Starving Artist: A Distributed Algorithm for Link Based Channel Assignment in a Mobile Ad Hoc Network

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MobiHoc08

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Outline

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Mobile Ad Hoc Networks

Definition (Ad Hoc Network)

A mobile ad hoc network is a peer to peer wireless network with mobile nodes.

Features

- Distributed routing
- All links are wireless
- Dynamic links between peers

Traditional Approach

- Divide Resources by Node
- Relinquish resource immediately
- Core problems must be constantly solved

Structured MANET

Hypothesis: A structured network can be more efficient than an unstructured network.[2]

Features

Structuring requires that:

1. A node should not use a channel for more than one link.
2. A node should not use any channel that is being used by one of its neighbors *unless* it is linked to that neighbor on that channel.

Outline

Starving Artist

Definition

A Distributed Algorithm for Link Based Channel Assignment in a Mobile Ad Hoc Network. Each node attempts to form some n number of links (Starving), pursuant to the total channels available.

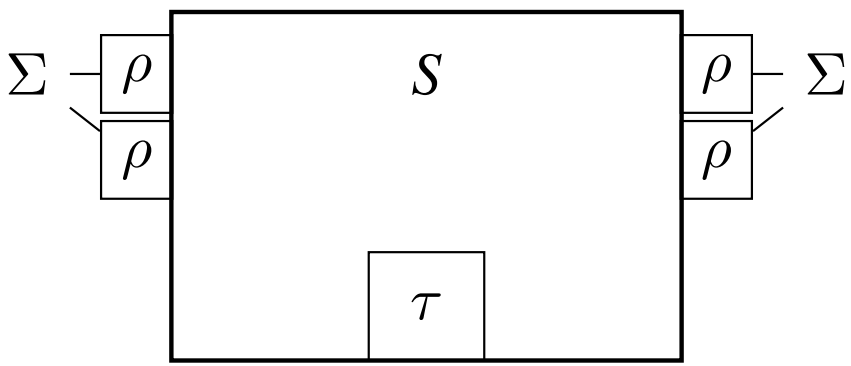
Features

- Multi-radio ready, but radios could be software only
- Uses one control channel, k data channels
- Distributed, uses only local information

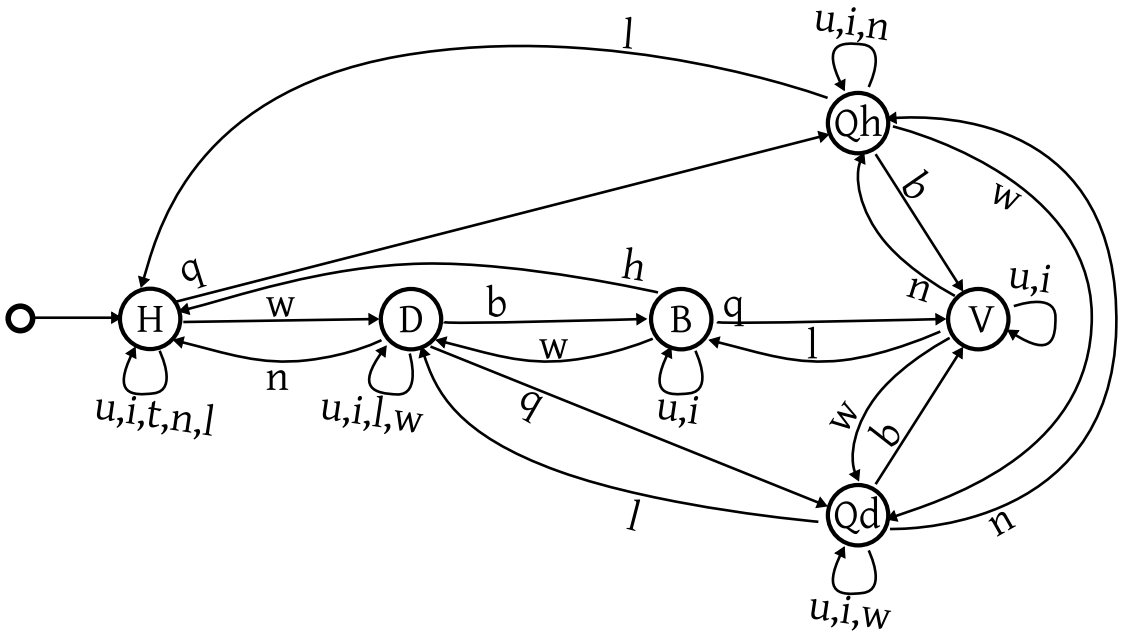
Design

State Machines

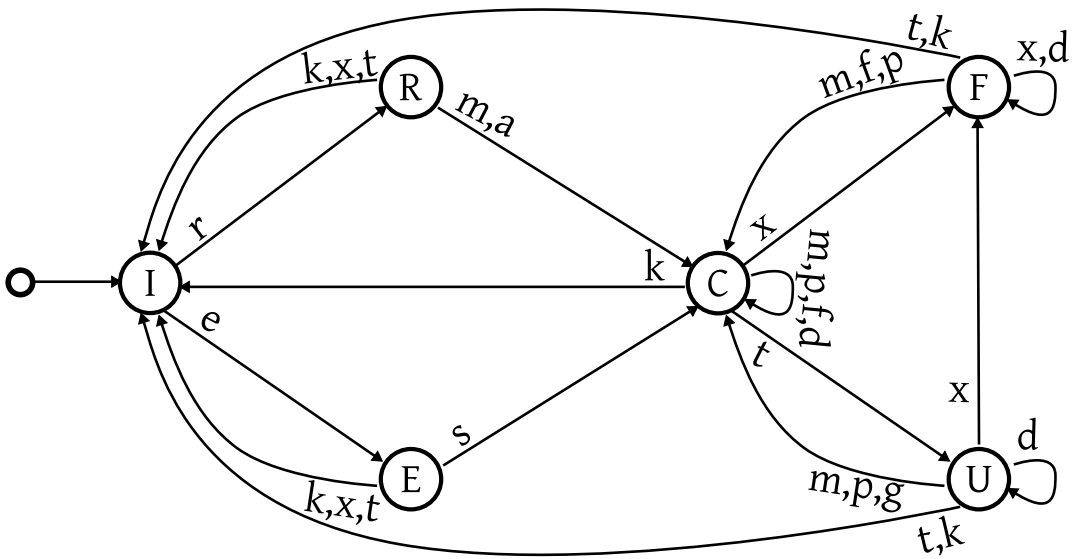
SA is designed as a modified finite state machine



State Machine



State Machine



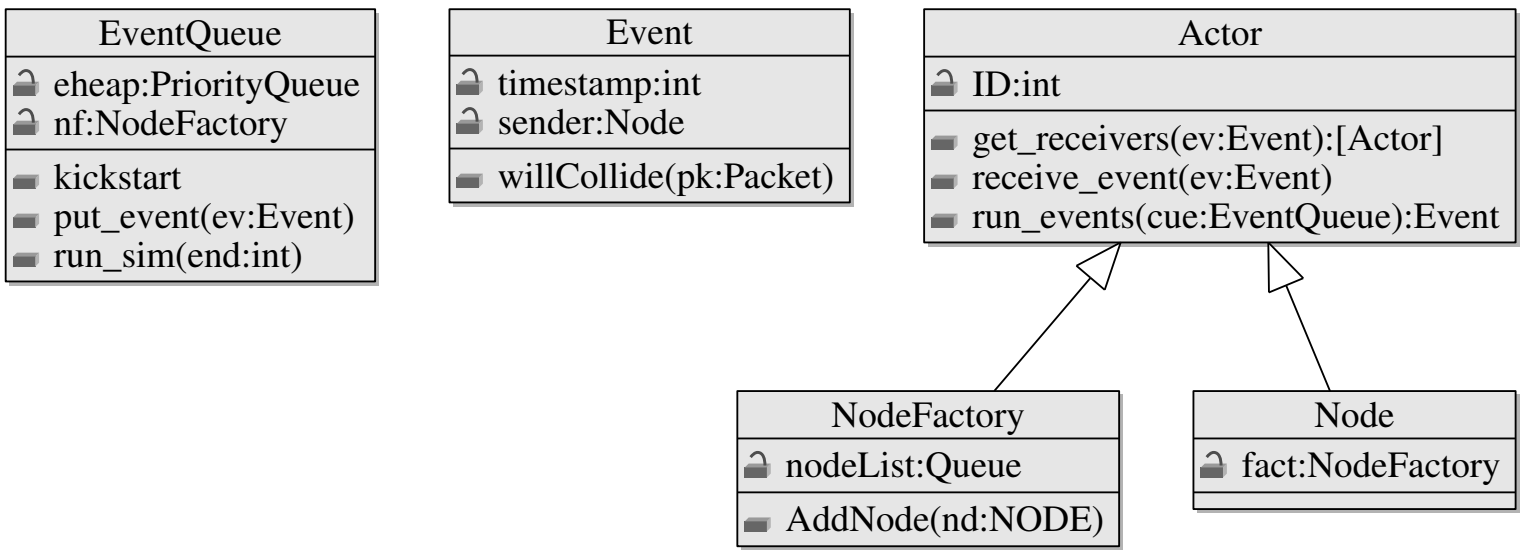
Outline

simpleHoc

Discrete Event Simulator for Networks

1. General Purpose
2. Extensable
3. Dynamic Language (Ruby)

classes


EventQueue
eheap:PriorityQueue
nf:NodeFactory
kickstart
put_event(ev:Event)
run_sim(end:int)
Event
timestamp:int
sender:Node
willCollide(pk:Packet)
Actor
ID:int
get_receivers(ev:Event):[Actor]
receive_event(ev:Event)
run_events(cue:EventQueue):Event
NodeFactory
nodeList:Queue
AddNode(nd:NODE)
Node
fact:NodeFactory

Outline

Results

1. Simple tests passed, simulator works
2. Complex scenarios, algorithm fails
3. Plenty of room to add features

Bibliography

J. Avonts, N. Van den Wijngaert, and C. Blondia.
Distributed channel allocation in multi-radio wireless mesh networks.
Computer Communications and Networks, 2007. ICCCN 2007. Proceedings of 16th International Conference on, pages 939–944, Aug. 2007.

F. Kuhn, T. Moscibroda, and R. Wattenhofer.
Initializing newly deployed ad hoc and sensor networks.
In *MobiCom '04: Proceedings of the 10th annual international conference on Mobile computing and networking*, pages 260–274, New York, NY, USA, 2004. ACM Press.