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(54)

PAR

, PAR

" - 1999 11 9 가 60/164,134
 , 가

(peak - to - average power ratio: PAR)

tion:DMT) (Discrete Multitone Modula
 ((,) (DMT
 DMT (Inverse Fast Fourier Transform:
 IFFT) , DMT DMT

DMT , D
 MT 가 DMT 가
 가 DMT 가 DMT

(PAR)

가

PAR (,) . DMT , PAR . DMT
 PAR 14.5 dB , 1E - 7 (clipping) . DMT
 PAR PAR가
 (component linearity) DMT

1 DMT (constellation map, 0 DMT 90 / 가 PAR 가 PAR

1
DMT 가 ,

2 .

1 (38) (18) (14)
DMT (10) 가 (DSL:digital subscriber line) (2) DMT
(10) DMT (22) DMT (26) (14) (30) (34)

QAM(orthogonally multiplexed quadrature amplitude modulation), DWMT(discrete wavelet mulitones)
OFDM(orthogonal frequency division multiplexing)

(18) DMT (22) (34) (30)
DMT (26) , (18) 가
(18) , 2 (quad) ,
(Dieselhorst - Martin) (10, 14)가
(18) (38)가 (10, 14) (air)

, 1 DMT (22) (quadrature amplitude modulation:QAM) (42),
(46) (bit allocation table:BAT, 44) (66) DMT (22)
(74) (14) (30) DMT
(22) DMT (22) ,
DMT (22) (34,36)

QAM (42) (54) QAM (42)
(54) QAM (58) (54) N QAM (58)
, QAM (42) (54) N QAM (58)
QAM (58) , N (46) BAT(44)
QAM (42) . QAM (58)

(46) DMT QAM (58) D
MT (70) (46) QAM (58) (54) (58)
, QAM (58) , (38)
, (46) QAM (58) DMT (70)
(IFFT) (46) QAM (58) DMT (70)
, (46) (IDFT) QAM (58) DMT (70)

(38) (34)
(38) (pilot tone)

(46) QAM - (66) (38)

(38) PAR (66) (46)
(66) (DSP) (34) DMT (10) (66)
(66')

(66) QAM (58)
(66)가 () ,
(pseudo - random number generator: pseudo - RNG),
DMT , DMT , DMT , DMT
(22) (34) (18) DMT

(66) (equation)
(54)

DMT (22) (74)
(76) (76) (54)
2) (74)가 DMT (22) (66) QAM (4
(38)가 가
PAR

2 (38)
DMT (22) DMT (22)
((100)).
(34) 가 DMT (22) (34) 가
, 가
DMT (22) - RNG (34)
(, - RNG - RNG)

DMT (22) DMT (34) DMT
(22) DMT 가 (34)
, DMT (22) (34) 가 DMT DMT
(22) (34)

" "

가 DMT
DMT
SL (2) 256 , 4.3125kHz , D
Hz . DMT (22) 0 255 0 kHz 1104 k
MT 50" 215.625 kHz(, 51* 4.3125 kHz) DMT , " D

, DMT (22) (34) 가 -
(, DMT)
, (- RNG) DMT (22) (18) (
34) (가).

, 69 DMT 1 가 가 .
(modulo) 68 , DMT (22)
255 , 가 255
1 가 .

가 DMT , - RNG

DMT (70) 가 , DMT
(70) - RNG, , , ,

, DMT (70) (38) ,
, DMT (22) ,
(10, 14)
(110).

DMT (22) (,
115). QAM

DMT (22)
 (120). , (66) (38) PAR
 가 , PS #1 - PS #3
 (66)

#1

#1(PS #1) N QAM $N^* / 3 \pmod{2}$
 $50^* / 3 \pmod{2} = 2$
 $51^* / 3 \pmod{2} =$
 51
 0
 N

#2

#2(PS #2) N QAM - $(N + M)^* / 4, \pmod{2}$,
 (M) , N 50 DMT M
 8 , $(50+8)^* / 4 \pmod{2} =$ /2
 가 , 50 DMT 가 9 , $(50+9)^*$
 $/4 \pmod{2} = 3$ /4

#3

#3(PS #3) N QAM - $(X_N)^* / 6, \pmod{2}$, (X_N 1,4,9,5,...]
 $(9)^* / 6 \pmod{2} =$ /3
 $(5)^* / 6 \pmod{2} = 5$ /3
 $(9 X_N 5)$
 가

가 (66) PS #1, #2 #3
 . DMT (22) (38)
 (34) (130). , DMT (22)
 (38) (160).

(, PAR) (38) DMT (22) (18) -
 가 (38) - (38) (,)
 , DMT (70) DMT (70)
 DMT (70)
 (38) (54)

, DSL (38) (2) DMT (70) (38) . DMT (22)
 (38) (38) , DMT (22) (140). DMT (70) (78) (15
 0).

(78) DMT (22) (34) DMT (70)
 . (78) (54) (,),
 (34) (34) . (78) (78) "
 (34) 0" , DMT (22) . (, DMT (22)
). (34) 가 , (78)
 DMT (22) . , (78)
 (78) (34) .

(34)가 (38) , (34) (38)가 (78)
 . (34)가 (78) , (34)
 (78) (,).

(78) , (66) ((120). , QAM (58) -
) QAM - DMT (70) 가 DMT (70)
 T (22) 가 . (38)가 (34) , DM
 (78)

(78) , DMT (22) DMT (70') (38)
 , DMT (70') DMT (70)
 DMT (70) DMT (70')

DMT (2) (38) (, 10^{-7} (70) 1
) . DMT (70')가 (78)가
 (38) (34) (150).
 DMT (70) . DMT (22) DMT (22)
 가 DMT (70') . DMT (78)
 22)가 DMT (70') , DMT (22) (34) (38)
 . DMT (70) (38) PAR

, (PS #4) (38) (66) .

(PS #4)

T #4(PS #4) N /3*(M+N), mod 2 (M DM
) , DMT (70) DMT M 5
 , (78)가 (38) DMT ,
 DMT 6 , DMT (70 70') QAM (58) ,
 DMT (70') 가 .

((38))가 , DMT (22)
 (38) , DMT (22) (78) (38)
 (78) DMT (70) , (22)
 DMT (70') QAM DMT (70')
 , (22) 가 DMT (70') (78)

DMT (70) (38) (78) DSL (2)
 PAR가 . (38) 10⁻⁷ DMT
 (2) 10⁻⁵ (14.5 dB) 12.8dB PAR
 10⁻⁵ , DMT (70) 512 (70) 가 , DMT
 (22) 10⁵/512 195 DMT (70) 1 DMT (70) 195 DM
 T 가 , () (78)가 가 10⁻
 5 가 0.5%(1/195) 가 , (38) PAR가 1.7 dB

, ADSL, VDSL, SDSL, HDSL, HDSL2 SHSDL DSL,

, DSL (, , , ,

(57)

1.

2

1

2.

1 , PAR(peak - to - average power ratio)

3.

1 ,

4.

1 ,

5.

1 ,

6.

1 ,

7.

1 , DMT

8.

1 ,

9.

8 ,

10.

8 ,

11.

8 ,

12.

8 , .

13.

1 , .

14.

1 , .

15.

14 , .

16.

14 , .

17.

16 , 1 2 .

18.

15 , " 0" .

19.

15 , - .

20.

2 , 1

,

,

,

,

,

,

21.

20	,	.
22.		
20	,	.
23.		
20	,	.
24.		
20	,	.
25.		
20	,	DMT
26.		
20	,	.
27.		
26	,	.
28.		
26	,	.
29.		
26	,	.
30.		
26	,	.
31.		
20	,	.
32.		
31	,	.

33.

31 , .

34.

33 , 1 2

35.

32 , " 0" .

36.

32 , -

37.

38.

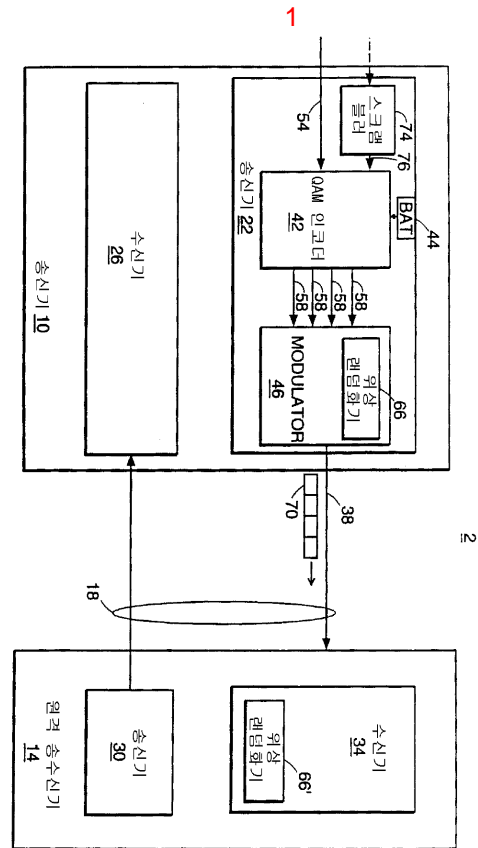
37 , , PAR

39.

, ,
- DMT ,

DMT - - ,

DMT - - DMT DMT



2

