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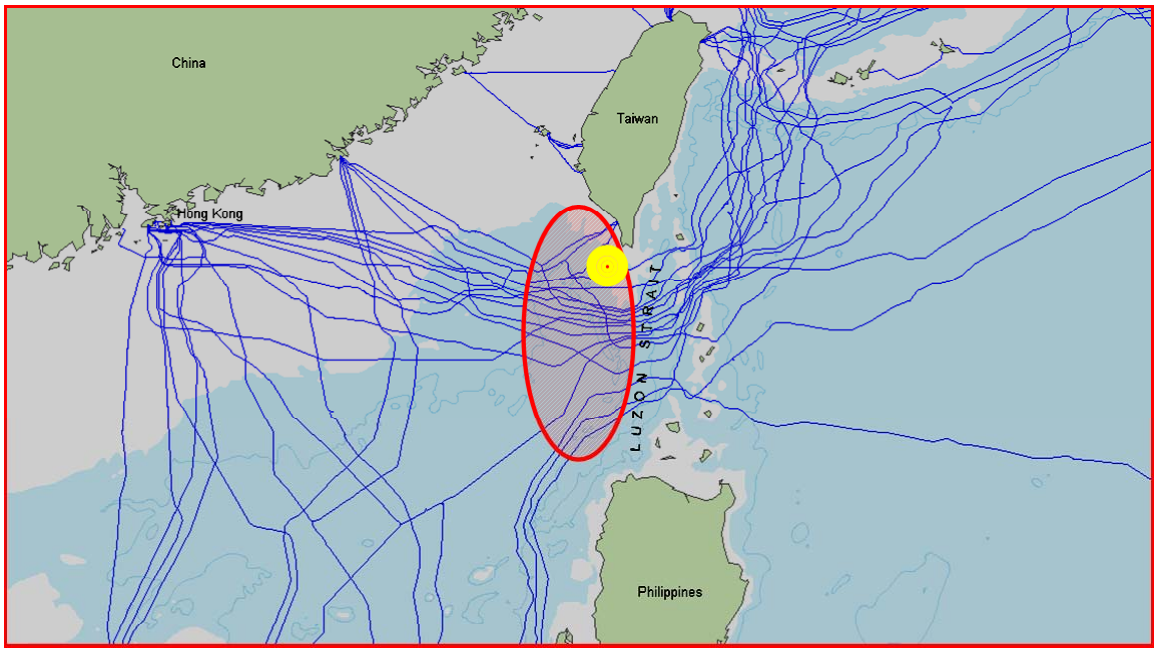
Subsea Landslide is Likely Cause of SE Asian Communications Failure

On 26th December, 2006, a powerful earthquake shook the seabed off southern Taiwan. The magnitude 7.1 Hengchun earthquake was followed by one of the largest disruptions of modern telecommunications systems. Nine submarine cables in the Strait of Luzon, between Taiwan and the Philippines, were broken thus disabling vital connections between SE Asia and the rest of the world:



Earthquake epicentre (yellow dot) and the general area of the disruption of the submarine cables (blue lines). Courtesy Global Marine Systems Ltd

Internet links in China, Hong Kong, Singapore, Taiwan, Japan & the Philippines were seriously impaired. Thus, day-to-day activities such as banking, airline bookings and email were either stopped or delayed. Financial markets, commerce and general communications were also severely affected. Even with the re-routing of traffic through undamaged cables, delays were experienced in the following weeks.

Submarine telecommunications cables are a critical part of a nation's infrastructure. Globally, they carry well over 95% of all transoceanic telecommunications and data traffic; the remainder is by satellite. Thus, the Hengchun earthquake was the main agenda item at last week's conference of the International Cable Protection Committee Ltd (ICPC). Representing 83 submarine cable owners and operators from 45 countries, the ICPC meeting was the first opportunity to pool knowledge from a wide group of professionals who were involved in the aftermath of the earthquake.

21 faults were recorded in the 9 cables and it took 11 ships 49 days to restore everything back to normal. This length of time was due to the number of faults, the availability of cable repair vessels, adverse sea conditions and the occurrence of faults in water depths down to 4000 m. The repair effort was hampered further by the burial of some cables under a layer of mud and the huge size of the area that was affected.

When a cable fails, the time of the failure is known precisely. Reports from the Strait of Luzon demonstrate that cables close to the epicentre broke very soon after the earthquake, which occurred at 12.26 (Greenwich Mean Time). However, more distant cables progressively failed at a later time. For example, a cable that was located 110 km from the epicentre failed nearly 4 hours after the earthquake. Another located at 173 km failed almost 9 hours later.

The sequential timing of the breakages (plus the burial and displacement of some cables) indicates that the disruption was probably caused by one or more large subsea landslides. At this early stage of the investigation, it is surmised that the Hengchun earthquake triggered a landslide that was guided by the seabed topography to move South at an average speed of about 20 km/hour – about the pace of a world-class middle distance runner. Such high speeds suggest the landslide behaved as a very fluid mudflow or possibly a mud-charged current or *turbidity current*.

Such a massive landslide is consistent with Taiwan's position at the junction between two giant tectonic plates. As the plates collide, the surface of the earth is deformed resulting in numerous fault lines and earthquakes. Taiwan itself is rising rapidly and, along with the frequent seismic shaking and the erosional impact of typhoons, it produces huge volumes of mud and sand. Taiwanese rivers discharge about 2% of the sediment entering the world's oceans. Consequently, thick, semi-stable deposits of mud form on the adjacent seabed, to be transformed into subsea landslides by the next major earthquake. Although it will take many years for thick piles of sediment to reform, the submarine cable industry is already exploring ways to minimize the impact of another earthquake in this area.

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