Weather Disruption-Tolerant Wireless Mesh Networking
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Millimeter Links and Mesh Networks
- Millimeter wave (70 – 90 GHz) links
  - point-to-point LOS; range ≤ 5 mi.
  - 5 GHz bandwidth: link rate ≤ 10 Gb/s
  - very susceptible to rain attenuation
- Metropolitan wireless mesh network
  - multihop to central office or POP
  - high bandwidth wireless Internet access
  - alternative to wired backhaul
  - must be disruption tolerant to precipitation

Geometric Storm Modelling
- Model as three states: strong, weak, disconnected
- Model storm cells as moving ellipses
  - size and trajectory from radar imagery
  - fronts and complex systems are multiple ellipses

Proposed Solution: Predictive Routing
- Reroute traffic before impairment attenuates
  - prediction of several minutes sufficient
  - can be done from radar imagery
  - avoids need to:
    - attempt 50ms path restoration
    - reconverge IGP or BGP
  - link state algorithm
    - cost ∝ projected BER
    - BER predicted from rain intensity
      - based on radar reflectivity
      - ITU rain attenuation model

Link Availability Simulation
- Frame delivery ratio in 4×4 mesh
  - 14 2.4 Mb/s (3G) CBR over UDP flows
  - static routing: 77.8% average frame delivery
  - predictive routing: 97.2% average frame delivery