

Network Services for Disaster-stricken Areas

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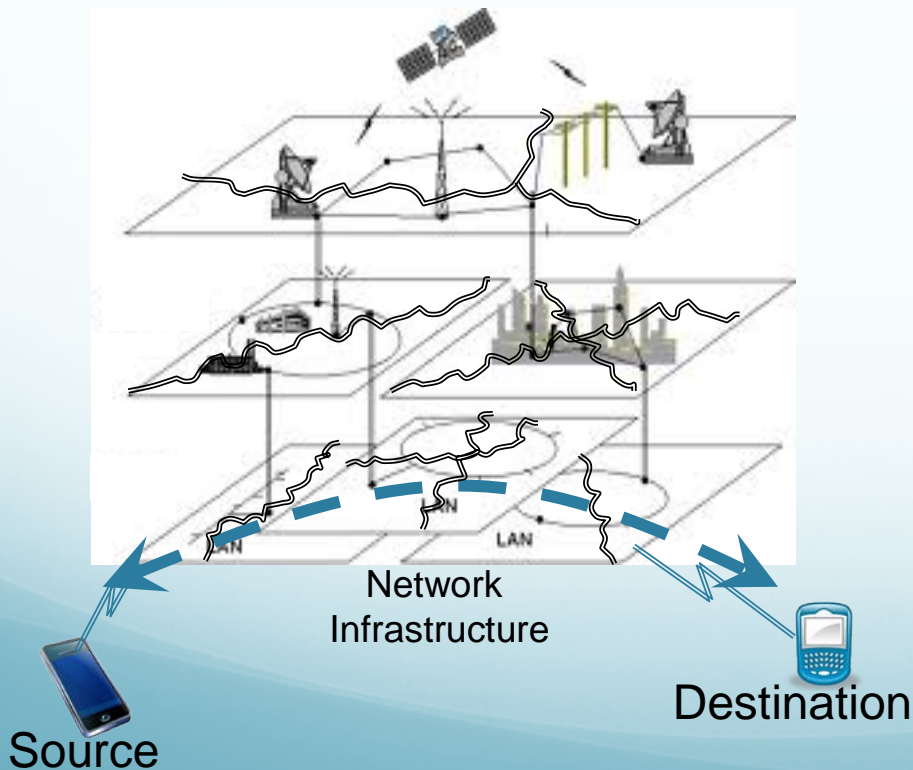
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Date: 2012/2/16

Introduction

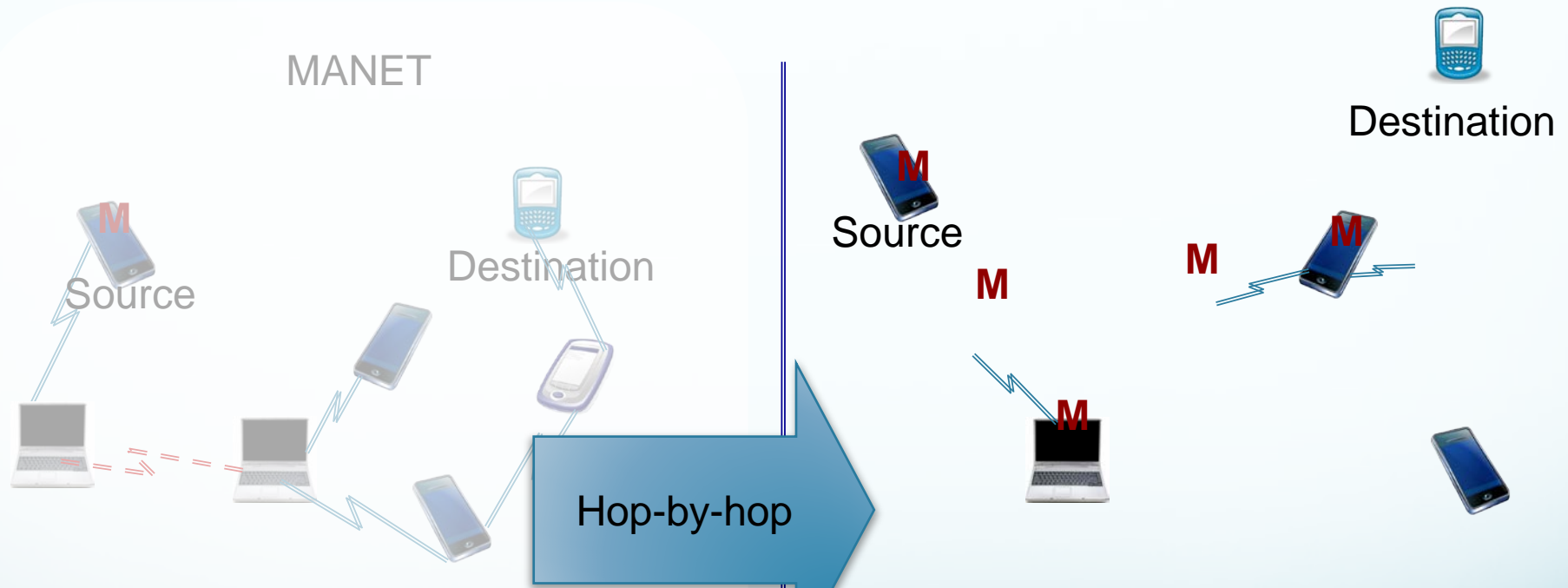
- Network Scenario



Challenges

- Infrastructure destroyed
- Server unreachable
- Communication path between source/destination cannot be established.

Communication in Disaster-stricken Area

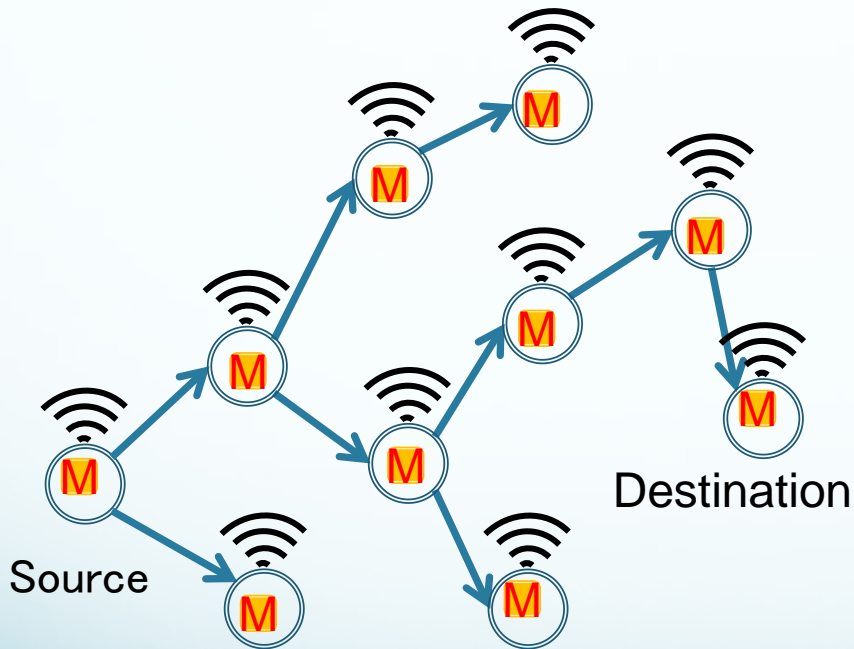


Never end-to-end path, never send messages

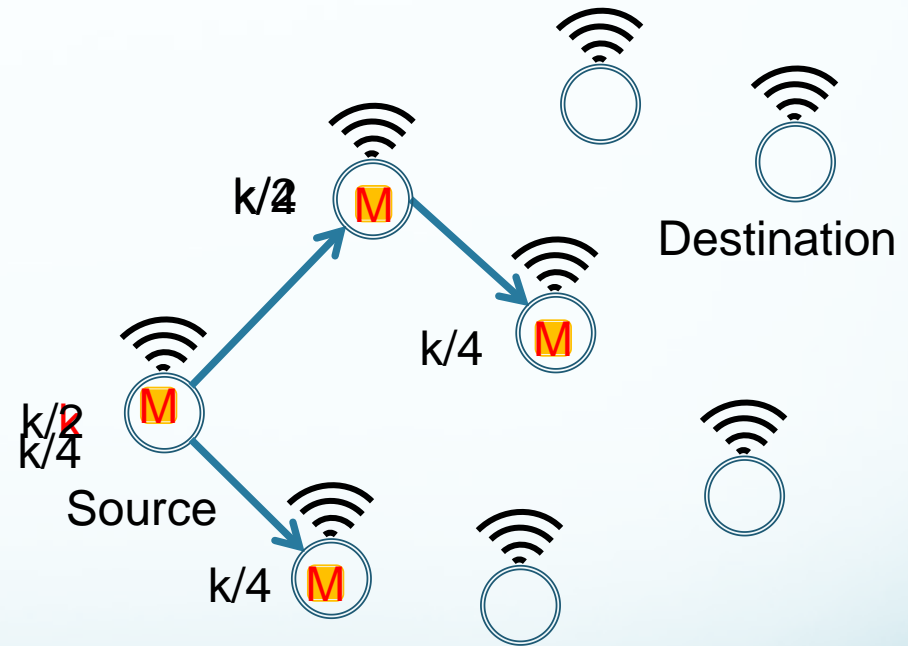
- Opportunistic forwarding
- Known as “delay- and disruption-tolerant network (DTN)”

Routing Protocol for DTN

- Considerations: buffer size, energy consumption



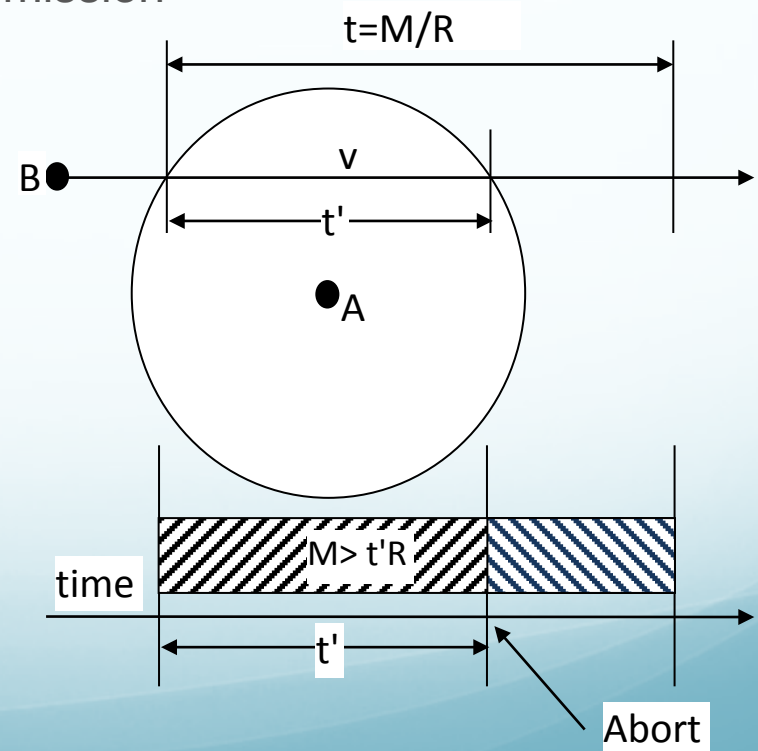
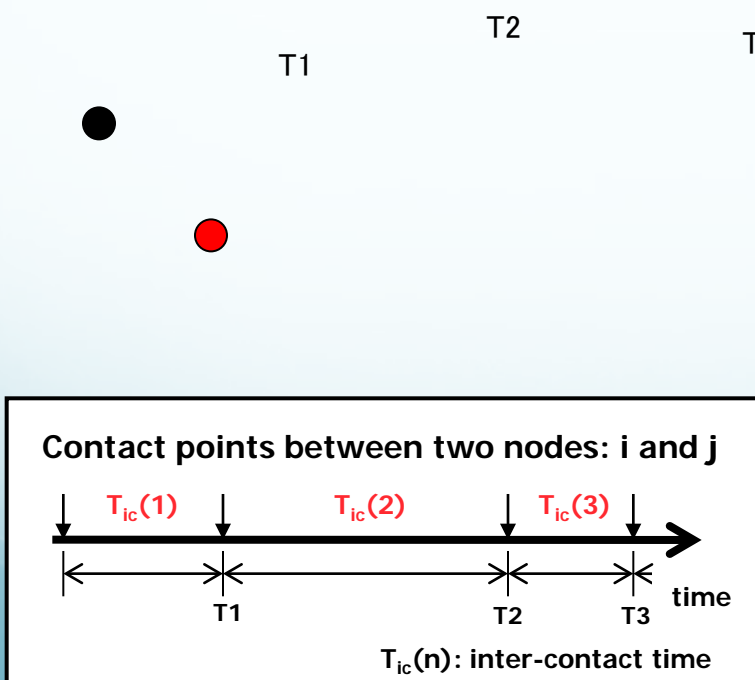
Example1: Epidemic



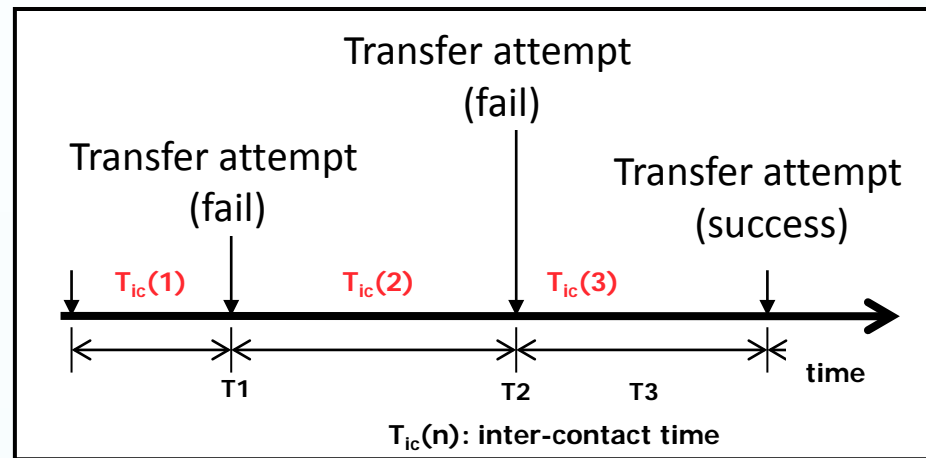
Example2: Spray and wait

Performance Factors for Delivery Ratio and Delay

- Inter-contact time: interval between two contact points
 - Higher meeting frequency- better performance
- Contact Duration: time for which two nodes remain within each others range
 - Insufficient contact duration- retransmission



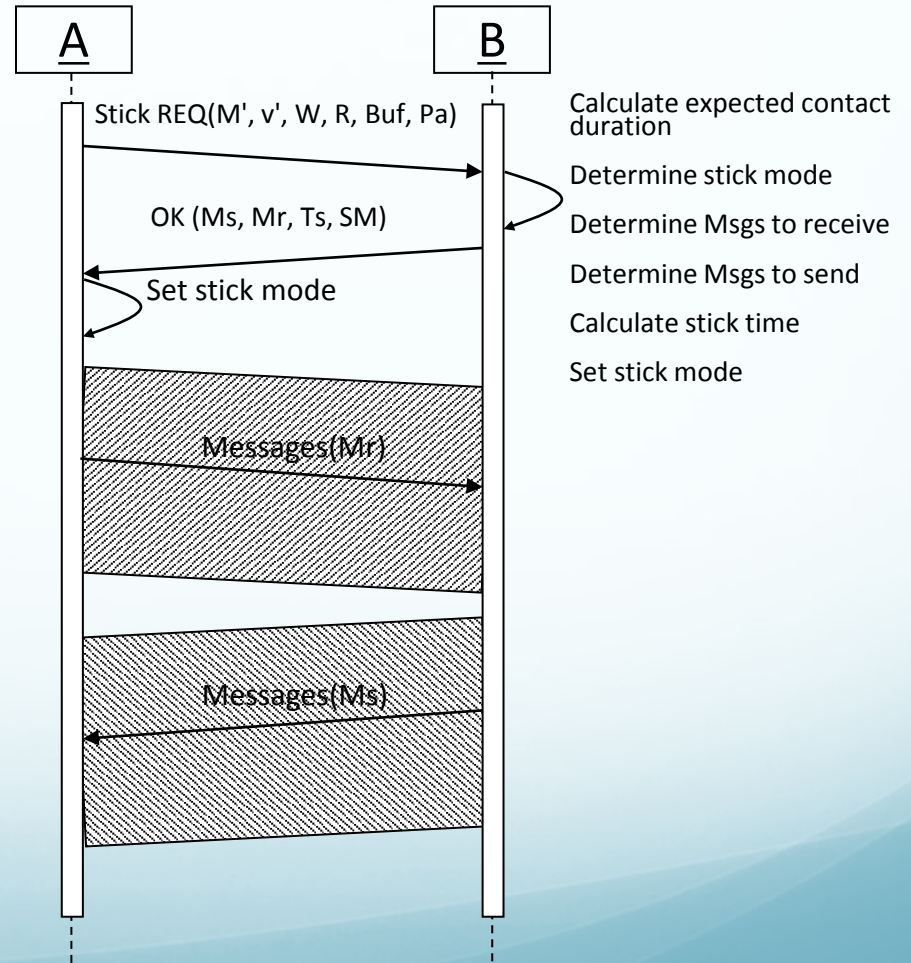
Insufficient Contact Duration



- Time to forward a copy $T_{ic}(1) + T_{ic}(2) + \dots + T_{ic}(n)$
- Inefficient use of opportunities

Sticky Transfer Protocol

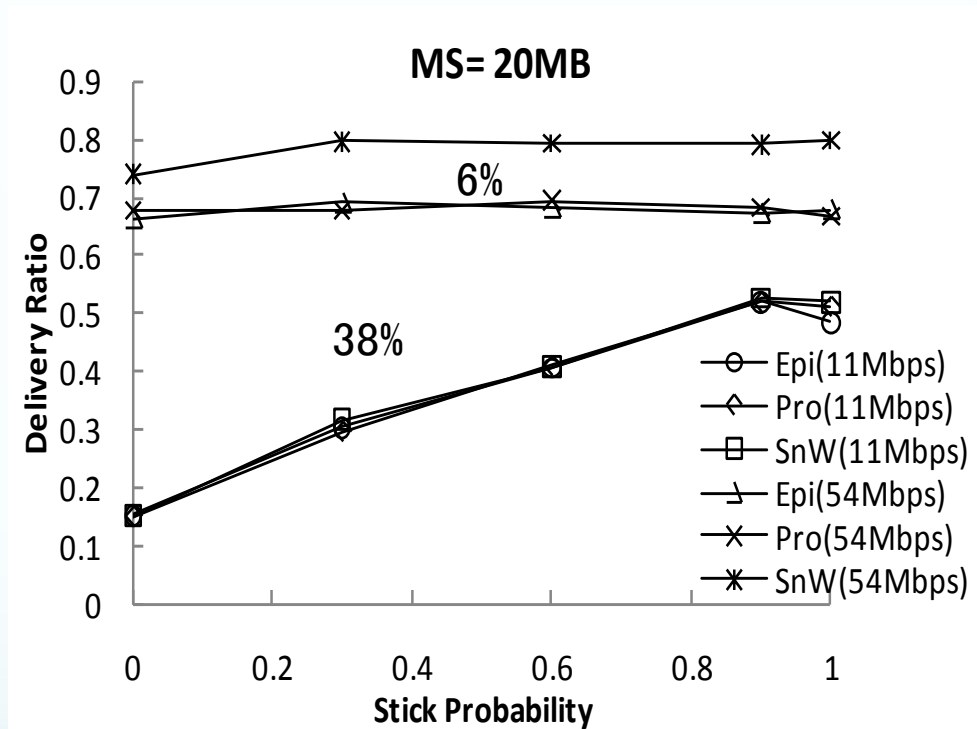
- Mutual agreement to stick together
- Transfer messages
- Resume movement



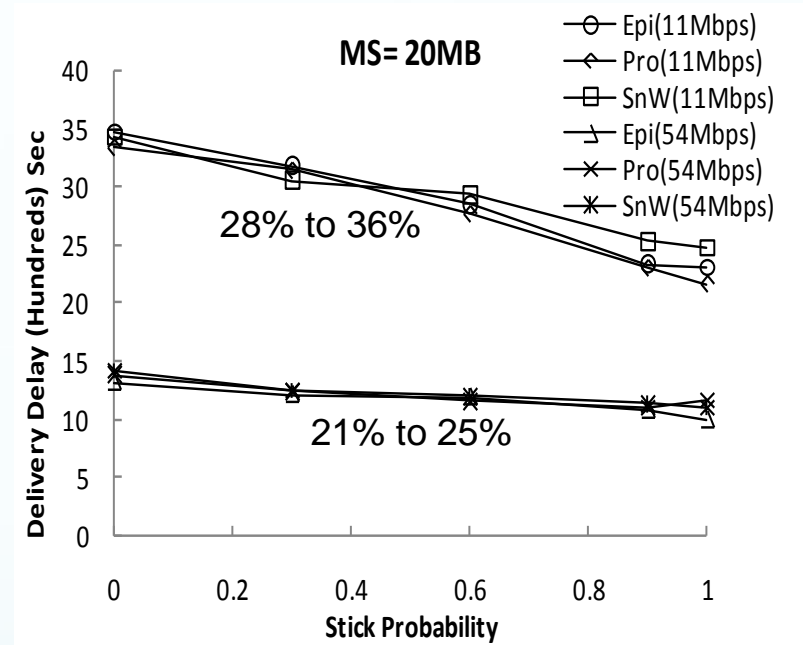
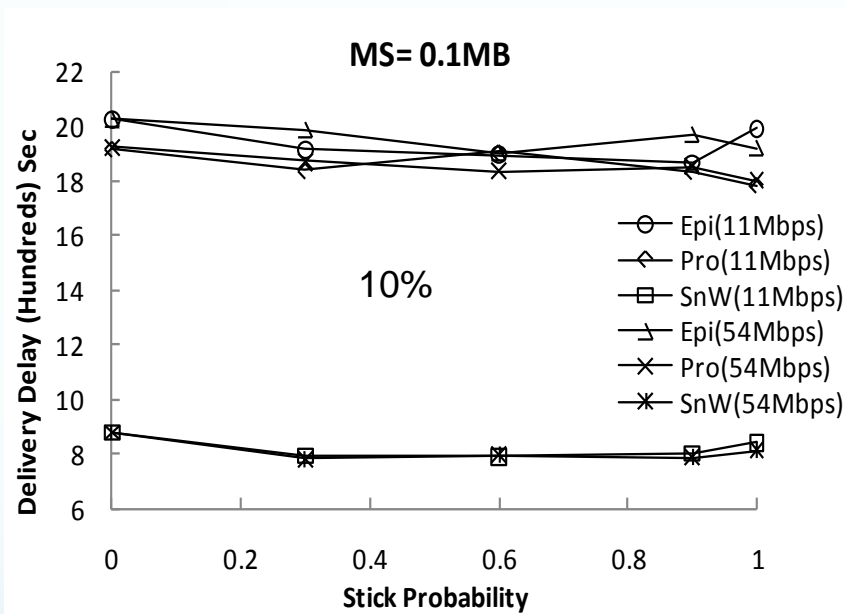
Simulation Settings

	Mobile node type	Node speed (m/s)	No. of nodes	Buffer size (GB)	Msg. size (MB)	Transfer rate (Mbps)
Range	-	1.25-30	10-30	1	0.1,20	11, 54
Default	Pedestrian	1.25-1.53	4	1	20	11
	Cyclers	2.5-8.33	6			
	Car	20-25	10			

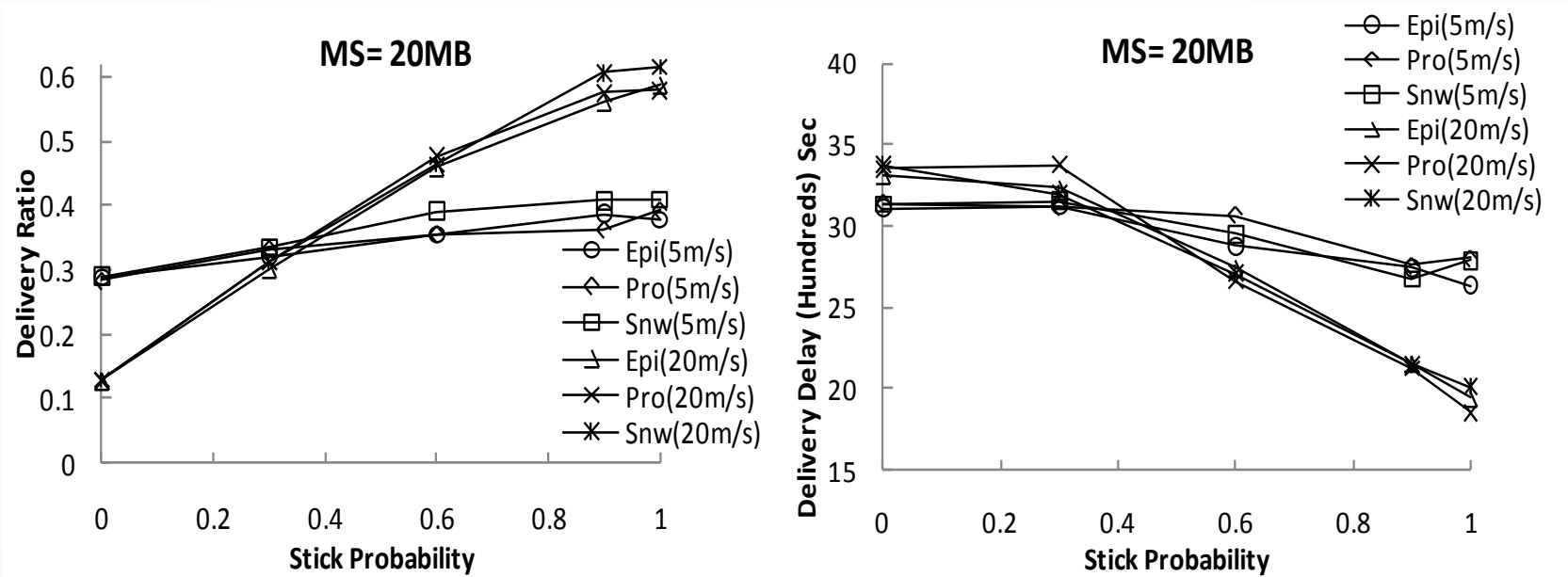
Delivery Ratio



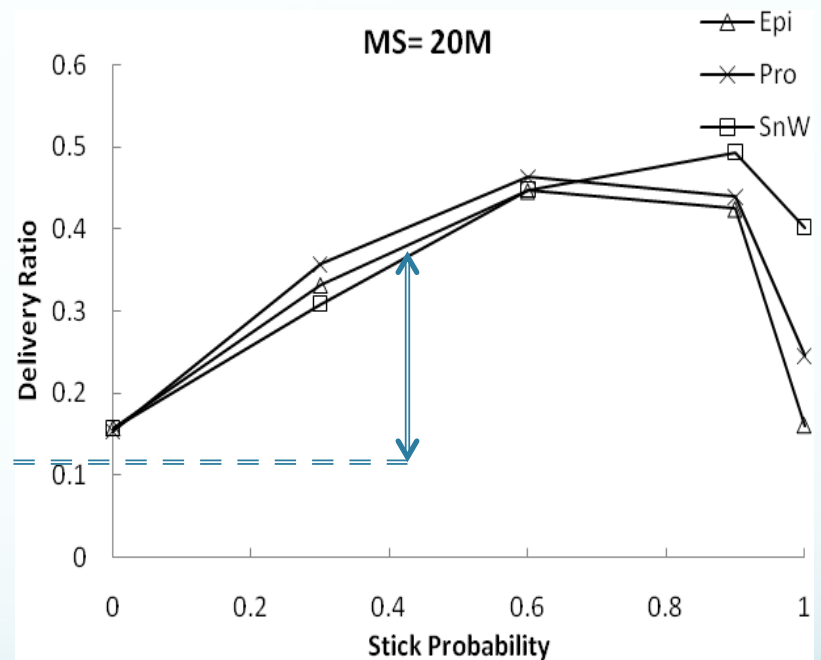
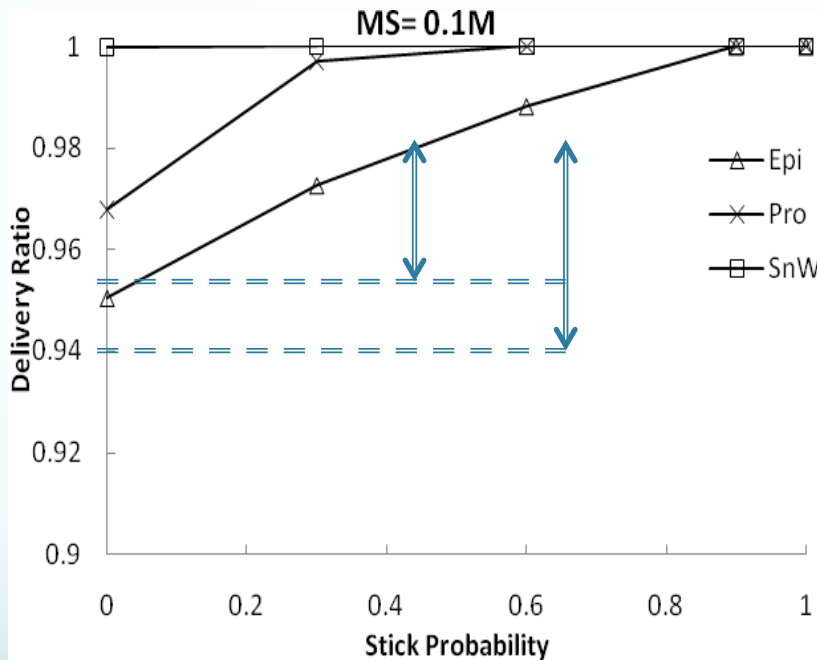
Delivery Delay



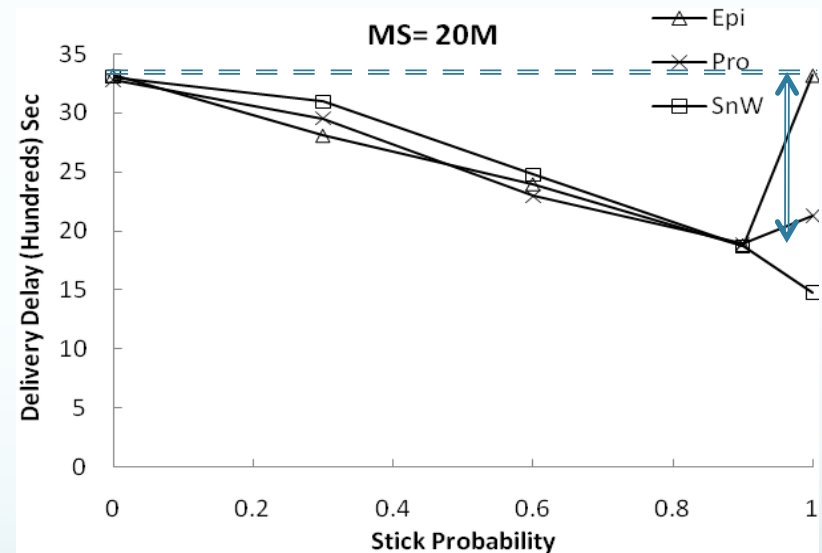
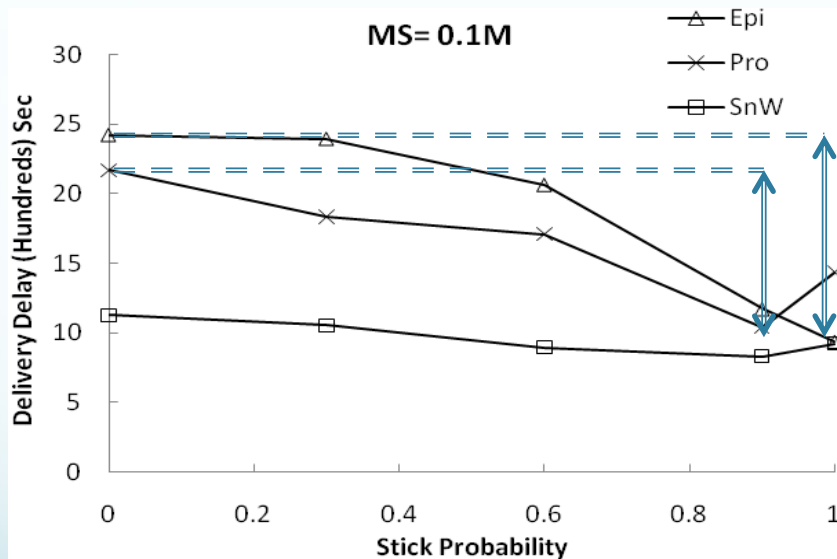
Effects for Different Node Movement Speed



Stick without necessity assessment (Delivery Ratio)



Stick without necessity assessment (Delivery Delay)



Conclusion

- A novel framework : sticky transfer
 - Cooperative forwarding– agreement for mutual benefit
- Improves both delivery and delay
 - Useful for data recovery and backup in disaster area
 - Most beneficial for large data sizes