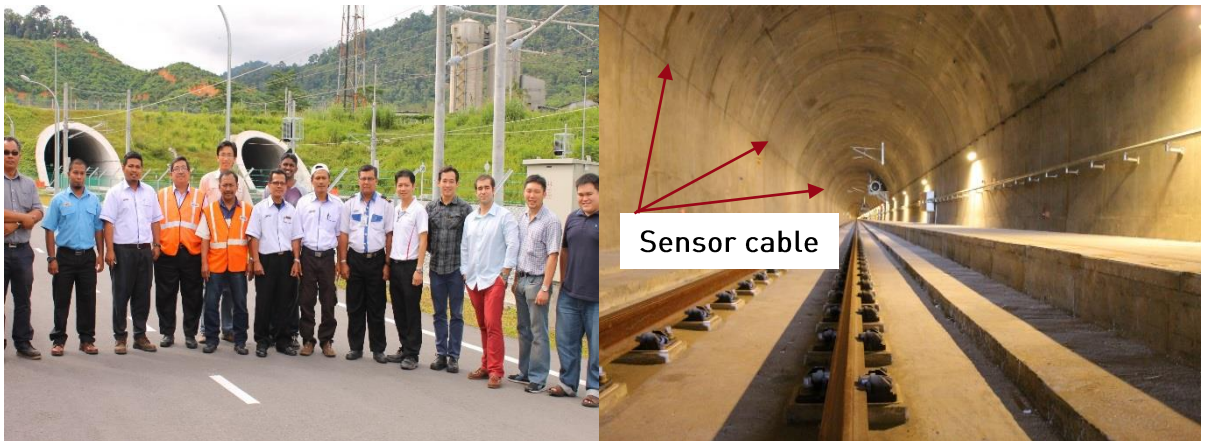




## Rail Tunnel Safety in Bukit Berapit Malaysia

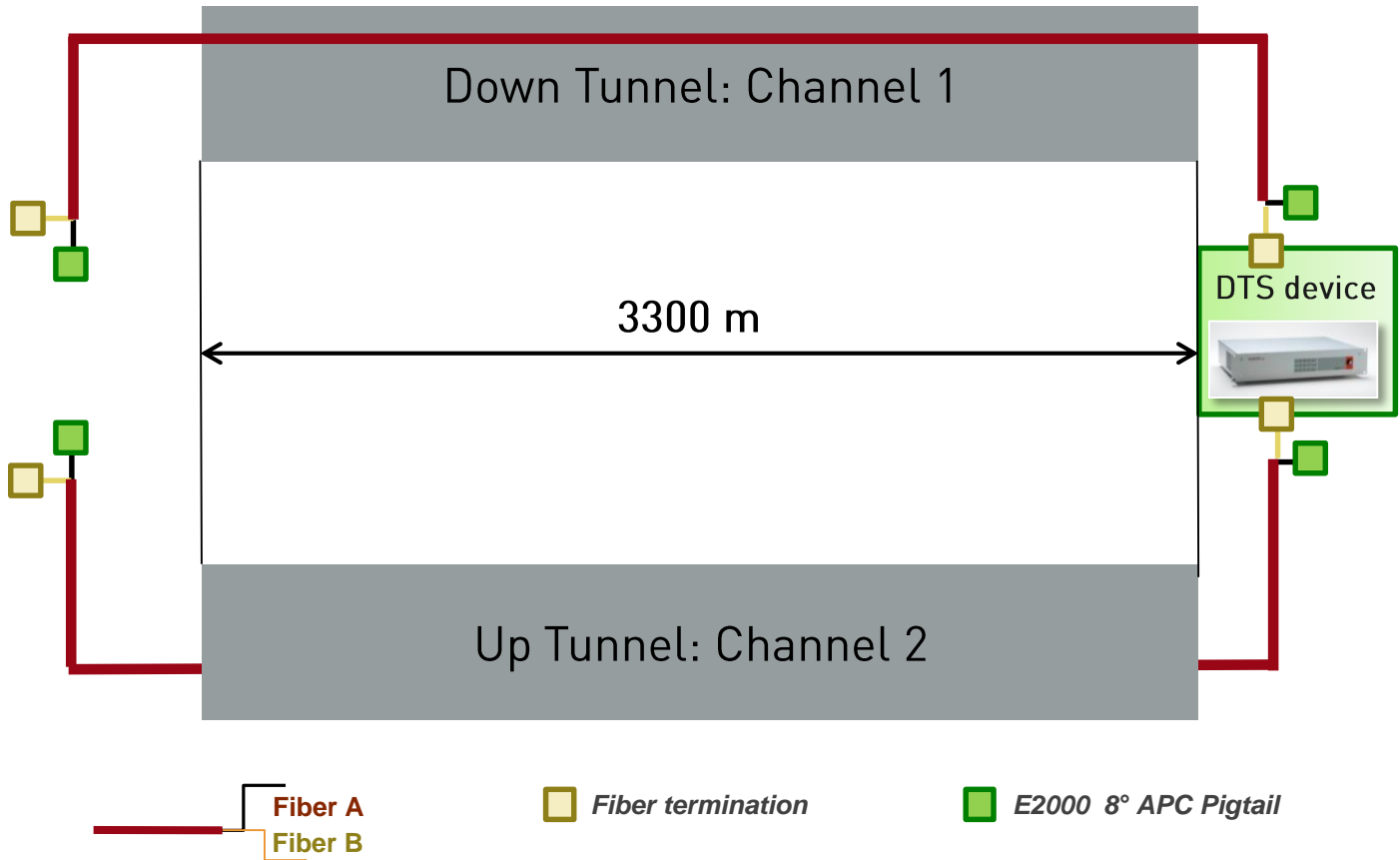
The beautiful southeast Asian country of Malaysia has modern cities and transportation infrastructures to go with its beaches and green countryside. The twin Berapit rail tunnels each have a length of 3.3 km and run between Padang Rengas and Taiping. When the tunnel operators needed to provide a fire detection system to complement the fixed manual water suppression, they turned to AP Sensing's DTS (Distributed Temperature Sensing) solution, the *Linear Heat Series*.

There are longitudinal jet fans installed in the tunnel to provide emergency ventilation in case of a fire. These help ensure a safe evacuation of people and make it easier for firefighting efforts to proceed, as long as the information about the fire location and direction of spread is readily available. The *Linear Heat Series* provides an accurate temperature profile every few seconds along the entire length of the sensor cable.



One DTS device with **two channels of 4km range** was installed to monitor both tunnels with a length of 3300 m each, as shown in the following sketch.

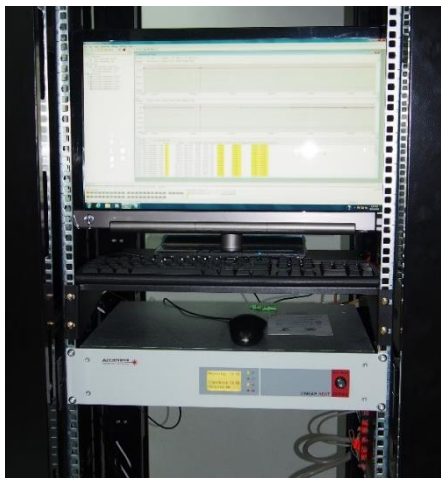
A total of 19 zones were defined for each channel. **UL standards** were applied to define the **alarm settings** in each zone.



**Sensor cable with 2 fibers**

In the control room an operator always has a **current overview of the temperature status** in the tunnels. In case of an alarm he can zoom in to the hotspot with a CCTV camera and activate the ventilation fan and water suppression system.

All relevant DTS information is **linked into the SCADA system and fire panel**.



Upon completion of the installation a **successful SAT (Site Acceptance Test) was carried out**, including reviews of the physical installation and sensor cable, a system performance test, power supplies and the Fire Control panel.

The AP Sensing Support team then delivered an **onsite training course** for 12 members of the operating staff, covering all aspects of the system functionality and safety.

The training included a **hands-on session in the control room** to ensure that the entire staff is prepared to react properly in case of an emergency.



In conclusion, a vital Malaysian rail tunnel now has **maximum fire safety measures** successfully implemented with the **industry's most rugged and reliable DTS solution**. A **valuable infrastructure is protected** and great care has been given to personal safety.

