

FOOTLOOSE NETWORKING



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Gunnar Karlsson

Laboratory for Communication Networks

KTH, Royal Institute of Technology

Stockholm, Sweden

Mobile networking

Mobility can interrupt wireless communication

- Moving users will get out of coverage occasionally
 - Omnipresent cellular coverage is not economical
- Ad hoc networks may break apart
 - Nodes meet occasionally

Utilize any connectivity

- Performance that scales with connection durations
- Communications do not break by disruptions

Goal: Mobile communication where ever people go

- beyond the infrastructure
 - node to node communication
- expanding the infrastructure
 - cues to potential deployers

Capturing mobility

- Space-time geography



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Scaling with connectivity

System designed for arbitrarily short connections

- From infrastructure mode,
 - via ad hoc mode
 - to delay-tolerant mode
 - without manual reconfiguration
- Exploit fully the connectivity at hand
 - Instantaneous handshaking
 - Ultra high bit rate

Applications with atomic data units (chunks)

- Can be used without access to other units
 - Tolerant to delay and disruptions
 - No ordering requirement
 - Multiple description coding, embedded coding
- Nodes exchange chunks when they meet

Monitor the surroundings

- Station DXing
 - QSL: “I confirm receipt of your transmission”
 - Reports also of areas without coverage



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Scaling the infrastructure

Small footprint cells

- High frequency bands (60 GHz ISM)
- Spectral re-use

Planning the infrastructure

- Too small scale for pre-planning
- Deploy and see

A self-deploying system

- Operators deploy access points
 - Not just telcos and hot-spot operators
- The access points and the mobile nodes provide cues about the infrastructure
 - Alignment of nodes to coverage
 - Operators get cues about beneficial future deployments
- Establish a closed-loop with positive feedback
 - Drive the overall system towards saturation



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Mobility modeling

Landscape

- Topographic restrictions on mobility

People moving, not just node

- Capture constraints
 - Capability
 - Coupling
 - Authority

Large scale

- Distances reachable within a session
- Number of nodes

Model the dynamical deployment

- Infrastructure grows along the movements of mobile users
- Mobile users and communication increase with coverage



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Summary



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- Mobile node design that scales from continuous to no connectivity
 - Delay and disruption tolerant apps
 - Remove ordering constraints
 - Fast handshaking
- Measurement system based on reports from access points and mobile nodes
 - Expose opportunities for new deployment sites
- Model the space-time geography of human mobility