

(19) (KR)
(12) (B1)

(21)	10 - 2000 - 7009940	(65)	2001 - 0085223
(22)	2000 09 07	(43)	2001 09 07
	2000 09 07		
(86)	PCT/US1999/30006	(87)	WO 2000/41354
(86)	1999 12 29	(87)	2000 07 13

(30) 60/115,294 1999 01 08 (US)

(73)	가	가
	2	3 8

(72) 153 2 3 - 8 가 가

(74)

(54)

가

xDSL

(,)가
가 ,
가 .

2

가 가 (MB)가 . V.34

SHDSL, SDSL(4KHz xDSL) DSL(Digital Subscriber Line) xDSL (local twisted wire pair), DSL, ADSL, VDSL, HDSL,

xDSL , /

, 가
(, CAT3 CAT5) , xDSL

ACK - Acknowledgement Message;

ADSL - Asymmetric Digital Subscriber Line;

CCITT - International Telegraph and Telephone Consultative Committee;

CDSL - Consumer Digital Subscriber Line;

DSL - Digital Subscriber Line;

FSK - Frequency Shift Keying;

GSTN - General Switched Tele

HDSL - High bit rate Digital Subscriber Line:

HSTU - C - handshaking portion of the xDSL central terminal unit(xTU - C);

HSTU - R - handshaking portion of the xDSL remote terminal unit(xTU - R);

ISO - International Organization for Standardization;

ITU - T - International Telecommunication Union - Telecommunication Standardization Sector;

NAK - Negative Acknowledgement Message;

NTU - Network Termination Unit(Customer premise end);

POTS - Plain Old Telephone Service;

PSD - Power Spectral Density;

PSTN - Public Switched Telephone Network;

RADSL - Rate Adaptive DSL;

VDSL - Very high speed Digital Subscriber Line;

xDSL - any one of the various types of Digital Subscriber Line(DSL);

xTU - C - central terminal unit of an xDSL;

xTU - R - remote terminal unit of an xDSL.

, (,)

,

1 (,) 2 (,)

1 2 , 1 2 , 1 2
2 , 1 2 , 1 2
가

, 1 2 xDSL xDSL

, (,)

1 (,) 2 (,) . (, xDSL)
) 1 2 가 , 2
. 1 가 .

4KHz

, 1 2 가 . , 1 2 3

4KHz

, 1 2 xDSL(, xDSL)

), . 가 (4KHz

1 2 xDSL(, xDSL)
가 (,)
4KHz
1) 가 (

, 1 , , ,
 , 2 , , , 1
 - , 1 , , , 1
 2 , - ; 2 , ; 1
 ; 1
 2 , 1 , 1
 .
 가 1
 - , 1

1 2 (, xDSL)
 가 ,
 1
 ,
 가

- ITU "Procedures For Starting Sessions Of Data Transmission Over The
 General Switched Telephone Network" V.8(09/04);

- ITU "Procedures for the Identification and Selection of Common Modes
 of Operation Between Data Circuit - Terminating Equipments(DCEs) and Between Data Terminal Equipmen
 ts(DTEs) over the General Switched Telephone Network" V.8bis(08/96);

- ITU "Procedure For the Allocation of CCITT Defined Codes for Non - st
 andard Facilities" T.35;

- ITU "A Modem Operating at Data Signaling Rates of Up To 33,600 bit/s
 for Use on the General Switched Telephone Network And on Leased Point - to - Point 2 - Wire Telephone -
 Type Circuits" V.34(10/96).

1999 1 8 US Provisional Application No. 60/115,294
 가

1 1
 2 1
 3 xTU - R xTU - C
 .
 4 xTU - R xTU - C

xTU - R

xTU - C

5 xTU - R xTU - C

6 xTU - R xTU - C

7 xTU - R xTU - C가 xTU - R

8 xTU - R , xTU - C가 xTU - R

9 xTU - R , xTU - C가 xTU - R

10 xTU - R xTU - C가 xTU - C

11 xTU - R , xTU - C가 xTU - C

12 xTU - R , xTU - C가 xTU - C

가 . , , , 가

1 , 1 (central office system)(2) (re
mote system)(4) , 1 (5)

(2) (2) (5) MDF(main distribution f
rame)(1) . MDF(1) , (, 5)
(,) .

$$(3) \quad . \quad \text{NID}(3) \quad (4) \quad (5) \quad (\quad , \quad) \quad \text{(NID)}$$

2 1 1 . . (2) (4)
(installation) . .

2 , (2) (34) (38), (82) (38), (test ne
 gociation block) (46), (68), (70) (82) . ((46)
 82) (46) (2), (4) (5) (condition),
 46) (68) (4) (,) (68,70) ,
 (70) (46) (4) (54) (68,70)
 , ADSL, HDSL, SHDSL, VDSL, CDSL (68,70)
 (68) (82) (54) (52)
 (82) (70)

, (46) (52) (54) (54) (2)

(4) (36), (40), (48), (72),
 (66) (84) (84) (48) (48), (72),

(46) (40) (5) (5) ,
 (48) (2), (4) (5) ,
 (72) (2) (50) (56) (66) (84) (72)

, (48) (56) (50) (50) (50) (4)

(4) (50) (2) (2) (52)
 (56) (2) (54) (4) (4)

(2) (4) (22,26,28,30,32) (6,10,
 14,16,18) (, 0 - 4KHz) , (6) (34,36)
 (32) (4) (36) (2) (33) ((36)) (5) (36) , (33)

(33)

(10,14,16,18)(84), (10,14,16,18)(bundled), (discrete signals)(), (10,14,16,18) RS - 232, , FireWire(IEEE - 1394), USB(Universal Serial Bus), , (IrDA) (22,26,28,30), (discrete signals)(), (bundled),

, 2

TDMA, (FDM)가 (2), (4) / (, CDMA,)

0 Hz 4 KHz 가 PSTN
 4 KHz
 1 25 KHz . , T1E1 T1.413 ADSL 34.5 KHz
 (tone bursts)가 . , (precursor)

(handshake procedure) 가
가 , , (inter - modulation products) (rob
ust), (spacing) . 4.3125 KHz 4.0 KHz (base frequency)

신호 수신지	업스트림 주파수 인덱스 (N)	다운스트림 주파수 인덱스 (N)
A43	9 17 25	40 56 64
B43	37 45 53	72 88 96
C43	7 9	12 14 64
A4	3	5
B4	4 28 34	66 67 76

(4) , (limitation)

$$\begin{array}{ccccc} (2) & & , & & (4) \\ (2) & (\quad \quad) & , & (4) & \end{array}$$

$$(xTU - C) \quad (2) \quad (xTU - R) \quad (4)$$

, \quad (\quad)

가 (prefix) (suffix) 가 가

TONE() - ;

- (a) 7 , xTU - R xTU - C가 xTU - R ;

(b) 8 , xTU - R , xTU - C xTU - R ;

(c) 9 , xTU - R , xTU - C xTU - R ;

(d) 10 , xTU - R xTU - C가 xTU - C ;

(e) 11 , xTU - R , xTU - C xTU - C ;

(f) 12 , xTU - R , xTU - C xTU - C ;

xTU - R R - FLAG1 R - TONE1 C - TONES
 . xTU - R R - TONE1 R - FLAG1 C - TONES

xTU - R , xTU - R xTU - C가
 7 xTU - R xTU - C가 , xTU - R
 . xTU - R (R - TONES - REQ) () , ,
 16 ms . R - TONES - REQ 가 xTU - C , ,
 xTU - C (C - TONES) () . C - TONES 가
 xTU - R , xTU - R , 50ms 500ms 2
 (, (silence)). , xTU - R xTU - C가 C - TONES
 , 100ms 1 (R - FLAG1)
 . R - FLAG1 가 , xTU - R , 2
 (R - FLAG - HD2)가 . xTU - C가 R - FLAG - HD2 , , 100ms
 (C - FLAG - HD) . 가 , xTU - C
 , 2 (C - FLAG - HD2)가 . xTU - C 가 ACK
 xTU - R . , xTU - C 가 ACK 가 , xTU - R R - FLAG
 1 . , xTU - C R - FLAG1 , ,

xTU - R , xTU - R xTU - C

8 xTU - R , xTU - R , xTU - C
. xTU - R (R - TONES - REQ) ()
, , 16ms . R - TONES - REQ
가 xTU - C , xTU - C (C - TONES) ()
. C - TONES 가 xTU - R , xTU - R , 50ms 500ms
2 (, (silence)). , xTU - R
, 100ms 1 (R - FLAG1) .

xTU - C , xTU - C C - GALF ,
 C - TONES , xTU - C C - TONES , xTU - R C -
 TONES (end) , xTU - R xTU - C가
 . , xTU - R R - GALF Glafs 2 ,
 . xTU - C R - GALF Galfs , xTU - C C - TONES

xTU - R , xTU - R xTU - C

9 xTU - R , xTU - R , xTU - C
 . xTU - R (R - TONES - REQ) () . R -
 TONES - REQ 가 xTU - C , xTU - C (C - TONES) ()
 . C - TONES 가 xTU - R , xTU - R , 50ms
 500ms 2 (, (silence)).
 , xTU - R , 100ms 1
 (R - TONE1)

xTU - C , xTU - C C - TONES . x
 TU - R C - GALF , () () .
 R - GALF 2 ,
 xTU - C가 , xTU - R xTU - C가

10 xTU - R xTU - C가 , xTU - C
 . xTU - C (R - TONES) () . C - TONES 가
 , 50ms 500ms 2 xTU - R , xTU - R xTU -
 C가 C - TONES , 100ms 1
 (R - FLAG1) . R - FLAG1 가 , xTU - R
 , 2 (R - FLAG - HD2)가 . xTU - C가 R - FLAG - HD2
 , 100ms (C - FLAG - HD) 2 .
 , xTU - C , (C - FLAG - HD2)가

xTU - C 가 ACK , xTU - R , xTU - C 가 A
 CK가 , xTU - R R - FLAG1 ,
 G1 , . xTU - R ACK .
 xTU - C가 , xTU - R xTU - C

11	xTU-C		, xTU-R		, xTU-C	
		. xTU-C		(C-TONES)	()	
	. C-TONES	가	, 50ms	500ms		
R	, xTU-R		, 100ms			2 xTU-
LAG1)		. xTU-C			1 , xTU-C	(R-F C-GALF
	, C-TONES					C-TONES
	, xTU-R	C-TONES	(end)	()	, xTU-C	
						가
		. , xTU-R	R-GALF	2		
TU-C	R-GALF		, C-TONES			.
						x
xTU-C가		, xTU-R		xTU-C		

12 xTU - C , xTU - R , xTU - C (C - TONES) ()
 . C - TONES 가 , 50ms 500ms ()
 R , xTU - R , 100ms 2 xTU - (R -)
 FLAG1) . xTU - C , xTU - C - TO
 NES () . xTU - R C - GALF
 , (, C - TONES) , xTU - R xTU - C 가
 , R - GALF 2 , xTU - R , xTU - R ,
 ,

5 xTU - R xTU - C
 (deactivating) xTU - R(xTU - C) MS(mode selec
 t) (16 "7E") xTU - C(xTU - R)
 MS , xTU - C(xTU - R) , ACK(1)
 . xTU - R(xTU - C) ACK(1) , xTU - R(xTU - C) GALF (16 "
 81") , (,), . xTU -
 C(xTU - R) ↳ GALF , xTU - C(xTU - R)
 (,), .

6 xTU - R xTU - C (deactivating)
. . , xTU - R(xTU - C) ACK(1)
. xTU - R(xTU - C) ACK(1) , xTU - R(xTU - C)
(,), GALF (16 "81") ,
xTU - C(xTU - R)가 , xTU - C(xTU - R) (,),

3. - Octet2 - NPar(3)

데이터 속도 NPar(3)s	8	7	6	5	4	3	2	1
단말에 의해 지정되지 않음	x	x	0	0	0	0	0	0
데이터 속도 (비트 5-1 x 32 kbit/s)	x	x	0	x	x	x	x	x
데이터 속도 (비트 5-1 x 64 kbit/s + 1024kbit/s)	x	x	1	x	x	x	x	x
데이터 속도 1544 kbit/s	x	x	1	1	1	1	1	0
예비됨	x	x	1	1	1	1	1	1

(57)

1.

1

2

1

2

■

1

2

■

1

가

2

2.

1

1

- 19 -

3.

1 ,

1 2 xDSL

4.

1 ,

xDSL

5.

1 ,

6.

5 ,

7.

1 ,

1 2 1
2

8.

7 ,

9.

1 2

,

1 2

,

2 - ;

1 2
가

10.

9 ,

1 , 2

,

11.

9 ,

1 2 xDSL

,

12.

9 ,

xDSL

,

13.

9 ,

14.

13

,

4KHz

15.

9

,

1

2

16.

15

,

17.

,

1

2

- ;

1

2

1

-

-

,

2

가

1

1

가

1

2

가

,

2

2

-

;

,

2

18.

17

,

1

,

2

19.

17

1

2

xDSL

20.

17

1

21.

20

22.

17

2

1

가

2

,

23.

17

24.

23

4KHz

25.

1 2 , - , 1
 , 2 , - ;
 2 1 - ;
 가 1 , 가 1
 2 가 - ;
 2 1 가 - , 1 -
 2

26.

25 ,
 1 , 2

27.

25 ,
 1 2 xDSL

28.

25 ,
 가

29.

28 ,

4KHz

30.

25

가 , 1

31.

1 1 , 2 2 - , - ;
 2 1 - ;
 가 1 가 1
 2 가 - ;
 2 가 2 , 1 - 1 2
 가

32.

31

1 , 2

33.

31

1 2 xDSL

34.

31

,

가

35.

34

,

4KHz

36.

31

,

가

,

1

37.

,

1

-

1

2

- ;

1

2

1

-

;

가

2

,

1

2

가

2

-

;

2

38.

37

,

1

,

2

39.

37

1 2 xDSL

40.

1 2 ,
 1 2 , 1 - , 2 - ;
 1 2 - , 1 - ;
 가 2 1 1 2 1
 가

41.

40 ,
 1 , 2

42.

40 ,
 1 2 xDSL

43.

40 ,
 가

44.

43 ,

4KHz

45.

40

가 , 1

46.

1

2 , 1 - , 1 - ;

2

2 - , 1 - ;

2

1 - ;

가 2 1 1 2
1 가

47.

46

1 , 2

48.

46

1 2 xDSL

49.

46

,

가

50.

49

,

4KHz

51.

46

,

가

,

1

52.

17

,

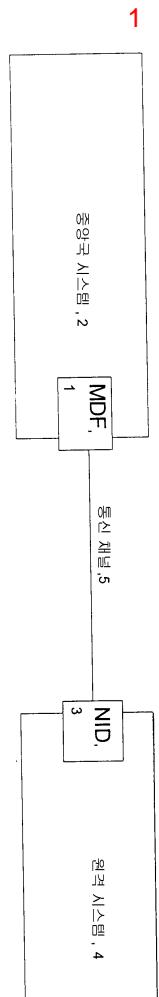
2

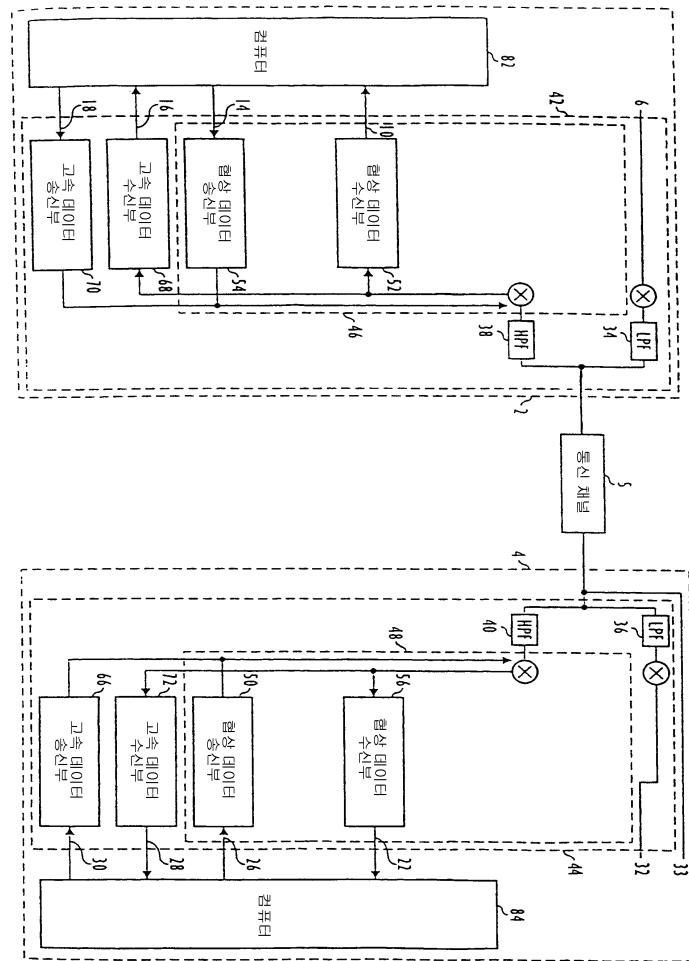
가

1

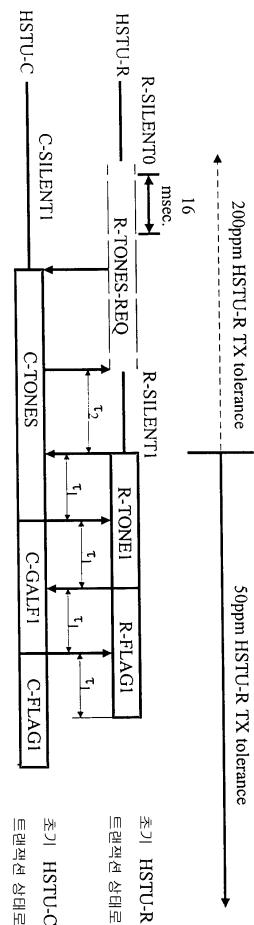
3

,



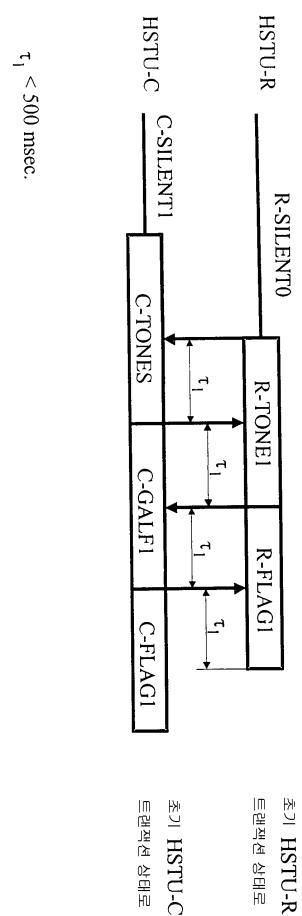


3



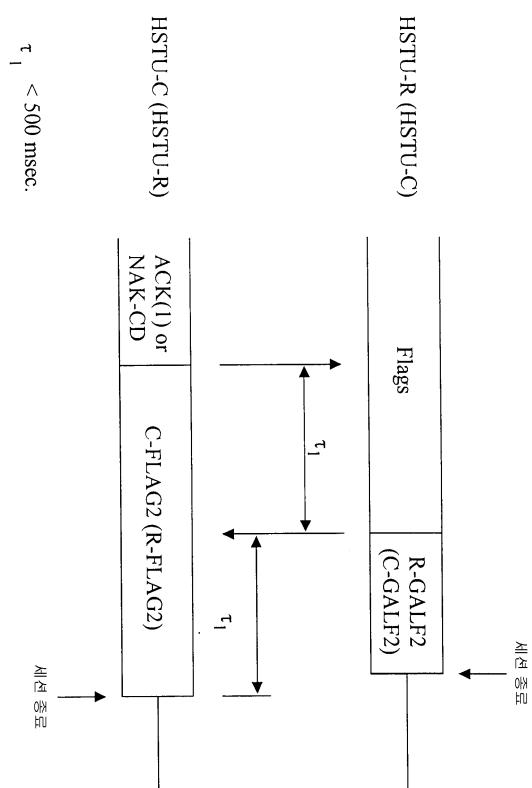
$\tau_1 < 500$ msec.
 50 msec. $< \tau_2 < 500$ msec.

4



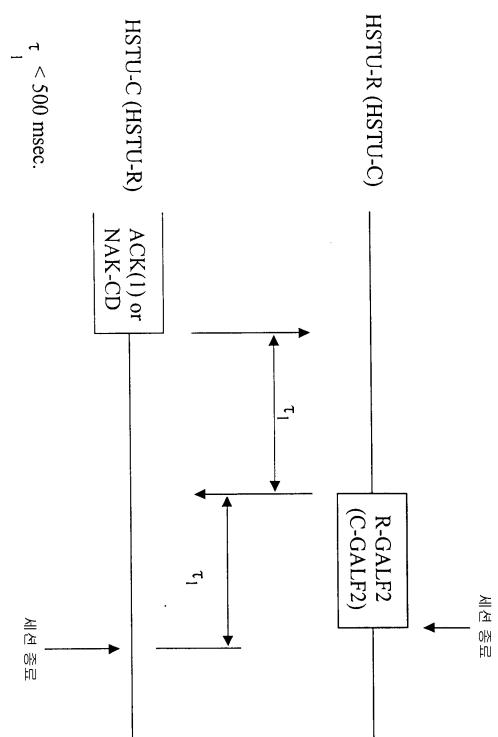
$$\tau_1 < 500 \text{ msec.}$$

5

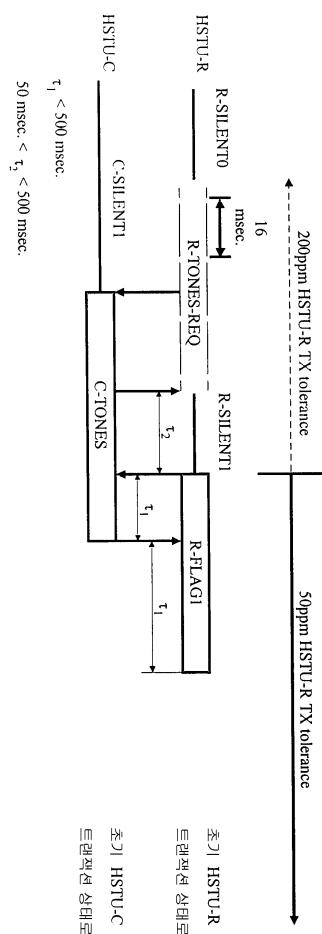


$\tau_1 < 500$ msec.

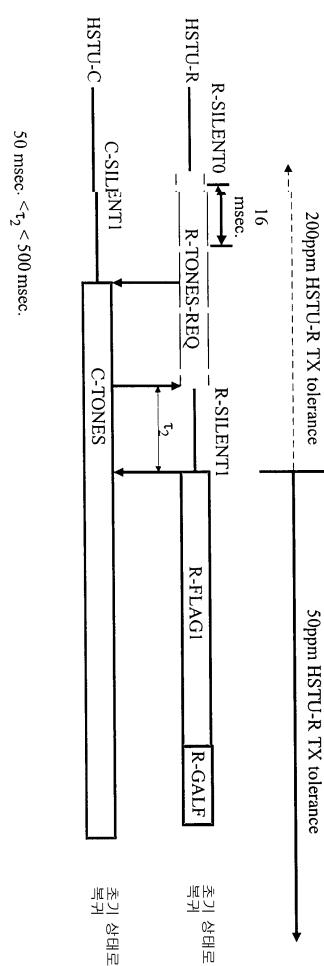
6



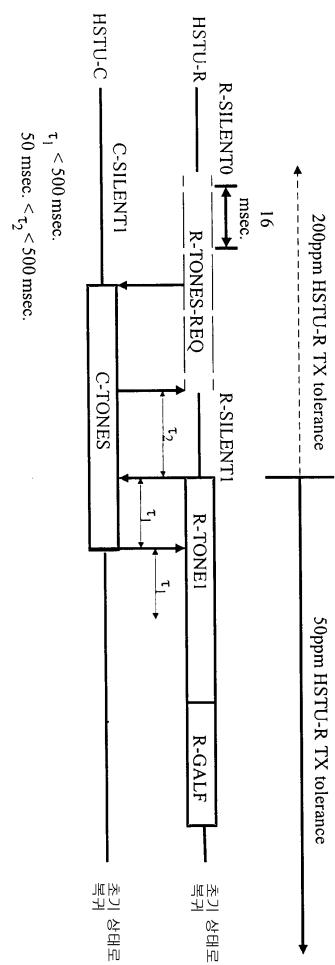
7



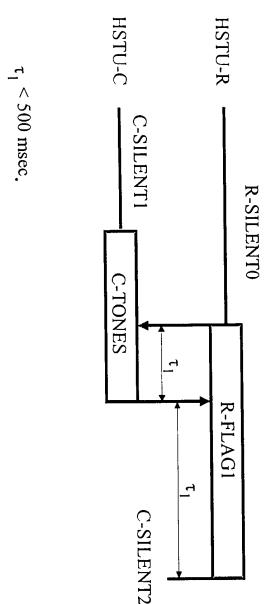
8



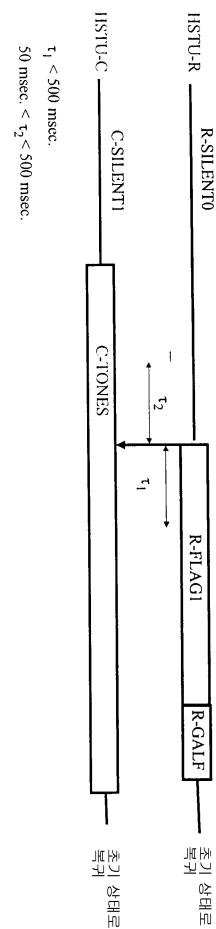
9



10

 $\tau_1 < 500$ msec.

11



50 msec. < τ_2 < 500 msec.

C-TONES

초기 상태로
복귀

12

