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2004 12 10

(21) 10-2004-0022202
(22) 2004 03 31

(30) 1020030034962 2003 05 30 (KR)

(71) 20

(72) 12 403

45-1 102 1406

()1006 1504

(74)

:

(54)

(DLLCompleted)

(TimeOut)

(SvcTimeOut)

(MACExecTime)
(NPDU)
(SendTimeOut)

-

1
 2
 3a 3b 2
 4a 4f 3a 3b
 5a 5b

* *
 1: 2:
 3: LnCP 4:
 10: 20 23:
 30, 31: LnCP 40 49:

(home Network)
 가

가 , 가 , 가 , 가
 1 , ,

[1]

	PC	,
	A/V(Audio/Video)	,
	가	가 , , ,

, (data network) PC

가 , (entertainment network) , (living network) 가 ,

가 ,

가 , , 가 , ,

(Living network Control Protocol: LnCP)

LnCP

(DLLCompleted) (MACExecTime) (NPDU) (SendTimeOut) -

(TimeOut) (SvcTimeOut)

endTimeOut) (MACExecTime) (TimeOut) , (SendTimeOut) (TimeOut) , (S (SvcTimeOut)

(MACExecTime) 1

(SendTimeOut) 1

(TimeOut)

(SvcTimeOut) 30

(LnCP)

가 ,

1

1 (4) (2) 가 LnCP (1) (3) (2) LnCP (3) (1) LnCP (3) /

(2) 가 (1) (2) (4)가 (4)가 (Wap sever)(

Web sever)() , (4)가 (Wap sever)(

4) , LnCP (3) (1) (

1) (4) (2) , LnCP (3) (

(1) LnCP (3) (1) LnCP (3)

(1) (2) (10) , (40 49) LnCP (30 3

1) , (40 49) (22) (46)가 LnCP (35 36) ,

(1) (40 49)

ansmission medium) RS-485 , RF (non-standardized tr

on medium) IEEE 802.11 (standardized transmissi

(1) (2) ,

aster) (1) (40 49) (M

(Slave) (40 49) (20 23) , (40

49) (20 23) LnCP (3) / (40

(4) (20 23) (20 23) (20 23)가

가 ,

(,)

, RF) (20 23) , (40 49) (, RS-485

, LnCP (30 31) / LnCP (35 36)

0 , (40 49) / LnCP (30 31) / LnCP (35 36) (2

23) (, Ox00, Ox01)

('0x02', '0x01') (Node Address)

, 0x0200(1), 0x0201(2) (40 49) / LnCP

(30 31) / LnCP (35 36)가 (

, (40 49) / LnCP (30 31) / LnCP (35

36)) '1' /

'1' 가 .

2

36) (LnCP) (20 23) , LnCP (30 31) , LnCP (35

(40 49) 가 (20 23) , LnCP (

30 31) , LnCP (35 36) (40 49) LnCP .

2 , LnCP (20 23) , LnCP (30 31) LnCP (35 36) 3
 6) (40 49) (50) , 가 (20 23) (60) , (80) ,
 0) , LnCP (30 31) LnCP (35 36) (40 49) (90) (40 49) (no
 de parameter) (100) .

(30 31) LnCP (50) (35 36) (40 49) (20 23) , LnCP
 (51) 가 . , (51) (100) , LnCP가 가

, (70) (20 23) , LnCP (30 31) LnCP (35 36)
 , LnCP가 (40 49)가 (PLC) / 가 IEEE 802.11, (71) RS-485 (71)
 가 LnCP (71) RS-485 4

가

3a 3b 2 .

3a (90) , 3b
 (90)

(1) (Protocol Data Unit: PDU)

, APDU(Application layer PDU) (60) (70) ,
 NPDU(Network Layer PDU) (70) (80) (71) (7
 1)) , HCNPDU(Home Code Control Sublayer PDU) (70)(
 (80) (80) (90)
 가 .

4a 4f 3a 3b .

4a (60) APDU .

AL(APDU Length) APDU (AL) , 4
 77 .

AHL(APDU Header Length) APDU (AL ALO) ,
 3 , 7 가 . LnCP ,
 APDU 7 .

ALO(Application Layer Option) , '0' ,

, ALO

4b (70) NPDU , 4c NPDU NLC .

SLP(Start of LnCP Packet) 0x02 .

DA(Destination Address) 16 (20 23) , 8

SA(Source Address) 1 (40 49) (flag), 7 가 (

PL(Packet Length) NPDU 12 , 100

SP(Service Priority) 2 3 , 가

[2]

		(Application Layer)
(High)	0	-
(Middle)	1	- (Online State) (Offline State)
(Normal)	2	-
(Low)	3	-

NHL(NPDU Header Length) 9 , NPDU 16 (SLP NLC 가) ,

PV(Protocol Version) 4 (sub-version) 1 4 (version) 16

NPT(Network layer Packet Type) 4 , LnCP
 (Request Packet), (Response Packet), (Notification Packet)
 NPL NPL
 NPT 3

[3]

0	
1~3	
4	
5~7	
8	
9~12	

13~15	
-------	--

TC(Transmission Counter) 가
 4 TC NPT TC 2

[4]

	()
	1~3
	1
	1~3

PN(Packet Number) 2 TC
 5 NPT PN

[5]

	()
	0~3
	PN
	0~3

APDU (60) (70) APDU
 0 88

CRC(Cyclic Redundancy Check) (SLP APDU) 16

ELP(End of LnCP Packet) ELP 가 0x03

4d (71) HCNPDU
 , NPDU HC(Home Code) 가 가

4

4e (80)

LnCP (80) 가 (Null Field) 가
 , NPDU

(70) HCNPDU (90) IEEE 802.11 (80) NPDU
 4 가 NPDU 가 .
 HCNPDU .
 4f (90) .
 LnCP (90) . LnCP (.
 90) RS-485 RF (80) ,
 IEEE 802.11 LnCP (1)
 , (20 23) (40 49)가 RS-485 LnCP (30 31), LnCP (35
 36) UART(Universal Asynchronous Receiver and Transmitter) RS-232
 . UART
 . LnCP 4f , 10 UART
 . UART 1 (Start Bit), 8 , 1
 (Stop Bit) , (Parity Bit) . UART
 , 가 . LnCP가 (1) UART
 가 .

6

[6]

char	signed char	가	1
uchar	unsigned char	가	1
int	signed int	가	2
uint	unsigned int	가	2
long	signed long	가	4
ulong	unsigned long	가	4
string	string	가 NULL	
FILE	-	가	

, APDU (60) 가 (50) (Message)
 U (50) , (70) APD
 (60) (Node Parameter) 7 .

[7]

	constant uint AddressReqInt	0x00 (70)	AddressReqInt ()
	uint NP_AliveInt	(70) 가 0x00 NP_AliveInt()	

	uchar NP_BufferSize	()
	const uint SvcTimeOut	(60) (ReqMsgSend) 30
	const uint DLInterval	(60)

(70)

(20 23) (40 49)

(20 23) (40 49)

3

(Transaction Control)

LnCP (35 36) LnCP (30 31)

(70) {

{1-Request, 1-Response}, {1-Request, Multi-Responses}, {1-Notification}, {Repeated-Notification }

가 가

{1-Request, 1-Response} 가 (Response Packet)

(Request Packet)

{1-Request, Multi-Responses} 가

{1-Notification} ()가 ()

{Repeated-Notification} {1-Notification}

() (NLservice) 8a

[8a]

		(NLService)
{1 - request, 1 - response}	-	Acknowledged(0)
{1 - request, multi - response}	-	Acknowledged(0)
{1 - notification}		Non - acknowledged(1)
{Repeated - notification}		Repeated - notification(2)

(70) (Node Parameter) 8b .

[8b]

	uchar ProductCode	.
	uchar NP_LogicalAddress	가 1
	uchar NP_ClusterCode	1 .
	ulong NP_HomeCode	4 .
	constant uchar SendRetries	Acknowledged Repeated - notification .
	constant uint SendTimeOut	(70) (80) NPDU (ms) , 10 DLLCompleted 00ms .
	uint ResDelayTime	Acknowledged 가 , (ms) 0~5,000ms .
	constant uint RepeaterDelayTime	가 ,) 5,000ms. (ms
	constant uint DupElapsedTime	가 , (ms) , 10,000ms

(80) (Medium Access Control: MAC)
 , RS-485 (80)
 (Medium Access Control Protocol) p-DCSMA(probabilistic-Delayed Carrier Sense Multiple Access)
 , IEEE 802.11

UART (80) (Node Parameter) 9
 . 가 4800bps , 1 IUT(Inf
 ormation Unit Time) 2.1ms (90)

[9]

		UART 2IUT
	constant uchar MaxFra	UART 1IUT

	meInterval	.
	uint MinPktInterval	5IUT (60), (80)
	constant uchar BackOfRetries	MAC, 10.
	constant uint MACExecTime	MAC (ms), 1000 ms.
	constant uchar BusyCheckTime	(), 3IUT.
	uint RandomDelayTime	가 (Wc) SvcPriority.

, (90) 10 .

[10]

	unit NP_bps	UART 4800bps .

5a 5b

5a (primitive)

, (50) (60), UserReq, UserDLReq, UserULReq, ALCompleted, UserRes, UserEventRcv가 .

(UserReq) (50) (UserReq)

11a .

[11a]

	ulong ALSvcCode	(60) .
	RequestMessage * ReqMsg	.
	uchar ReqMsgLength	RequestMessage .
	uint DstAddress	.
	uchar NLSERVICE	(70) 0: Request - response - message,

		1: Request - message - only, 2: Repeated - message, 3: Event - message - only.
	uint TimeOut	ALService가 Request - response - message (ms) ALService가 R (ms). peated - message
	uchar SvcPriority	(80)

(ALService) , (Request - response - message) 가
가 , (Request - message - only) , (Repeated - message)
, (Event - message - only) 가
,
(UserDLReq) (50)
, 11b .

[11b]

	ulong ALSvcCode	(60)
	FILE *DownloadFile	가
	uchar ALService=0	Request - response - message(0)
	uint DstAddress	
	uint TimeOut	(ms)
	uchar SvcPriority	(80) '1'

(UserULReq) (50)
, 11c .

[11c]

	ulong ALSvcCode	(60)
	FILE *UploadFile	
	uchar ALService	Request - response - message(0)
	uint DstAddress	
	uint TimeOut	(ms)
	uchar SvcPriority	(80) '1'

(UserRes)

(50)

, 11d

[11d]

	ulong ALSvcCode	(60)
	ResponseMessage *ResMsg	
	uchar ResMsgLength	ResponseMessage
	uint SrcAddress	

(UserEventRcv)

(50)

, 11e

[11e]

	ALSvcCode	(60)
	EventMessage *EventMsg	
	uchar EventMsgLength	ResponseMessage
	uint SrcAddress	

(ALCompleted)

(60)

(50)

, 11f

[11f]

	ulong ALSvcCode	(60)
	uchar ALResult	가 가 SERVICE_OK(1), SERVICE_FAILED(0)
	uchar ALFailCode	ALResult가 SERVICE_FAILED

MsgRev (60) (70) , ReqMsgSend , NLCompleted
 (ReqMsgSend) (60) (70)
 12a

[12a]

	ulong CycleID	
	uchar *ReqAPDU	(60) APDU.
	uchar APDULength	APDU
	uint DstAddress	
	uint SrcAddress	
	uchar NLService	0:Acknowledged, 1:Non-acknowledged, 2: Repeated-notification.
	uchar responseTime Out	NLService가 Acknowledged (ms).
	uint RepNotilnt	NLService가 Repeated-notification (ms).
	uchar SvcPriority	

Address)가 (CycleID) (ALSvcCode) (node)
 (MsgRcv) (70) (60)
 12b

[12b]

	ulong CycleID	
	uchar *ResEventAPDU	(60) APDU
	uchar APDULength	APDU
	uint DstAddress	
	uint SrcAddress	

(CycleID)

(NLCompleted) (70) (60)
 , 12c .

[12c]

	ulong CycleID	
	uchar NLResult	CLE_FAILED(0). CYCLE_OK(1), CY
	uchar NLFailCode	NLResult가 CYCLE_FAILED
	uchar NLSuccessCode	NLResult가 CYCLE_OK

, (70) (80) , PktSend , PktRcv D
 LLCompleted .
 (PktSend) (70) (80)
 , 13a .

[13a]

	uchar *NPDU/HCNPDU	(70)
	uchar NPDULength	NPDU/HCNPDU
	uchar SvcPriority	

(PktRcv) (80) (70)
 , 13b .

[13b]

	uchar *PDU	(70)
	uchar PDULength	PDU

(DLLCompleted) (80) (70)
 , 13c .

[13c]

	uchar DLLResult	: SEND_FAILED(0) SEND_OK(1),
	uchar DLLFailCode	DLLResult가 SEND_FAILED(0)

RptLineStatus (80) (90) , FrameSend , FrameRcv
 (FrameSend) (80) (90) 1
 , 14a

[14a]

	UART_byte	1

(FrameRcv) (90) (80) 1
 , 14a
 (RptLineStatus) (80)
 , 14b

[14b]

	uchar LineStatus	UART (Busy) LINE_BUSY , LINE_IDLE

5b (primitive)
 , (50a) (60a) , UserReqRcv , UserResSend
 UserEventSend
 (UserReqSend) (50a) , 15a
)

[15a]

	ulong ALSvcCode	(60a)

	uchar *ReqData	
	uchar ReqDataLength	ReqData ()
	uint SrcAddress	

(UserResSend) (60a) , 15b .

[15b]

	ulong ALSvcCode	(60a)
	uchar *ResData	
	uchar ResDataLength	ResData

(UserEventSend) (60a) , 15c .

[15c]

	uchar ALSvcCode	(60a) ,
	uchar ALService	2: Repeated-message, 3. Event-message-only
	uint EventCode	
	uchar *StateValue	

(60a) (70a) , ReqMsgRcv , ResMsgSend , EventMsgSend NLCompleted .

(ReqMsgRcv) (70a) (60a) , 16a .

[16a]

	uchar *ReqAPDU	(60a) APDU
	uchar APDULength	APDU

	uint DstAddress	
	uint SrcAddress	
	uchar NLService	Non-acknowledged 0: Acknowledged, 1:
	uchar DuplicateCheck	NORMAL_PKT(1), DUPLICATED_PKT(0)

(ResMsgSend) (60a) (70a)
 , 16b .

[16b]

	ulong CycleID	
	uchar *ResAPDU	APDU (60a)
	uchar APDULength	APDU

(EventMsgSend) (60a) (70a)
 , 16c .

[16c]

	ulong CycleID	
	uchar *EventAPDU	APDU (60a)
	uchar APDULength	APDU
	uint DstAddress	
	uint SrcAddress	
	uchar NLService	Repeated - notification (70a) 1: Non-acknowledged, 2: R
	uchar RepNotiInt	NLService가 Repeated - notification (ms)
	uchar SvcPriority	

(NLCompleted)

16d

(70a)

(60a)

[16d]

	ulong CycleID	
	uchar NLResult	CLE_FAILED(0). CYCLE_OK(1), CY
	uchar NLFailCode	NLResult가 CYCLE_FAILED
	uchar NLSuccessCode	NLResult가 CYCLE_OK

90a) , 5a (70a) (80a) , (80a) (

(MACExecTime) 1 (1000ms) (80) (70) (80) NPDU
 ut) 1 (DLLCompleted) (ALService)가 Request - response - message (SendTimeOut)
 (ms) (ALService)가 Repeated - message
 (ms) (TimeOut) (SvcTimeOut) 30

(TimeOut) (MACExecTime) , (SendTimeOut) ,
 20 (30 31) , LnCP (35 36) , (40 49) (

1

MACExecTime < SendTimeOut < TimeOut < SvcTimeOut

1 , (MACExecTime) (SendTimeOut)
 NPDU (MACExecTime) (SendTimeOut)
 (DLLCompleted) (80)
 (SendTimeOut) (MACExecTime) (70)

(TimeOut) (60) NPDU (SendTimeO
 ut) (SvcTimeOut)
 (TimeOut)

가 .

(Living network Control Protocol: LnCP)

가 .

LnCP

가 .

(57)

1.

, ; ,
 , (MACExecTime) , (DLLCompleted)
 (NPDU) (SendTimeOut) - (TimeO
 ut) (SvcTimeOut) .

2.

1 (SendTimeOut) (MACExecTime) (SendTimeOut) (Sv
 cTimeOut) (TimeOut) , (TimeOut)

3.

1 2 , (MACExecTime) 1

4.

1 2 , (SendTimeOut) 1

5.

1 2 , (TimeOut)

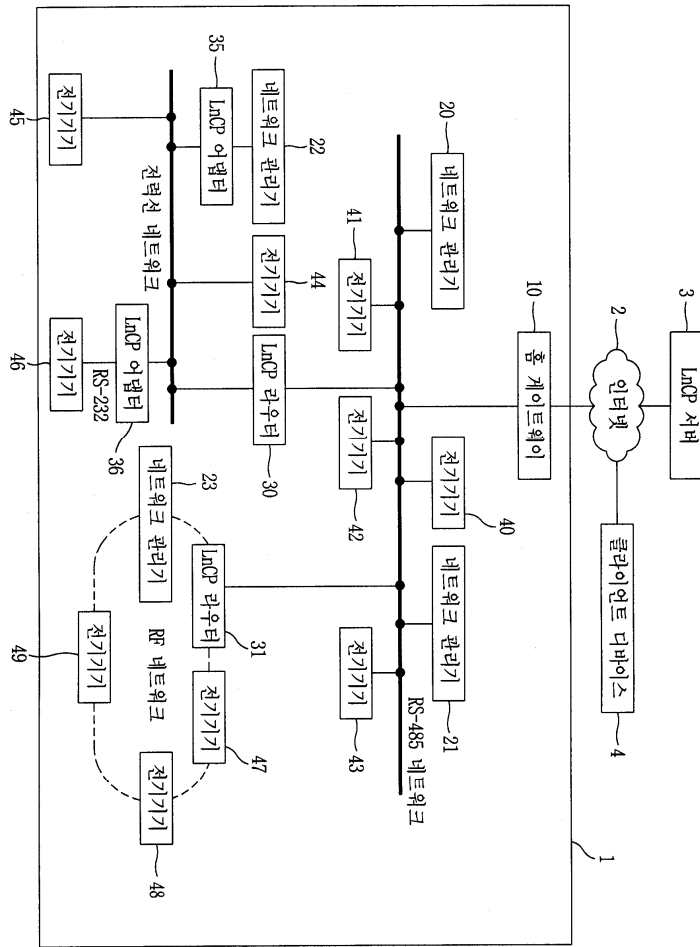
6.

1 2 , (SvcTimeOut) 30

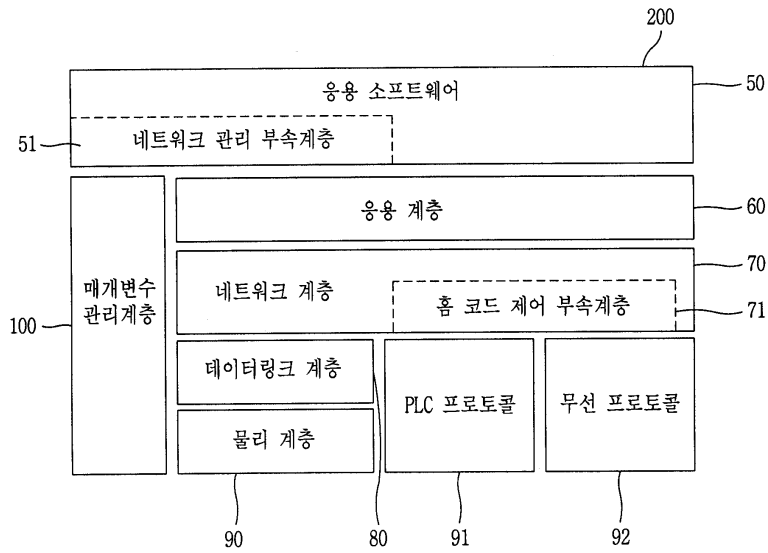
7.

1 , (LnCP)

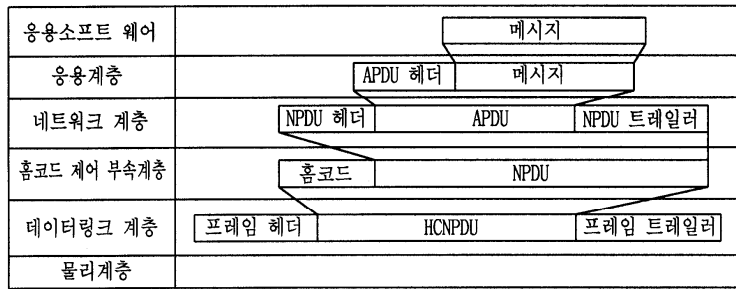
1



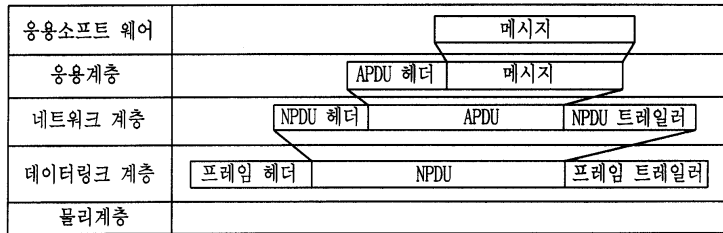
2



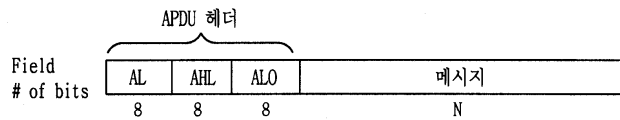
3a



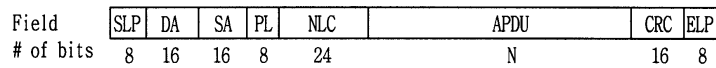
3b



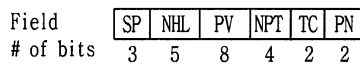
4a



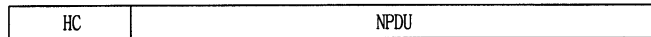
4b



4c



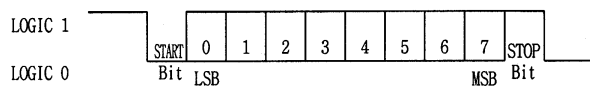
4d



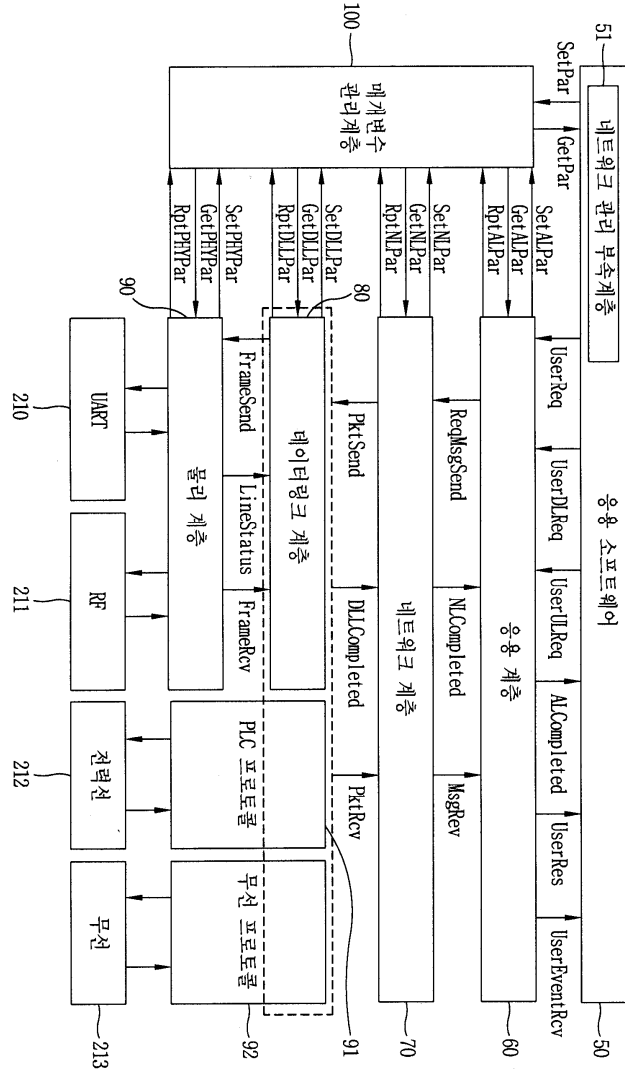
4e

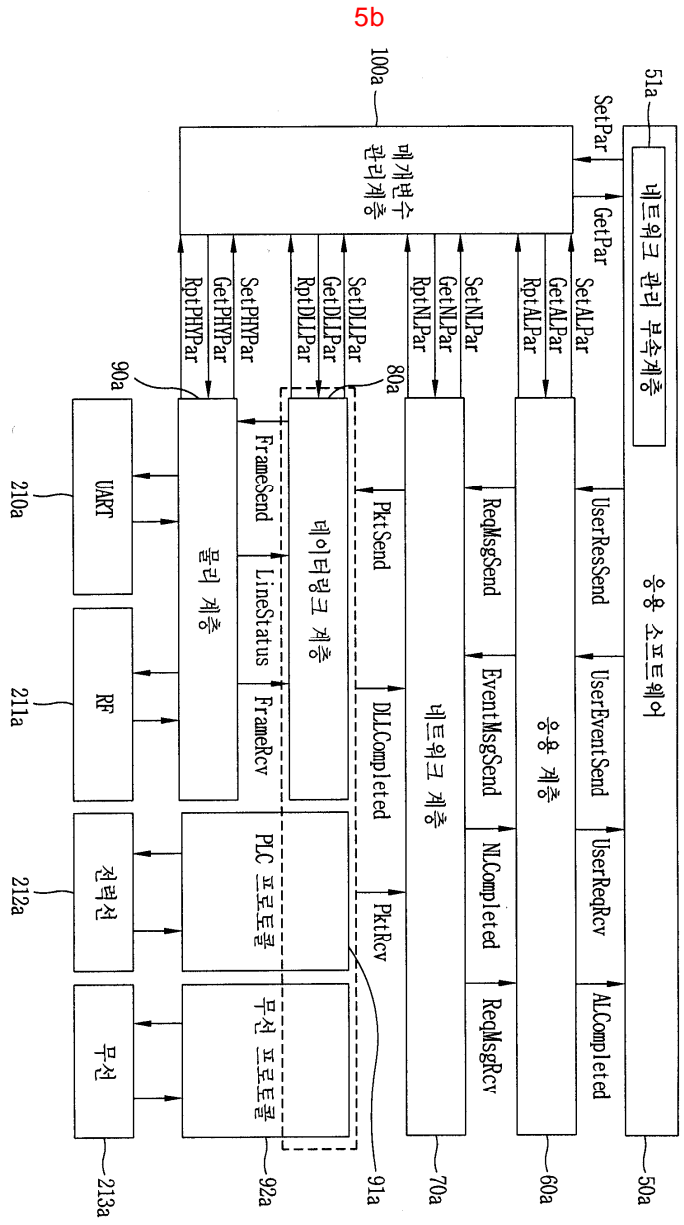


4f



5a





5b