Zone Routing Protocol

Nets – Reading Group
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Ad Hoc Networks

• Additional networking issues cf. Traditional nets
  – Infrastructureless
  – No fixed routers
  – Highly mobile
    • Changing topology
  – Link instability
  – Resource poor
    • Limited bandwidth
    • Limited energy resources
Ad-hoc Routing

• Two main types
  – Proactive
    • In advance
    • Route immediately available
    • Cost time
    • Route might be stale
  – Reactive
    • On demand
    • Route delayed availability
    • Cost load
    • Route less likely to be stale
ZRP Motivation

• Pro-active / Reactive Routing
  - Take the best part of both
  - Assume most traffic is local
  - Zonal
    • Allows local repair
What is ZRP?

- Routing framework
  - Bordercast
    - BRP
      - Bordercast Resolution P
  - Proactive Routing
    - IARP
      - IntrA-zone RP
  - Reactive Routing
    - IERP
      - IntEr-zone RP
Zones

- ZRP defines the idea of a zone, each node has a zone centered on itself.
  - hops
  - Inside the zone
    - Proactive
  - Outside the zone
    - Reactive
  - Border nodes
    - BRP constructs a map
Routing

- **Local**
  - Check IARP first

- **Remote – use reactive routing**
  - Route request sent to border nodes
    - Border nodes reply if they know a route
  - Otherwise border node bordercasts to it's border nodes
    - Relay back results

- Source may receive multiple versions of the route
Route maintenance

• ZRP makes use of local topology to do local maintenance
  – Local knowledge can make locally optimal choices
    • NDP – helps here
Protocol Implementation

- **Framework**
  - **IARP**
    - Timer based link state protocol
      - Need to limit on TTL
  - **IERP**
    - Source routing
      - Needs to inter-operate with IARP
  - **BRP**
    - Route request packets tunneled to border nodes
      - Encapsulated
      - Multicast
Zone size?

- Two methods
  - Minimum
    - Increment / Decrement zone radius in a search to look for a minimum, then keep that.
      - Long evaluation period required
  - IARP : IERP ratio
    - Watch IARP : IERP traffic and adjust zone size so that the ratio is at a pre-defined metric
Discussion

- Is this a good idea?
- Does it scale?
- Is it too complex?
- Would it apply to fixed networks?
- Use of multicast?
- Extensions?
  - Multiple types of IERP, IARP, BRP