**KU-LoCGen: Location and Cost Constrained Topologies**

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**Network Topology Generation**

- **Goal:** generate realistic network topologies
  - based on real world network evolution
  - representative of the process, not properties
  - emphasis on physical topology, not logical relations

- **Network characteristics**
  - hierarchical deployment
  - several design constraints
  - finite costs

- **Existing approach**
  - simulates network properties using graph models
    - may introduce unwanted artifacts
    - not representative of network resilience

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**Location and Cost Constraints**

- **Approach**
  - decouple node distribution from node connectivity
  - hierarchical: different models at different levels

- **Location constraints**
  - physical node locations constrained by design
  - multiple options for node positioning
    - existing networks, population centers
    - heavy tailed distributions, user specified

- **Cost constraints**
  - fixed and variable costs per link
  - determine feasible link generation parameter values

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**Hierarchical Model**

- **Level 1:** backbone network
  - nodes distributed based on location constraints
  - links generated using various models
    - random, locality, Waxman, ...
    - models parameters based on cost constraints

- **Level 2:** access networks (ANs)
  - uniformly distributed number of ANs per backbone node
  - ANs are normally distributed around a backbone node
  - access network connectivity: ring, star, mesh

- **Level 3:** subscribers
  - normally distributed around access network nodes
  - subscribers connect to the closest access node

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**Implementation**

- Illustration of a 3-tiered topology generation
  - each level may use a different graph model

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