An Effective Queue Management Scheme for Opportunistic Networks

Md. Enamul Haque   Shigeki Yamada

Opportunistic Networks

- Supports communication between intermittently connected nodes by isolating delay with a store-and-forward technique
- Endorse mobility by custody transfer mechanism
- Utilizes hop by hop routing mechanism
- Prospective example: smartphones communicating each other forming such network
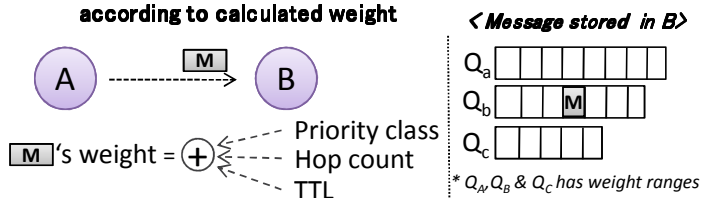
Motivation

- Unpredictable delay and store-carry-forward mechanism make congestion control and/or avoidance very important
- Lack of global knowledge turns available solutions unsuitable
- An effective queue management can avoid and/or control congestion in such cases
- Overall objective: Obtain better delivery ratio

## A Queue Management Scheme

Three components of this scheme:

A. Weighted fair queuing

- Intermediate nodes store, rearrange & forwards bundles according to calculated weight

<Message stored in B>

Q_a

Q_b [M]

Q_c

* Q_A, Q_B & Q_C has weight ranges

A -- [M] --> B

[M]'s weight = (+) <<- Priority class
                     Hop count
                     TTL

B. Early avoidance mechanism: If buffer is almost full, deny custody and accept message with higher weight

C. Exchange mechanism: Exchanges with less weight messages when buffer full

A -- [M] --> B Buffer full

Exchange ?
OK
less weight [M]
high weight [M]
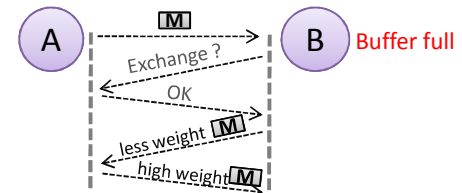
Preliminary Evaluation

■ Partially implemented in Spray and Wait routing, Prophet routing module of One simulator.
■ Compared this scheme's performance with First-In-First-Out (FIFO) scheme.

Simulation criteria
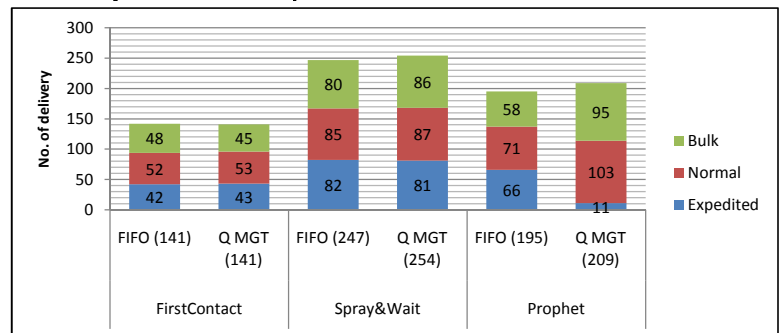■An urban scenario with 20 pedestrians, 5 buses and 5 taxis.
■ All were mobile

Performance
■ Better delivery ratio compared to FIFO
■ Less overall number of dropped messages

Future work
■ Full implementation of proposed scheme and compare with other more resembling schemes.
■A suitable early congestion avoidance algorithm

- Delivery ratio in different protocols

	Expedited	Normal	Bulk
FIFO (141)	42	52	48
Q MGT (141)	43	53	45
FIFO (247)	82	85	80
Q MGT (254)	81	87	86
FIFO (195)	66	71	58
Q MGT (209)	11	103	95

FirstContact   Spray&Wait   Prophet

- Drop ratio considering two drop reasons

	Expired	Overflow
FIFO	877	1253
Q MGT	940	1021