Simulating the Behavior of Opportunistic Network Protocols at Mass Events with ns-3

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**Goal**
Comparing and analyzing different opportunistic routing protocols through simulation using real-world mobility traces

**Protocols**

**Opportunistic routing protocols** route messages by passing them on via intermediate devices within range

- **Buffer management**
  - Maximum buffer size
  - Message retaining priority
- **Sending frequency**
  - Depending on current neighbors
  - Depending on history
- **Number of copies**
  - Limit the number of message copies in the network
  - Enforce a maximum per message among nodes
- **Predictions**
  - Predict probability of contact between neighbor and recipient
  - Forward to neighbor according to this probability

**Protocol metrics**

**Evaluate** protocols using objective metrics

- Hops
- Overhead
- Delivery rate
- Latency

**Simulations**

Simulations are performed in two different network simulation environments

- **ONE**
  - Offload network infrastructure
  - Communicate at mass events
  - Direct message exchange
  - Delivery guarantees
  - Ease of deployment
  - Dynamic scalability
- **ns-3**
  - Opportunistic protocols already implemented
  - Better real-world modeling
  - Fast prototyping
  - Advanced tracing capabilities

**Acquiring mobility data**

**Bluetooth tracking** of visitors at a mass event: the Pukkelpop 2012 music festival

**Possible improvements in ns-3**

- More robust handling of mobility traces
- Enhance IPv6 multicast for easier neighbor communication
- Readily available opportunistic network protocol implementations

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