Sponsored Project Work Description

Northeastern University, Boston MA

PI Name: Prof. A. Bruce McDonald, Dept. of Electrical and Computer Engineering
Assistant Professor in Communications and DSP and Computer Engineering;
Research and Academic Advisor to Daniel Ugarte;

RA Name: Prof. Daniel Ugarte, Dept. of Electrical and Computer Engineering
Ph.D. student in Communications and DSP;

Project Title: XG Architecture and Protocol (XAP)

Research Assistantship Sponsor: BBN Technologies
RA: Daniel Ugarte Sep. 8 2003 - Sep. 7 2004

Project Title: *XG Architecture and Protocol (XAP)*: The sponsored project requires the development of simulation models utilizing the *OPNET* simulation engine of a subset of XG (Next-Generation Wireless) protocols and environment scenarios. XAP is a portion of a larger project managed by BBN Technologies that involves the design, specification and evaluation of an entire framework for next-generation wireless communications for civilian and military use. The scope of the systems under study in the context of this project are limited to the civilian portion of the XG Project. The precise specification of the models to be developed are expected to evolve over time in response to what is learned and to interactions with other components of the overall XG architecture. As a member of the XAP team, the sponsored Research Assistant (RA) Daniel Ugarte will continue to work closely with XAP team members at BBN to develop model specifications and validate implementation. In general the sponsored project will involve the design and coding (in OPNET) of modules that simulate the sharing of wireless transmission spectrum among several classes of communications nodes. For example, nodes may be XG or non-XG, they may also have heterogeneous MAC protocols, modulation and coding schemes. In addition to model development the project will require the design of experiments and running of simulation models subject to different workloads and system parameters; the precise specification of these experiments will be determined in collaboration with other XAP team members. Simulation experiments will be conducted for the specific models in isolation and possibly in an integrated fashion with other XAP modules developed at BBN Technologies. Performance evaluation of XAP modules will be required in accordance with the specific objectives of each experimental design. This effort will be based on fully validated simulation models, appropriate and agreed selection of workload models and system parameters and statistical analysis of output data. Finally, it is required that all work, including model design, simulation code, experimental design, output data and analysis be fully documented.

Facilities: RWIN-Lab

Computer Equipment and Software
227 Eqan Research Center (617) 373-3009

The PI is the faculty coordinator of the *Reconfigurable Wireless Networking and Communications Laboratory* (RWIN-Lab) at Northeastern University. The laboratory, which is located at 227 Egan Research Center is equipped with two dual-processor Sunblade 1000 workstations, three single processor Sunblade 100 workstations and one Sun Ultra-Sparc 10. Each machine is fully equipped with the software and processing capacity required for the completion of the required work: for example, OPNET Modeler, OPNET Radio Module for Modeler and Matlab. In addition, the lab maintains several other simulation environments including NS-2 for Solaris and Linux and CSIM-18 for Solaris. The PI is also the coordinating faculty member of the Northeastern branch of the *Academic OPNET Research and Education Project*; each year the licensing agreement with OPNET must be renewed under the ITG program based upon the status of on-going use of OPNET in teaching and research projects. The PI will cover this expense which includes 30 licenses allowing for multiple simultaneous simulation execution. The additional facilities of the ECE Department allow for considerable

concurrency and we are currently working on developing a parallel simulation environment. In addition we have on-going projects designed to further improve the scalability and execution time of simulations of wireless and ad hoc network environments. As additional support for this project we note that one RWIN-lab group member has significant expertise in OPNET having interned at OPNET Inc. and participated in the development of the next release of OPNET Modeler.

BUDGET:

The following proposed budget is based on 12 months of support under XAP.

Number	**Description**	**Months**	**Funds Requested**
1	Senior personnel	1.0	$ 8229
1	Graduate students	12.0	$21,450
	Fringe benefits		$3,369
	Total salaries, wages and fringe		$33,048
	Total direct costs		$33,048
	Total indirect costs (F&A 58% of direct costs)		$19,168
	Total direct and indirect costs (requested funds)		$52,216

Table 1: Proposed Budget