Corridor Routing in Mobile Ad-hoc Networks

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Overview

- Advantages of Multi-Path Routing
- Existing Multi-Path Protocols
- Corridor Routing
- Simulation Results and Analysis
- Conclusion and Future Work
Advantages of Multi-Path Routing

- Bottleneck Circumvention
  Choosing paths with low traffic

- Efficient Bandwidth Usage
  Disperse traffic over multiple paths

- Reduced Destination Discovery Frequency
  Reducing signaling overhead
Existing Multi-Path Protocols

**Ad-hoc On-demand Multi-Path Distance Vector Routing**, AOMDV

Das, Marina:

**Split Multi-Path Routing**, SMR

Gerla, Lee:

- Disjoint paths
- Paths of different length
- Limit on number of routes
- Unicast Route Reply messages
Corridor Routing

**Existing MP Protocols**
- Disjoint paths
- Paths of different length
- Limit on number of routes
- Unicast Route Reply messages

**Corridor Routing**
- Paths may **overlap**
- Paths are **minimum-hop**
- Number of routes **unlimited**
- **Broadcast** Route Reply messages

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**Diagram**
- Source
- Corridor
- Destination
Destination Discovery

Route Request message...
- is flooded into the network
- holds a Hops-to-Source field

Route Reply message...
- is regionally broadcasted along the corridor
- holds a Hops-to-Destination field
- holds a Total-Hops field
Intermediate router is on a minimum-hop path

\[\Leftrightarrow \text{Hops-to-Source} + \text{Hops-to-Destination} = \text{Total-Hops}\]
Simulation Results and Analysis

- Network Simulator 2
- 50 Mobile Nodes
  - 50 m Transmission Range
  - 300x60 m² Movement Area
  - ∅ 2 ~ 7 m/s Movement Speed
- DSR, AODV, and Corridor Routing Protocol (CRP) at L3
  - IEEE 802.11b at L2
- VoIP, 12.2 kbps (AMR Codec)
  - 60s Call Holding Time
  - 1 ~ 6 Parallel Calls
Datagram Delivery Ratio

[Graphs showing the delivery ratio of datagrams under different conditions: number of parallel communication sessions and station velocity, with lines indicating CRP, DSR, and AODV protocols.]
Routing Failure Ratio

![Graph showing routing failure ratio vs. station velocity]
Destination Discovery Frequency

- CRP
- DSR
- AODV

Parallel communication sessions [#] vs. Destination-discovery frequency [#/min]

Station velocity [m/s]

Parallel communication sessions: 2

Parallel communication sessions: 4

Station velocity [m/s] vs. Destination-discovery frequency [#/min]
More Analysis

- Datagram Delivery Ratio
- Routing Failure Ratio
- Destination Discovery Frequency
- Datagram Delivery Delay
- Buffer Overflow Ratio
Conclusion and Future Work

- **Corridor Routing**
  - Use of All Minimum-Hop Paths
  - Unlimited Number of Paths
  - Paths are Not Necessarily Disjoint

- **Performance**
  - Increased Packet Delivery Ratio
  - Reduced Destination Discovery Frequency
  - Adverse Impact of Routing Failures

- **Future Work**
  - Comparison to Multi-Path Protocols
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Supplementary Presentation

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Why are there so many?
Analysis: Loss of Reply Messages

- Reply messages are broadcasts
- Broadcasts are unprotected by acknowledgements
- Increased risk for collision
- Some discoveries terminate prematurely
Solution: Propagation Monitoring

- X broadcasts Reply
- X listens whether Y propagates
- If Y does not propagate, X re-transmits
Destination Discovery Frequency, revisited
per Call (60 seconds)