CSE 588 Class Notes
4/23/2002

(From the previous class) The question(s) to take away from the BGP discussion are:

- How would you improve the protocol?
- How do you handle policy constraints in a manner that achieves efficient global connectivity?

Ad-hoc routing paper discussion:
Can we have a completely ad hoc network that routes to all nodes?

Application Domain:

1. Military communication (on a battlefield between troops)
2. Neighborhood communication – i.e. a "Rooftop network" without traditional infrastructure
3. Sensor network (weather, battlefield, etc.)
4. low-power, low-range networks – these don't have the ability to boost power to reach a base station

Possible solutions:

1. Wire base stations to all locations of interest. This fixes the problem and reduces it to something similar to cell-phone tower hand-offs
2. Wireless forwarding – each host can also route to help provide connectivity to all. This requires no infrastructure but has greater possibility of link failure since connectivity depends on others

The paper examines this second solution. There was some discussion in this class about how viable the topic was. How big was the application domain where this solution was the best possibility?

Goals of such a network:

1. Fast convergence – best routes determined quickly
2. Handle low-power scenarios or limited CPU budget scenarios
3. Different mobility speeds (some hosts move faster than others, affecting convergence)
4. Bandwidth
5. Flow Control (do we buffer or drop packets when we can't forward it onwards?)
6. Security – how does one deal with non-cooperative nodes and/or access control

Possible algorithms:

1. Link State Distribution. There is a tradeoff between the number of packets that get sent vs. the rate at which the network topology changes. In general, this does not handle large topology changes well due to the amount of state which becomes invalid and the slow rate of propagation through the network.
2. Distance Vector. This might allow routes to be computed "lazily", but it also requires that old routes be invalidated when they change. The overhead traffic is

a function of the number of changes in network topology and the number of routes used (if lazy computation is used).

3. Source Routing: Route requests/responses are broadcast and results are cached at each node. The source determines an exact route for the packet. This method seems less able to handle network topology changes, and it would fail completely if the convergence time is greater than the timeout time for discovering a route.

Other considerations:

1. Adaptive Updates – determining different approaches to invalidate old routes
2. Source routing with dynamic routing/caching on broken links
3. Aging/History of nodes
4. How to handle misbehaving/non-cooperative nodes