Universität Würzburg
Lehrstuhl für Verteilte Systeme
Prof. Dr.-Ing. Phuac Tran-Gia
www3.informatik.uni-wuerzburg.de

EADS Deutschland GmbH
Innovation Works
www.eads.net

Load Balancing in Wireless Networks using Statistic-Based Routing

Alexander Klein

What is Statistic-Based Routing?

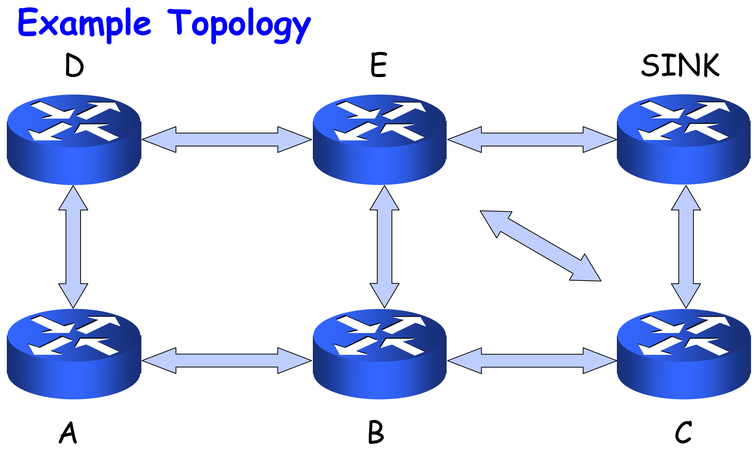
- Hello messages are periodically transmitted by each node
- Each node increases a routing value that represents the end-to-end quality after receiving a new hello message
- The routing values are decreased periodically
- New hello messages are only forwarded if received by the best neighbor
- The node with the highest routing entry value to the destination is chosen as next hop

Routing Characteristics

	End-To-End Routes	Load-Balancing	Mobility	Multipath	Complexity	Memory	Comp. Power
SBR	-	+	+	+	-	-	-
OLSR	+	-	-	-	+	+	+
AODV	+	-	0	-	+	0	O
GBR	-	0	0	0	-	-	-
MCFA	-	0	-	0	-	0	-

Routing Table

Example Topology



Node B	Number of Received New Hello Messages				
Originators	A	C	D	E	SINK
A	20	-	-	-	-
C	-	20	-	-	-
D	12	-	-	7	-
E	-	-	-	18	-
SINK	-	8	-	12	-

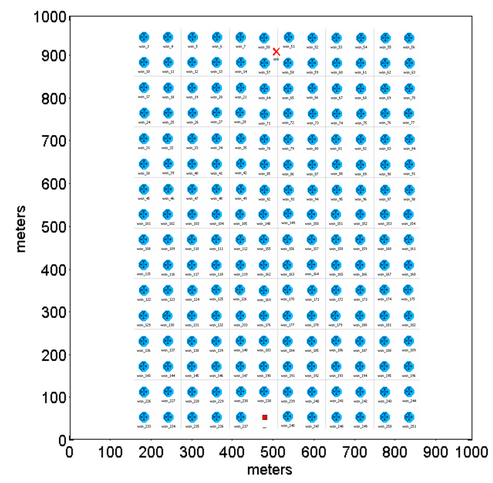
- Empty column → No neighbor
- Empty row → Unreachable
- Entry on diagonal → Direct Neighbor
- More than one entry in a row → Multiple Paths

Load-Balancing

Load-balancing can be achieved by delaying the forwarding of hello messages to manipulate the increase and decrease of the routing entry values in the table.

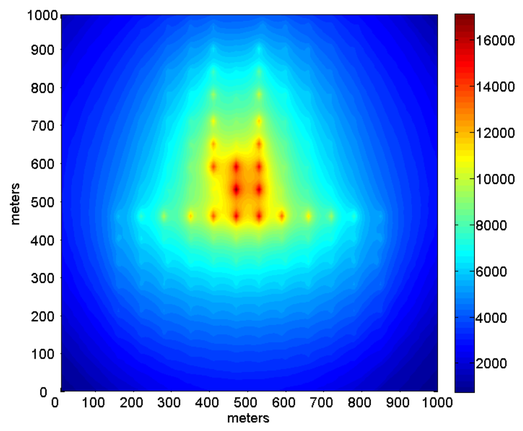
Load balancing Metrics:

- End-to-end delay
- Forwarded traffic
- Utilization of the air interface
- Routing entry value ratio
- Overheard traffic
- Forwarded traffic / overheard traffic ratio
- Self regulating

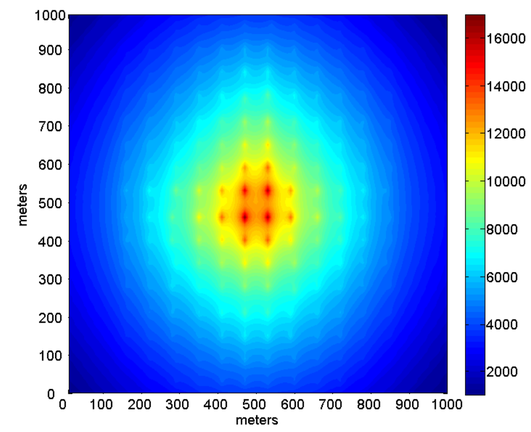


Load balancing Scenario

Center Traffic Scenario:

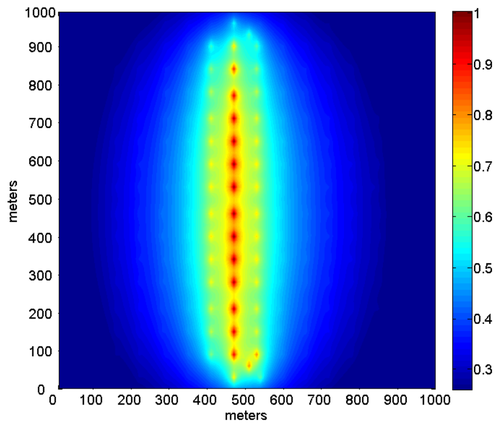


Forwarded Packets – OLSR

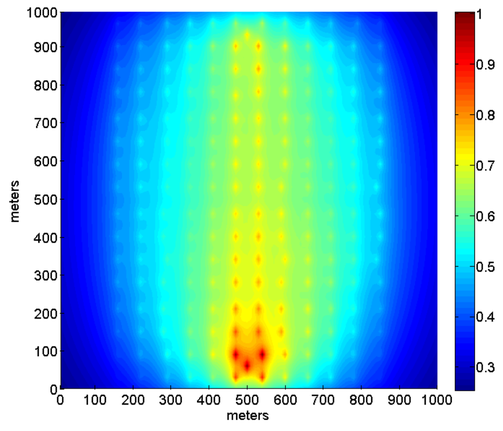


Forwarded Packets – SBR

Straight Traffic Scenario:

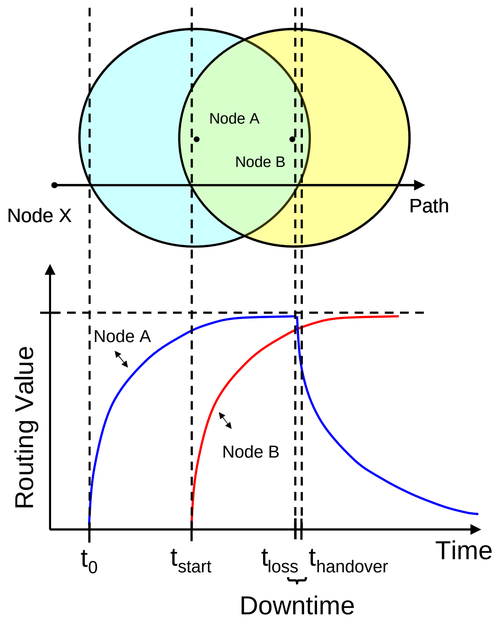


Traffic Load – OLSR Protocol



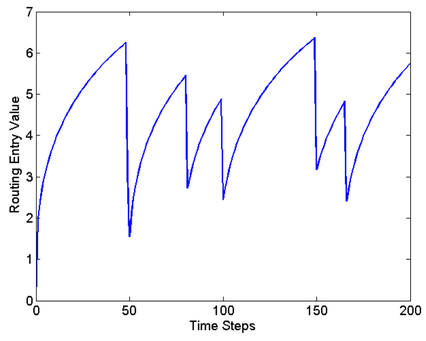
Traffic Load – SBR Protocol

Handover Example



Routing Entry Functions

- Used to increase/decrease the routing table entries
- Affect the reaction time of the protocol



Snapshot of routing value function