Requirements of Next Generation Wireless Internet

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Wireless extensions of the Internet

- Leads to growth of networked “Nodes” far beyond the number of humans and general purpose computers
  - Transient RF ID Tags on billions of products and packages
    - *big impact* on commerce
    - but what about the return information path
  - Persistently deployed wireless enabled sensors for
    - Environment and structural monitoring for public safety
    - Automobile for transportation management
    - Monitoring to care for the elderly and lowering healthcare costs
    - Animal/meat health monitoring (A2M) for food safety
    - Appliances for consumer use

- Application abstraction
  - Gathering, sharing and collaborating with massive data sets
  - Mix of synchronous and asynchronous usage
  - Large number of participants
Coping with large numbers of nodes

- In some scenarios deploying many end-to-end capable nodes may be undesirable
  - Higher cost
  - Greater energy consumption
  - Adverse ecological implications

- Revising the notion of a node
  - Many partially impaired nodes form a more reliable virtual node
    - Engineering spatio-temporal diversity for functionality
  - Virtualization of the “end” node

- Node abstraction
  - The connection ends in a cloud of nodes
    - Naming, Associating, Authenticating and Querying a cloud

- Revising traffic models
  - Many very sporadic sources
Rethinking the plumbing

- Rethink notions of pricing and fairness in a resource constrained environment
  - Users are used to paying for services in the cellular world
  - Min-max and proportional are two of about ten interesting rules studied in bankruptcy theory
- Rethink mechanisms for negotiations
  - Multi party
  - Distributed negotiations
  - Gaming, behavioral
A loosely structured peer-to-peer learning framework for network usage and control and challenges

- Gather spatio-temporal feedback from all layers of a protocol stack and the user experience
  - Was the connection up?, Estimate of channel interference ...
  - Extraction
- Code it in a spatio-temporal manner and feed into an “experience” cloud
  - Identity, location, time, system, application
  - Accuracy, Privacy
- Organize, archive and store
  - Real time or off line
  - Representation, Disambiguation, Scalability
- Analyze
  - Long term trends, Diurnal variations
  - New algorithms for distributed systems management
- Provide
  - Real time response to queries
  - New algorithms for distributed systems management
- No one else will do it in the commercial world