

1.

2.

2.1 (): ITU-T X.233(1993), ISO/IEC 8473-1:1994

2.2 : KCS 55('92)

2.3 :

3. ()

3.1 ITU-T X.233(1993) ,

3.2 가 :

3.3 :

4. :

5. :

6.

1	1992	12	10
---	------	----	----

2 1997 3 21

Preface

1. Purpose of standard

This us Standard specifies a protocol that is used to provide the connectionless-mode Network service described in OSI reference model and to perform certain Network layer management functions.

2. Referenced Recommendations and/or Standards

- 2.1 International standards ITU-T X.233(1993), ISO/IEC 8473-1:1994
- 2.2 Domestic standards : Korean Communication Standard KCS 55('92)
- 2.3 Other standards-None

3. Relationship to International Standards (Recommendation)

- 3.1 This standard has been developed refer to ITU-T X.233(1993) recommendation without a discrepancy.
- 3.2 This Standard has no additional content compared to ITU-T X. 233(1993).
- 3.3 The text layout of the standard same with ITU-T X. 233(1 993).

4. The statement of Intellectual Property Rights : None

5. The statement of conformance testing and certification : None

6. The history of standard

Edition	Issued date	Contents
The 1nd edition	1992.12.10.	Established
The 2nd edition	1997.3. 21.	Revision

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1.

ITU-T X.213 | ISO/IEC 8348

가

ISO/IEC 8648

(SND CF)

(SND CP)

ISO/IEC 8802 ISO/IEC 8208
가

1)

:

2) 가

(PDU)

;

3)

:

4)

1)

:

2)

:

3)

ITU-T X.290 | ISO/IEC 9646-1

2.

가

가

2.1

- ITU-T Recommendation X200(1994) | ISO/IEC 7498-1:1994, Information technology - Open System Interconnection - Reference Model: Basic Reference Model.
- ITU-T Recommendation X210(1993) | ISO/IEC 10731:1993, Information technology - Open System Interconnection - Conventions for the definition of OSI services.
- ITU-T Recommendation X213(1992) | ISO/IEC 8348:1992, Information technology - Network service definition for Open Systems Interconnection

22

- ITU-T Recommendation X224(1993), Protocol for providing the OSI connection-mode Transport service.

ISO/IEC 8073:1992, Information Technology - Telecommunications and information exchange between systems - Open Systems Interconnection - Protocol for providing the connection-mode transport service.

- ITU-T Recommendation X290(1992), OSI conformance testing methodology and framework applications - General concepts

ISO/IEC 9646-1:1991, Information technology - open Systems Interconnection - Conformance testing methodology and framework : General concepts.

2.3 가

- ITU-T Recommendation X25(1993), Interface between data terminal equipment(DTE) and data circuit - terminating equipment(DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit
- ISO/IEC 8208:1990, Information technology - Data communications - X25 Packet Layer Protocol for Data Terminal Equipment.
- ISO/IEC 8648:1988, Information processing systems - open Systems Interconnection - Internal organization of the network layer.
- ISO/IEC 8802:1990, Information processing systems - Data communications - Local area networks

3.

3.1

ITU-T Rec. X.200 | ISO/IEC 7498-1

:

- a) (ES)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)
- k)
- l)
- m)

3.2

ITU-T Rec. X.210 ISO/IEC 10731 :

- a)
- b)

3.3

ISO/IEC 8648 :

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)

3.4

ITU-T Rec. X.213 | ISO/IEC 8348 :

a)

b)

c)

3.5

ISO/IEC 8802 :

a)

3.6 (PICS)

ITU-T Rec. X.29 ISO/IEC 9646-1 :

a) (PICS proforma)

b) (PICS)

3.7 가

3.7.1 PDU(derived PDU) : N-UNIT DATA
PDU .

3.7.2 PDU(initial PDU): N-UNIT DATA
.

3.7.3 (local matter) :

3.7.4 (Network entity title) : NSAP

3.7.5 (Reassembly) : PDU PDU

3.7.6 (Segment) : N-UNITDATA N-UNITDATA

3.7.7 (Segmentation): PDU PDU
PDU PDU

4. 가

4.1

NSDU	Network service data unit
PDU	protocol data unit
SDU	service data unit
SNSDU	subnetwork service data unit

4.2

DT PDU	data protocol network service data unit
ER PDU	error report protocol network service data unit
ERP PDU	echo reply protocol network service data unit
ERQ PDU	echo request protocol network service data unit

4.3

DA	destination address
DAL	destination address length

DUID	data unit identifier
E/R	error report flag
LI	length indicator
LT	lifetime
MS	more segments flag
NLPID	network layer protocol identifier
SA	source address
SAL	source address length
SL	segment length
SO	segment Offset
SP	segmentation permitted flag

4.4

DA	destination address
QoS	quality of service
SA	source address

4.5

CLNP	connectionless-mode network protocol(.)
NS	network-service
NPAI	Network Protocol address information
NSAP	Network Service access point
PICS	protocol Implementation Conformance statement
SN	subnetwork
SNAP	subnetwork access protocol
SNDCF	subnetwork dependent convergence function
SNDCP	subnetwork dependent convergence protocol
SNICP	subnetwork independent convergence protocol
SNPA	subnetwork point of attachment

5.

5.1

ISO/IEC 8648

. ISO/IEC 8648

OSI

ISO/IEC 8468

(SNICP)

. SNICP

OSI

,

OSI

가

(SNDTCP)

/

NSAP

ISO/IEC 8648

SNICP

가

5.5

5.2

,

,

0

.(6.7).

5.3

5.3.1

7.3 NSAP
NSAP ITU-T Rec. X.213|ISO/IEC 8348
NSAP ITU-T Rec. X.213|ISO/IEC
8348 (preferred encoding) . ITU-T Rec. X.213|ISO/IEC 8348
NSAP 7.3

5.3.2

(NET)
NSAP NSAP 가
가 . 7.5.4 7.5.5
. 7.9
PDU 7.10 PDU, 7.11 PDU
ITU-T Rec.
X.213|ISO/IEC 8348 . ITU-T Rec. X.213|ISO/IEC 8348

5.4

ITU-T Rec. X.213 | ISO/IEC 8348
1
- ITU-T Rec. X.213 | ISO/IEC 8348 (NSDU)
64512

N-UNITDATA	Request	NS-Source-Address,
	Indication	NS-Destination-Address,
		NS-Quality-of-Service,
		NS-Userdata

5.5 가

" " (6)

SN-UNITDATA	CLNP	SN-UNITDATA
-------------	------	-------------

2

8

2

SN-UNITDATA	Request	SN-Source-Address,
	Indication	SN-Destination-Address,
		sN-Quality-of-Service,
		SN-Userdata

6.

6.19

가

6.1 PDU

7 PDU
(PCI) , N-UNITDATA

PDU (NPAI) NS -
Source-Address NS-Destination-Address . NS-Destination-Address
NS-Quality-of-Service
(NS-Userdata)

NS-Userdata

(DUID)가 . PDU PDU
(PDU PDU (6.7).

PDU
PDU N-UNITDATA
DUID 가 (6.10).
PDU PDU
PDU PDU
PDU
PDU PDU
PDU PDU

6.2 PDU

N-UNITDATA . N-UNITDATA
NS-Source-Address NS-Destination-Address PDU
NPAI . PDU

N-UNIT DATA

NS - Userdata

. PDU

PDU
of-Service

N-UNIT DATA

NS - Quality.

6.3

, PDU가
(NLPID)

PDU

PDU가

[illegible]

PDU

가

PDU

NLPID

PDU

(SNPA)

NSAP

가

6.4 PDU

PDU

PDU

PDU

PDU

PDU

(500ms).

PDU

PDU

PDU

PDU

PDU

PDU
PDU
PDU

가 PDU

. PDU

500m s

a) PDU가

b) PDU

500m s

PDU
6.10 가 0 PDU
PDU
가

6.5 PDU

PDU가 ()
()
PDU
PDU 가 PDU
PDU 가 PDU
“ ”
NS QoS N-UNIT DATA NS - Quality - of-
Service QoS가 CLNP
N - Quality - of - Service
QoS PDU
() N - Quality - of - Service
()

6.6 PDU

SN - UNIT DATA Request (5.51) PDU
SND CF ,
“ ” SND CF
(.)
,
PDU가
(6.7).

6.7

가 PDU

PDU (PDU_s)

PDU PDU가 PDU가

PDU ,

() PDU

- 가 PDU (PDU_s)

PDU . PDU

PDU SN-UNITDATA

SN-

PDU 0 8

, PDU 0 0 8

PDU가

PDU

a) ;

b) ;

c)

PDU :

a) - PDU

b) - PDU

c) 가 - PDU가

PDU 1

d) - PDU

PDU PDU

1 PDU가

0

PDU PDU

6.8

(PDU (PDU) PDU
 PDU (PDU s) PDU가
 , PDU PDU가
 PDU가
 (PDU s) PDU
 (6.10).
 PDU PDU
 PDU , PDU
 PDU PDU
 -
 1) < B
 2) 가 가
 PDU
 a)
 b) 가
 가
 3) PDU PDU PDU () PDU
 PDU 가

6.9 PDU

- 1 -
 - a)
 - b) PDU
 - c) PDU
 - d) PDU
 - e) 가 PDU
 - f) 가 PDU
 - g) , 가
 - h) PDU
 - i) Type 2 PDU

2 - NSAP 가 (ITU-T Rec. X.213|ISO/IEC 8348 - (가 - PDU (NPAI) , f) d) (6.10 8) “ ” ” ”

6.10

6.10.1

PDU가 6.9 PDU PDU PDU 가 가 PDU PDU PDU 가

PDU
가
PDU
PDU가
PDU
가
PDU
PDU
PDU
PDU
(E/R)

- 1) PDU NS 가 가
PDU 가 ER PDU
가
- 2) PDU가 PDU가

6.10.2

PDU PDU
PDU 가 PDU
PDU가 , PDU 가
가 6.10.4 6.9
PDU가
PDU 가
6.9 b), c), d)

6.10.3

PDU 가 PDU
PDU PDU
NSAP PDU
PDU PDU
PDU 6.4
6.10.4
PDU ER PDU

가 ER PDU
 . ER PDU
 ER PDU
 ER PDU
 PDU
 PDU
 .

- 8.3
 가
 ,
 PDU
 512
 가 ER
 PDU

ER PDU가
 . ER PDU
 NPAI
 PDU
 (PDU
) ER PDU

6.10.4 PDU
 PDU
 PDU
 PDU
 가
 PDU가
 PDU
 PDU
 PDU

a) PDU , QoS , PDU
 PDU PDU

b) PDU
 PDU 가

c) PDU
 PDU , PDU

PDU

d) PDU

PDU

d) PDU
,
PDU

- e)
PDU

6.11 PDU

PDU

PDU

PDU

PDU PDU
(

PDU 0

$$\sum_{i=1}^L a_i \pmod{255} = 0$$

$$\sum_{i=1}^L (L - I + 1) a_i \pmod{255} = 0$$

$$\sum_{i=1}^L PDU a_i i \pmod{255} = 0$$

PDU가 (,)

PDU

- PDU

가

C

6.12

PDU

가 PDU

6.13

NSDU

(, ,)

ITU-T Rec. X.213|ISO/IEC 8348

QoS

PDU

PDU

가

7.5.3

(PDU

6.14

PDU가

PDU 가 . PDU
 . PDU
 PDU가 , PDU
 PDU가 가 PDU
 가 가 .
 . , PDU
 PDU . 6.10 PDU
 PDU 가 .
 가
 ,
 가 PDU (가)
 6.15
 PDU가 PDU
 . PDU
 PDU가 . PDU
 .
 가 PDU
 가 .
 가
 가
 가
 가
 . PDU 가

가

가

가

가

PDU (PDU)

PDU

PDU가

PDU가

PDU

PDU

PDU

PDU

6.16

NS

QoS

PDU

PDU

6.17

PDU

PDU

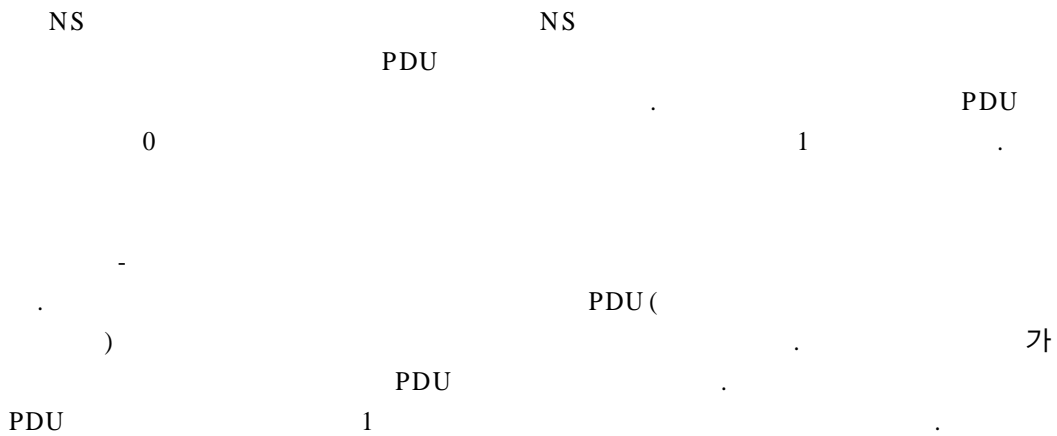
PDU

가

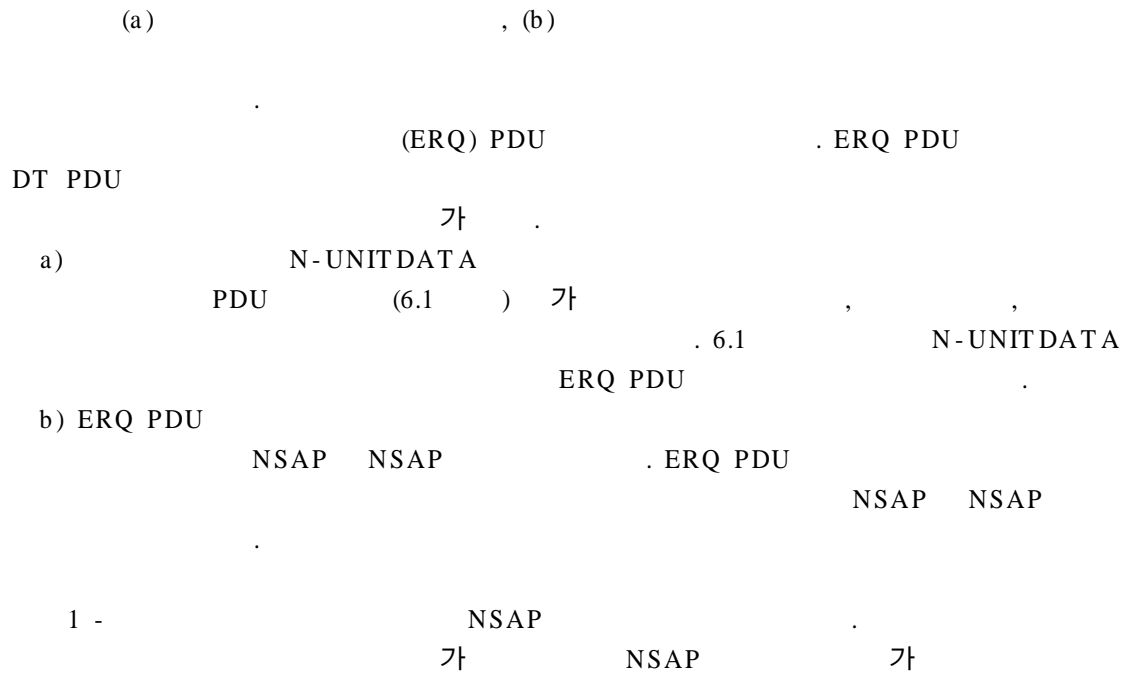
0

PDU가

6.18



6.19



PDU
(N-UNITDATA
NETs NSAP
ERQ PDU

ERQ PDU
) ERQ PDU

c) ERQ PDU가

PDU

(6.20)

2 -
PDU

2

(6.21)

ERQ

PDU

가

d) ERQ PDU

PDU
ERQ PDU가

PDU
PDU

e) ERQ PDU

0

((d)

ERQ PDU

).

10000 0001(

NLPID)

)

PDU

,

가

가

0 가

가 1

가

가

7.5

3 -
PDU

PDU 가 ERQ PDU
(6.20 (d))

6.20

가 (, ERQ PDU
NSAP NSAP)

.

(ERP) PDU . ERP PDU

, DT PDU

가 .

a) N-UNITDATA PDU
가 , ERQ PDU
. 6.1 N-UNITDATA
ERP PDU

b) ERP PDU ERQ PDU
ERP PDU ERQ PDU .

- 6.19 1 ERP PDU .

c) ERQ PDU ERP PDU . ERP PDU
ERP PDU

d) ERQ PDU 가 ERP PDU [6.19 e)], PDU
ERP PDU

.

ERP PDU ERP PDU

ERP PDU
ERP PDU ERP PDU

e) ERP PDU 가 7.5

. ERQ PDU ERQ PDU ERP PDU ()

. ERP PDU

ERP PDU
ERP PDU ERQ PDU

f) 가 ERQ PDU
 . DT PDU 6.4

6.21

6.1 6.20 . 3

1 -
 2 - , 2
 PDU PDU ,
 가 1 6.10.4 , PDU
 3 - , 3
 PDU
 , PDU . PDU
 3 3
 3

PDU	1	1	1
PDU	1	1	1
	1	1	1
PDU	1	1	N/A
PDU	1	1	N/A
PDU	1	1	N/A
PDU	1	N/A	N/A
PDU	1	N/A	N/A
PDU	1	1	N/A
	1	1	N/A
	1	1	N/A

QoS	2	2	N/A
	2	2	N/A
	2	2	N/A
	2	2	N/A
	2	2	N/A
	3	3	N/A
	3	3	N/A
	3	3	N/A
	3	3	N/A
	3	3	N/A

1) ,

2) 3

PDU

3
PDU

7. PDU

7.1

PDU

. PDU

(1)

가 가

(1) (s)

가

(1)

가

(가

)

가

가

"MSB" "LSB"

PDU "MSB"

"LSB"

- PDU 가

a) 가 ,

b) (8) , (1) .

PDU :

a) :

b) :

C) ();

d) ();

e) ();

f) ().

a) e) PDU .

7.8 . 7.2 -7.5

1 . 1 7.5 ER PDU

7.2

7.3

7.4

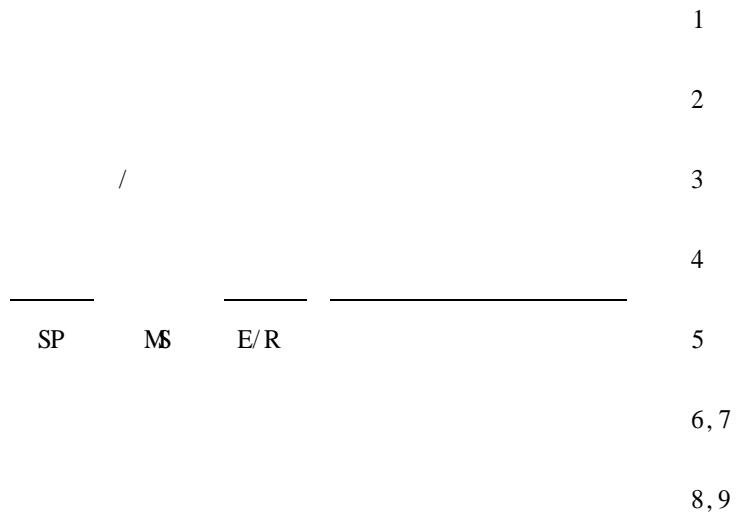
7.5

7.6

1-PDU

7.2

7.2.1



2-PDU -

7.2.2 (Network layer protocol Identifier)

1000 0001
0000

0000

7.2.3 (Length indicator)

, 254(1111 1110) 7.1
. 255(1111 1111)

PDU - PDU (PDU)
PDU PDU

7.2.4 / (Version/protocol identifier extension)

0000 0001 가 , 1

7.2.5 PDU (Lifetime)

PDU PDU , 500ms .

7.2.6 (Flags)

7.2.6.1 (Segmentation permitted)

가 . PDU
 , PDU PDU
 (1) 가 , (0) 가
 . (0) PDU 가 ,
 PDU 가 (3.2.8 7.4.3).

7.2.6.2 (More segments)

가 PDU가 NSDU
 . 가 NSDU PDU
 가 가 (1) . 가 (1)
 가 (1)
 가 가 (0) , PDU NSDU

7.2.6.3 (Error report)

가 (1) , PDU
 ER PDU 6.10
 가 (0) PDU ER PDU
 .

7.2.7 (Type code)

PDU . 4 .

4.PDU

PDU

5 4 3 2 1

DT PDU	1	1	1	0	0
ER PDU	0	0	0	0	1
ERQ PDU	1	1	1	1	0
ERP PDU	1	1	1	1	1

7.2.8 PDU (Segment length)

() PDU
PDU가 ,
가 .
() PDU .
PDU

7.2.9 PDU (Checksum)

PDU PDU
가 PDU
(0) PDU (6.11)
) 0 0

7.3

7.3.1

PDU 3

10

11

$m-1$

m

$m+1$

$n-1$

3-PDU -

7.3.2

ITU-T Rec. X.213|ISO/IEC 8348

NSAP

가

ITU-T Rec.

X.213|ISO/IEC 8348

“ ”

4

(, 'm')

$n-1$

$n+m$

4 -

7.4 (Segmentation Part)

7.4.1

PDU (7.2.6.1)가 (1) , 5 가 (0) 가 ().

n, n+1

n+2, n+3

n+4, n+5

5-PDU -

7.4.2 (Data Unit Identifier)

PDU(PDU) 가 2 .

7.4.3 (Segment Offset)

PDU , PDU PDU (, PDU) (0) , () PDU (0) (8) 가 .

7.4.4 PDU (Total length)

PDU PDU (PDU) .

7.5

7.5.1

3-PDU -

7.3.2

ITU-T Rec. X.213|ISO/IEC 8348

NSAP

가

ITU-T Rec.

X.213|ISO/IEC 8348

“ ”

4

(, 'm')

n- 1

n+m

4 -

7.4 (Segmentation Part)

PDU

6

.

n+6

p

6-PDU -

가

가

.

,

= PDU - (- -)

PDU

6.10

PDU

7

.

n

n+1

(, 'm')

n+2

n+m+1

7.

2

가

8

235

7 00

,

. 255(2 1111 1111)

2 m

1,

254

, m

가
 m
 $m = 252 - (\quad + \quad + \quad)$
 m
 가

7.5.2 (Padding)

PDU (6.12)

: 1100 1100

: 가

:

1

7.5.1

0 (

) PDU

7.5.3 (security)

PDU (6.13).

∴ 1100 0101

: 가

: 2 5

0

5 -

--	--

00
01
10
11

7.5.3.1 (Source address specific)
“01”

NSAP

.

7.5.3.2 (Destination address specific)
"10"

NSAP

.

7.5.3.3 (Globally unique security)
“11”

.

.

7.5.4 (Source routeing)

가

(6.14).

: 1100 1000

: 가

: 2 가

가

.

.

0000 0000

0000 0001

<

>

가

(3)

가

가

7.5.5

(Recording of route)

PDU가

(6.15

).

: 1100 1011

: 가

: 2

가

가

0000 0000

0000 0001

(3)

가

(1)

가

가

- PDU , PDU .

7.5.6 (QoS Maintenance)

가 ,
가 ,
(6.16)

: 1100 0011

: 가

: 2 6 QoS .

6. QoS

QoS

QoS

00

01

10

11

7.5.6.3

QoS 가 ,

6-1 0 .

QoS .

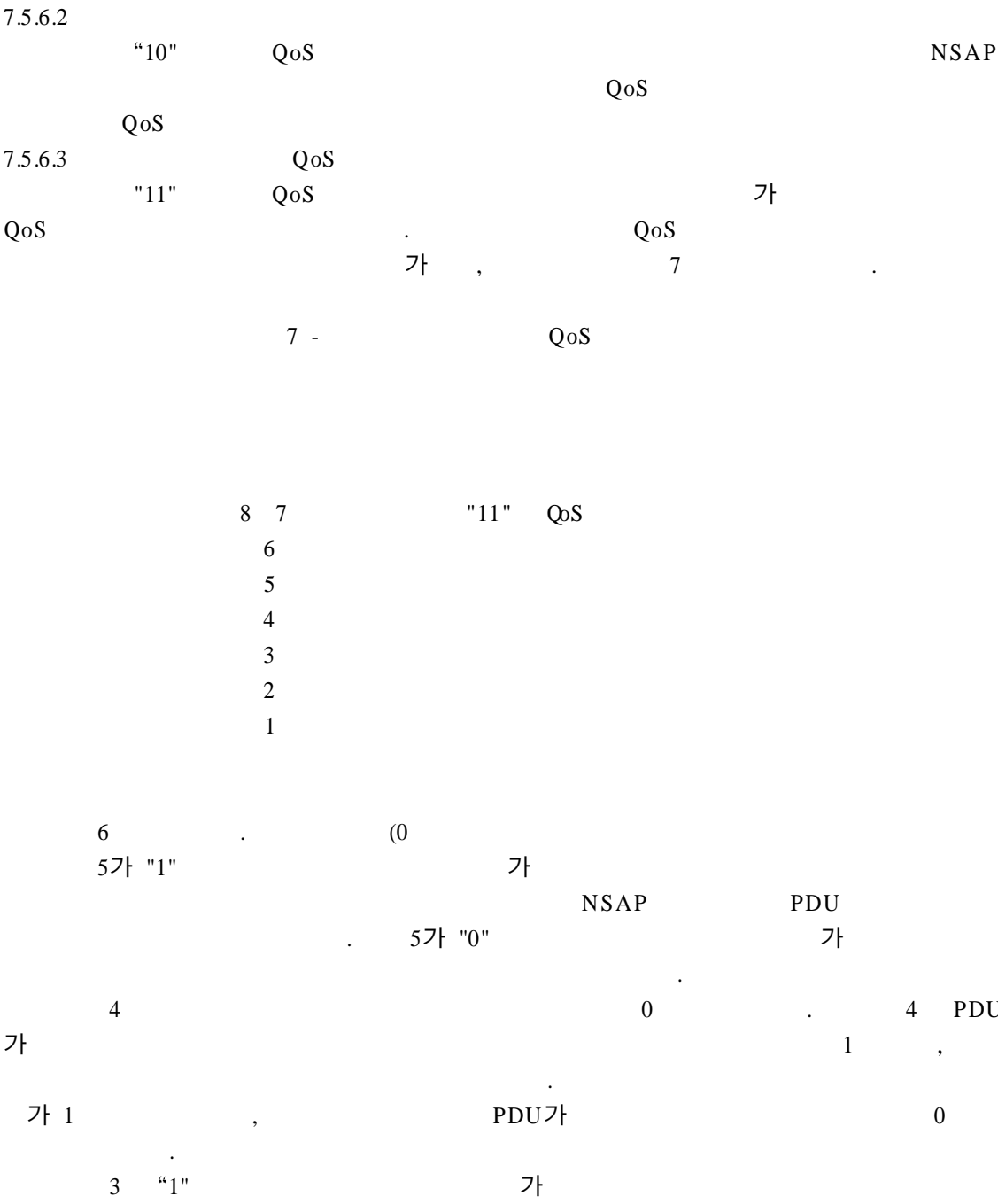
7.5.6.1

"01" QoS

NSAP

QoS

QoS .



3 “0”
 2가 “1” 가
 2가 “0”
 1 “1” 가
 1 “0”

7.5.7

PDU
 (6.17).
 : 1100 1101
 : 1
 : 0000 0000 - ()
 0000 1110 -
 < >
 0000 0001 0000 1110
 PDU 0000 0000

7.6

PDU 8 -



8-PDU -

7.7 PDU

7.7.1

PDU 9 .

SP MS E/R

- 1
- 2
- 3
- 4
- 5
- 6, 7
- 8, 9
- 10
- 11
- ~~m~~ 1
- m
- ~~m~~+1
- n- 1
- n, n+1
- n+2, n+3
- n+4, n+5
- n+6
- p
- p+11
- z

9 - PDU

7.7.2

- | | | |
|---------------|--------|---|
| 1) | (7.2.2 |) |
| 2) | (7.2.3 |) |
| 3) - | (7.2.4 |) |
| 4) | (7.2.5 |) |
| 5) SP, MS,E/R | (7.2.6 |) |
| 6) | (7.2.7 |) |
| 7) | (7.2.8 |) |
| 8) | (7.2.9 |) |

7.7.3

7.3

7.7.4

7.4

7.7.5

7.5

7.7.6

7.6

7.8

7.8.1

PDU 10 .

	1
	2

2-n

10.

7.8.2

2 0(0000 00000) .

7.8.3

SN-UNITDATA

SN-

1

.

N-UNITDATA

NS-

가 SN-

1

(7.6).

7.9

PDU

7.9.1

PDU

11 ㄷ ㄷ

.

1

2

/

3

4

SP

MS

E/R

5

6, 7

8, 9

10

11

m 1

m

m+1

n-1

p-1

p

q-1

q

z

11- PDU

7.9.2

() PDU

- 1)

2)

3) /

4)

5) SP, MS, E/R(0)

6)

7)

8)
- 7.2.2

7.2.3

7.2.4

7.2.5

6.10

7.2.7

7.2.8

7.2.9

7.9.3

PDU PDU .

7.9.4

7.5

7.9.5

PDU

$$: 1100 \ 0001$$
$$: 2$$
$$: 2$$

8

PDU

가

2

가

0

가

8 -

0000 0000

000 1

00 10

0011

0100

0101

0110

01 11

가

PDU

()

가

PDU

1000 0000

000 1

가

1001 0000

000 1

0010

00 1 1

10 10 0000

000 1

가

1011	0000
	0001
	0010 PDU
	0011
	0100
1100	0000

7.9.6

PDU , PDU
.

7.10 PDU

ERQ PDU DT PDU (7.7).

7.11 PDU

ERP PDU DT PDU (7.7)

8.

(SND CF) 가 , SND CF가
.
(SND CP) (, SND CP
) .

8.1

SN-UNITDATA

(SNPA s)

. SNPA s

8.2

(QoS)

SN-UNITDATA

) 가 (. 가

. ITU-T Rec.

X.213|ISO/IEC 8348

- a)
- b)
- c)
- d)
- e)

SNDCF

QoS

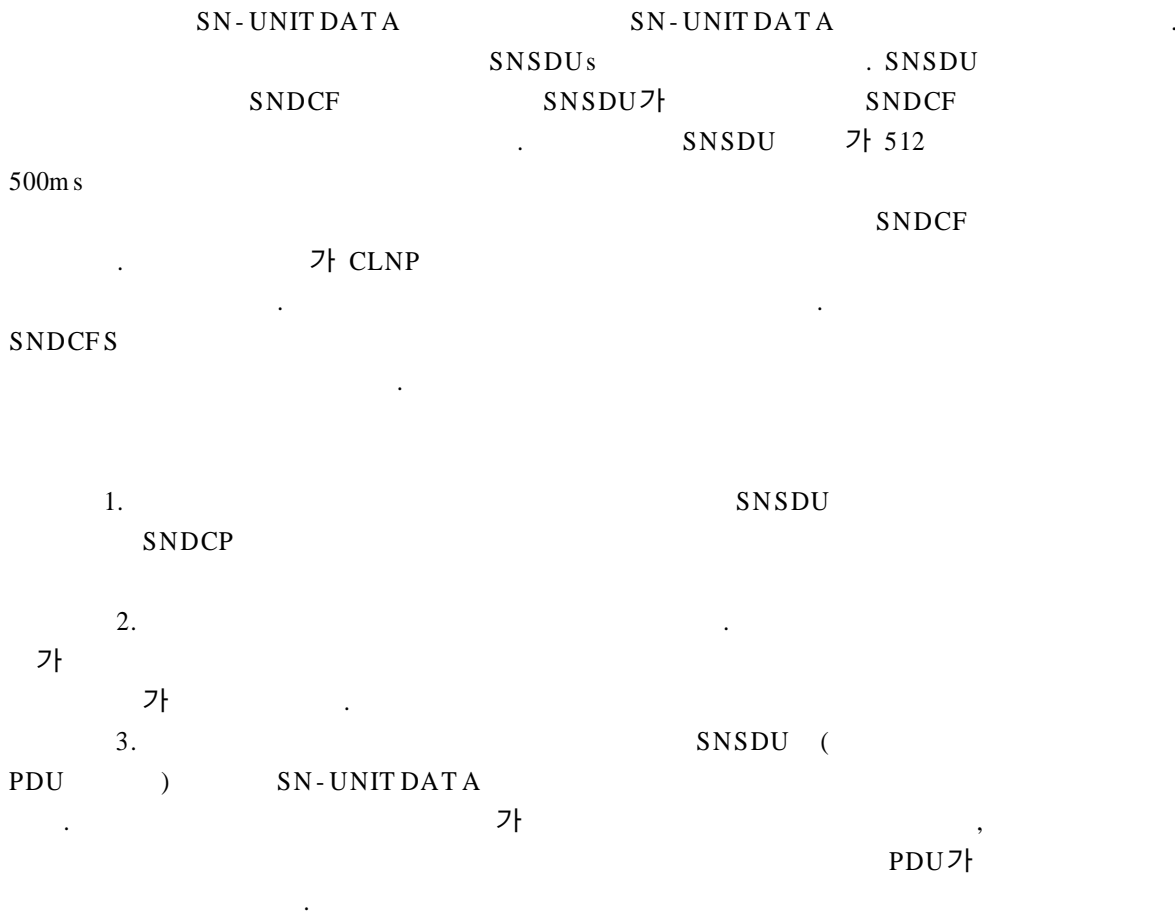
(CLNP)

QoS

- a) SNDCF CLNP PDU QoS :
- b) SNDCF QoS :
- c) SNDCF a), b) QoS

QoS

8.2.1



8.2.2

SN- , , , 가,

8.2.3

SNDCF가 SNSDU

NSDU

CLNP PDN

가,

가

SNDCF

-

8.2.4

NS 가 QoS 가
CLNP가 PDU
가 CLNP PDU

- CLNP PDU
가 :

- 1) 가 SNSDU 가 ,
가 :
- 2) 가 , 가
, (가
가) 가 .
- 3) 가 NSDU ,

PDU CLNP가 NSDU , NS 가
NSDU(NSDU_s)
NS

8.3

SN-

. CLNP가 가

512

PDU
가

가

.

-

가

.

8.4

가

. CLNP SN-UNITDATA

UNITDATA

UNITDATA 가

SNDCF가 CLNP UNITDATA

.

CLNP가 가

. CLNP SN-UNITDATA

SN-Userdata

(, , 가)

가 SN-UNITDATA . SN-Userdata

PDU가

SNDCF CLNP SN-UNITDATA

. CLNP가 가

.

.

9.

9.1

9.1.1

- a) NPDU :
- b) NPDU :
- c) 9 :
- d)

- e) NPDU_s
- f) NPDU_s
- g) 9

- a) NPDU_s

9 ,

(PDU) PDU

PDU

9.1.2

- a) 9 ,
- b)

- c) 9

(1)

PDU (2)	6.1	M	N/A	N/A
PDU (2)	6.2	N/A	M	N/A
	6.3	N/A	M	M
PDU	6.4	M	O	M
PDU	6.5	M	N/A	M
(2)	6.6	M	N/A	M
(2)	6.7	M	N/A	(3)
PDU	6.8	N/A	M	O(4)
	6.9	N/A	M	M
	6.10	M	M	M
	6.11	M	M	M
	6.13	O	O(4)	O(4)
	6.14	O	N/A	O(4)
	6.15	O	O(4)	O(4)
	6.19	O	O(4)	O(4)
	6.20	N/A	O(4)	O(4)
	6.14	O	N/A	O(4)
	6.15	O	O(4)	O(4)
	6.17	O	O(4)	O(4)
QoS	6.16	O	O(4)	O(4)
	6.18	N/A	O(4)	O(4)
	6.12	O	M	M

M ;

O ;

N/B

/

1 DT, ER, ERQ,
ERP PDUs
DT, ER, ERQ, ERP PDUs

2. PDU PDU , , ER TPDU

3. PDU
SDU가 ()
가 ,

4.
9.2
9.2

:

a) 9 ;
b)

PDU s 7
9 PDU
PDU , 6.21 PDU

9.3 (PICS Proforma)

A