Collaboration Plan

1 Team Expertise

The project will be collaborative between Stony Brook University (SBU) and Carnegie Mellon University (CMU). The project team has a broad range of inter-disciplinary expertise available suitable to deliver on different facets of the project.

- PI Gupta (Assoc. Professor, Computer Science, Stony Brook University) is an expert in algorithmic aspects of networking, specifically involving routing, scheduling, connectivity and geometric aspects mostly related to wireless and sensor networks.
- PI Sekar (Asst. Professor, ECE, Carnegie-Mellon University) has interest in broad aspects of networked systems. His work spans design and management of middleboxes, Internet video, scalable network monitoring, content distribution, software-defined networking and network forensics.
- Co-PI Das (Professor, Computer Science, Stony Brook University) is an expert in networking protocols and systems specifically focusing on wireless/mobile networks. He has built several experimental systems related to ad hoc/mesh and sensor networking and vehicular networking. In prior research, he also developed scalable discrete event simulation systems.
- Co-PI Longtin (Professor, Mechanical Engineering, Stony Brook University) is an expert in laser ... XXXFillmeXXX.

A total of 4 PhD students (2 CS students and 1 ME student in SBU and 1 ECE student in CMU) will participate in the project. Each will be primarily advised by a PI/Co-PI. They will also closely work with the rest of the team.

While all investigators will participate in all parts of the project, each Task will be lead by one of the investigators (see Table 1). Gupta will lead Tasks XXXFillmeXXXthat are mostly related to topology design and algorithms for traffic engineering. Sekar will lead Tasks XXXFillmeXXXthat are related to network management and control plane design. Das will lead Tasks XXXFillmeXXXthat related to system building and evaluations. Longtin will lead Tasks XXXFillmeXXXrelated to building the lower layers of FSO-based design.

Task	Lead	Collaborator(s)
FSO1	Das	Longtin
FSO2	Longtin	Das
Theory1	Gupta	Sekar
Theory2	Gupta	Sekar
System1	Sekar	Gupta
System2	Sekar	Das
System3	Das	Sekar
E2E	Das, Gupta	Longtin, Sekar

Table 1: Task leads

2 Division of Work and Collaboration Plan

The PI/Co-PIs have history of collaborations. Gupta and Das have long collaborated on several wireless/sensor networking topics and have published 15+ papers [] together. They also collaborated in 4 different NSF-funded projects. The collaborations with Sekar started with Sekar joining SBU faculty in 2012. This collaboration resulted in the preliminary work along the direction of this proposal – published as a position paper in ACM HotNets 2013 []. After this initial success, the team sought input from Longtin who helped build the SFP-based FSO link (Figure XXXFillmeXXXin the proposal) in his optics lab thus

demonstrating the general feasibility of the design. Das and Longtin also collaborated in a home energy monitoring project [] funded by NYSERDA.

With Sekar joining CMU faculty starting 2014, the collaborations will continue - remotely aided by frequent 'skype' meetings and semi-annual visits. The hardware prototype will be primarily developed in SBU and has been accordingly budgeted. The initial development and characterization of the FSO links, the alignment and steering techniques will be pursued in the optics lab (in SBU Mechanical Engineering) that Longtin directs. The lab has excellent set up for laser studies including multiple optical benches, say something about the lab's equipments that can benefit the project. Concurrently, the simulation platforms will be set up and trace-driven simulations will be performed on the initial topology control and reconfiguration techniques (both in SBU and CMU by Gupta and Sekar in their respective labs). At this time, the NetFPGA-based switches will be developed as well (in SBU WINGS/PCL Lab by Das) to aid the final end-to-end prototyping. The SDN-based control plane will be primarily developed in CMU (by Sekar) and will be ported to SBU in time for the end-to-end testing. The RF-based controller system will developed in SBU (in SBU WINGS/PCL Labs by Das). The general description of above labs and other facilities available for the project are described in the Facilities section.

In the third year of the project, we expect the initial design of FSO and steering mechanisms will have stabilized and understanding of the rest of the Firefly system will have progressed far enough. At this time the project will concentrate significantly on the end-to-end prototyping. This will be done in the CEWIT datacenter (as articulated in Section XXXFillmeXXX) in SBU (led by Das). The large-scale evaluations and refinement of topology control, reconfiguration and control plane will still continue while this proof-of-concept prototype is developed. [VS: it might be better for the lead PI to be on the integration task?]

3 Project Timeline

[sd: Below needs revision. Best to state in terms of tasks/subtasks.]

	Year 1 (2014)		Year 2 (2015)		Year 3 (2016)		Year 4 (2017)	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
??: Algorithms				○	○	○	○	
??: DataPlane				○	○	○	○	
??: ControlChannel				○	○	○	○	
??: E2E Demos				○	○	○	○	

Table 2: Projected schedule for tasks described in the previous sections. The ○ shows when a task is "active". Some tasks are split in the timeline as we will need to revisit/integrate with respect to other aspects of the proposed work.