CASE STUDY

GÉANT
global collaboration

# High-speed networking: saving lives by typhoon forecasting

**Typhoons are major natural killers. High winds and extreme rainfall damage property, while collapsing buildings, flood waters and disruption to food supply, sanitation and communications cause injury and death. Nothing can be done about the weather, but a great deal can be accomplished if local authorities have the precious advantage of time to prepare. Effective disaster warning systems rely on accurate storm forecasts and the speedy communication of weather alerts. In this race against time, high-speed data networks can make all the difference to typhoon-prone regions like the Philippine archipelago.**

## *Two typhoons contrasted*

Typhoon Uring made landfall in the Philippines in November 1991. One of the deadliest tropical cyclones in Philippine history, there were so many casualties that the number had to be estimated – 9000, of which nearly 6000 were deaths. Typhoon Emong, a much stronger storm with winds of up to 140 km/h, hit the Philippine town of Bolinao in May 2009. Despite its fearsome strength, Emong caused far fewer casualties than Uring 18 years before – 126, of which 60 were deaths. The people of Bolinao were benefiting from accurate storm warnings issued by the Philippine weather bureau PAGASA. The bureau was in turn relying on the power of high-speed networks – the pan-European GÉANT, its Asia-Pacific counterpart TEIN3 and PREGINET in the Philippines – for the transfer of global meteorological data essential to the timely forecasting of possible disaster. Well before Emong reached Bolinao, emergency teams had been issuing SMS text message alerts, had been patrolling the town, warning people with loud hailers, moving residents to evacuation centres, positioning heavy lifting equipment and getting food to distribution points. The early warning made possible by these networks significantly reduced casualties both from the storm and from its aftermath.

## *Global data for local forecasting*

PAGASA (Philippine Atmospheric, Geophysical and Astronomical Services Administration) collaborates with its German counterpart, Deutscher Wetter Dienst (DWD) which provides it with an accurate, real-time flow of meteorological data to drive its forecasting. The collaboration rests on the power of high capacity networks, which enable the speedy transfer of vast amounts of data from DWD to PAGASA, the local agency at the sharp end.

*Bolinao after Emong struck in May 2009*

## *Connect – Communicate – Collaborate*

The world is criss-crossed with high-capacity data communications networks, connecting and serving research and academic institutions across the globe. The most advanced of these is GÉANT, serving Europe. GÉANT interconnects with counterparts across the world, such as TEIN3 in Asia-Pacific.

Separate from the public Internet for reasons of security and performance, many of these networks are designed, deployed and run by the networking organisation DANTE and make an enormous practical contribution to research in a wide variety of areas – saving lives, building knowledge, establishing real-time collaboration between scientists all over the world.

GÉANT and its counterparts provide a stable and reliable connection between the expertise and high-speed computing capacity of the DWD in Germany and the meteorologists of PAGASA in the Philippines. They play a vital role in the timely transmission of global meteorological data and make prediction of typhoons a reality.

TEIN3 PREGINET DWD

## *PAGASA: protecting life and property*

PAGASA's key function is to ensure the safety and well-being of the inhabitants of the Philippines. Its world-class expertise in monitoring, analysing, forecasting and warning of tropical storms saves lives. PAGASA is connected to PREGINET – the Philippine Research Education and Government Information Network, managed by ASTI (the Advanced Science and Technology Institute in the Philippines) – through which it connects to the regional high-speed networks TEIN3 in Asia and GÉANT in Europe and further afield. PAGASA and ASTI are agencies of the Department of Science and Technology (DOST).

## *How a computer in Germany saves lives in the Philippines*

Forecasting typhoons and warning of disasters are examples of the kind of international co-operation enabled by networks like GÉANT. The technology is based on distributed computing and on two numerical weather forecasting models developed by Detlev Majewski of the DWD and his research team. A global model - GME, running at DWD in Germany - produces data for a high resolution regional model - HRM, running at PAGASA's computing facility in the Philippines. Based on a set of equations defining particular weather conditions (temperature, wind speed, humidity, pressure and so on), the models use observations and previous forecasts to estimate the current and future state of the atmosphere. GME is run on powerful computers at DWD and an extract is produced that serves as input data for the HRM covering the Philippines and surrounding areas. This extract, consisting of huge data, is sent to PAGASA over a network path consisting of GÉANT, TEIN3 and PREGINET. The GME forecast is produced twice every 24 hours and the volume of data is so large that it takes 75 minutes to transfer. Handling this amount of data with absolutely predictable consistency is vital in applications like typhoon forecasting.

> **"When it comes to minimising the impact of typhoons, fast, accurate forecasting is critical. Being able to co-operate with our colleagues at PAGASA relies on the power and international reach of the GÉANT network. Our joint work is improving forecasting accuracy and enabling earlier warnings to potentially affected communities, consequently saving lives across the Philippines."**

*Detlev Majewski, Deutscher Wetter Dienst (DWD)*

> **"We co-operate with the DWD and have access to the enormous power of their supercomputers to run our weather prediction models. This is an expense we would find it difficult to manage on our own and it is only a viable method because TEIN3, GÉANT and PREGINET together provide an absolutely stable and predictable network for transferring the data we need."**

*Dr Alan Pineda, Officer-in-Charge, Hydrometeorological Division, PAGASA, Philippines*

## GÉANT – the dedicated high-bandwidth pan-European network

- the third generation of the successful GÉANT project
- advanced interconnectivity between Europe's research networks through 50,000 kilometres of mostly optical fibre
- enables collaboration between nearly 40 million research and education users in over 8,000 institutions across Europe
- global connections extend the reach of GÉANT to North and Latin America, Asia, Mediterranean and Africa

*For more information:*

GÉANT: www.geant.net
TEIN3: www.tein3.net
PREGINET: www.pregi.net
PAGASA: www.pagasa.dost.gov.ph
DWD: www.dwd.de
DANTE: www.dante.net
EC: http://ec.europa.eu/europeaid/index_en.htm

DANTE

This document has been produced with the financial assistance of the European Union. The contents of this document are the sole responsibility of DANTE and can under no circumstances be regarded as reflecting the position of the European Union.