



PERFORMANCE OF TELECOMMUNICATIONS SYSTEM IN THE 2016 KUMAMOTO EARTHQUAKE

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Abstract

The April 14 2016 Mw 6.0 (foreshock) and April 16 2016 Mw 7.0 (main shock) earthquakes occurred in Kyushu, the south island, near the City of Kumamoto, Japan. This presentation covers the performance of one of the lifelines – telecommunications system. Telecommunications system includes landline (fix line), cellular, and data.

Telecommunications system. There are three major telecommunications providers in Japan. They are NTT (Nippon Telegraph and Telephone), KDDI and SoftBank. In Kyushu Island, NTT West (a subsidiary of NTT) is one of the service providers, along with KDDI and SoftBank. Majority of the landlines are served by NTT West, while both NTT West (DoCoMo) and KDDI are the big cellular service providers.

The primary cause of cellular service interruption was due to power failure after backup power was exhausted. Both underground and aerial cable sustained damage due to ground deformation and pole failure (most of the poles failed due to ground deformation or landslide). Service interruptions did not occur until after the April 16 main shock. The wireless network sustained the most impact, due to short duration reserve power at cell sites, and damaged cables that connect to Central Offices or Mobile Switching Centers. Cable damage was the result of ground failure, as all feeder cables are buried cables – metal or fibre. There was no Central Office impacted by the two earthquakes.

The normal post disaster high volume of calls was managed by emergency service number 171 (which worked well in the Great East Japan Earthquake and Tsunami of 2011), which allows both incoming and outgoing calls to use voice-recording message for the called parties. In addition, the speedy set up of free WiFi stations in the earthquake impacted areas by the cellular service providers to allow individuals with smart phones to send text messages to concerned parties resulted in reducing the use of landlines. Many free WiFi stations were set up in refugee housing sites allowing victims getting in touch with relatives to relate their current conditions. This service works only when there is no damage to Central Offices in the impacted areas.

There was report of a collapsed cell tower in Kumamoto, but this is not validated yet.

By April 20, all telecommunication services were back to normal.

Data of failures and resources to recover will be presented and discussed. NTT West and DoCoMo were the service providers who are willing to provide us with such data.

Lessons learned.

Technology surely provided relief to surging voice calls and allowing telecom users to pass on their message to concerned parties in a timely manor. Having longer duration reserve power at cell sites must be considered by all service providers. It does not mean that all cell sites must have very long duration reserve power, it only means that strategically located cell sites must have longer reserve power. There is also a need to reduce underground cable damage due to landslide and ground deformation.

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