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SWINBURNE
UNIVERSITY OF
TECHNOLOGY

Centre for Advanced Internet Architectures

Overview

The Centre for Advanced Internet Architectures (CAIA) was founded in early 2002 and has three primary goals:

■ perform industry-relevant, innovative and critical research into new internet protocol (IP) networking architectures

■ establish collaborations with leading industrial and academic research groups in Australia and internationally

■ provide a world-class, stimulating and flexible research and teaching environment.

The emphasis is on identifying, characterising and developing solutions to the engineering problems facing the internet as it grows to support a more mobile and demanding consumer base. The centre encourages prototyping of solutions and developing simulations to prove or disprove ideas.

The centre is widely involved in alliances with external institutions through numerous national and international collaborations and is continually seeking to further its collaborations with government and industry organisations. Researchers regularly carry out contract research projects for external organisations.

Our research focus

The centre's expertise is in four broad areas of industry-relevant research:

broadband IP architectures – such as traffic models, automated traffic classification, performance optimising architectures, IPv4 to IPv6 migration strategies and IP Quality of Service for interactive consumer and business applications

IP network resilience and security – such as network failure modes and service recovery methods, attacks and associated defence mechanisms, appropriate use of encryption technologies and automated attack recognition schemes

mobile networking – including performance characterisation of wireless networks, signalling and configuration mechanisms for maintaining service quality with ad hoc and semi-static topologies

energy efficient networking – including management of peer-to-peer file distribution, control of servers in internet data centres, the disruption to PC sleep modes due to network activity and providing the communications facilities needed for the future Smart Grid.

Industry involvement

The centre welcomes opportunities to provide innovative solutions through research and consultancy services to meet industry and society needs.

The centre's most significant industry collaboration to date is with Cisco Systems in the United States. The relationship with Cisco has been long and productive with the most recently funded project involving the implementation and performance analysis of a packet filter extension that provides machine learning-based traffic classification based on statistical properties, and decouples flow classification and treatment.

Involvement with other industry bodies includes:

■ Asia-Pacific Network Information Centre (APNIC) Pty Ltd – exploring the use of IPv4 address space and size of the NATed IPv4 Internet

■ FreeBSD Foundation – porting TCP enhancements and instrumentation into the FreeBSD source tree

■ auDA Foundation – network layer spam mitigation techniques and passive detection of worm and virus-initiated network scans

■ Smart Internet Technology CRC – automated network re-engineering techniques and planning tools to support highly interactive, latency-constrained applications.

Recent projects

Some of the centre's recent projects include:

NEWTCP – independent FreeBSD implementation and performance analyses of newer TCPs, such as those for high bandwidth-delay product paths (such as CUBIC and H-TCP), those that infer congestion from variations in Round Trip Times and a variant to reduce server resource use

Global Research into Energy Efficient Networking (GREEN) – determining how to adapt capacity to dynamically varying internet workloads to balance network energy consumption and delay

Mobile Applications and Global Internet Communications (MAGIC) – theoretical and empirical work exploring new techniques to enhance the service quality over wireless and to enable emerging applications with IP mobility such as those in Intelligent Transport System (ITS)

Surveying the Internet's Growth (STING) – measuring the number and location of actively used IPv4 addresses to aid the transition to IPv6.

Education

Supported by a range of university scholarships, the centre offers supervision for full-time students to pursue a PhD in IP networking research. Current and past students have come from diverse regions, including Europe, the Middle East and Asia.

Our centre's summer and winter internships promote research opportunities for Australian engineering students. The centre also runs an Industry-Based Learning (IBL) research assistant program for local students, which provides a possible recruitment path for students.

Contact us

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