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New Honours, Master and PhD research topics in the area of:

A. Future Internet and Next Generation Networks, their design, performance modeling and evaluation by means of theory, simulation and experimentation using global experimental networking infrastructures (these studies would use PlanetLab NZ and Akaora2, see www.planetlabnz.canterbury.ac.nz and www.akaroa.canterbury.ac.nz):

- A1: New services and control of Future Internet
- A2. Management and performance issues of global experimental global networking infrastructures (PlanetLab, OneLab, GENI, etc.)
- A3. Fractal properties of teletraffic in the Internet and similar multimedia networks: their origins, consequences and applications.
- A4. Internet topology: its properties and methods of generation
- A5. On-line algorithms for wavelength scheduling in all optical networks
- A6. On-line algorithms for frequency scheduling in wireless networks
- A7. Performance issues of wireless networks, including wireless Internet
- A8. Performance issues of all-optical networks, including all-optical Internet
- A9. Survivability and resilience issues of multimedia networks.
- A10. QoS and QoE in P2P networks
- A11. Biologically inspired network security mechanisms
- A12. Network and data security mechanisms for P2P applications
- A13. Management and control of large scale sensor networks.
- A14. Management and quality issues of P2P-based TV.

and many more topics possible

B. Automated and distributed experimentation and stochastic simulation (designing tools for performance modeling and evaluation of Future Internet and other Next Generation Networks on the basis of PlanetLab NZ and Akaora2, see www.planetlabnz.canterbury.ac.nz and www.akaroa.canterbury.ac.nz):

- B1. distributed stochastic simulation on PlanetLab
- B2. extension of MRIP (Multiple Replications in Parallel) scenario beyond mean value analysis
- B3. quantitative simulation of processes with heavy-tailed probability distributions and fractal processes
- B4. investigations of transient effects in steady-state simulation of networks

- B5.** new measures of coverage
- B6.** fast steady-state simulations
- B7.** study of new, Stacey's class, steady-state estimators for MRIP, including coverage analysis
- B8.** study of different stopping criteria for sequential estimation (δ , δ/X , MSE, variance, etc) in MRIP, with the emphasis on heavy-tailed and selfsimilar processes.
- B9.** the length of initial transient for multiparameter estimation (steady-state in the sense of distribution), in MRIP (in the latter: making use of parallel realisations)
- B10.** generation of correlated sequences by TES and ARTA
- B11.** speeding up simulation by applying MRIP as the Variance Reduction Technique
- B12.** Indirect Estimation as a VRT dependent on the stopping criterion
- B13.** distributed processing for simulation of rare events
- B14.** experimental evidence of poor coverage caused by too short simulation runs and more sophisticated rules of thumb for protecting against too short runs
- B15.** fractal teletraffic: the length of simulation and speed up under MRIP

and many more topics possible

C. Random number generators:

- C1.** new trends in pseudo-random number generation: single instruction generators, Tauworthy generators, non-lattice congruential, etc.
- C2.** determining conditions for a congruential pseudo-random number generators to follows trajectories with tails (and/or forked tails)
- C2.** generators of pseudo-random numbers for data security/cryptographic applications.
- C3.** extremely large generators of pseudo-random numbers: their properties and performance

The above-listed topics will be jointly supervised by Professor Krzysztof Pawlikowski (Computer Science & Software Engineering), and Associate Professor Donald McNickle (Management), or Professor r Harsha Sirisena (Electrical & Computer Engineering).

Some of these topics are parts of international research projects and involve cooperation with research teams from universities in Italy and Germany. Some topics are of interest of industry in New Zealand

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