

TCP

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Vertical and Horizontal Flow Controls for TCP Optimization in the Mobile Ad Hoc Networks

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Mobile Ad Hoc Network(MANET)

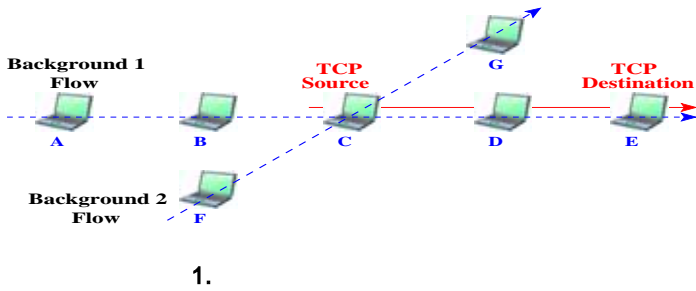
TCP throughput 가 MANET IEEE 802.11
MAC
2

1. IEEE 802.11 MAC
MANET[1]
2 MANET
AP(Access Point) throughput 가 2가
3 NS-2
MANET throughput 가
throughput . MANET throughput

2. TCP

2.1.

가
가
MANET
IEEE 802.11
MANET
RTS/CTS
[2]. 802.3x congestion
가
MANET 가
가
가
TCP



2.2. Vertical Flow Control

MANET

, IFQ 가 가

TCP 가

IFQ

TCP

TCP 가

IFQ 가

1

1. MANET
 1. C E TCP 가 TCP
 가 C
 C (Interface Queue, IFQ) 가
 TCP IFQ
 TCP 가 IFQ congestion

```

Algorithm 1 Vertical Flow Control
1: nPacket <- 0;
2: if IFQ.Length() < IFQ.Limit() then
3:   Maxburst <- min{Maxburst, IFQ.Limit()-IFQ.Length()};
4: else
5:   Maxburst <- 0;
6: end if
7: while Seq Number _ Highest ACK + cwnd do
8:   if Maxburst == nPacket then
9:     break;
10:  end if
11:  Send packet();
12:  nPacket ++;
13:  Seq Number ++;
14: end while
  
```

Maxburst TCP 가

Maxburst

IFQ

, Maxburst

가

, IFQ

가

, Maxburst 0

TCP



2. RTS/CTS

2. RTS/CTS IEEE 802.11

B C RTS/CTS

, B C

C 가

C IFQ 가 가

B 가

C CTS

, B C

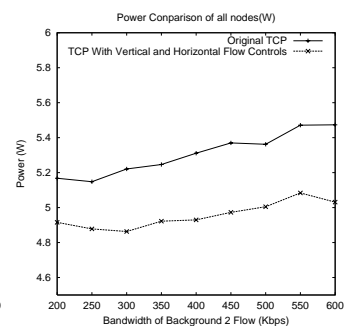
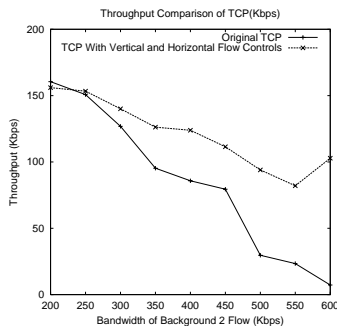
C

2

2.3. Horizontal Flow Control

IFQ 가 가
 RTS/CTS
 RTS
 IFQ
 가
 CTS
 가
 RTS
 RTS
 CTS
 7
 [3].
 IFQ 가 가
 RTS
 CTS
 CTS
 IFQ 가 가

congestion
 throughput



3. Throughput

4. Power

Cumulative TCP ACK
 UDP

4

[4].

Horizontal

가
 RTS_Threshold
 가
 가 TCP ACK
 가 UDP

4.

MANET TCP

TCP 가 IFQ

가 UDP
 가
 가

IFQ
 , IFQ 가 가

throughput

3. 가
 가 NS-

가

2 , throughput

1 가 . 1Mbps CBR(Constant Bit Rate) 가 Background 1 Traffic A

E , F G

Background 2 Traffic 200Kbps 600Kbps

50Kbps 가 . Background 2 Traffic

C , C

congestion

3

TCP throughput

Reference

[1] Charles E. Perkins, "Ad Hoc Networking," Addison Wesley, 2000.
 [2] IEEE Computer Society, "802.11: Wireless LAN Medium Access Control (MAC) and
 [3] Z. Fu, P. Zerfos, H. Luo, S. Lu, L. Zhang and M. Gerla, "The Impact of Multihop Wireless Channel on TCP Throughput and Loss," to appear in IEEE INFOCOM 2003.
 [4] E. Altman and T. Jimenez, "Improving TCP over multihop network using delayed ACK," to appear in MADNET 2003.