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2003 08 14

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(22) 2003 02 07

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10/185,741 2002 06 27 (US)  
10/186,298 2002 06 27 (US)

(71) ( : 98052)

(72) 108

(74)

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(54)

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/ 가

5

1

2 .  
3 .  
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6 .  
7 .  
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9 .  
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11 .

< >

120 :  
130 :  
132 :  
134 :  
136 :  
138 : RAM  
140 : ROM  
142 :  
144 :  
146 :  
148 :  
150 :  
152 :  
154 :  
158 :  
160 :  
162 :  
164 :

(BIOS)

166 :

168 :

170 :

172 :

174 :

175 :

177 : LAN

178 :

179 : WAN

182 :

186 :

189 :

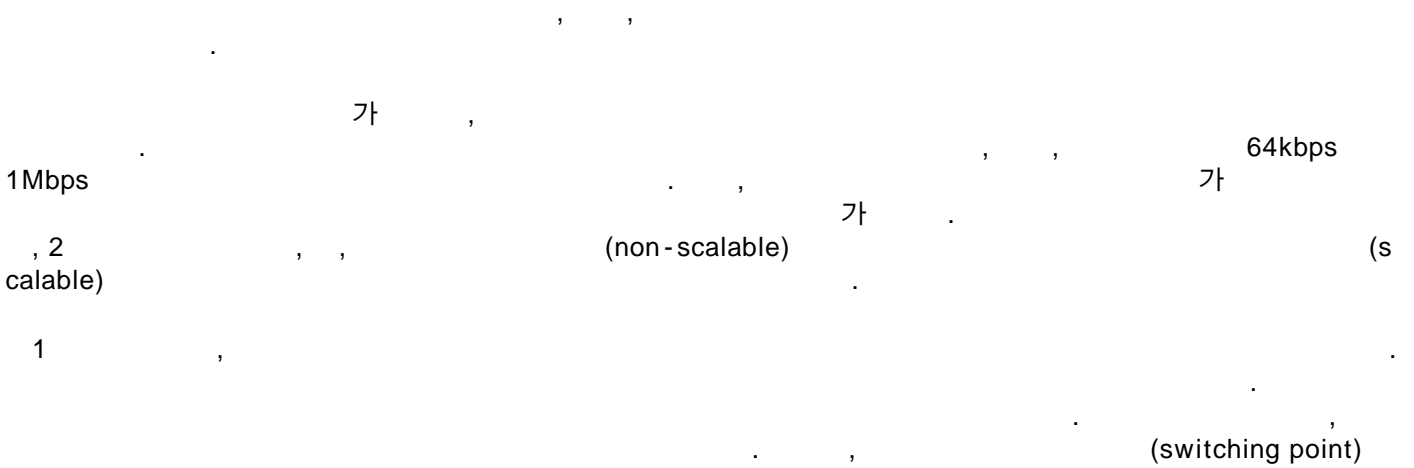
200 :

300, 500, 700, 900, 1000 :

400, 600, 800, 1100 :

902 :

1102 :



2  
 , FGS ) , MPEG-4 (scalability) (Fine Granularity Scalable)(enhancement)  
 , FGS FGS가 (PFGS; Progressive Fine Granularity Scalable)  
 , FGS  
 가 2 (enhancement layer)  
 ( , I ) (drifting)  
 가  
 (error-resilience)  
 / 가  
 1 1 1 2 2  
 2 1 1 2 1 2 2  
 , 1 1 2 1 2 1 1  
 2 , 2 , 1 2 2 1 가  
 , 1 2 , 1 2 1 / 1  
 2 , 1 2 1 2 1 1 1 2  
 2 1 1 2 1 2 1 2  
 , 1 1 1 2 1 2 2  
 1 1 1 2 1 2 2

2 가 , 1 2 2 . , , 1 2  
2

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Ragip Kurceren Marta Karczewicz , ' SP ' , VCEG-M-73, ITU-T  
가 , Austin, TX, 2001 4 2~4 ( , Kurceren ) ,  
가 (seamless)  
SP

2 (200) . , SP 1 2

, , , , 가 ,  
1 2

2 가 1 , SP 2 , SP S1  
S1, S2 S12 , 2

3 4 Kurceren (300) (400) Kurceren

TCP  
가 , , TCP

, Kurceren Qs ( Qs Qs SP 1 2 )  
, 4 ), Qs 가 . Qs ,

1 2 가 , Qs , Kurceren

, Kurceren 가 ( , 4 )  
) . , 가 , 1 2 1 2 가 . Kurceren

5 6 , Qs 가

2 , Kurceren , 1

, TCP  
 Qs  
 , 7 8 가 , 가  
 , 가  
 PC,  
 1 (120) (120)  
 (120) (120)  
 / (thin) (thick)  
 PC, 가  
 1 (120) (130) (130)  
 (132), (134), (134)  
 (136) (136)  
 (136) , 가  
 (ISA; Industry Standard Architecture) (MCA; Micro Channel Architecture)  
 ISA(EISA; Enhanced ISA) (VESA; Video Electronics Standards Association)  
 (Mezzanine) (PCI; Peripheral Component Interconnects)  
 (130) 가 (130)  
 1 (134) RAM(140) / ROM(138)  
 가 (BIOS)(142) (130) (start-up) ROM(138) , RAM(140)  
 (132) (132) /  
 (130) / / 1  
 (148)( ) (144),  
 R/RW, DVD-ROM/R/RW/+R/RAM (146), CD-ROM/  
 (152)

(150) (150) (154) (144), (146)  
 (136) .  
 가 , ,  
 8) (130) (14) , RA  
 M, ROM (152) , , 가  
 가 ) (158), (160), (162) (164)  
 (148), (152), ROM(138) RAM(140)  
 (162) / (164) (158), (160),  
 (166), (168)( , ) (130)  
 ( , ) (136) (170) (13)  
 2) , , ,  
 (172) 가 (174) (136) .  
 (172) ( , ) (175) ,  
 ( , )  
 (130) (182) (182) (130)  
 .  
 1 LAN(177) WAN(179) . ,  
 , ,  
 LAN , (130) (186) LAN(177)  
 . WAN , WAN(179) (178)  
 (178)  
 (170)  
 (136)  
 1 , WAN 가 (130) (178) (180)  
 ) (182)  
 , (130) (130) , (189) (182)  
 , , 1 , ,

---

urceren , 가 5 8 . , K  
 3 8 .

DCT:

IDCT:

: . (arithmetic) 가 .

: 가

Q:

$Q^{-1}$ :

MC:

ME:

: (artifacts) (smoothing)

0: /

P :

SP :

:

가

$$L_1 = Q(K_1) \quad , \quad Q(Q^{-1}(K_1)) = L_1$$

$$L_1 = Q(K_1) \quad L_2 = Q(K_2) \quad , \quad Q(Q^{-1}(L_1) + Q^{-1}(L_2)) = L_1 + L_2$$

$$L_1 = Q(K_1) \quad , \quad Q(Q^{-1}(L_1) + K_2) = L_1 + Q(K_2)$$

(copy)

$$3 \quad , \quad L_{err1} \quad \text{가} \quad S1 \quad , \quad L_{err1} \quad S1 \quad QP_1^{-1} \quad ,$$

$$K_{serr1} = QP_1^{-1}(L_{err1})$$

DCT

$K_{pred1}$

$K_{rec1}$

$$K_{rec1} = K_{pred1} + K_{serr1}$$

$K_{rec1} \quad Qs$

$L_{rec1}$

$$L_{rec1} = Qs(K_{rec1})$$

$$QS^{-1} \quad L_{rec1} \quad , \quad DCT$$

S12

S12

1

2

S1

$$, L_{rec1} \quad L_{rec2} \quad , K_{rec1} \quad K_{rec2} \quad , QP_1^{-1} \quad Qs^{-1} \quad , K_{serr1} \quad K_{serr2}$$

$$2 \quad S2 \quad . Qs \quad S12$$

1



$$\begin{aligned}
 & \text{DCT} \left( \begin{matrix} S1 \\ S2 \end{matrix} \right) = \text{DCT} \left( \begin{matrix} SP \\ S1 \\ S2 \end{matrix} \right) \\
 & L_{pred1} = Qs(K_{pred1}) \\
 & K_{spered1} = Qs^{-1}(L_{pred1}) \\
 & K_{err1} = K_{orig1} - K_{spered1} \\
 & L_{err1} = QP_1(K_{err1}) \\
 & L_{rec1} = Qs^{-1}(L_{err1}) \\
 & L_{err12} = L_{rec2} - L_{pred1} \\
 & L_{err12} = QP_1^{-1}(L_{err1}) \\
 & K_{serr1} = QP_1^{-1}(L_{err1}) \\
 & Qs = Qs_1 \\
 & L_{serr1} = Qs(K_{serr1}) \\
 & L_{pred1} = Qs_1(K_{pred1}) \\
 & K_{spered1} = Qs_1^{-1}(L_{pred1}) \\
 & L_{spered1} = Qs_1(K_{spered1}) \\
 & L_{rec1} = L_{spered1} - L_{serr1}
 \end{aligned}$$

$Qs^{-1} = Qs_1^{-1}$   $L_{rec1}$  , DCT .  
 .  
 , 1  $S12$  ,  $QP_1^{-1}$   $Qs_2^{-1}$  ,  $Qs_1$   $Qs_2$  ,  $Qs_1^{-1}$   $Qs_2$   
 $-1$  ,  $L_{rec1}$   $L_{rec2}$  ,  $L_{err1}$   $L_{err12}$  ,  $K_{serr1}$   $K_{serr12}$  ,  $L_{spr}$   
 $ed1$   $L_{spred12}$  .  
 $Qs_1$   $Qs_2$   $S12$  .  
 $S2$  . , 1  
 2 .  
 , 6 (600) .  
 SP  $S1$   $S2$  ,  $S1$  , ,  
 DCT ,  $K_{orig1}$  .  
 $K_{pred1}$  , DCT ,  $K_{pred1}$  ,  $Qs_1$   
 $L_{pred1} = Qs_1 (K_{pred1})$   
 ,  $Qs_1^{-1}$   $L_{pred1}$  .  
 $K_{spred1} = Qs_1^{-1} (L_{pred1})$   
 $K_{orig1}$   $K_{spred1}$   $K_{err1}$  .  
 $K_{err1} = K_{orig1} - K_{spred1}$   
 ,  $QP_1$   $K_{err1}$   $L_{err1}$  .  
 $L_{err1} = QP_1 (K_{err1})$   
 ,  $L_{err1}$   $S1$  .  
 $S1$  , ,  $L_{rec1}$  , .  
 $Qs_1$   $Qs_2^{-1}$  .  
 , 1 2 ,  $S12$   $S1$   $S2$   
 .  
 ,  $Qs_2$   $S1$   $K_{spred1}$  .  
 $L_{spred12} = Qs_2 (K_{spred1})$   
 $S2$   $L_{rec2}$   $L_{spred12}$  .  
 $L_{err12} = L_{rec2} - L_{spred12}$   
 ,  $L_{err12}$  ,  $S12$  .  
 , 7 (700) .  
 SP  $S1$   $S2$  ,  $S1$  .

$$\begin{aligned}
 & \text{S1} \\
 & \text{QP}_1^{-1} \text{ , } \text{L}_{err1} \text{ , } \text{L}_{err1} \text{ .} \\
 K_{serr1} &= \text{QP}_1^{-1} (\text{L}_{err1}) \\
 & \text{ , } \text{DCT} \text{ , } \text{K}_{pred1} \text{ , } \text{K}_{rec1} \\
 & \text{ .} \\
 K_{rec1} &= \text{K}_{pred1} + \text{K}_{serr1} \\
 & \text{K}_{rec1} \text{ , } \text{Qs}_1 \text{ , } \text{L}_{rec1} \text{ .} \\
 \text{L}_{rec1} &= \text{Qs}_1 (\text{K}_{rec1}) \\
 \text{Qs}_1^{-1} & \text{L}_{rec1} \text{ , } \text{DCT} \text{ .} \\
 & \text{ , } \text{1} \\
 & \text{ , } \text{S12} \text{ , } \text{QP}_1^{-1} \text{ , } \text{Qs}_2^{-1} \text{ , } \text{Qs}_1 \text{ , } \text{Qs}_2 \text{ , } \text{Qs}_1^{-1} \text{ , } \text{Q} \\
 \text{S}_2^{-1} & \text{ , } \text{K}_{serr1} \text{ , } \text{K}_{serr12} \text{ , } \text{K}_{rec1} \text{ , } \text{K}_{rec12} \text{ , } \text{L}_{rec1} \text{ , } \text{L}_{rec2} \text{ ,} \\
 \text{L}_{err1} & \text{L}_{err12} \text{ .} \\
 & \text{S2} \text{ , } \text{1} \\
 & \text{2} \text{ .} \\
 & \text{ , } \text{8} \text{ (800) .} \\
 & \text{SP} \text{ , } \text{S1} \text{ , } \text{S2} \text{ , } \text{S1} \text{ .} \\
 & \text{ , } \text{ , } \text{DCT} \text{ , } \text{K}_{orig1} \text{ .} \\
 & \text{ , } \text{DCT} \text{ , } \text{K}_{pred1} \text{ .} \\
 & \text{ , } \text{K}_{orig1} \text{ , } \text{K}_{pred1} \text{ , } \text{K}_{err1} \text{ .} \\
 K_{err1} &= \text{K}_{orig1} - \text{K}_{pred1} \\
 & \text{ , } \text{QP}_1 \text{ , } \text{K}_{err1} \text{ , } \text{L}_{err1} \text{ .} \\
 \text{L}_{err1} &= \text{QP}_1 (\text{K}_{err1}) \\
 & \text{ , } \text{L}_{err1} \text{ , } \text{S1} \text{ .} \\
 & \text{Qs}_1 \text{ , } \text{Qs}_1^{-1} \text{ , } \text{L}_{rec1} \text{ ,} \\
 & \text{ , } \text{1} \text{ , } \text{2} \text{ , } \text{S12} \text{ , } \text{S1} \text{ , } \text{S2} \\
 & \text{ , } \text{Qs}_2 \text{ , } \text{S1} \text{ , } \text{K}_{pred1} \text{ .} \\
 \text{L}_{pred12} &= \text{Qs}_2 (\text{K}_{pred1}) \\
 & \text{ , } \text{S2} \text{ , } \text{L}_{rec2} \text{ , } \text{L}_{pred12} \text{ .} \\
 \text{L}_{err12} &= \text{L}_{rec2} - \text{L}_{pred12} \\
 & \text{ , } \text{L}_{err12} \text{ , } \text{S12} \text{ .}
 \end{aligned}$$

9 , DCT (residue) S1 S2 DCT (900) , Qs

$$Y = [X * A(Qs) + 2^{19}] / 2^{20},$$

, X DCT , Y DCT . A(.) . Qs  
 Qp Qs ,

$$L_{rec} = \frac{[K_{pred}(i, j) + L_{err}(i, j) * \frac{(2^{20} + A(Qp)/2)}{A(Qp)}] * A(Qs) + 2^{19}}{2^{20}},$$

, L\_err , K\_pred SP  
 [...] ,  
 (900) 2 , 가 , ,  
 (902) , , JVT

10 S12 (1000) S1 S2 (1000) , ,  
 Qs DCT ,

$$Y = [X * A(Qs) + 2^{19}] / 2^{20}.$$

(1000) SP , , 1 ( , 1)  
 (1000) SP  
 ) ( , 5 )  
 , P SP , 1 ' , ' S12  
 QP' , QP' 가 1 , 가 0 ,  
 S1 S2 , QP' Qp .  
 P SP , 'SP QP' ' QP'  
 Qs ,

11 (1100) .  
 , (1100) (1102) , DCT DCT  
 DCT , DCT , DCT  
 . DCT 가 DCT

, SP 가 Qs . Qs가 ,  
 . Qs ,  
 , / , ,

(57)

1. 1 ; 2

1 ; 2

1 2 2 2 1 1

2. 1 , 2

3. 1 ,

4. 3 ,

5. 1 , 2 가

6. 1 ; 2 2

1 ; 2 2

1 2 2 2 1 1

가 가 가

6 7. ,

1 2 가

6 8. ,

가 .

8 9. ,

가

6 10. ,

1 2 가 가 .

1 11. ;

1 1

1 2 2 ; 2

1 2 1 가 , 1 2 2

11 12. ,

1 2 .

11 13. ,

13 14. ,

11 15. ,

1 2 가 .

**16.**

1 1 , 1 2  
2 ;

;

1 1 2 2 1 1  
2 ; 1

**17.**

16 ,

1 2 .

**18.**

16 ,

**19.**

18 ,

**20.**

16 ,

1 2 가 .

**21.**

1 1 , 1 2  
2 ;

;

1 1 2 2 1 1  
2 ; 1

가 가 가 .

**22.**

21 ,

1 2 가 .

21 23. ,

가

23 24. ,

가

21 25. ,

가 1 2 가

1 1 26. ; 1 1

1 2 2 ; 2 2

1 2 1 가 2 , 1 2

26 27. ,

1 2 .

26 28. ,

28 29. ,

26 30. ,

1 2 가 .

DCT 31. ;



CT DCT DCT 가 DCT (Qs) , D

32.

31 ,  
DCT ,

$$Y = [X * A(Qs) + 2^{19}] / 2^{20}$$

, X DCT , Y DCT , A(.)

33.

31 ,  
QP QS ,

$$L_{rec} = \frac{[K_{pred}(i, j) + L_{err}(i, j) * \frac{(2^{20} + A(Qp)/2)}{A(Qp)}] * A(Qs) + 2^{19}}{2^{20}}$$

, L\_err , K\_pred

34.

33 ,

$$K_{pred}(i, j) + L_{err}(i, j) * \frac{(2^{20} + A(Qp)/2)}{A(Qp)}$$

35.

31 ,

36.

31 ,

37.

36 ,

가

38.

37 ,

39.  
 DCT ;  
 DCT DCT 가 DCT (Qs) , D  
 CT  
 가 , 가 가

40.  
 39 ,  
 DCT ,  

$$Y = [X * A(Qs) + 2^{19}] / 2^{20}$$
 , X DCT 가 , Y DCT , A(.)  
 가

41.  
 39 ,  
 QP QS ,  

$$L_{rec} = \frac{[K_{pred}(i,j) + L_{err}(i,j) * \frac{(2^{20} + A(Qp)/2)}{A(Qp)}] * A(Qs) + 2^{19}}{2^{20}}$$
 , L\_err 가 , K\_pred 가 가

42.  
 41 ,  

$$K_{pred}(i,j) + L_{err}(i,j) * \frac{(2^{20} + A(Qp)/2)}{A(Qp)}$$
 가 가

43.  
 39 ,  
 가 가 가

44.  
 39 ,  
 가 가 가

44 45.

, 가

45 46.

가 .

DCT Qs) 47.

, DCT DCT DCT 가 DCT (

47 48.

DCT

$$Y = [X * A(Qs) + 2^{19}] / 2^{20}$$

, X DCT , Y DCT , A(.)

47 49.

QP QS

$$L_{rec} = \frac{[K_{pred}(i, j) + L_{err}(i, j) * \frac{(2^{20} + A(Qp) / 2)}{A(Qp)}] * A(Qs) + 2^{19}}{2^{20}}$$

, L\_err , K\_pred

49 50.

$$K_{pred}(i, j) + L_{err}(i, j) * \frac{(2^{20} + A(Qp) / 2)}{A(Qp)}$$

47 51.

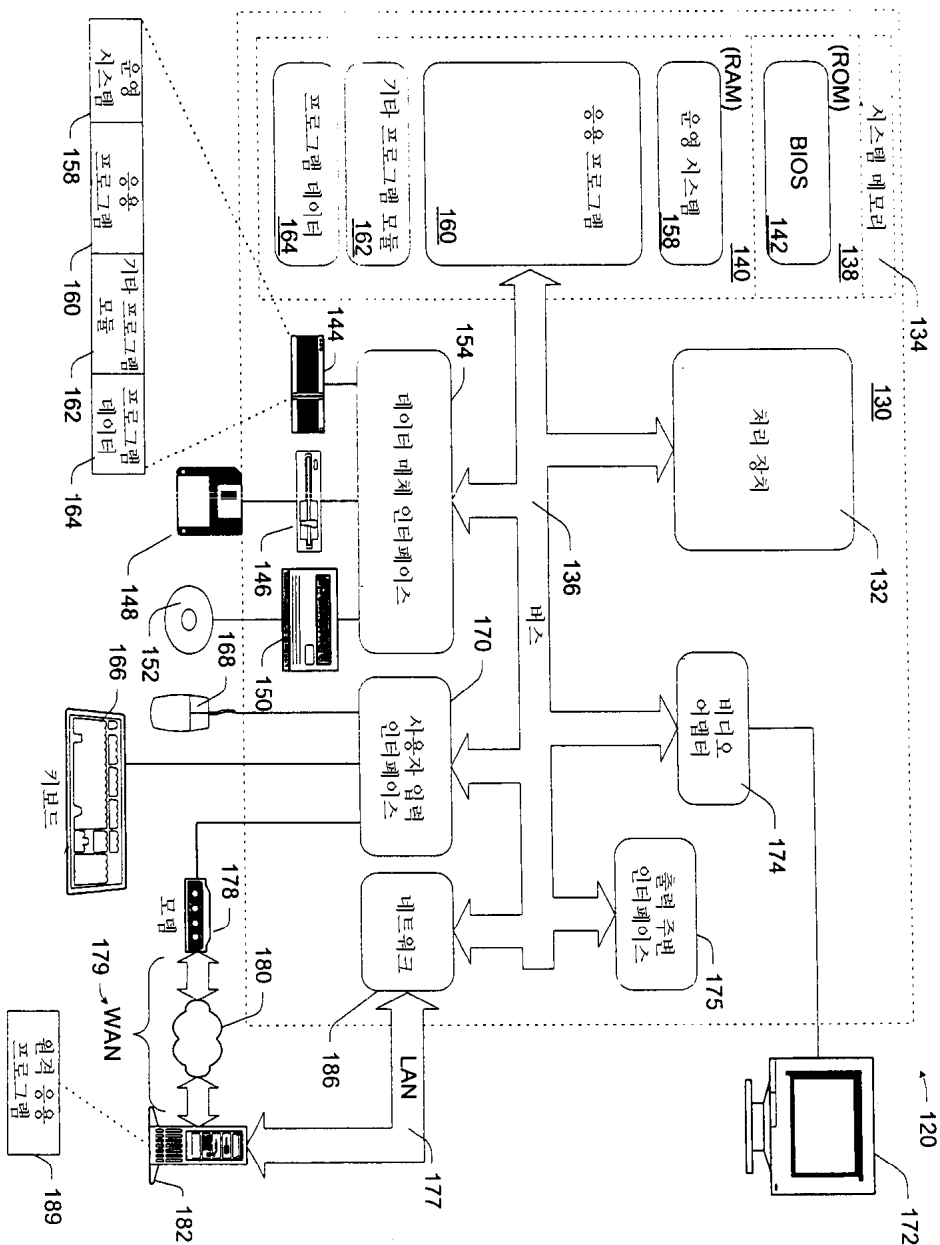
47 52.

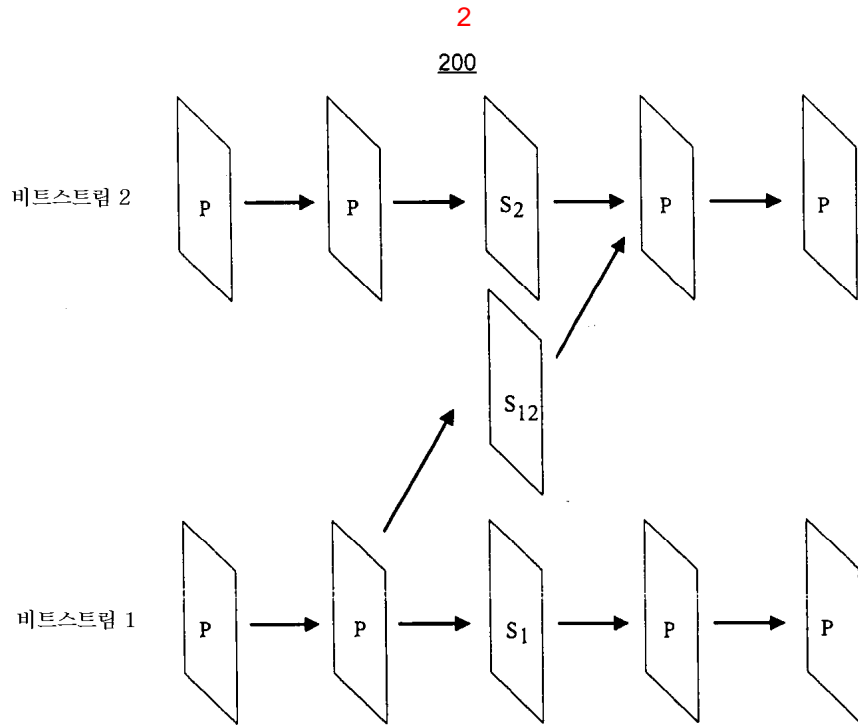
52 53.

53 54.

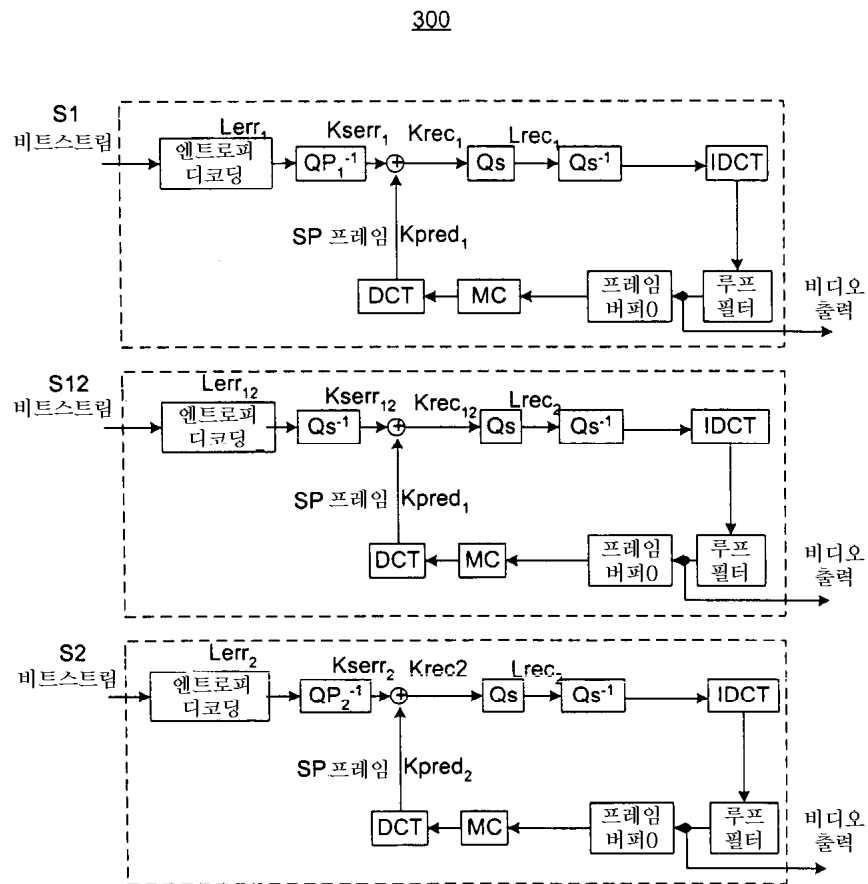
가

1



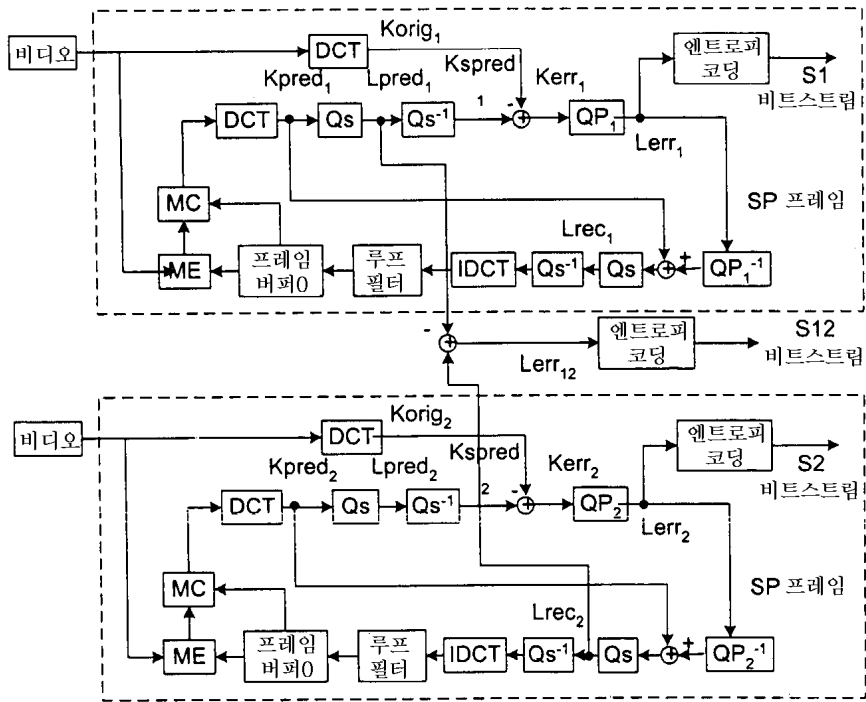


3  
(종래 기술)



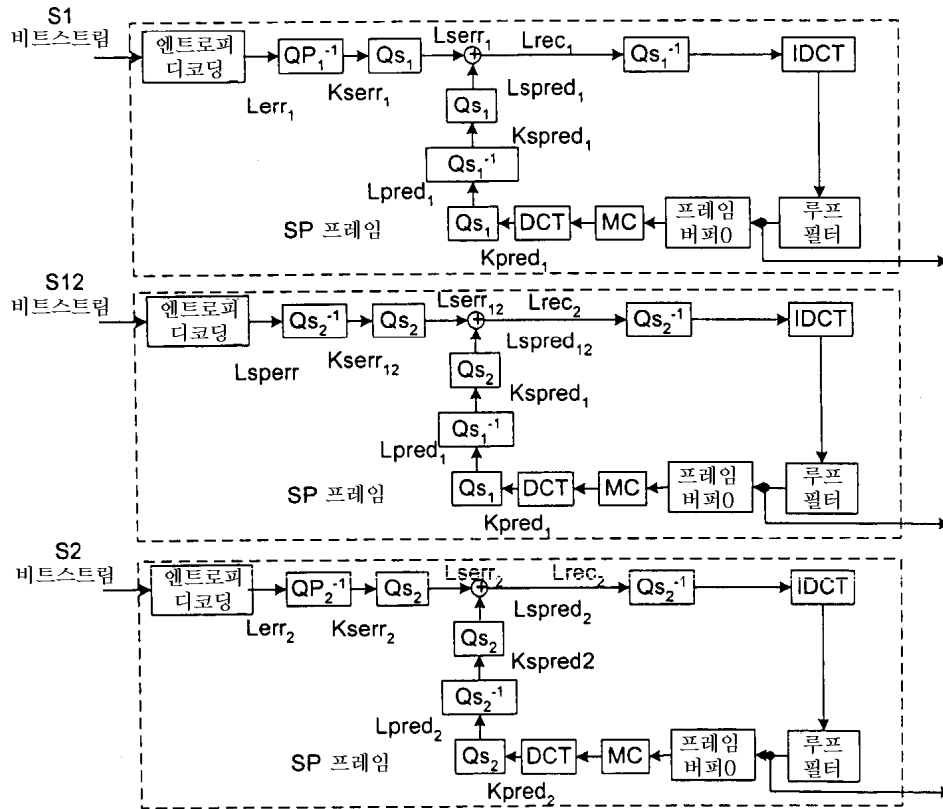
(종래 기술)

400



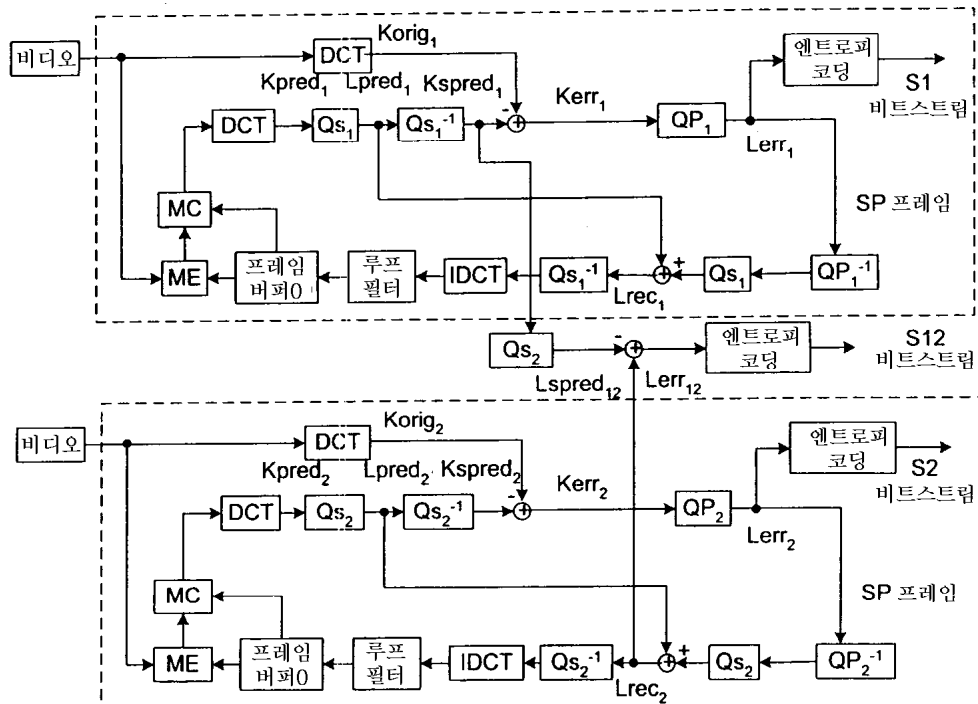
5

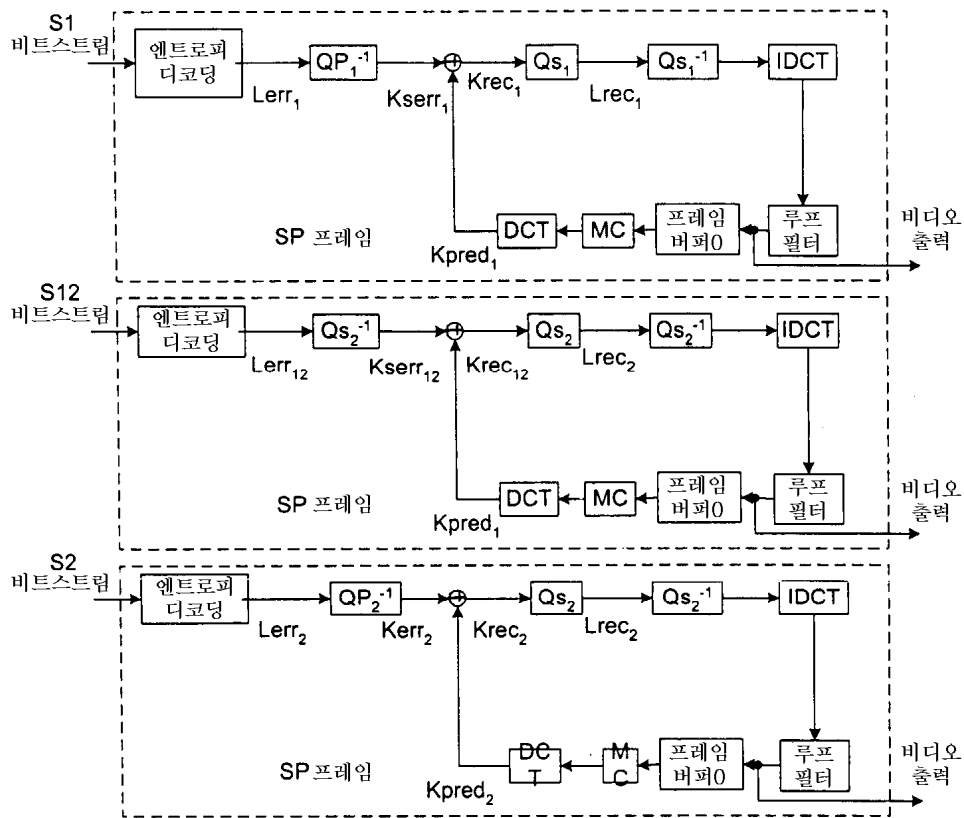
500



6

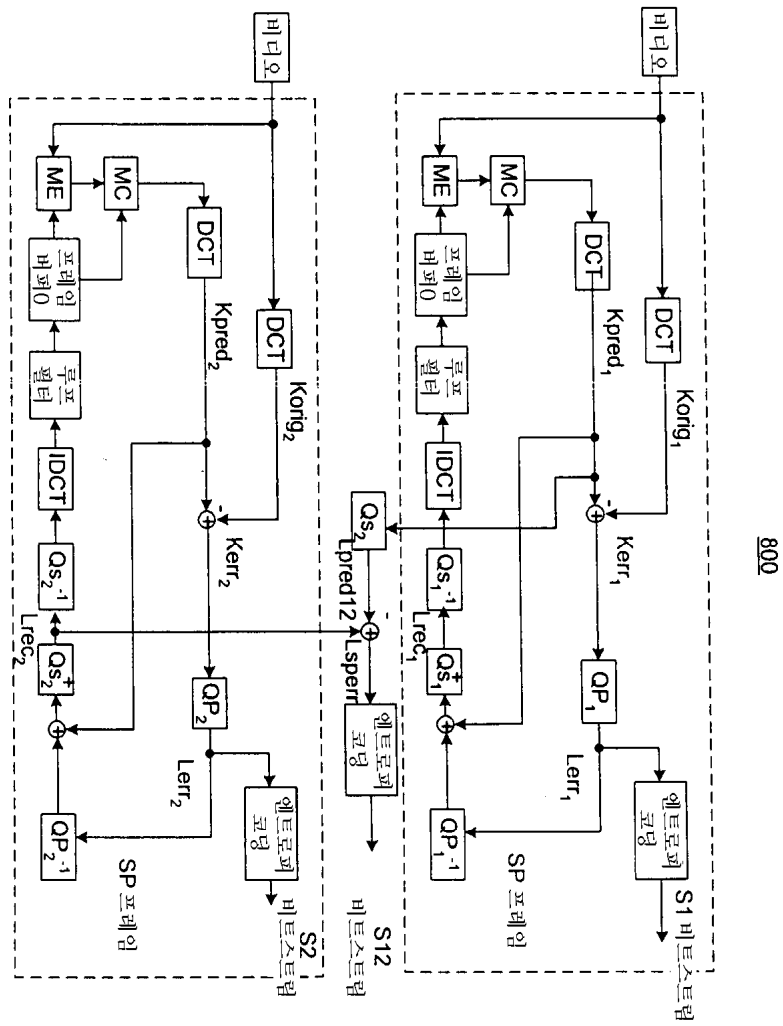
600



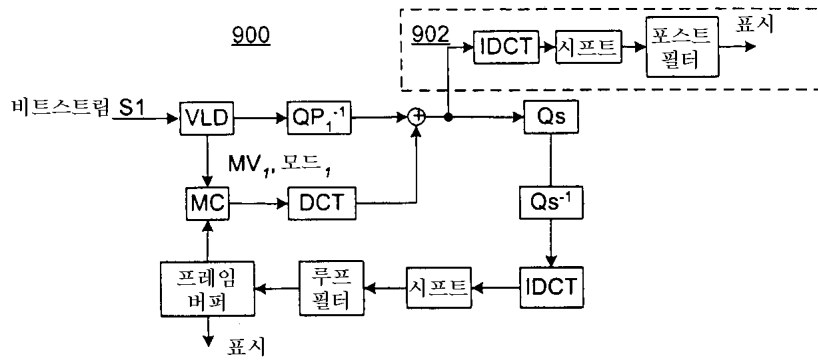




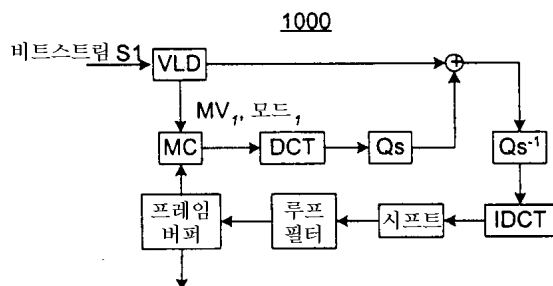
8



9



10



11  
1100

