Simulation-based projects

If you choose to do a simulation project, you must create a new protocol or mechanism for doing something. You cannot simply evaluate existing protocols or do something that has already been done. Look through QualNet to see all the models that are available to you. Think about using different error models, application protocols, transport layers, physical layers, mobility models, etc.

- * Channel Assignment
  Develop a channel assignment solution for multi-radio mesh networks. Decide whether it should be centralized or distributed.

- * Rate Adaptation
  Develop a rate adaptation algorithm that differentiates between congestion-related losses and link quality-related losses.

- Path selection criteria
  Develop, implement and evaluate different path selection criteria for on-demand routing protocols to determine under what network conditions each one gives the best performance.

- MAC protocols
  Develop a new MAC protocol for mesh networks that outperforms 802.11.

- * Mobility models
  Develop a new mobility model for mobile networks, and compare its characteristics to existing models. Try to base your model on your intuition of real movement.

- Security
  Augment an existing ad hoc routing or multicast protocol so that it is secure against specified attacks from intruders.

- Security
  Develop a new routing protocol that is secure against specified attacks from intruders.

- * Delay Tolerant Networks
  Develop a solution for packet delivery in a delay tolerant network and compare the performance to previous solutions.

- * Addressing
  Develop a solution for addressing and routing based on a node’s current location.

- Satellite Networks
  Customize any of the above ideas for satellite networks.

- * Green Networks
  Develop a solution for powering down access points/mesh routers when not in use.
Implementation-based Projects

If you choose an implementation-based project, you can either create some new software for laptops (your own laptops), or you can characterize existing software.

- **Streaming Video**
  Develop a mechanism for supporting streaming video for video conferences to small handheld devices. Investigate the capabilities and limitations of the handheld device. You may also consider what happens when traffic congestion increases at the access point.

- **Media Server**
  Develop a media server that determines the resources of the end device, and then adapts the media stream appropriately such that the end device can process it.

- **Uni-directional Links**
  Determine the frequency of occurrence of uni-directional links. This will include a comprehensive study of different metrics that result in the occurrence of these links.

Data Analysis Projects

For this type of project, you should either develop monitoring/data collection software, use it to collect data and then analyze the data, or you should do an in-depth analysis of an existing data set.

- **Monitoring**
  Develop a system for capturing wireless transmissions. Use your monitoring system to collect and analyze data from a deployed wireless network (campus, IV, etc.).

- **Real-time Monitoring**
  Develop a system for capturing and analyzing wireless transmissions in real-time. The system should display graphs of some selected set of data, such as transmissions, users, packet sizes, etc.

- **Data Analysis**
  Analyze existing data sets from deployed wireless networks to develop models of traffic, user behavior, mobility, etc. Check http://crawdad.cs.dartmouth.edu/data.php or http://nile.usc.edu/MobiLib/ for data sets from the mobility community. Perform an in-depth analysis, or develop a simulation model that captures some statistical trends.