THE INTERNET 'ROAD GANG'
fixes network potholes

STORY BY David Adams

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THEY ARE THE SORT OF SMALL frustrations we continue to face when gaming online: at a crucial moment the connection dies and by the time you've recovered, your avatar is dead. Or perhaps you are poised to make a last-minute bid in an online auction, only to have the connection drop out and the chance lost.

According to Professor Grenville Armitage, these are the "externally observable impacts" of deficiencies that still exist in the underlying technology that powers the internet.

The director of the Centre for Advanced Internet Architectures (CAIA) within Swinburne University of Technology's Faculty of Information and Communication Technologies, Professor Armitage heads a team of researchers looking at how the internet's underlying engineering can be improved to address some of the causes of service failures.

"Most people have a conception of the internet being the websites they go to, whereas our focus is on the infrastructure of the internet – the underlying network technologies that allow content to fly between web servers and your web browser," he says.

"So the research we do is about how do we make the underlying technologies work more efficiently and more robustly."

Professor Armitage says there is still 'tweaking' that can be done in terms of improving the way internet infrastructure handles interactions.

The group's list of projects is broadly aimed at addressing issues in three main areas: broadband internet provider (IP) access architectures, IP network resilience and security, and IP mobility.

One recent undertaking demonstrated how online 3D games engines can be used as tools to monitor and manage networks. The project aimed to make it easier for people with limited skills to help administer networks and, at the other end of the spectrum, to help skilled people more quickly diagnose network issues.

CAIA's current projects include one concerned with validating the performance characteristics of different variants of TCP (transmission control protocol) – the protocol that sits underneath web-browsing protocols and operates to speed up and slow down transfer of data to minimise congestion on the internet.

"The research community has come up with algorithms that basically speed up and slow down in such a way as to not cause too much interference to other TCP flows. But they're not necessarily optimal, nor necessarily the most efficient," Professor Armitage says.

"One of the challenges in this area ... is to actually have TCP behaviour independently validated and verified."

The study has already found that some TCPs do have a detrimental effect on what Professor Armitage calls "innocent bystanders", such as online games and voice-over IP flows that are sharing a congested ADSL router or a cable modem.

The TCP project is just one of a number of research projects that have been funded by Cisco Systems.

US-based Cisco Fellow Fred Baker says the global IT company started working with Associate Professor Armitage when he joined Swinburne in 2002 after leaving the US, where he worked in research and development for IT companies including Bell Labs Research, Lucent Technologies and Bellcore from 1994 to 2001.

He says that the company has since found that while much of the research going on around the world in academic institutions concerns 'old' issues – or what he deems "problems industry solved a while back, or decided it could live with and move on" – CAIA was interested in solving 'new' ones, those that "industry needs solutions to".

Mr Baker says CAIA's research feeds into the products the company produces and contributes to solving some of the problems with the internet. Cisco's collaboration with institutions such as Swinburne also enables it to tap into the next generation of potential employees. "Programs like Swinburne's allow us to get to know these kids and hire some."

Meanwhile, looking to the future, Professor Armitage says that among the key themes the centre's researchers will be addressing is "energy-efficient networking".

He says the group will be conducting a number of projects this year that will be broadly looking at the design and use of internet-enabling devices, such as ADSL modems and backroom web-servers, and how these impact on the amount of energy being consumed.

"Whether you do it for social reasons or purely financial reasons, everyone is starting to ask that question," he says. ■