Routing in Anhinga

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Agenda

- Introduction & Background
- Dynamic Source Routing
- Project Architecture
- Demo
- Future work & Conclusion
- Questions
Introduction to MANET

- MANET
- Very dynamic in nature
- Nodes join and leave on the fly
- No existing infrastructure
- Many scenarios
Introduction - Anhinga

- Anhinga
- M2MP
- M2MI
M2MP Architecture
Introduction - IP Based Routing

- Unique address
- External intervention required
- Routing
- Good for preconfigured networks
Routing in MANET

- Classical Approaches

- Routing in MANET
  - Table Drive (Pro-active)
  - On-Demand (Reactive)
Why this project required?
Introduction - Table Driven Routing

- Routing Tables
- Proactive
- Distance Vector Based
  - DSDV
- Link State Information Based
  - STAR
Introduction - On-demand Routing

- Source initiated
- Dynamic
- Various flavors
  - AODV, DSR etc.
Dynamic Source Routing (DSR)

- What is DSR?
- DSR Data Structure
- DSR Processes
- DSR Protocol
DSR Data Structures

- Route Cache
- Send Buffer
- Route-Request Table
DSR Processes

- Route Discovery
  - Route Request
  - Route Reply
- Route Maintenance
Route Discovery
Route Maintenance

- Route Error

```
A  B  C  D  E
```

Diagram showing connections and error between nodes A, B, C, D, and E.
Sending a packet

1. Is the received packet a "Route Request"?
   - Yes: Add myself to Route Node Sequence, Send "Route Response" back to "Route Request" initiator
   - No: Proceed to next step

2. If not a "Route Request":
   - Is this a "Route Reply"?
     - Yes: Proceed to next step
     - No: Unknown packet, discard

3. Is this a "Route Error"?
   - Yes: Proceed to next step
   - No: Unknown packet, discard

4. Is the target of "Route Request"?
   - Yes: Proceed to next step
   - No: Unknown packet, discard

5. Is the "Route Request" ID "Unique"?
   - Yes: Proceed to next step
   - No: Unknown packet, discard
Processing a received packet

1. Is the received packet a "Route Request"?
   - Yes: Am I the target of "Route Request"?
     - Yes: Add myself to Route Node Sequence. Send "Route Response" back to "Route Request" initiator
     - No: Is the "Route Request Id" "Unique"?
       - Yes: Go to 3
       - No: Discard
   - No: Is this a "Route Error"?
     - Yes: Go to 5
     - No: Unknown packet discard
2. Is this a "Route Reply"?
   - Yes: Go to 4
   - No: Discard
Processing a Route Request

1. Is there a route in my Route Cache for this Route Request?
   - Yes: Proceed to the next step.
   - No: Proceed to the next step.

2. Is the route in cache valid?
   - Yes: Send out "Route Reply" Message to "Route Request" initiator.
   - No: Cache any important routes formed so far from Route Node Sequence of packet.

3. Does this "Route Request" need to be retransmitted? (based on max hops criterion)
   - Yes: Add myself to packet's Route Node Sequence, Rebroadcast the "Route Request" package.
   - No: Discard.
Processing a Route Reply

Am I the intended recipient?*

No: Cache route information from Node Sequence. Broadcast it back to next recipient

Yes: Cache route information from Node Sequence. Remove related "Route Request" packet from "Send Buffer"
Processing a Route Error

Am I the source node in the route reported broken?

No

Invalidate all routes in cache that uses node sequence reported as broken. Re-broadcast the "Route Error"

Yes

Invalidate all routes in cache that uses node sequence reported as broken
Project Architecture

- Application Process
  - M2MP Layer
  - Daemon Channel

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- DSR Routing Logic
  - DSRM2MP Layer (Modified)
  - DSR Daemon Channel (Modified)

- M2MP Daemon Process
  - UDPMulticast Channel

- External Network
Routing Layer Architecture

- **Routing Protocol Processes**
- **Routing Engine**
- **DSRM2MP** (Forwards Packets)
- **Packet In**
- **Daemon Process / Channel**
- **Packet Out**
- **Forwarding Table Updates**
- **Routing Protocol Packets from Network**
Design Specification

- edu.rit.m2mp.dsr
- edu.rit.m2mp
- edu.rit.m2mi
- edu.rit.m2mi.chat2
Design contd.
Test Application

- Chat Demo
Conclusion

- DSR for M2MP successfully implemented & integrated with M2MI
- A Demo Chat Application
- Routing overhead scales with change in network topology
Future work

- Salvaging Packets
- Automatic Route Shortening
- Increased spreading of Route Error
- Using uni-casting for point-to-point communication
References


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