

## GÉANT AND TEIN3: BRINGING CULTURES TOGETHER ACROSS CONTINENTS

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In December 2009 two continents and two cultures on opposite sides of the globe were joined through a music and dance performance made possible by the high-performance GÉANT and TEIN3 research and education networks. Showcased at the GÉANT launch event in Stockholm, Sweden, and the TEIN3 gala dinner in Malaysia, Kuala Lumpur, the unique performance was an exciting collaboration of artists and networks.

The GÉANT pan-European network offers the performing arts community the challenging and fascinating ability to create new genres of artistic events,



transcending distance and fusing experiences and cultural backgrounds. GÉANT has speeds of up to 10Gbps across 50,000km of European network infrastructure, and interconnections with other global networks extends its reach to over 80 countries worldwide.

December's performance was a collaboration between GÉANT and TEIN3, the Asia-Pacific's research and education network, able to connect researchers in the region with their counterparts in Europe at speeds of up to 2.5 Gbps.

### Two locations, 9,300km, one virtual stage

The performance took place in two different locations, brought together to form a "virtual stage" linked by the GÉANT and TEIN3 networks and locally by SUNET (the Swedish NREN) and MYREN (the Malaysian NREN). Bandwidth was reserved locally on both events' venue networks to ensure the required capacity was available when needed, and to ensure high-quality sound and images. Despite the need for standard resolution due to latency issues, the dance could be projected to the Stockholm audiences on a screen nine feet wide and six foot nine inches high, with minimal loss of image quality.

### A world-first artistic performance

Kuala Lumpur provided the stage for the dancers, who performed live at the TEIN3 Gala Dinner as part of the ASIA-Europe Meeting workshop. Their musical background was provided by musicians performing at the GÉANT Launch, held at the Modern Art Museum in the Swedish capital of Stockholm. The music was composed especially for this event using traditional Western musical scales, and written for a combination of Western instruments and two "extinct" instruments. The dance performance was choreographed using a fusion of traditional and modern Malaysian moves. By uniting these different elements, the event celebrated the differences in the cultures and demonstrated how ancient and modern techniques and distant cultures can work together.

### DVTS enables music and dance performers to interact

The two sites were connected with a bi-directional audio-video channel set up using DVTS (Digital Video Transport System) over the TEIN3 and GÉANT links. DVTS is a multi-platform video/audio streaming application and hardware solution relying on high-bandwidth, low-latency network

infrastructures. It enables digital quality video and audio to be transmitted across an IP network using a fixed network bandwidth and inexpensive consumer-grade video and audio equipment.

The DVTS connection enabled the dancers in Malaysia to hear the music played in Sweden with almost zero time delay, while the musicians at the Modern Art Museum in Stockholm played their instruments following the video images of the dancers. This was the first occasion that this system has been used to create a live music and dance performance across the 9,300 km distance.

DVTS is also used in the Arts and Humanities communities for music master classes and conferences.

### Instruments of the past play their part

The background layer of the music piece was created using data on the traffic across the GÉANT and TEIN3 networks. This network data was converted into sounds and transformed into melodies using a data sonification process originally created to help predict volcanic eruptions.

Over this, musicians played the flute, harp, percussion and two "lost" instruments – the Epigonion and the Barbiton – that have been resurrected through the ASTRA project. No real (physical) copies of these Ancient Greek instruments remain today, and they are thus "played" using a keyboard linked to a computer housing the sounds of the instruments. This concert was the first opportunity for the Barbiton to be heard after centuries of si-



lence. The high-quality sounds were created by processing archaeological and historical data through a computer-modelling procedure, powered using the GILDA and EUMEDGRID grid infrastructures via the GÉANT and EUMEDCONNECT research networks. The performance was the result of collaboration between several organisations, including DANTE, MYREN (Malaysian Research & Education Network), Consortium GARR (Italian Research and Education Network), SUNET (Swedish University Network), NORDUnet (Nordic Research and Education Networks), Arts Exchange in Asia, University of Malaya and ASTRA/Lost Sound Orchestra Musicians.

You can watch the video of the performance on the GÉANT website.