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(73)

206

66 - 3 103 703

(72)

17

463 - 1

463 - 1

(74)

:

(54) (A T M) (T C P)

(RM) (ATM) (TCP) ,
down size) , ER (Explicit Rate : ER) TCP (congestion win

1 ABR TCP

2 TCP

<

11 : ATM 12 : ATM

121 : ATM ATM

122 : ATM TCP

13 : ATM

131 : ATM ATM

132 : ATM TCP

(Asynchronous Transfer Mode : ATM) (Tra
 nsmission Control Protocol : TCP) , 가
 (Available Bit Rate : ABR) (Resou
 rce Management : RM) (Explicit Rate : ER) TCP
 (congestion window size) , ATM ABR TCP
 TCP

ABR ATM , TCP
 가

TCP (Acknowledgement : ACK)

TCP (timeout) 가 가 , TCP
 TCP

TCP (ACK)

가/
 가

ABR (Retransmission T
 ime Out : RTO)
 TCP
 TCP (throughput)
 가 . 'TCP - (TCP - Reno)' 'TCP - 가(TCP - Vegas)'
 가 .

ABR TCP TCP가 가 TCP
 가 (exponential increase fast - recovery) 가(linear inc
 rease) 가 .

, ATM ABR RM TCP
 TCP (RM ER)

Explicit Rate) ATM ATM (RM) ((RM) ;
 , ATM (RM) (Explicit Rate) ATM ;

ATM 가 ;
 ATM

ate mode ABR) ATM RM TCP ER ABR(Explicit r
 가 , ABR RM ER TCP TCP
 TCP ER TCP TCP

ER ATM 가 (Virtual Circuit : VC) (fairness) (stability)
 TCP TCP

- ATM
 RM , RM ER TCP .

- TCP
 (ACK) TCP .

$$awnd = "MIN" [credit, cwnd] \dots (1)$$

'awnd' (allowed window) , 'credit' TCP , '
 cwnd' (congestion window) .

'cwnd' ER 'cwnd' , TCP

TCP , TCP 가 .

TCP 'cwnd' . TCP 가

$$TCP = "last_ER" * \frac{48}{53} * \frac{31}{32} * \frac{TCP_MSS}{TCP_MSS + 56bytes} (2)$$

'TCP_MSS' TCP (maximum segment size) , ABR 가
 'last_ER' ATM , RM , TCP, (Internet Protocol : IP), ATM 5(
 ATM Adaptation Layer 5 : AAL5), 1577(Internet Engineering Task Force Request For Comm
 ents 1577 : RFC 1577) (overhead) TCP 가

$$cwnd = "TCP" * estimated_RTT * safety_factor (3)$$

'estimated RTT' (estimated Round Trip Time) , 'safety f
 actor' RTT .

TCP (safety_factor(s < 1)) RTT
 TCP TCP

1 ABR TCP , TCP ATM R
 M . RM . ATM (12) ATM (121)
 , ATM (12) TCP (122)
 TCP 'credit' (1) (cwnd)
 (awnd)

'11' ATM (13) TCP (132) , '131' ATM (13) ATM (131) , '132' ATM (12) ATM (121) TCP (122) (awnd) , ATM (12) ATM (121) ATM ABR (S1). RM 'last_ER' , TCP (122) (awnd) ATM (12) TCP (122) (ACK) 'cwnd' 1 (S2). (S3), (2) (3) 'cwnd' (S4). (1) (awnd) 가 (S5). , 가 TCP (awnd) (, 가 ACK) , 가 'awnd' (positive value) 3 (throughput)(Mbps) TCP (Throughput) TCP . TCP ABR (on - off) 5 (Constant Bit Rate : CBR) (File Transfer Protocol : FTP) n 가 150Mbps (LAN) (WAN) 가 1Km , 100Km, 1Km 0.1Km, 1Km, 0.1Km .

= "150" Mbps

= "1,000" (cells) (on - off CBR) , 2,500 (cells) (FTP)

- CBR (on time) = "84ms," (off time) = "84" ms

TCP (Maximum Segment Size : MSS) = "9,140" bytes

TCP (timer granularity) = "50" ms

TCP = "20" (segments) = "182,800" bytes

= "1,000,000" (cells)

ABR Nrm(RM : Number of cells between Forward RM cells) = "32

(Peak Cell Rate : PCR) = "150" Mbps

(Minimum Cell Rate : MCR) = "0.1" Mbps

(Initial Cell Rate : ICR) = "5" Mbps

가 (Rate Increase Factor : RIF) = "1

(Rate Decrease Factor : RDF) = "1

(Transient Buffer Exposure : TBE) = "512" cells

(Background)

TCP

BR 10 10Mbps , 가 10Mbps , 1 100Mbps - C
 가 .5 10Mbps 가
 (safety_factor) (s) 가 , .

1.

			s="0.2	s="0.3	s="0.4	s="0.5	s="0.6	s="0.7
			0Mbps	92.6	126.0	126.0	128.8	128.8
	14.4	2.1	2.1	0.8	0.5	0.5	3.7	
100Mbps*1	67.4	82.3	82.7	83.3	81.6	78.7	75.5	
	9.7	4.5	1.0	2.2	3.4	6.2	7.3	
10Mbps*10	65.6	85.5	86.0	83.9	82.0	77.5	74.1	
	10.9	1.7	1.0	2.2	3.4	6.2	8.4	
10Mbps*5	75.6	105.9	107.0	107.6	105.8	100.5	94.4	
	15.0	1.8	1.3	0.8	1.7	4.4	7.4	

2.

			s="0.2	s="0.3	s="0.4	s="0.5	s="0.6	s="0.7	s="0.8
			0Mbps	94.2	91.4	98.2	104.1	114.3	122.4
	14.0	14.2	12.8	11.2	7.1	3.7	3.8	6.3	
100Mbps*1	67.4	67.3	70.0	72.6	75.1	76.6	74.9	73.2	
	10.3	11.1	11.2	10.4	8.9	7.5	8.0	8.9	
10Mbps*10	65.8	65.8	70.5	74.9	79.4	78.6	75.6	73.5	
	10.6	12.2	11.0	8.3	5.3	5.7	7.7	9.1	
10Mbps*5	76.6	78.3	82.2	89.2	98.3	101.4	96.8	92.8	
	14.8	13.5	12.9	10.3	5.8	4.0	6.3	8.4	

P 가 , 가 가 가 TC
 가 , 가 가 .

TCP 가 0.5 가 ,
 , 가 0.5 28.3 10.27 가
 TCP ABR TCP TCP TCP
 TCP over ATM ' 1998 11 14 , ' RM

ER

(57)

1.

ATM ATM
 (RM) (Explicit Rate)
 (ATM) (TCP)

2.

1 ,
 (ATM) 가 (TCP)

3.

1 , (ATM)
 (TCP)

= " [credit," cwnd]

(credit

cwnd , * estimated_RTT * (safety_factor),

estimated_RTT

RTT

$$\text{last_ER} * \frac{48}{53} * \frac{31}{32} * \frac{\text{TCP_MSS}}{\text{TCP_MSS} + 56\text{bytes}}$$

last_ER RM ER ,

TCP_MSS)

4.

ATM (RM) ;

(RM) (Explicit Rate) ATM

;

(ER) 1 ;

ATM 가 ;

(ATM) ATM (TCP)

5.

4 ,

CP) (ATM) (T

= " " * estimated_RTT * (safety_factor)

(estimated_RTT ,

RTT)

6.

4 ,

(ATM)

(TCP)

$$= \text{"last_ER"} * \frac{48}{53} * \frac{31}{32} * \frac{\text{TCP_MSS}}{\text{TCP_MSS} + 56\text{bytes}}$$

(last_ER RM ER ,
TCP_MSS)

7.

4 ,

(ATM)

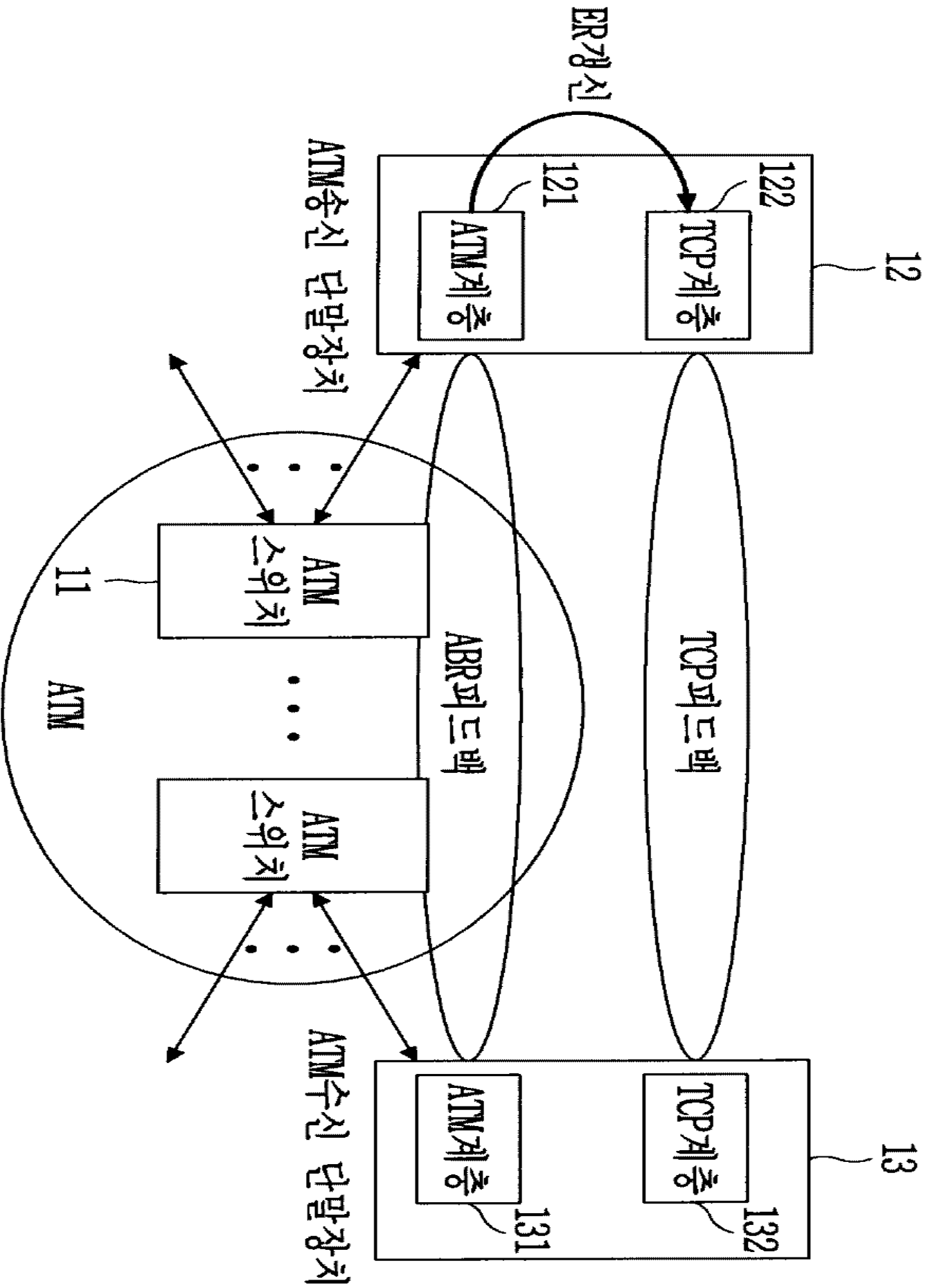
(TCP) .

= " [credit," cwnd]

(credit ,

cwnd)

1



2

