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303 403

347 1401

(74)

:

(54) (H S D P A)

(HSDPA: High Speed Downlink Packet Access)

가 (MAC) 가)
;

(HSDPA)
가 가

7

1 3GPP UMTS (UTRAN)

2
 3
 4
 5
 6
 7
 < >

MAC

MAC-hs

HS-DSCH FP

HSPDA

161...MAC-d 162...MAC-c/sh
 163...MAC-hs 171,201...
 172,203...HARQ 173,205...
 174,207... 209...

(HSDPA: High Speed Downlink Packet Access)

가 HSDPA

(UMTS, Universal Mobile Terrestrial System; GSM, Global System for Mobile Communications; IMT-2000) (Core Network) WCDMA(Wideband Code Division Multiple Access)

UMTS, 1998 12 ETSI, ARIB/TTC, T1 TTA (Third Gen (Specification) eration Partnership Project; 3GPP, UMS

3GPP UMS (Technical Specification Groups; TSG)

TSG Access Network : RAN (TSG-RAN) UMS WCDMA (Access Technology) I Radio Access Network; UTRAN

TSG-RAN (Plenary) 4 (Working Group)

1 (WG1:Working Group 1) (1) , 2 (WG2:Working Group 2) (2) (3) .

3 UTRAN (Radio Network Controller; RNC) (Core Network) , 4

1 3GPP UTRAN .

1 , UTRAN(110) (Radio Network Sub-systems; RNS)(120,130) , RNS(120,130) RNC(121,131) RNC(121,131) (Node B)(122,123)(132,133) .

RNC(121,131) GSM (MSC)(Mobile Switching Center)(141)) , GPRS(General Packet Radio Service) SGSN(Serving GPRS Support Node)(142) .

(Node B)(122,123)(132,133) RNC(121,131) (150) .

(Node B) UTRAN (Access Point) .

RNC(121,131) (Node B) RNC RNC(CRNC: Control RNC) , .

(Dedicated Radio Resources) RNC(SRNC: Serving RNC) RNC) . RNC RNC RNC RNC RNC RNC

UMTS (Interf) (Node B) RNC lub lu RNC lur

2 3GPP UTRAN 가

2 (PHY), (Signaling) (Control Plane) (User Plane)

IP 가 가 ,

2 (Open System Interface; OSI) 3 1 (L1), 2 (L2), 3 (L3) .

1 (L1) (PHY: Physical Layer) (Medium Access Control; MAC) (Transport Channel) (Transport Channel)

MAC (Dedicated Transport Channel) (Common Transport Channel)

2 (L2) (Data Link Layer) , UMTS

2 (L2) MAC , (Radio Link Control; RLC) , (Broadcast/Multicast Control; BMC) PDCP) , / (

, MAC (Mapping)

MAC

(Traffic Channel) (Control Channel) ,

MAC

RNC , SRNC MAC-d , C

RNC MAC-c/sh

RLC RLC SDU (Segmentation and Concatenation)

RLC PDU , RLC PDU (Automatic Repeat request; ARQ)

Mode), RLC SDU (Acknowledged Mode) 가 (Transparent Mode), (Unacknowledged RLC SDU

U RLC PDU RLC 가 , RLC RLC SD

PDCP RLC , IPv4 IPv6

, PDCP IP (Header Compression)

BMC CBS(Cell Broadcast Center)

BMC (Cell Broadcast Message)

RLC

, PDCP BMC

, RLC

(Radio Resource Control; RRC)

2 RLC PDCP (Entity) R

LC PDCP 가 . RLC PDCP

UMTS (Radio Bearer; RB)

2 (L2)

, 2 (L2) (Signaling Radio Bearer; SRB)

3 (L3) 가 RRC , ,

가 . RRC RRC

가 .

UMTS (Pico-cell) 2Mbps, 384kbps
가 가 가

3GPP UMTS 가
HSDPA(High Speed Downlink Packet Access)

HSDPA UMTS 10Mbps

HSDPA (Link Adaptation;
(Hybrid Automatic Repeat request; HARQ), (Fast
Cell Selection; FCS), (Multiple Input Multiple Output; MIMO)

(LA) (Modulation and Coding Scheme; MCS)
가 가 16QAM 64QAM (高度)
QPSK (低度)

(Fading)

z 10Mbps , WCDMA 5MH

가 16QAM 64QAM
QPSK

HARQ RLC

, LA

FCS 가 가

, FCS

MIMO

, HSDPA 가 U
MTS 가

가 가 (Node B)

, UMTS (Node B) RNC , HSDPA RNC

(Node B) RNC 가 , RNC

(Node B) WCDMA MAC

MAC-hs HARQ LA , HS
 DPA HS-DSCH(High-Speed Downlink Shared Channel)
 (Node B) MAC-hs

3 HSDPA (Node B) (PHY)
 MAC-hs , MAC-c/sh MAC-d CRNC SRNC

lub lur HSDPA HS-DSCH FP(Frame Protocol)
 , MAC-hs MAC-c/sh MAC-d , RLC

, HSDPA RNC 가

HSDPA MAC 4

MAC 4 MAC-d (161), MAC-c/sh (162) MAC-hs (163) 3가
 . MAC-d (161) SRNC , MAC-hs (163) (Node B) , MAC-c/sh HS
 (162) CRNC -DSCH

, HSDPA MAC-c/sh (162) , MAC-
 c/sh (162) SRNC MAC-d (Node B) MAC-hs

4 MAC-hs , HARQ, , TFC

(L2) (Congestion) HS-DSCH 2

, HS-DSCH

HARQ , HARQ MAC-hs (163) HARQ , HARQ , HARQ HARQ
 , HARQ 가 , HARQ

, HARQ HARQ (Process) , HARQ

HARQ 가 , 가

HARQ
 MAC-hs SDU , MAC-hs SDU 가 , 가
 MAC-hs SDU , MAC-hs SDU가 , 가
 , 가 MAC-hs SDU

TTI (Transmission Time Interval) , TTI
 2ms

Transmission Sequence Number; TSN) (Priority Class Identifier) (HARQ

TFC HS-DSCH , HS-DSCH (Transport F
 ormat)

4 RLC 가 MAC HS-DSCH
 RLC DTCH (Dedicated Traffic Channel) DCCH (Dedicated Control
 Channel) RLC PDU MAC-d 가

(DCH: Dedicated Channel) MAC-d (161) 가 DCH
 (Dedicated Channel) , HSDPA HS-DSCH
 RLC PDU MAC-c/sh (162)

가 RLC PDU MAC-c/sh (162) MAC-d (161) 가
 MAC-hs (163) . MAC-hs MAC-hs (163)

TSN 가 HARQ
 , HS-DSCH TFC(Transport Format Combination)

5 MAC-hs ,

5 (174) (171)
 (S101), (173) (S102).

(171) (Soft Memory) ,
 ARQ (172) MAC-hs SDU (174) (171) H
 (S103,S104).

(174) TSN 가 HARQ MAC-hs SDU
 HARQ HARQ

HARQ (172) HARQ (172)
 (171) (S105). 가 ,
 (S106). (174) 가

, HSDPA
 MAC-hs 가 가 ,

Protocol	RNC	HSDPA	HS-DSCH FP (Frame Pr)
6 HS-DSCH		HS-DSCH FP	(Data Frame)
MAC-hs SDU	CmCH-PI (Common Channel Priority Indicator)	CmCH-PI	가
가 0	가	가 15	가 가
가			가
6	Header CRC (Cyclic Redundancy Checksum)		
	Payload CRC		
FT	'0'		'1'
NumOfSDU	CmCH-PI	MAC-hs SDU	User Buffer Size RNC
		8	Spare Bit
		HS-DSCH FP	
	HSDPA	가	
		HSDPA	(母) UMTS
UMTS	가		'Conve
rsational'		'Streaming'	
'Interactive'	(E-mail)	'Background'	
	Streaming		(Real Time)
ctive	Background		(Non-Real Time)
HSPDA		Conversational	가
가			
	HSDPA		
가			
	Interactive	가	
	가	가	
	HSDPA		
가			
가			

가 ,

가

HSDPA

SDPA)

(H
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가

(Frame Protocol)

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lub

가

가

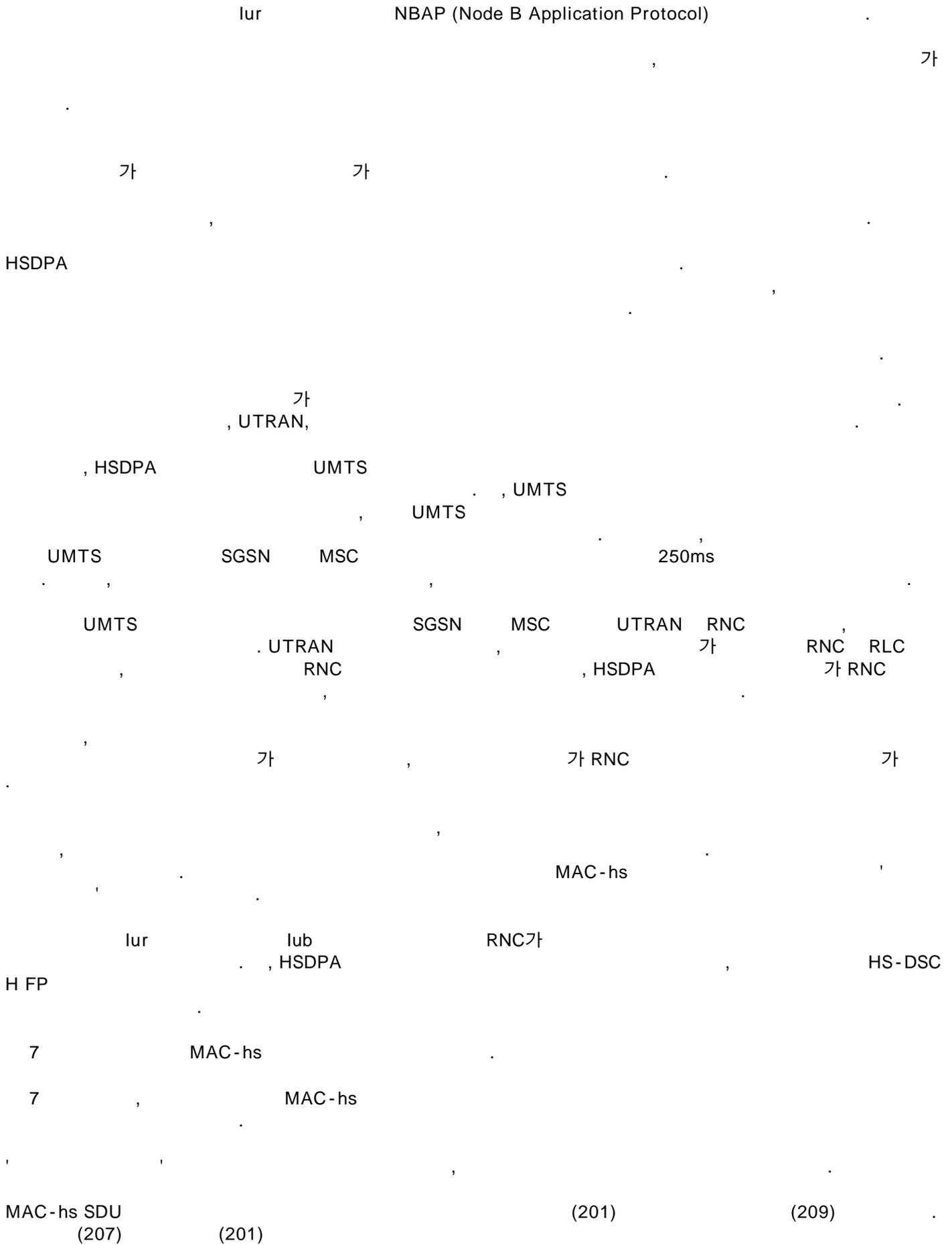
l)

(TT

가

가

가



(S212).

207) (S212) (205) (S213). 가 (

(207)가 TSN 가 HARQ MAC-hs SDU (203) (205) (S214,S215).

(201)가 HARQ (203) (S216), (201) (209)

가 HARQ (203) (207) (S217).

MAC-hs 가

P HS-DSCH FP MAC-hs 가 가 HS-DSCH F

가

95.32ms 가 1ms , 95 , 1ms 2ms

HSDPA TTI

TTI TTI

UMTS 250ms

, TTI가 2ms , 125 , 7

HS-DSCH FP 가 HS-DSCH FP

MAC-hs

HS-DSCH FP

가

가

가 , HS-DSCH

, HS-DSCH FP 가 가

, S-DSCH FP 가 , H

, HSDPA

, 가 ,

, , RNC

, HS-DSCH FP

, 200ms 150ms가

, (207)

, , MAC 가 가

, MAC 가

, 가 가 가

, 가

, 가 RNC

, 가

, 가

, (HSDPA) (HSDPA)
가 , 가
가 , 가 ..

(57)

1.

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2.

1 ,

3.

2 , 가

4.

3 (Frame Protocol) , ur lub (Fr

5.

4 ,

6.

4 , 가

7.

4 , ,

8.

7 ,

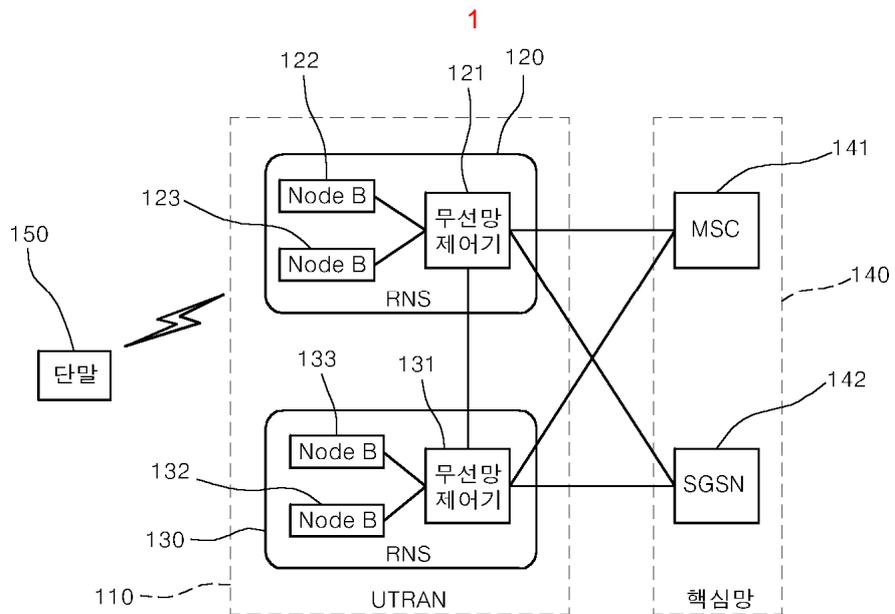
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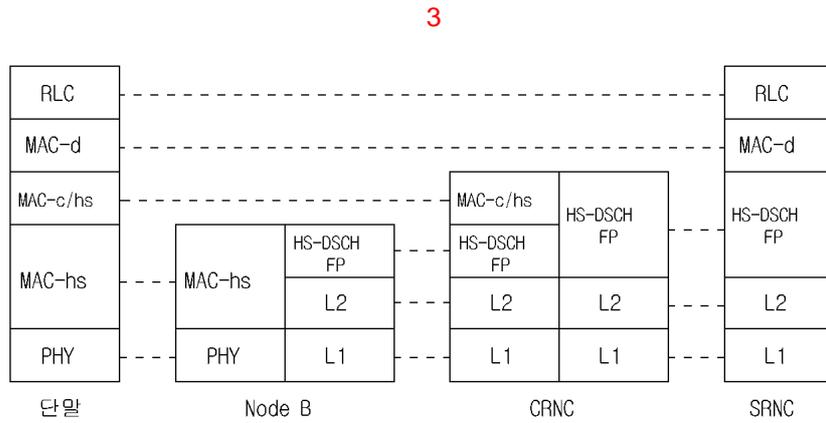
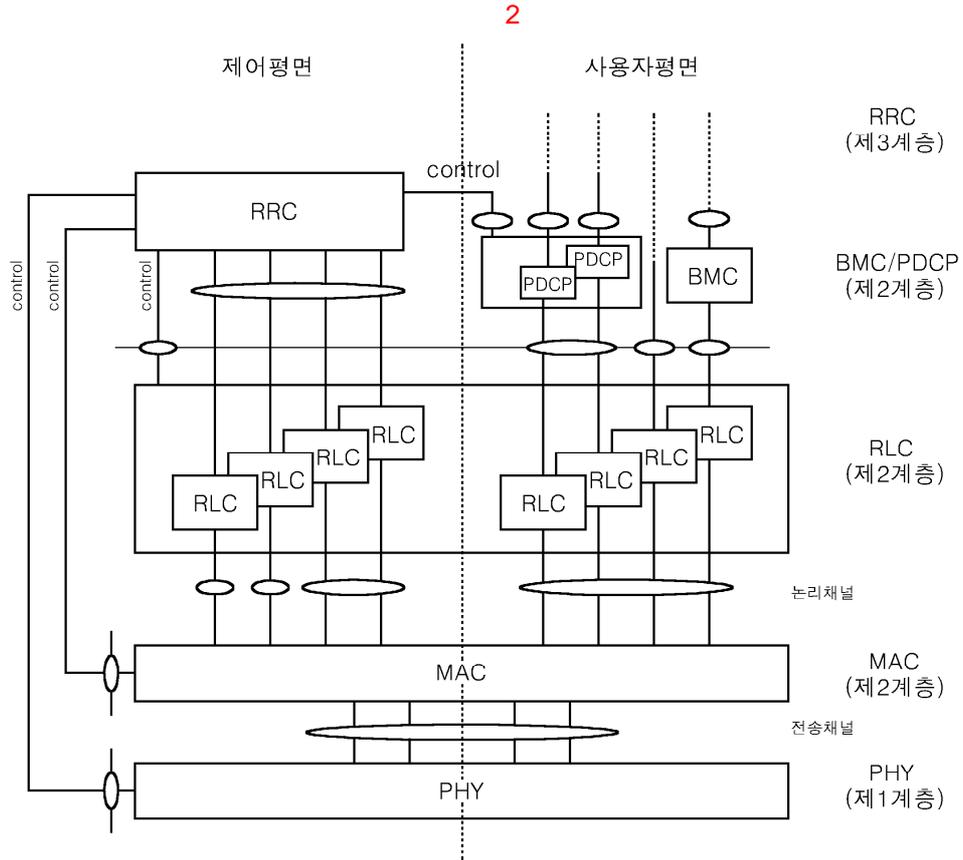
8 , 가

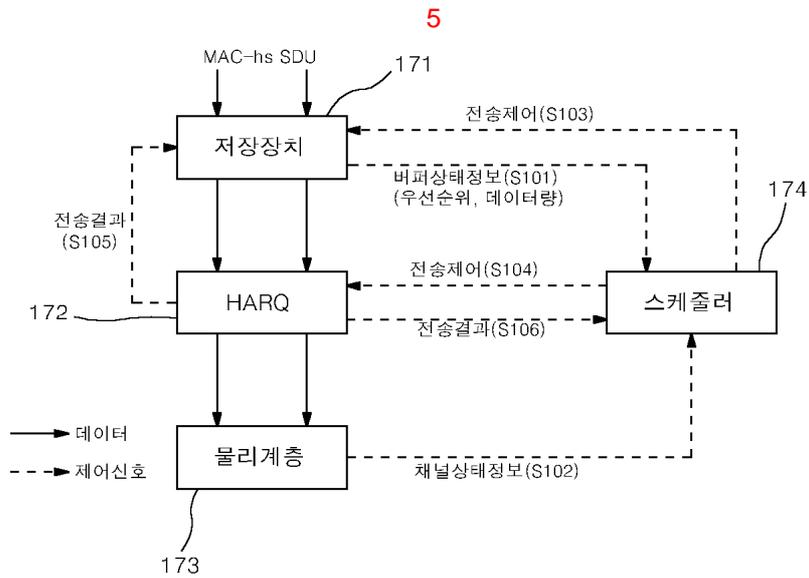
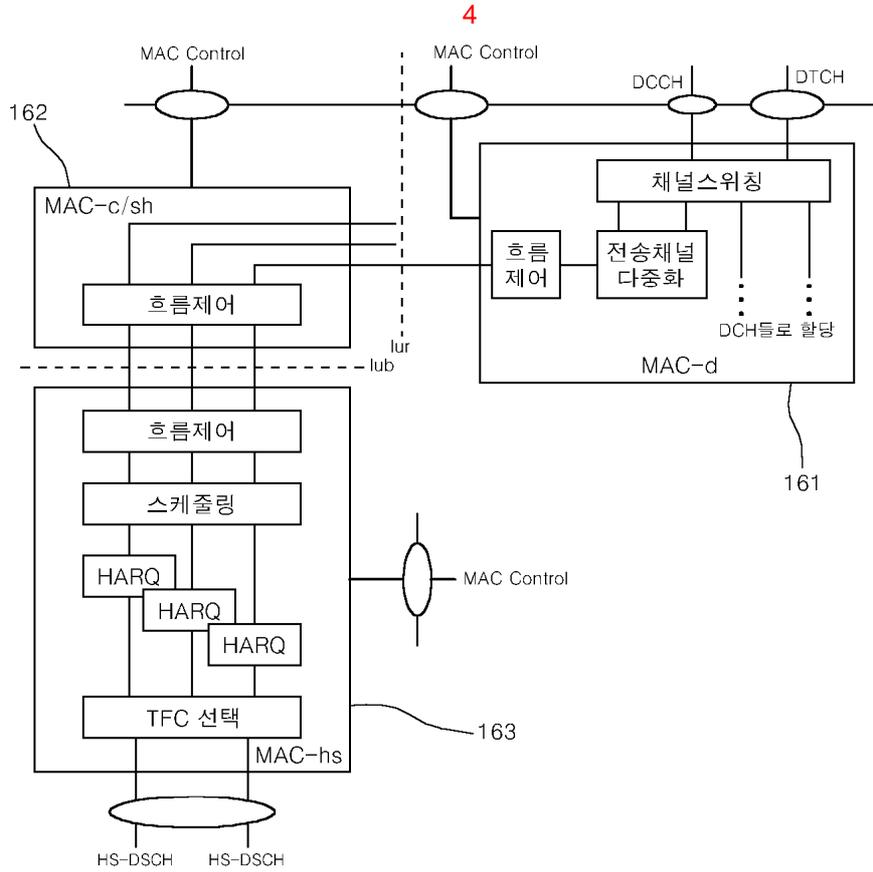
10.

3 (TTI) ,

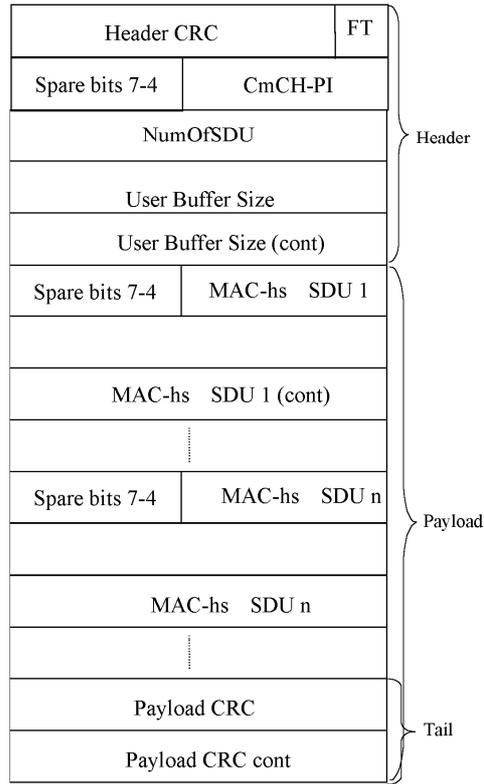
- 11. 가
- 12. 가 가
- 13.
- 14. NBAP (Node B Application Protocol)
- 15. Iur
- 16. 가
- 17. 가 가







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