Project Partners

The TEIN2 project is co-ordinated by DANTE, a not-for profit organisation which currently operates regional networking projects in Europe, Latin America and the southern Mediterranean rim. For TEIN2, DANTE is partnered by RENATER, SURFnet and UKERNA, the National Research and Education Networks (NRENs) of France, the Netherlands and the United Kingdom, respectively.

The Asian partners are China (CERNET), Indonesia (ITB), Japan (NICT, NII and MAFFIN), Korea (KISDI), Laos (LaoREN), Malaysia (MYREN), the Philippines (ASTI), Singapore (SingAREN), Thailand (ThaiREN) and Vietnam (VINAREN).

The Australian NREN AARnet and NSF-funded TransPAC2 are also actively participating.

The TEIN2 Topology

The diagram below shows the network topology as of January 2008.

It comprises three TEIN2 network hubs in Beijing, Hong Kong and Singapore, connected to GÉANT2 in Europe via high speed links on northern overland and southern sea cable routes. A fourth TEIN2 hub in Tokyo is managed by NII. In addition, TransPAC2 provides transit for TEIN2 partners to North America. All other links are being procured directly through the TEIN2 project.

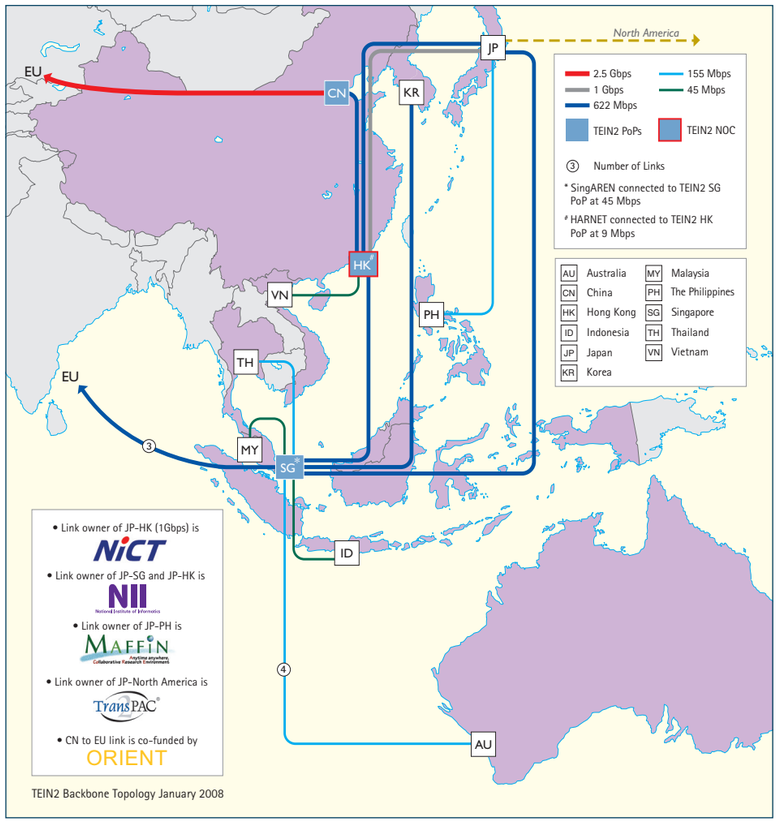
Additional network resilience is provided through cooperation with TEIN2 partners, including Korea and China.

Juniper Networks is sponsoring the Internet routing equipment at the TEIN2 hubs. The TEIN2 network is managed by Tsinghua University from a purpose-built Network Operations Centre (NOC) in Hong Kong.

> *"Technology gives telemedicine a new era. Using high-speed Internet, it is now easy to transmit uncompressed surgical images beyond geographic borders. High-quality pictures and minimal time delay are essential to recognise fine anatomical detail and to follow every step of the surgery. It is a promising tool not only for clinics but also for medical education in general, which leads to standardisation and globalisation of healthcare."*
>
> Prof. Shuji Shimizu, Kyushu University Hospital, Japan

ORIENT: A Complementary Initiative

TEIN2 is complemented by the ORIENT project, which interconnects China's academic networks and Europe's GÉANT2 partners, underpinning research projects such as EuChinaGrid (grid computing) and EXPReS (radio-astronomy). The anticipated potential for synergy will bring significant bandwidth and reliability benefits to the users of both ORIENT and TEIN2.



TEIN2 Backbone Topology January 2008

The Future

The European Commission is contributing €10m towards the costs of TEIN2 which runs to September 2008.

A further programme, TEIN3, is contracted to extend the programme to 2011. This is planned to maintain and further develop the network, extending its coverage to more countries and upgrading capacities. TEIN3 will further promote collaborative research and educational programmes between Europe and Asia and develop funding and organisational models to lead to long term stability and sustainability.

TEIN2 is receiving generous support from Juniper Networks and TransPAC

www.tein2.net www.geant2.net www.dante.net www.europa.eu

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January 2008

TEIN2

2nd Edition

TEIN2 – Powering Research and Education in Asia-Pacific.

Connecting East and West

DANTE GÉANT2

Chronology of a Success Story

2000 Oct
TEIN initiative launched at ASEM 3, Seoul, Korea

2001 Dec
2 Mbps France-Korea (TEIN1) link installed by RENATER and KISDI

2003 Sept
EU Commissioner Erkki Liikanen announces €10m support package for expansion of TEIN project

2004 May
Start of first phase of TEIN2: Feasibility study

1st TEIN2 Technical Committee Meeting, Kuala Lumpur, Malaysia

2004 Dec
TEIN1 link upgraded to 155 Mbps

2005 Jan
Tendering process starts

2005 July
Network topology agreed

2005 Oct
First contracts awarded

Equipment sponsorship awarded to Juniper Networks

2005 Nov
TEIN2 deployment announced by EU Commissioner Viviane Reding at World Summit on the Information Society, Tunis

2006 Jan
TEIN2 network operational and announced at 21st APAN meeting, Tokyo

2006 Sept
Official launch and recognition of TEIN2's success at ASEM 6, Helsinki

2007 Jan
Network recovers quickly after Taiwan earthquake

All partners participate in telemedecine applications for first time

2007 July
Traffic levels double in 12 months – 30 million end users able to access TEIN2

2007 Dec
TEIN3 contract signed

> *"TEIN2 brings tremendous benefits to researchers and educators in the Philippines. What was once a dream is now a reality."*
>
> Denis Villorente, Director,
> Advanced Science and Technology Institute (ASTI), The Philippines

DANTE
www.dante.net

Linking Asia-Pacific to Europe and Beyond

The Trans-Eurasia Information Network (TEIN2) provides the first large-scale data communications network for the research and education communities within Asia-Pacific, enabling them to engage in innovative joint projects. Offering direct connectivity to GÉANT2, Europe's multi-gigabit network, TEIN2 allows regional researchers to collaborate with their counterparts in Europe and thus to operate on a truly global scale.

Following feasibility studies and tendering, the TEIN2 network began operation in January 2006. Through its westbound links it now provides the first direct routes to Europe. Previously, most electronic communications between researchers in Asia and Europe went via North America.

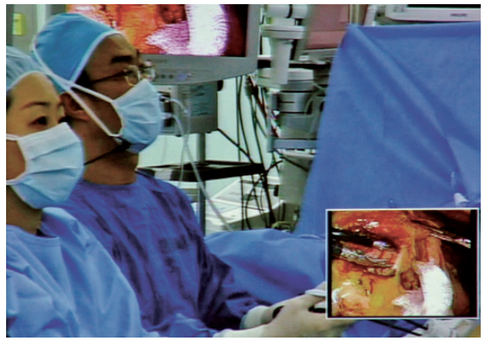
Driving Innovative Applications

With powerful network links now in place, academics in Asia-Pacific have an unparalleled ability to participate in world-class collaborative research projects. They are able to conduct more sophisticated scientific experiments, access digital libraries and geographically dispersed databases, share remote scientific instruments and engage in innovative e-learning activities. Improved network performance supports research in areas such as radio-astronomy, high energy physics and grid computing.

Many of the applications supported by TEIN2 are of high societal impact, thus bringing tangible benefits to the general population, rather than benefiting solely the scientific community.

• Telemedicine

Telecommunication technologies have been used for remote medical diagnosis and patient care for several decades; however, telemedicine is entering a new phase as advanced networks, such as TEIN2, offer unrivalled opportunities especially in the field of medical education. TEIN2 assists trainee surgeons throughout the Asia-Pacific region in adopting complex clinical techniques, such as new endoscopic surgery procedures, by supporting interactive tele-surgical training. Thanks to a fast and stable network connection, it is possible to stream a live surgery event in near real-time from an operating theatre to a remote classroom setting. These high-quality images are accompanied by a two-way audio connection for immediate interaction between the trainees and surgeons. Additional medical teams can have a 'tele-presence' and give feedback on the procedure, despite being separated by hundreds or even thousands of miles. Remote surgical training sessions now involve university hospitals in all Asian TEIN2 partner countries, as well as a number of European medical schools, clearly demonstrating the potential of this powerful training tool.



Typical set-up of an interactive tele-surgical training session.

With the deployment of the network link in Vietnam, medical staff at the Royal Children's Hospital in Melbourne and their counterparts at the National Hospital of Paediatrics in Hanoi, now undertake fortnightly remote videoconferences for project and case reviews, replacing some face-to-face visits with tele-consultations. This has enhanced their collaborative activities and will lead to treatment of a greater number of Vietnamese children affected, for instance, by cleft lip and palate deformities.

These examples show how TEIN2 can effectively help bring the concept of a regional telemedicine network to reality. Networking with European medical teams will provide an additional boost to the dissemination of best surgical practice between the continents.

• e-Learning

It is not only scientists who stand to benefit from the improved network performance which distinguishes TEIN2 from the public internet. TEIN2 opens new possibilities for students and academic staff by supporting e-learning initiatives across Asia and beyond.

Medical students at the University of Health Sciences of Cambodia (UHSC) will soon benefit from the provision of remote medical teaching provided by UPMC Medical School in Paris through streaming of multimedia lectures and interactive videoconferencing, which are supported by high-speed connectivity. This remote classroom project clearly demonstrates the commitment of the TEIN2 project to expand coverage of the network and benefits associated with it to other developing Asian countries, in collaboration with the WIDE Project's School of Internet.

Various projects funded under the EU Asia-Link Programme promote partnerships between higher education institutions in Europe and in developing countries in Asia, aiming primarily at human resource development and curriculum enhancement – objectives ideally met in a distance learning environment. Relying on a consortium of five university partners, located in the UK, Malaysia, Sweden and the Philippines, one of these projects is aimed at the development of open learning units in the area of sustainable technologies, applying a sophisticated e-platform that is well suited to support online teaching and learning.

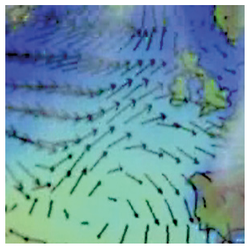
These partnerships clearly demonstrate how institutions across the region can cost-effectively cater for the growing student population in an interactive, curriculum-enriching, multimedia environment.

• Disaster Warning, Oceanographic Research and Climate Modelling

The 2004 tsunami, and subsequent natural disasters and extreme weather have highlighted the need to improve hazard evaluation and early-warning systems. Future catastrophes might be mitigated by tsunami/earthquake modelling, which enables researchers to make risk assessments.

The transfer of data from Germany's weather bureau to the Philippines weather agency via the TEIN2 network resulted in a locally generated High Resolution Model correctly predicting the path of typhoon "Caloy" to hit Mindoro Island directly. The Philippine agency was able to provide timely and accurate weather advisories to the public, potentially saving lives, reducing injuries and protecting livelihoods.

The Thai Earth Observation Satellite (THEOS) project, currently being planned with the satellite launch anticipated in early 2008, will collect data relevant to the environment, the impact of land use and natural disasters. The data collected by THEOS is expected to be transferred from a North Pole station across the Nordic Research Network to GEANT2, and then across TEIN2 to Thailand and other nodes for analysis by different communities. THEOS is intending to partner with the European Space Agency initiative, Global Monitoring for Environment and Security (GMES, www.gmes.info), which has similar objectives.



Applications like these show the real value of TEIN2: the network enables scientists across Asia-Pacific to respond to global challenges, while addressing local concerns.

• e-Science and Grids

During August of 2007, TEIN2 was used as part of a global radio astronomy initiative to transfer data at 256Mbps from the Sheshan Observatory near Shanghai across the trans-Siberian path to the Joint Institute for VLBI in Europe (JIVE). The data, combined with those of telescopes in Europe and Australia, provides the first real-time correlation results for Chinese-European and Chinese-Australian baselines.

The trans-Siberian route of TEIN2 provided the shortest path between China and the UK. This grid-based initiative shows how data taken from different sources located in Australia and the UK can be combined with data from China and analysed using a three-continent distributed computing/visualisation grid. This can be used to model existing consumer behaviour, predict future behaviour and identify emerging patterns of demand.

> *"Providing a significant boost to groundbreaking research projects of high societal impact, TEIN2 brings to fruition the very idea behind this ASEM initiative: fostering regional cohesion and development, enhancing international collaboration, and bridging the digital divide. TEIN2 validates the European Union's strategy for promoting global connectivity by supporting a regional backbone and interconnecting it to GÉANT2 , linking Asia-Pacific to Europe and beyond."*
>
> Geoffrey Barrett, ASEM Coordinator of the European Commission

Promoting Regional Development

TEIN2 gives a boost to Internet development in the region, promoting digital inclusion, fighting the brain drain and contributing towards the objective of an inclusive Information Society. Drawing on the expertise of its partners, the project stimulates growth in national research networking in the emerging countries participating in the ASEM initiative.

TEIN2, by creating the first regional network and linking it to its European counterpart GÉANT2, enables Asian-Pacific researchers to become key players in the global research community.

What is ASEM?

ASEM (Asia-Europe Meeting) was established in 1996 as an informal Euro-Asia cooperation forum. The ASEM dialogue addresses political, cultural and economic issues with the objective of strengthening links between the two regions. Membership currently comprises the 27 EU member states, the European Commission, 16 Asian countries (Brunei, Cambodia, China, India, Indonesia, Japan, Laos, Malaysia, Mongolia, Myanmar, Pakistan, the Philippines, Singapore, South Korea, Thailand and Vietnam), and the ASEAN Secretariat.

ASEM has biennial Summit meetings at the level of Heads of State and Government.

ASIA-EUROPE MEETING

aarnet

CERNET

ITB

NIA

NiCT

NII
National Institute of Informatics

MAFFIN
Anytime anywhere, Collaborative Research Environment

MYREN
Malaysian Research & Education Network

SingAREN

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