

IMT- 2000

1999

「IM-2000

」

.

2000. 1. 20.

: ()
: ()
: ()
()
()
()

1.

- IMT - 2000 2, IMT - 2000 2가 .
- , IMT - 2000 , 가 .
- IMT - 2000 global radio control channel
- , , 3
- MAC .
- , 가 , Voice over Data network 가 , ETSI Tiphon .
- .

2.

-
- - 2 /3 -
- IMT - 2000
- VoIP (Voice over IP) IMT - 2000

3.

-
- ITU- R MAC
-
-
- VoIP
- IMT- 2000 VoIP
- IMT- 2000 IP

4.

- WRC- 2000 IMT - 2000

5.

- WRC- 2000
- IMT- 2000
-

Summary

In this work, we focus on the global roaming technics between different standard specifications in 3rd generation IMT-2000 system. The current issues in the IMT-2000 standards are interface specification between two domain standards such as 3GPP and 3GPP2 for global roaming. We studied the current status of debates in the air interfaces, user identification module interfaces, and network network interfaces. Furthermore, we compare the pro and cons of the 3 combinations of implementation scenario in the IMT-2000 system.

Considering the high penetration and fast proliferation of mobile telephony and the growing popularity of the internet, it is likely, that most of the traffic, at least in the early stages of third generation mobile systems, will consist of voice and mobile Internet access. These service, also supported by 2nd generation systems, must in the 3rd generation systems be provided in a much more heterogeneous environment and on a larger scale. So, we investigate the medium-to-high bit rate mobile packet data networks as one part of IMT-2000 system. The Internet has shown rapid growth as a global networking platform for a variety of multimedia application. So, 3GPP and 3GPP2 introduce the "All IP" network concept which IP network is used as a core network. At first, we explain the current state of standard and related techniques in the Voice over IP (VoIP). Following this, we discuss the interworking with Intellignet Network service in the existing networks and discuss the structure of the IN network for VoIP network. In a near future, All IP will be the core part of the IMT-2000 network. Standard Bodies will establish the requirements first and will proceed to settle down the detail specification related the signaling, and switching. Most of the work will be focused on the global roaming.

| | | |
|---|----------------------|-----|
|  | ..... | 7 |
|  | ..... | 10 |
| 1 | ..... | 11 |
| 2 | IMT - 2000 | 14 |
| 1 | ITU IMT - 2000 | 14 |
| 2 | 3GPP | 28 |
| 3 | ..... | 37 |
| 1 | ..... | 37 |
| 2 | ..... | 39 |
| 4 | ..... | 46 |
| 1 | ..... | 46 |
| 2 | VHE | 60 |
| 5 | ..... | 63 |
| 1 | ..... | 63 |
| 2 | ..... | 70 |
| 6 | VoIP | 86 |
| 1 | VoIP | 86 |
| 2 | VoIP | 102 |
| 3 | ..... | 107 |
| 7 | All IP | 113 |
| 1 | All IP | 113 |
| 2 | 3GPP All IP | 114 |
| 3 | 3GPP2 All IP | 122 |
|  | ..... | 133 |

| | |
|---|----|
| 1- 1. IMT - 2000 | 12 |
| 2- 1. IMT - 2000 | 14 |
| 2- 2. SG11 | 15 |
| 2- 3. IMT - 2000 Framework | 18 |
| 2- 4. WP3 JQG | 19 |
| 2- 5. 가 | 23 |
| 2- 6. 가 | 23 |
| 2- 7. | 25 |
| 2- 8. | 26 |
| 2- 9. IMT - 2000 | 27 |
| 2- 10. IMT - 2000 | 29 |
| 2- 11. 3GPP | 30 |
| 2- 12. 3GPP2 | 32 |
| 2- 13. | 35 |
| 2- 14. OHG가 | 36 |
| 3- 1. | 41 |
| 3- 2. mapping | 43 |
| 3- 3. IS- 95B cdma2000 MAC state transition diagram | 44 |
| 4- 1. UIM MT | 48 |
| 4- 2. UIM | 49 |
| 4- 3. NNI | 50 |
| 4- 4. 3GPP NNI | 51 |
| 4- 5. IMT - 2000 가 | 53 |
| 4- 6. MC- 41 | 54 |
| 4- 7. MC- 41 protocol | 54 |
| 4- 8. MC- 41 | 55 |
| 4- 9. DS- MAP | 56 |
| 4- 10. DS- MAP | 56 |
| 4- 11. DS- MAP | 57 |

| | |
|----------------------------|-----|
| 4- 12. MC- MAP | 57 |
| 4- 13. DS- 41 | 58 |
| 4- 14. DS- 41 | 59 |
| 4- 15. DHC | 61 |
| 4- 16. RSC | 61 |
| | |
| 5- 1. WAP | 68 |
| 5- 2. WAP | 69 |
| 5- 3. IMT- 2000 / | 71 |
| 5- 4. TR.45.6 | 71 |
| 5- 5. | 73 |
| 5- 6. | 74 |
| 5- 7. IMT- 2000 | 75 |
| 5- 8. IMT- 2000 | 76 |
| 5- 9. IMT- 2000 가 | 77 |
| 5- 10. GPRS | 79 |
| 5- 11. GPRS | 80 |
| 5- 12. GPRS Protocol Stack | 80 |
| 5- 13. UMTS | 81 |
| 5- 14. MIP 1 | 82 |
| 5- 15. MIP 2 | 84 |
| 5- 16. MIP 3 | 85 |
| | |
| 6- 1. SIP | 87 |
| 6- 2. SIP Network Server | 88 |
| 6- 3. SIP | 89 |
| 6- 4. IP IETF | 93 |
| 6- 5. | 95 |
| 6- 6. SCTP | 95 |
| 6- 7. TIPHON | 99 |
| 6- 8. GMM | 100 |
| 6- 9. | 103 |
| 6- 10. Direct- routed Call | 104 |

| | |
|--------------------------------|-----|
| 6- 11. Gatekeeper- routed Call | 104 |
| 6- 12. PINT | 105 |
| 6- 13. | 108 |
| 6- 14. | 109 |
| 6- 15. NGN | 111 |
| | |
| 7- 1. All- IP | 114 |
| 7- 2. 3GPP option 1 All IP | 117 |
| 7- 3. 3GPP option 2 | 117 |
| 7- 4. | 121 |
| 7- 5. 3GPP2 All- IP | 123 |
| 7- 6. | 124 |
| 7- 7. cdma2000 All IP (3GPP2) | 125 |
| 7- 8. CISCO 1 | 125 |
| 7- 9. CISCO 2 | 126 |
| 7- 10. CISCO 3 | 127 |
| 7- 11. TiPHON | 128 |
| | |
| | |
| 3- 1. | 37 |
| 3- 2. IMT- 2000 | 38 |
| 4- 1. NNI | 51 |
| 4- 2. | 60 |

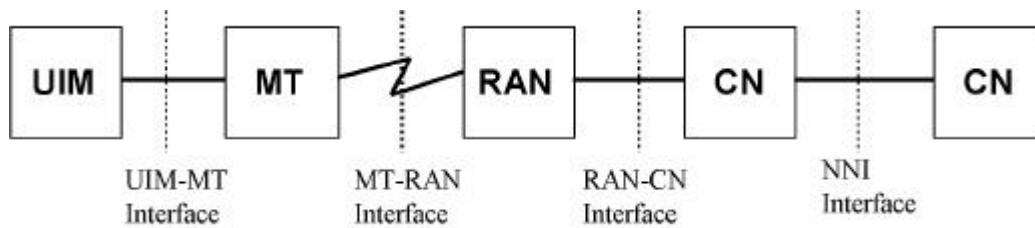
1

IMT - 2000 “ , , ” 가

IMT - 2000 가 ISDN , ,
IP 2
가
가

IMT - 2000 ,
/ , UIM(User Identity
Module) 2 가 .

IMT - 2000 , ,
 ,
 . IMT - 2000 ITU
 , 2 , /
3GPP(3rd Generation Partnership Project)
3GPP2 . ITU
IMT - 2000 ,
 1- 1 (network family
concept) IMT - 2000 가 .
CS(capability set)
 , IMT - 2000 가
 . IMT - 2000
 , UIM- MT CN NNI .



UIM(User Identity Module) MT(Mobile Terminal)
 RAN(Radio Access Module) CN(Core Network)

1- 1. IMT - 2000

IMT - 2000
 IMT - 2000 family member
 IMT - 2000 IMT - 2000 IMT - 2000
 Virtual Home Environment(VHE)

14 ITU - R TG8/1 IMT - 2000
 global radio control channel
 , 99 5 , global control
 channel ITU
 , ,
 , ,
 , 3 MAC(Medium Access Control)
 MAC
 ,
 Internet Interworking 가
 2 9- 14 kbps , 56- 384 kbps ,
 가 . 2

Mobile IP , 3
 IMT - 2000 .
 , ,
 가
 , Voice over Data network 가 .
 VoIP(Voice over IP Network)
 . ETSI Tiphon
 PSTN, ISDN, GSM
 . ,
 VoIP
 . 가
 99 8 3GPP, 3GPP2 All IP IMT - 2000
 , .
 All IP .
 . 2
 IMT - 2000 IT U, 3GPP, 3GPP2, OHG
 . 3 ,
 , MAC . 4
 , . 5
 , 6 VoIP
 . 7 All IP , 8
 .

2 IMT - 2000

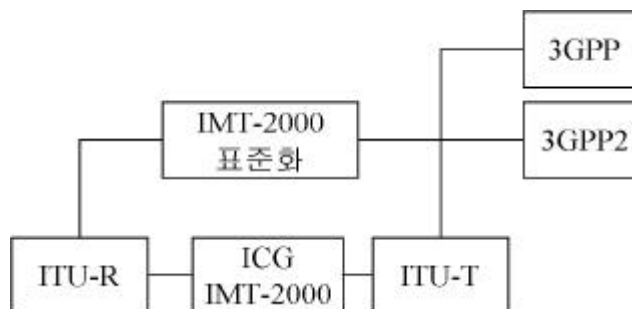
1 ITU IMT - 2000

1.

2-1 IMT - 2000 , ITU-R ITU-T , ITU-R SG 8 TG8/1 IMT - 2000 , ITU-T , IMT - 2000

(compatibility)

ICG(inter- sector Coordination Group) . ITU 3GPP 3GPP2 IMT - 2000 , ITU . - . - . 가 .



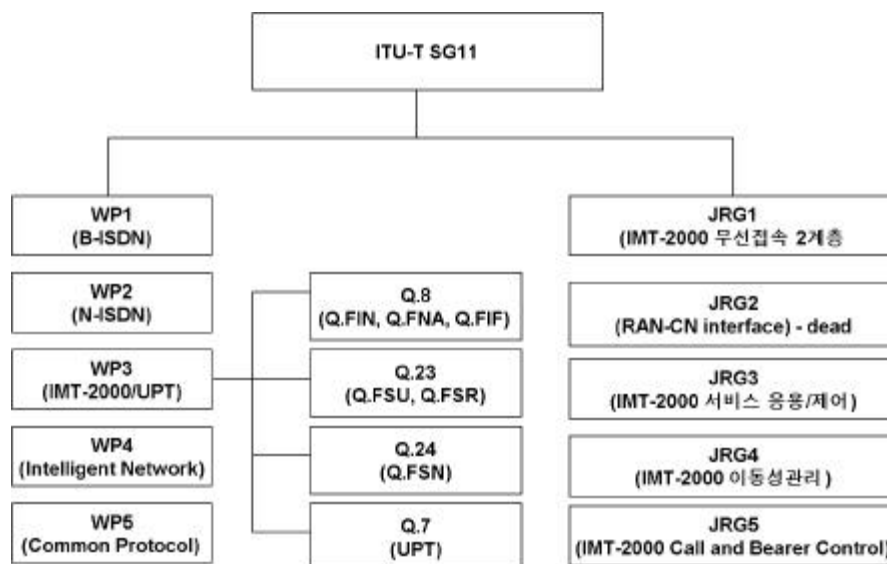
2- 1. IMT - 2000

ITU-T SG 1, SG 2, SG 11, SG 13, SG 15 . SG 11 IMT - 2000 , ITU-T IMT - 2000 F.115(Service Objectives and Principles for IMT - 2000) '94 가 . SG 2 IMT - 2000

ITU-T) ,
 . SG 11 IMT-2000 가
 . IMT-2000 /
 IN(Intelligent Network)
 1 TG 8/1 , 2 TG 8/1 SG 11
 , 3 SG 11 . SG 13
 ATM
 . SG 15 IMT-2000 .
 가
 G.728 ,
 (8kbps) .

2. ITU-T SG11

SG11 lead SG , 2-2
 . WP .



2- 2. SG11

가. WP1

- Q.6/11 - Signalling Requirements for Broadband and Multimedia
- AAL2 CS-2

• ATM backbone

Q.21/11

- Q.20/11 - Access signalling for broadband and multimedia
 - Q.2630.1(AAL2 CS-1 signalling)
- Q.13/11 - Network signalling for broadband and multimedia

• B-ISUP 2000 draft recommendation

- parameterized QoS, AAL type selection & negotiation

. WP2

- Q.21/11 -

• ATM PSTN/N-ISDN

• IN/internet benchmark

• SOI cover

- Q.9/11 -

• 가 IP ATM internet architecture
echo control logic

. WP3

- Q.7/11 - Universal Personal Telecommunication

• Q.1701, Q.1711 (ITU-T IMT-2000)

• Q.1721(Information flows)가 12 determination

• Q.FSN Q.FSU

- Q.23/11 - Radio and Access signalling requirements for IMT-2000

• Q.FSR-GA, L3 ,

• Q.FSU Ver.4 가 , Q.1721

- Q.24/11 - Network and Interworking Signalling Requirements

- JQG 3, 4, 5 Signalling requirements

• Q.1721

. WP4

- Q.5/11 - (IN Capability Sets)

• Q.1231(IN CS-3)

- Q.1238(IN CS-3) 12

- Q.10/11 - Common Upper Layer Protocols

- IN B-ISDN

Ÿ - IN IP IETF PINT(PSTN-) CS- 2
CS- 3

. WP5

- Q.2/11 - Signalling System No.7 - Management(OMAP)

- SWP1 ; Q.14/11 - UNI data link layer protocol

- Ÿ multilink SSCOP

Ÿ - SS7 over IP

- Q.16/11 - MTP and SCCP

- Q.25/11 - service provider portability, location portability, service portability

Ÿ - Internet alternative addressing

. JQC

- JQC1(Radio Interface L2)

- JQC3(Service application)

- Q.1721(Information flows) VHE

- SCP

- INAP

- IMSI, terminal capabilities, addressing mechanism

- JQC4()

- LMFv(Location Management Function) state model

- AMF(Authentication Management Function)

- JQC5(Call/Bearer Control)

- CN- CN interface

- ISDN/PSTN CN- CN N- ISUP

3. ITU-T WP3/11

WP3 ITU SG11

IMT-2000

ITU-T

WP3/11

3

3

IMT-2000

1 IMT-2000

(Forward compatibility)

2

3

IMT-2000

Q.1701

ITU-T SG11

IMT-2000

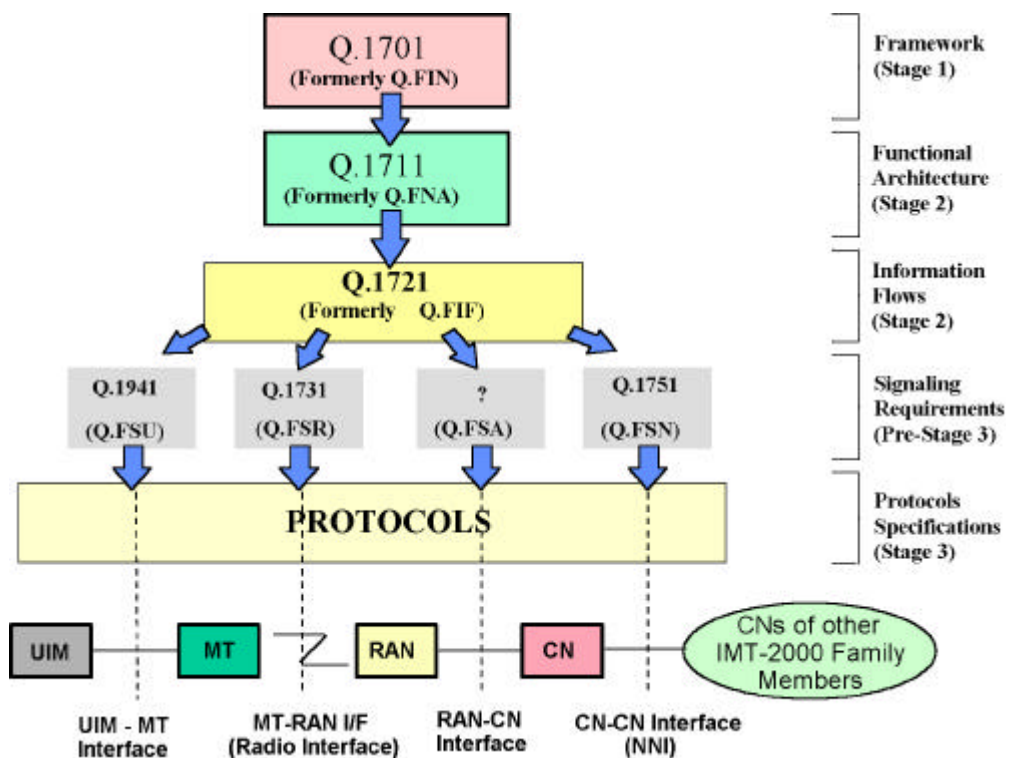
2-3

WP3

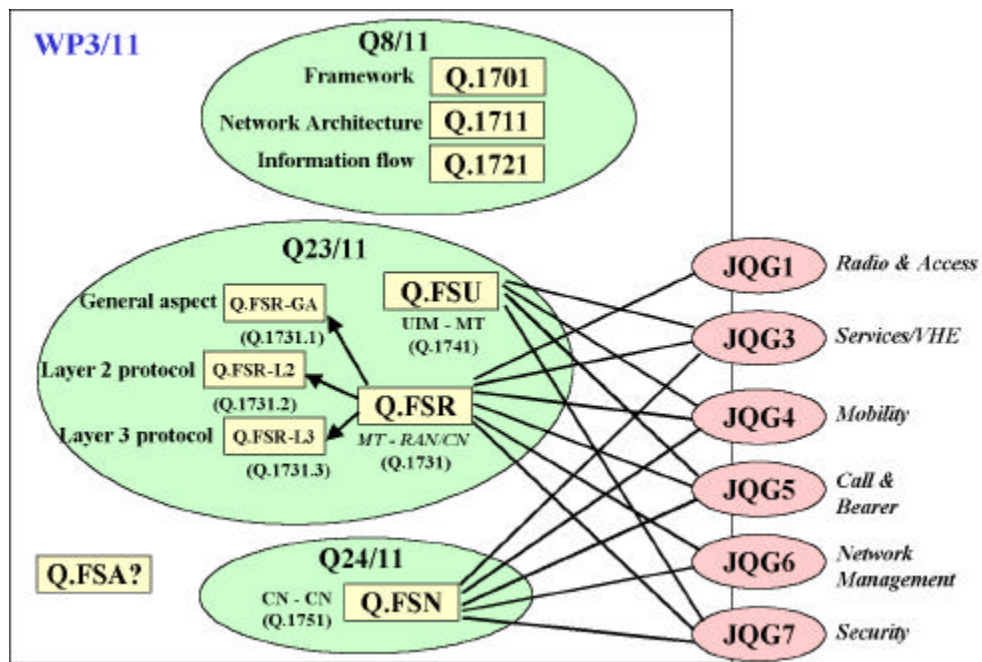
JQG

가

2-4



2- 3. IMT-2000 Framework



2- 4. WP3

JQG

가. Q.1701 (Q.FIN)

Q.1701 IMT - 2000

IMT - 2000

IMT - 2000 CS - 1 IMT - 2000

IMT - 2000

IMT - 2000

. Q.1711(Q.FNA: Functional Network Model for IMT - 2000)

Q.1711 IMT - 2000

, IMT - 2000

IMT - 2000

2 1 5

· **Q.1721(Q.FIF: Information Flow)**

Q.1721 IMT - 2000 , CS- 1
2 ,
IMT - 2000 .
 , 1999 12
.

· **Q.1731(Q.FSR:)**

Q.1731 IMT - 2000 , Q.23
Q.1731- GA(general aspect), Q.1731- 2, Q.1731- 3
Q.1731- GA IMT - 2000
 , Q.1731- 2 IMT - 2000 2
 ,
Q.1731- 3 IMT - 2000 3
 , 가
.

· **Q.1741(Q.FSU:)**

Q.1741 IMT - 2000 UIM(user identity module)
 , Q.1731 Q.23 .
IMT - 2000 UIM UIM MT
.

· **Q.1751(Q.FSN)**

Q.1751 IMT - 2000 NNI , Q.24
.
 가
.

4. ITU- T SG13

SG13 , GII(Global Information Infrastructure), BISDN, IP . 4 WP 가

가. WP1(GII and General Network Aspects)

- Internet Protocol(IP) / GII)
 - IP GII SG13 project .
 - IP .
 - IP GII .
 - IP GII project .
- - Multimedia Services
 - B- ISDN
- - Global , multimedia service, enhanced network intelligence,
 -

. WP2

- B- ISDN
 - B- ISDN Service- Oriented
 - B- ISDN Internet
- B- ISDN
 - IP over ATM
- AAL2
- B- ISDN Interworking
 - IP B- ISDN
 - PSTN ATM

. WP3

- ATM layer
 - ATM layer Multi- point broadcasting
- B- ISDN OAM
 - Segment AIS

. WP4

- o G
- o B-ISDN / ATM

5. ITU

가.

Q.1711 IMT - 2000 3가
(Functional Entity: FE)

(Reference Model),

ITU-T Q.1701 CS 1

. IMT - 2000 , IMT - 2000

ITU

가

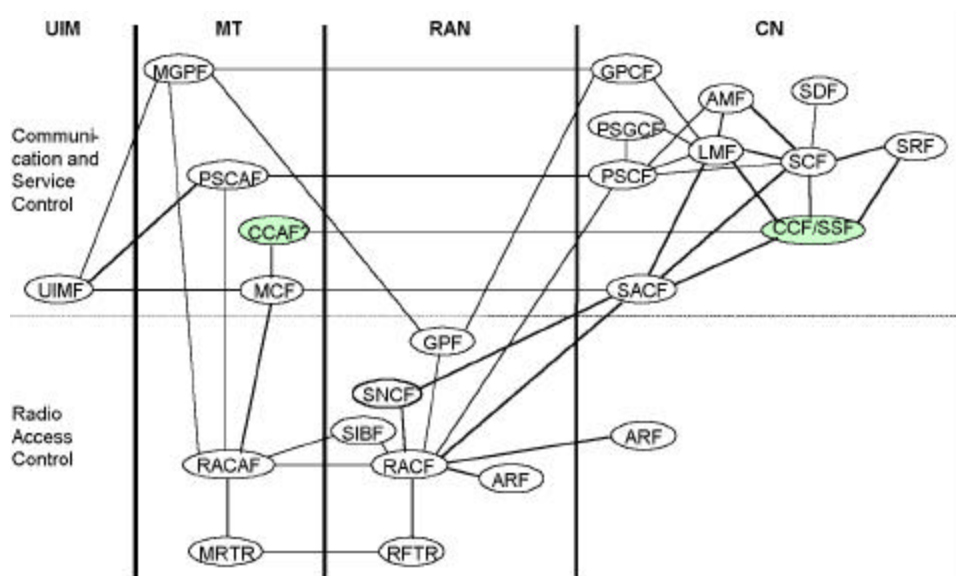
2- 5

CCAF CCF/SSF가

2- 6

CCAF가

CnCF



AMF-Authentication Management Function

CCAF-Call Control Agent Function

CN-Core Network

CnCF-Connection Control Function

GPCF-Geographic Position Finding Control Function

MCF-Mobile Control Function

MRTR-Mobile Radio Transmission and Reception

PSCF-Packet Service Control Function

PSGCF-Packet Service Gateway Control Function

RAN-Radio Access Network

RNCF-Radio Network Control Function (only satellite)

SIBF-System Access Broadcast Information

SRF-Special Resource Function

UIMF -UIM Function

ARF-Access link Relay Function

CCF-Call Control Function

CnCAF-Connection Control Agent Function

GPF-Geographic Position Finding Function

LMF-Location Management Function

MGPF-Mobile Geographic Position Finding Function

MT-Mobile Terminal

PSCAF-Packet Service Control Agent Function

RACAF-Radio Access Control Agent Function

RFTR-Radio Frequency Transmission and Reception

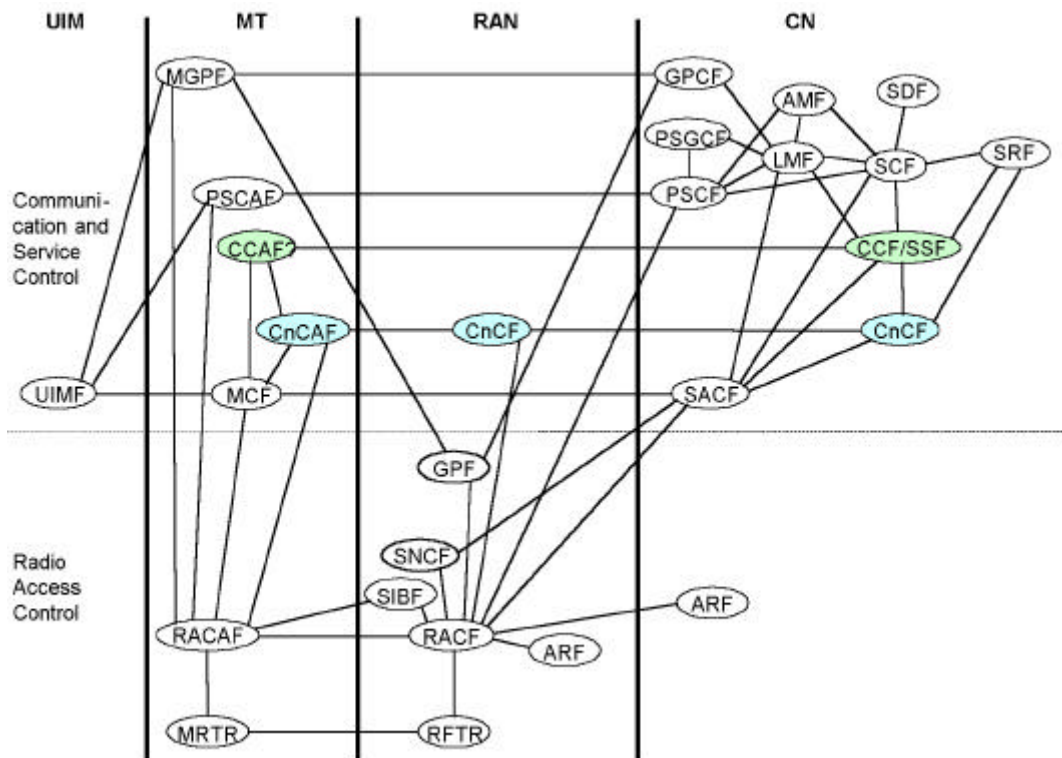
SACF-Service Access Control Function

SNCF - Satellite Network Control Function

UIM-User Identity Module

2- 5.

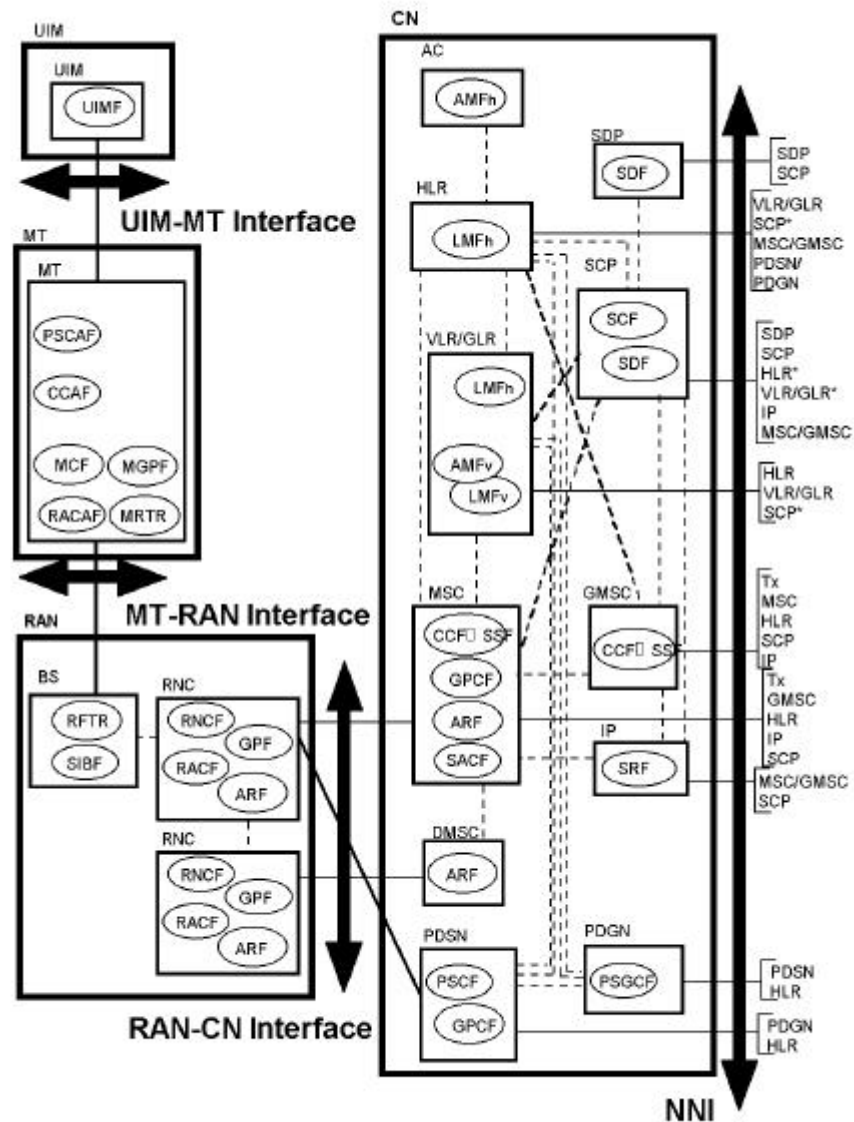
가



2- 6.

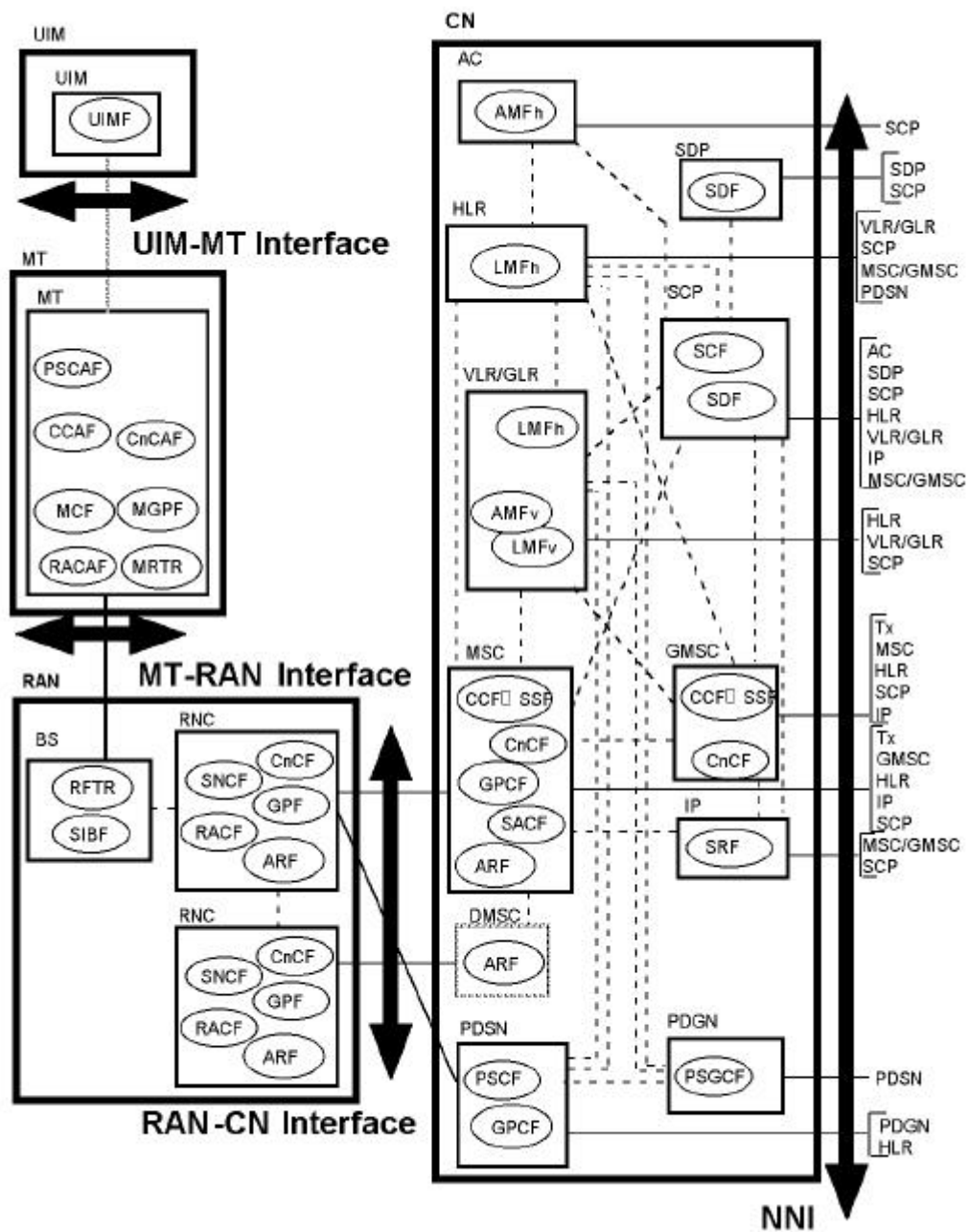
가

ITU-T, Q.1711 가
 2-7 2-8
 IMT-2000 가 UIM(User
 Identity Model), RAN (MT: Mobile
 Terminal), (core network) /
 (RAN: Radio Access Network),
 가
 (CN: Core Network) .
 , RAN (BS: Base Station)
 (RNC: Radio Network Controller) ,
 (MSC: Mobile Switching Center), 가
 / VLR/GLR(Visitor Location Register/ Gateway
 Location Register),
 (AC: Authentication Center),
 (PDSN: Packet Data Serving Node, PDGN: Packet Data Gateway Node),
 GMSC(gateway MSC),
 SCP(Service Control Point), SDP(Service Data Point), IP(Intelligent
 Peripheral) .



AC - Authentication Center
 DMSC - Drift MSC
 GMSC - Gateway MSC
 IP - Intelligent Peripheral
 MT - Mobile Terminal
 PDSN - Packet Data Serving Node
 SCP - Service Control Point
 Tx - Transit Exchange
 VLR - Visited Location Register

BS - Base Station
 GLR - Gateway Location Register
 HLR - Home Location Register
 MSC - Mobile Switching Center
 RNC - Radio Network Controller
 PDGN - Packet Data Gateway Node
 SDP - Service Data Point
 UIM - User Identification Module





- IWF : IMT- 2000 2

6. ITU IP

ITU, IETF가 IP
ITU SG Network traffic
IP가 . , ITU IETF
, IP ITU-T가
, IP
.
Network traffic 가 (CONS : connection
oriented network service) (CLNS : connectionless NS)
,
infrastructure .
ITU-T IETF IP/TCP/UDP (end
system) infrastructure ,
.
ITU IETF vision infrastructure
.
, Addressing, routing, transmission(transport), ATM,
Frame relay, , interworking infrastructure
.

2 3GPP

1.

IMT - 2000 ,
ITU가 . ,
97 9 (family concept)
.
ITU .
,
98.12 3GPP(3rd Generation Partnership Project)
, 99 1 3GPP2(3rd Generation

Partnership Project 2)가 3GPP 가
3GPP2

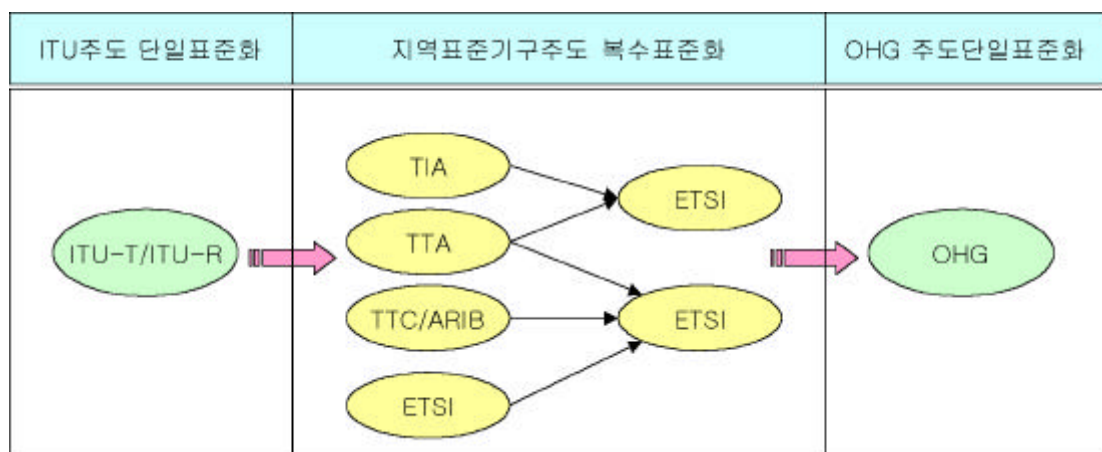
IMT - 2000

OHG(Operator Harmonization Group)

5 OHG [1]
3GPP 3GPP2 3GPP 3GPP2

2- 10

3GPP 3GPP2, OHG



2- 10. IMT - 2000

2. 3GPP

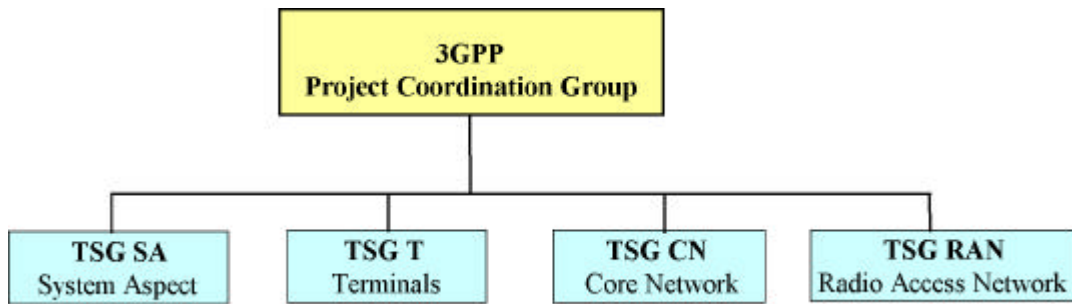
3GPP IMT - 2000 / ,
DS- CDMA GSM

3GPP 1998

TR(Technical Report) 3GPP

TS(Technical Specification) 3GPP

TSG(Technical Specification Groups) 2- 11



2- 11. 3GPP

가. TSG- SA(System Aspects)

TGS- SA

Working group WG1(Services), WG2(Architecture), WG3(Security), WG4(Codec), WG5(Telecom Management) 5 WG7

- UTRAN
- 3GPP Capability
- TSG Coordination(Monitoring)
- System Architecture / Subsystem
- bearer
- , , , (security)
- CODEC, network management

. TSG- RAN(Radio Access Network)

TSG- RAN Layer1 Layer2&3
WG#1(Layer1), WG#2(Layer2&3), WG#3(Iub/Iur/Iu specification and UTRAN O&M requirements), WG#4(Radio performance and protocol aspects from a system point of view - RF parameters and BS conformance), AHG1(Ad-hoc group on ITU (internal) coordination) 5 WG7

- 1 (RTT) : MT- RAN
- 2 (MAC, LAc) : MT- RAN
- 3 (Radio Resource)

- •UTRAN Iu (BSC- MSC)
- •UTRAN Iur (BTS- MSC)
- Conformance test
-
- UTRAN

. TSG- CN(Core Network)

- TSG- CN , WG1(MM/CC/ SM (Iu)), WG2(CAMEL/MAP), WG3(Interworking) 3 WG가 .
- CN CC, SM, MM 3
 - /
 - , 가
 - CN interworking
 - 2 GSM interworking (Handover)
 - Packet - QoS (IP , VOIP)
 - CN In

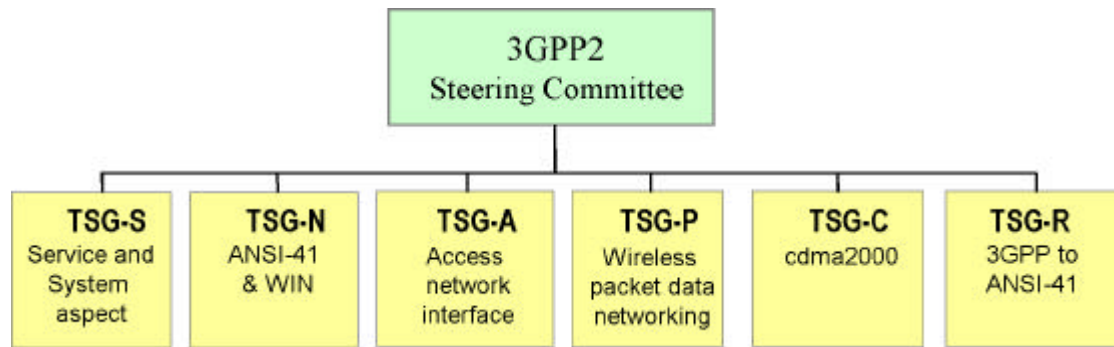
. TSG- T (terminal)

- TSG- T UIM WG1(Mobile Terminal Conformance testing), WG2(Mobile Terminal Services & Capabilities), WG3(USIM) 3 Working Group .
- - USIM
 - Service
 -
 - Multimedia
 - conformance

3. 3GPP2

- 1998 5 3GPP ANSI 3GPP2
 ANSI 3G Ad- hoc Committee . TIA TR45.5(cdma2000)
 T1P1(W- CDMA) /
 3 ANSI- 41

, '98 9 , 10 , 12
, '99 1 4
가 .



2- 12. 3GPP2

2- 12 3GPP2 , 3GPP2

- cdma2000
- A 3G Network evolved from ANSI- 41
- Interface of 3GPP Radio access technology to 3G Core network evolved from ANSI- 41
- Wireless Packet Data Networking
- Interface System
- Service and System aspects

가. TSG- S(Systems and Services Aspects)

- System Capability Set
- 1 Feature
- System Reference Model /
-
- TSG OAM&P 1
- TSG Monitoring

. TSG- N (ANSI- 41/WIN)

- [illegible]

. TSG- C (cdma2000)

- 1/2/3
- /
-
- , ,
- Digital Speech Codecs
- Video Codec adoption
- 가
- Conformance Test Plans
- MS-Adapter Interface

. TSG- P (Wireless Packet Data Network)

- Wireless IP Services (IP)
- Wireless IP design
- Voice over IP
-
-
- Packet Data
- Multimedia
- QoS

. TSG- A(Access Network Interfaces)

- , ,
- Access Network
- 3G Capabilities (e.g. High speed data support)
- Abis
- Inter- Operability Specification
- 3GPP2

. TSG- R

- : Interface of 3GPP Radio Access Technology to 3G Core Network evoked from ANSI- 41
- UTRA feature Interface
- ANSI- 41 Core Network , UTRA /
- cdmaOne (2G) UTRA Handoff (Intersystem and intrasystem handoff)
- GSM core network ANSI- 41 core network UTRA handset / TE /Infrastructure issue
- 3G

4. OHG(Open Harmonization Group)

1999 6 OHG
 . OHG ,
 , (RTT: Radio Transmission Technologies)
 , .
 . , 3GPP W- CDMA 3GPP2
 ANSI- 41 . RTT
 DS(Direct Spreading) WCDMA
 3.84 Mcps 가
 . 가 ,

3GPP UTRAN

3GPP2 ANSI-41

cdma2000 GSM-MAP

가 2-13

3GPP

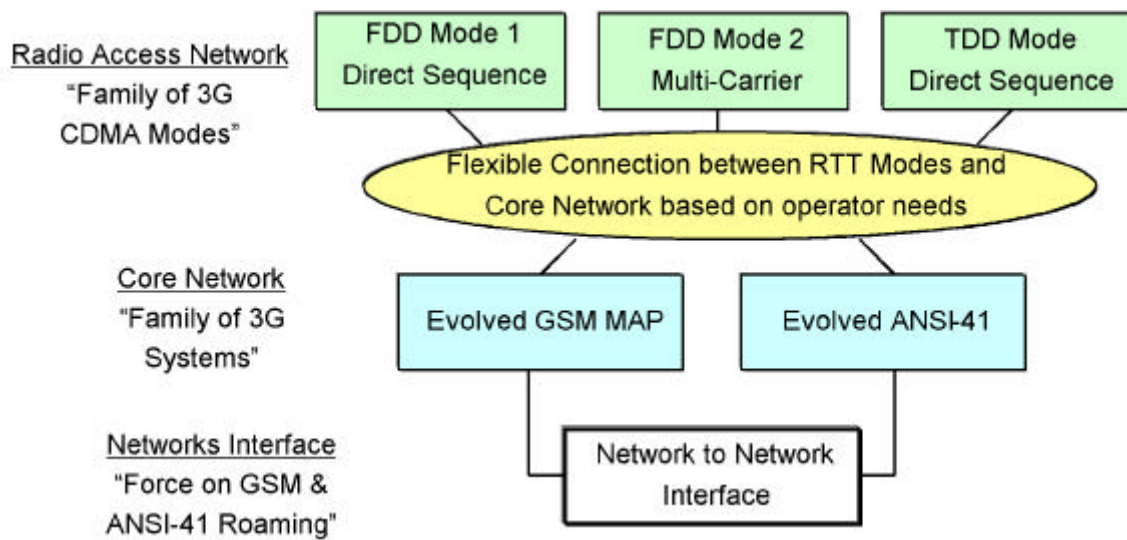
3GPP2

()

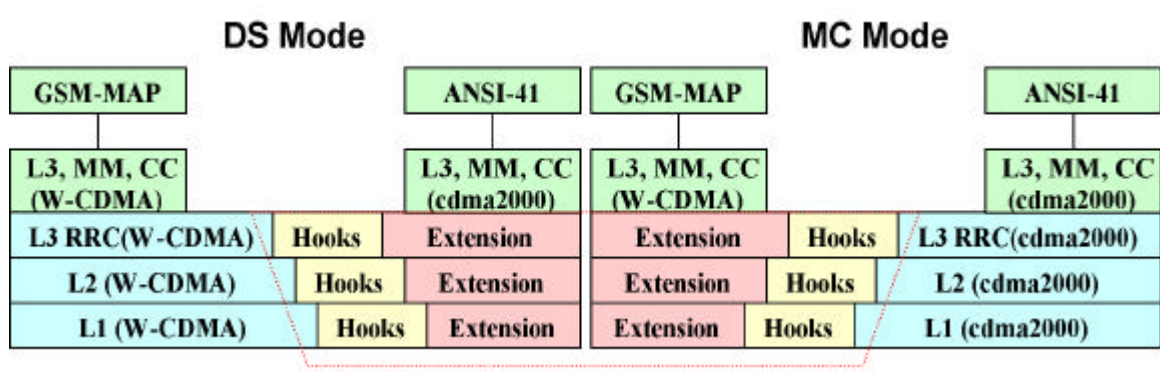
RTT

2-14

OHG 5 [1]



2-13.



2- 14. OHG가

2- 14 Hook Extension 가 .
DS GSM- MAP WCDMA
ANSI- 41
WCDMA 가
, Hook Extension .
MC(Multi- Carrier) 가 Hook
Extension 가 Hook
가 99 (3GPP
Release 99, 3GPP2 Release A)
, Extension Hook 가
. 3GPP 3GPP2
가
. 18 ITU- R TG 8/1
[2]

3

1

IMT - 2000 ,
 ,
 IMT - 2000 IS - 95
 cdma2000 , GSM
 W - CDMA
 2 (CDMA, GSM)
 (Intellecture Property Rights: IPR) 가
 GPS(Global Positioning System)
 , CDMA PCS
 GPS
 , GSM

3- 1 cdma2000 W - CDMA

3- 1.

| | W - CDMA | cdma2000 |
|------------------|--------------------------------|--|
| | WB DS - CDMA | WB DS - CDMA Multi - Carrier CDMA |
| Bandwidth(MHz) | (1.25)/5/10/20 | 1.25/5/10/20 |
| Chip Rate(Mcps) | (1.024)/4.096/8.192/16.3 83 | 1.2288/3.6864/9.8304/11.0592/1 4.7456 |
| Frame | 10msec | 5msec/20msec |
| Modulation FL/RL | QPSK/BPSK | QPSK/BPSK |
| Spreading FL/RL | QPSK.ocqpsk(hpsk) | QPSK/OCQPSK(HPSK) |
| | CS - ACELP/(AMR) | EVRC, QCELP(13kbps) |

1999 3 25

(1)

cross-licensing (2) W-CDMA cdma2000

, cdma2000 (3)

CDMA (4) CDMA, GSM,

TDMA 3 1999 11

DS, MC, TDD

OHG(Operator's Harmonization Group)

1999 5 5 (1) DS

(2) MC (3)

TDD, 6 3 ITU

OHG

3-2 IMT - 2000

3- 2. IMT - 2000

| | | DS(Direct Sequence) | | MC(Multi Carrier) | TDD(Time Division Duplex) |
|------|-----------------|---------------------|-------|-------------------|---------------------------|
| | | | | | |
| | Chip Rate(Mcps) | 3.6864 | 4.096 | 3.6864 | 3.84 |
| | | | | | TBD |
| | | PCS | | | |
| 99.6 | Chip Rate(Mcps) | 3.84 | | 3.6864 | 3.84 |
| | | | | | TBD |
| | | Chip Rate , | | | |

DS+GSM, MC+ANSI-41 DS+ANSI-41 .
DS ANSI-41 feature , MC
GSM/UMTS feature Layer Hooks & Extension
가 , .
4 .

2

1.

IMT - 2000 2

.

ITU IMT - 2000

ISO/OSI

2 ()

ARQ(automatic repeat request)

(LAC: Link Access Control)

(MAC: Medium

Access Control)

,

, B-ISDN RSVP

QoS

QoS

. MAC

QoS

QoS

. , - (circuit-oriented), -

(packet-mode), asymmetric

가 ,

,

.

(best effort delivery)

QoS

QoS

가

가

slotted ALOHA

가

2. cdma2000 air interface

cdma2000 air interface

가

가 MAC

IS - 95

가

IS - 95

가

IS - 95 3

cdma2000 IMT - 2000

CDMA

, cdma2000 IS - 95

가

cdma2000

IS - 95A, B

가

3가

○ air link budget

○ Air signaling protocol
Control)

MAC(Medium Access

○

IS-95, cdma2000 IS-95

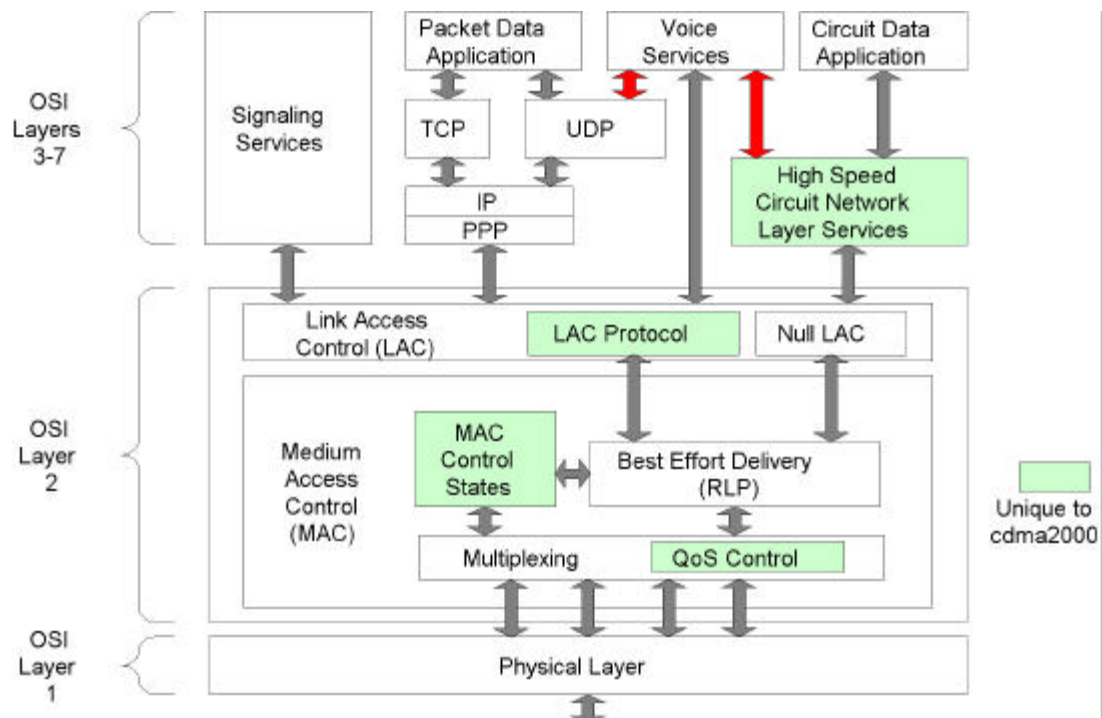
IS-95B, cdma2000 spreading gain, cdma2000

가 가

(1.25 MHz), SCH(Supplemental Channel)(9.6Kbps-2Mb/s), reverse link pilot channel coherent detection, fast forward power control, forward link transmit diversity, turbo code

IS-95A, B (2), 가 가 (IS-95B 115.2 Kbps cdma2000 144Kbps가 가).

3-1, cdma2000, OSI(Open System Interconnection) 1 2



3-1.

2 LAC(Link Access Control) MAC sublayer .

MAC instance state machine , QoS(Quality of Service) ,

signaling circuit data air link . , LAC

. OSI 3 7 cdma2000

LAC . , , ,

TIA cdma2000 . 1 144 Kbps

, 2 cdma2000 full capability .

, cdma2000 1 가 , MAC, LAC, L3 signaling IS 2000.3, 2000.4, 2000.5 . MAC

IS- 95B , cdma2000 state control, best effort , , multiplexing QoS

. IS- 95B active dormant 가 ,

PPP link가 IWF , active state 가 air channel signaling , RLP link가 setup PPP packet . , active state ,

interactive , active state timer가 , state 가 ,

cdma2000 state , control hold state suspend state .

, cdma2000 MAC 3가 .

- MAC states
- Best Effort Delivery : RLP
- Multiplexing and QoS Control

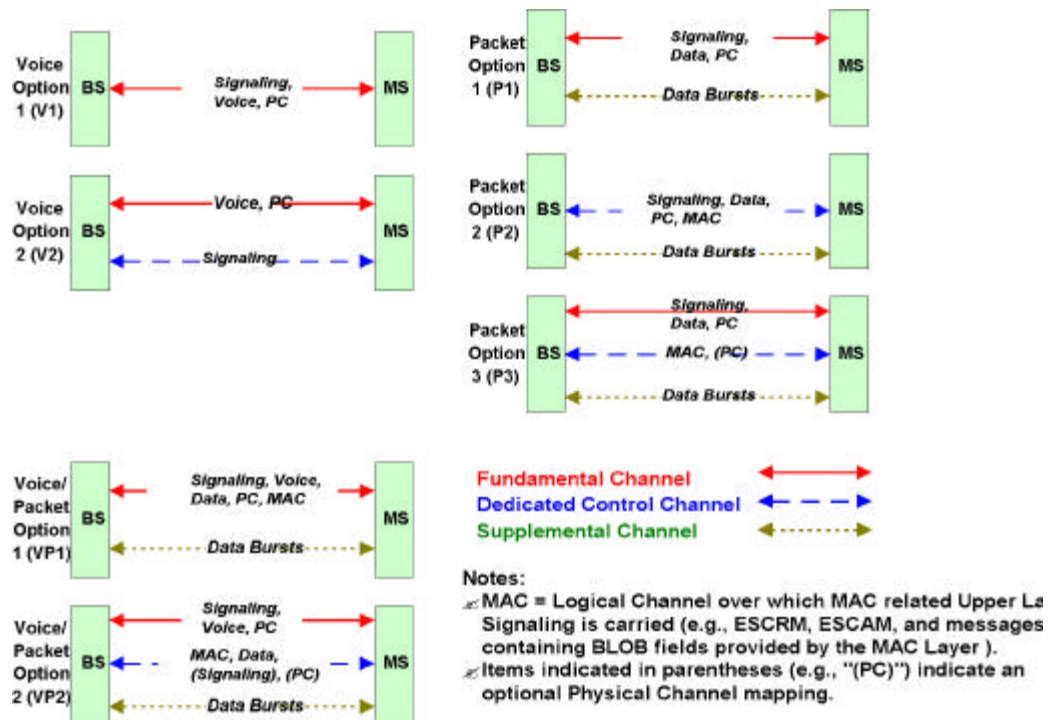
Logical link cdma2000 traffic ,

MAC , signaling ,

mapping , 가 가 : ,

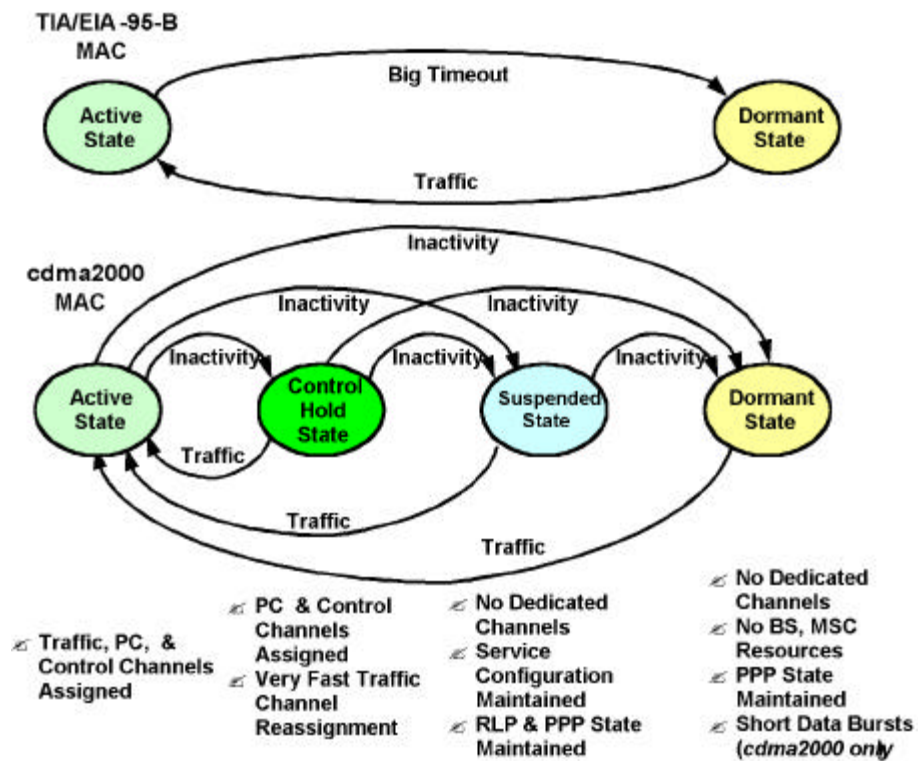
3 V1, V2, P1, P2, P3, VP1, VP2 가

mapping 3
1 C1,C2, VC1 2



3- 2. mapping

, cdma2000 MAC ,
release , 가 ,
가 ,
IS- 95B , MAC state , release
3- 3 IS- 95B cdma2000 state
transition 가



3- 3. IS- 95B cdma2000 MAC state transition diagram

Active , traffic MAC , control hold state , traffic . 가 , MAC traffic active , PPP RLP가 , traffic signaling active 가 . Control hold state , suspended state . release . , release . , IS- 95B active 가 active control hold . Suspended , RLP PPP 가 , , 가 , IS- 95B dormant active 가 . RLP가 , VAS(virtual active set)가 . Suspended , dormant , RLP가 close , VAS , PPP . , IS- 95B dormant 가 suspended

dormant .
 MAC protocol feature P2 .
 P1, P2, P3 가 , P1 P2
 , P3 mapping . P1 P2
 . P1
 FCH(Fundamental Channel) , P2
 DCCH(Dedicated Control Channel) . P1 active control hold
 가 control hold state가 . , IS- 95B
 suspended state FCH가
 , active 가 FCH air
 null frame , air capacity . , P2
 DCCH , DTX(Discontinuous Transmission) DCCH
 , air link .
 DCCH cdma2000 , FCH
 (9600bps) , DTX . , 가 , air link
 (FCH null frame).
 , DCCH ,
 . P2 DCCH , DTX active
 , 가 , air null frame , air
 capacity , control hold DCCH가
 release air capacity
 air link , , control hold state
 active state ,
 delay- throughput . , control hold state
 , interactive bursty active
 state P1 (P1 active
 가). ,
 , P1 ,
 가 .

4

IMT - 2000 2

. IMT - 2000

' , ' IMT - 2000 , ,

IMT - 2000 Global

.

IMT - 2000

IMT - 2000 family member

IMT - 2000 IMT - 2000

IMT - 2000 Virtual

Home Environment(VHE) .

1

1. Global Roaming

IMT - 2000 가

가 가 . IMT - 2000

ITU IMT - 2000 ,

3GPP 3GPP2가 . 2

(backward compatibility)

IMT - 2000 ,

가 가 IMT - 2000

.

가.

- 1) ,
- 2) IWF

3)

가 SMS

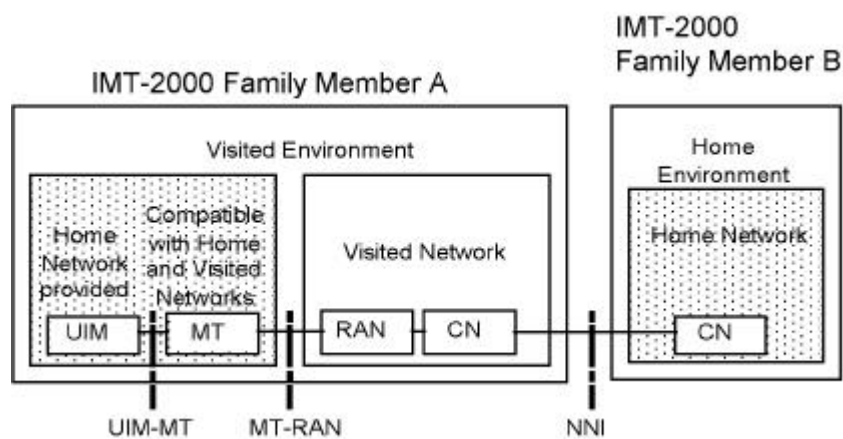
MAP(Mobile Application Part)
interworking, DB mapping, transaction
가 .
 , DB mapping
가 Id, ,
Transaction

. IMT - 2000

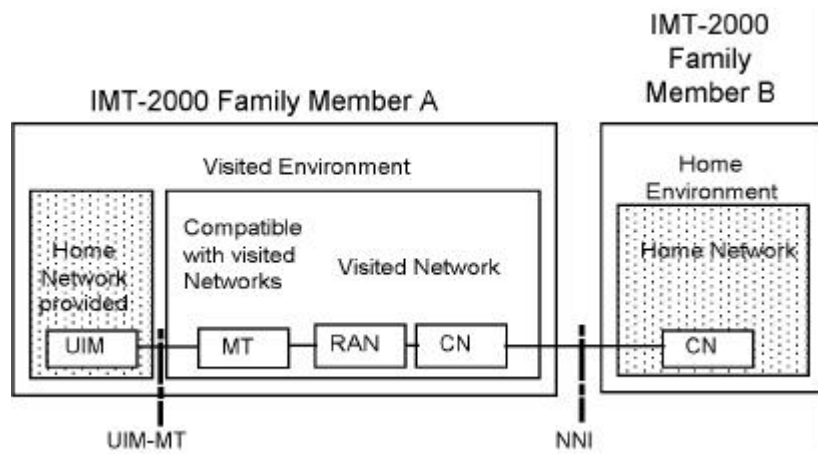
- Home Network: IMT-2000 가 profile
- Supporting network: 가
- Visited(Serving) network: IMT-2000 가 가
- Interrogating network: IMT-2000 가 가
- Destination network: IMT-2000 가 가 가
- Previously visited network: IMT-2000 가 가

2. IMT - 2000

IMT - 2000 ,
 UIM- MT NNI
 , Q.1711 4- 1 4- 2 2가
 . 4- 1 UIM- MT, MT- RAN, NNI가
 IMT - 2000 , 4- 2 UIM- MT, NNI
 가 가 .



4- 1. UIM MT



4- 2. UIM

가. UIM

UIM

가

가 (/ GSM , IS- 41)

. / UIM

, UIM

UIM

UIM- MT

.

, global roaming

. UIM (UIM

)

multi- mode

.

. NNI

, NNI

4- 3

가

.

i)

NNI

가

.

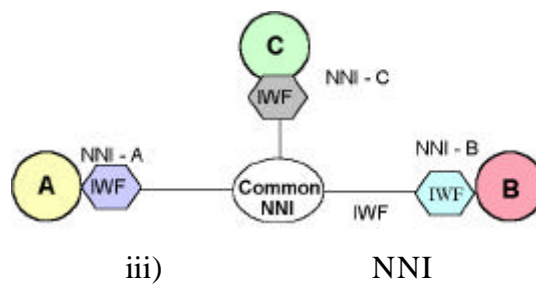
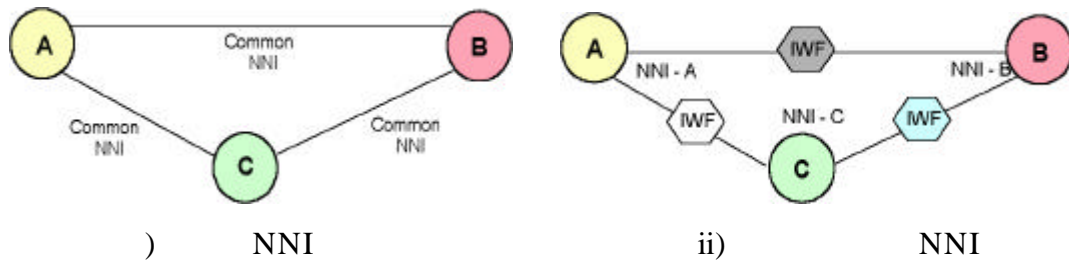
ii)

(bi- lateral) IWF(interworking function) /

IWF가

.

iii) NNI , IWF



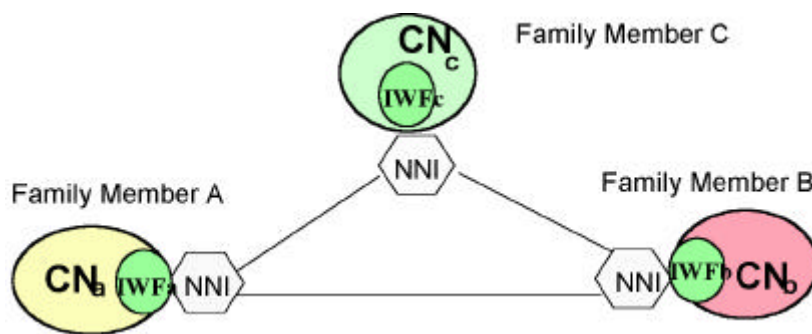
4- 3. NNI

ITU- T SG11 NNI
 . SG11 ,
 SG11 99 , 2000
 . ITU- T SG11 SDO 3GPP
 reference ,
 3GPP ITU- T Q.AAL2
 . , NNI 4- 1

, 3GPP 4- 4 . ITU
 , NNI NNI/IWF

4- 1. NNI

| ISDN/PSTN | |
|---------------------------------|--|
| | N- ISUP CC Capability |
| | <div>ATM AAL1</div> <div>ATM AAL2</div> <div>STM</div> <div>B- ISUP</div> <div>Q.AAL2</div> <div>N- ISUP</div> |
| | |
| | ATM AAL5 |
| | IP |
| : ITU- T INAP+mobile extensions | |
| : ITU- T SG11 | |



4- 4. 3GPP NNI

. 2 /3

2

3

IMT - 2000

Gateway IWU(Inter Working Unit)

IMT - 2000

HLR

2

HLR

Global roaming

multi- mode

IWF

global roaming

•

, IS- 41

GSM

- GLR(global location register) (IS-41
GLS, GSM GLR)
- IS-41 GLR GSM IS-41 GSM
HLR/AC
- IS-41 GLR GSM IS-41 VLR
- IS-41 GLR GSM IS-41 AC
- GSM GLR GSM IS-41
- GSM IS-41 GLR
- IS-41 HLR IS-41 GLR GSM GLR 가
- GSM GLR GSM VLR 가
- IMSC

3. IMT - 2000

IMT - 2000 2

. 2

가 , IWF

, IMT - 2000 ITU - T

.

. 2

가 ,

. IMT - 2000 ,

가 , 가 .

4-5 IMT - 2000 가 ,

OHG .

W-CDMA GSM-MAP 3GPP

, cdma2000 ANSI-41

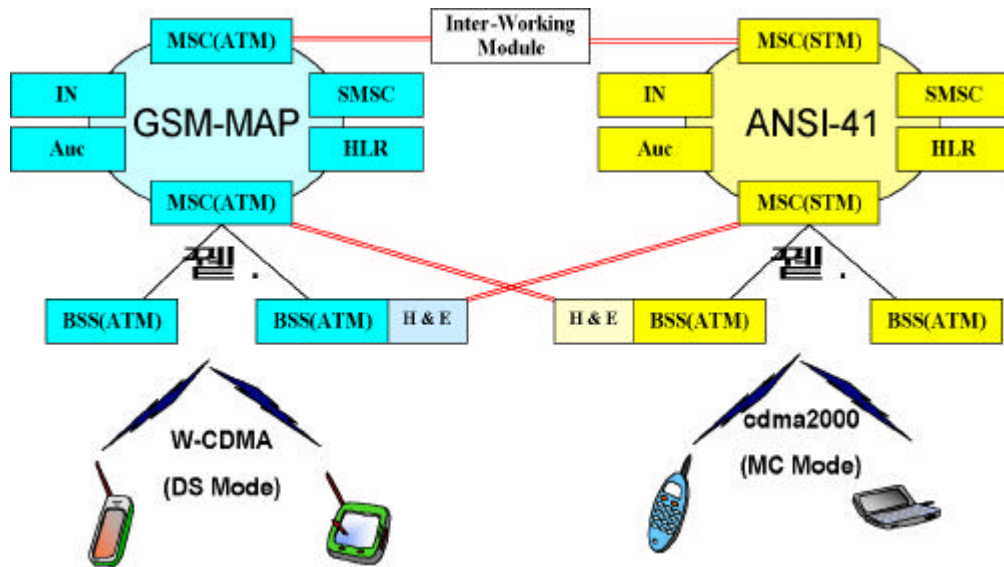
3GPP2 . ,

가 4가 가 가 .

i) MC(cdma2000) ANSI-41 : MC-41

- ii) DS(W-CDMA) GSM-MAP : DS-MAP
- iii) MC(cdma2000) GSM-MAP : MC-MAP
- iv) DS(W-CDMA) ANSI-41 : DS-41

4가



4- 5. IMT - 2000

가

가. MC- 41

MC- 41

가

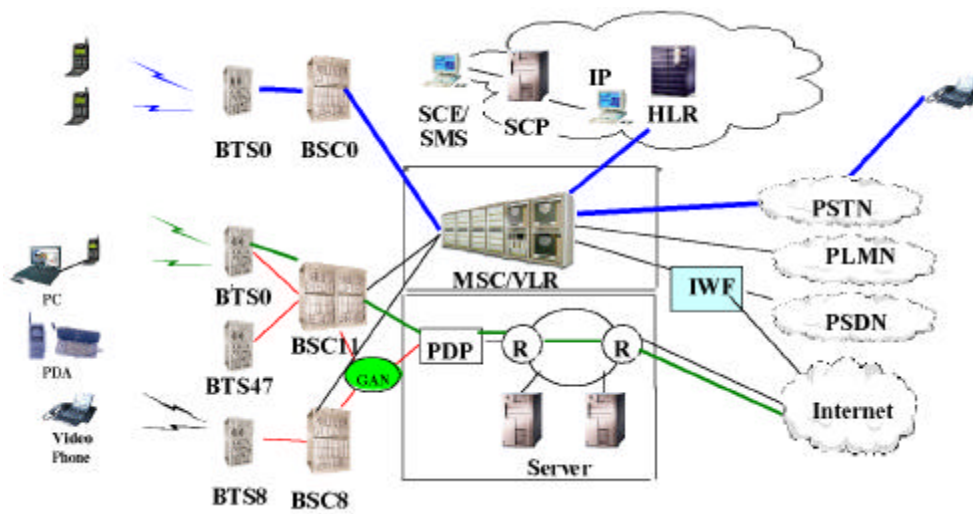
. 4- 6 2 3 ,

, 4- 7

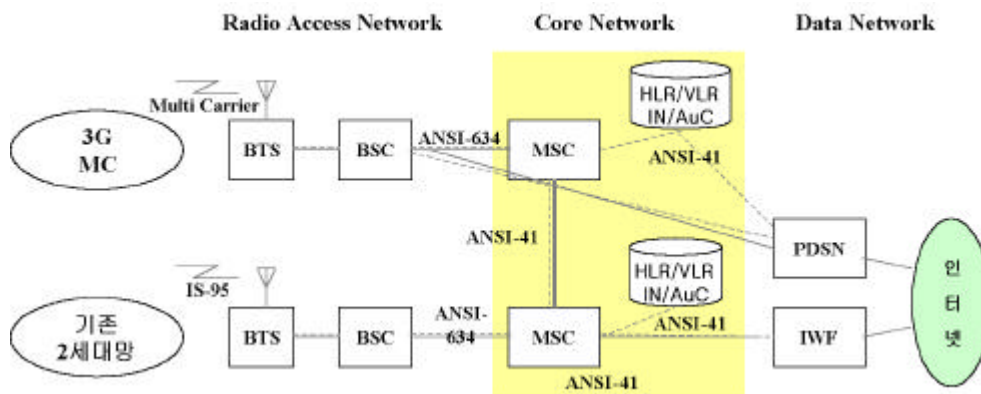
. IS- 95 2

IMT - 2000

, IMT - 2000



4- 6. MC- 41



4- 7. MC- 41 protocol

4- 8 .

가 CC(Call Control)/MM(Mobility Management)

MS(Mobile Station)/UE(User Equipment) MSC(Mobile Switching Center)

, CC/MM BS(Base Station)/RNS(Radio Network Subsystems)

. , Air/Uu

A/Iu . ,

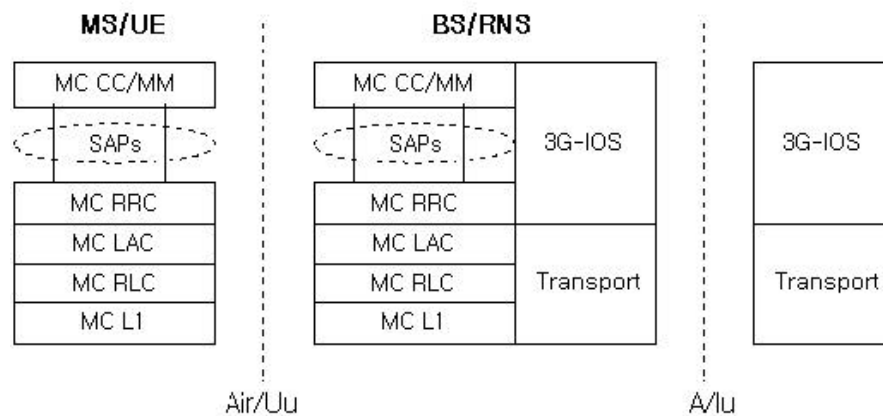
BS/RNS CC/MM 가

. , cdma2000 CC/MM RRC(RR)

. , BS/RNS CC/MM

CC/MM RRC SAP(Sssservice Access Point)
 3GPP2 cdma2000
 CC/MM RR
 RRC
 , CC/MM RRC SAP

3GPP2



4- 8. MC- 41

· DS- MAP

DS- MAP MC

가 , 2

,

가

IMT - 2000

75% 가

GSM

DS

가

가

ANSI- 41

,

가

4- 9 DS

,

GSM

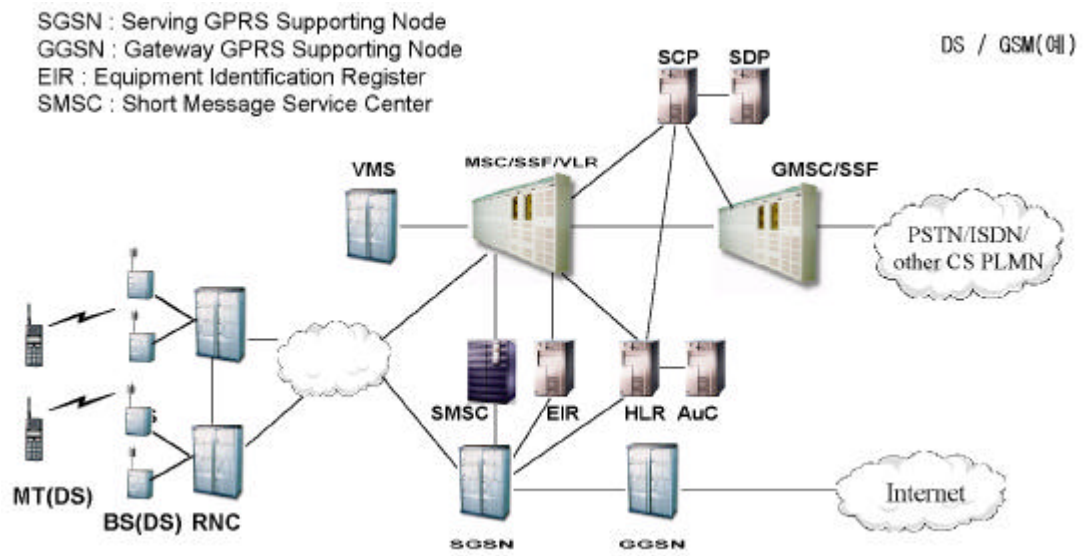
GPRS

.

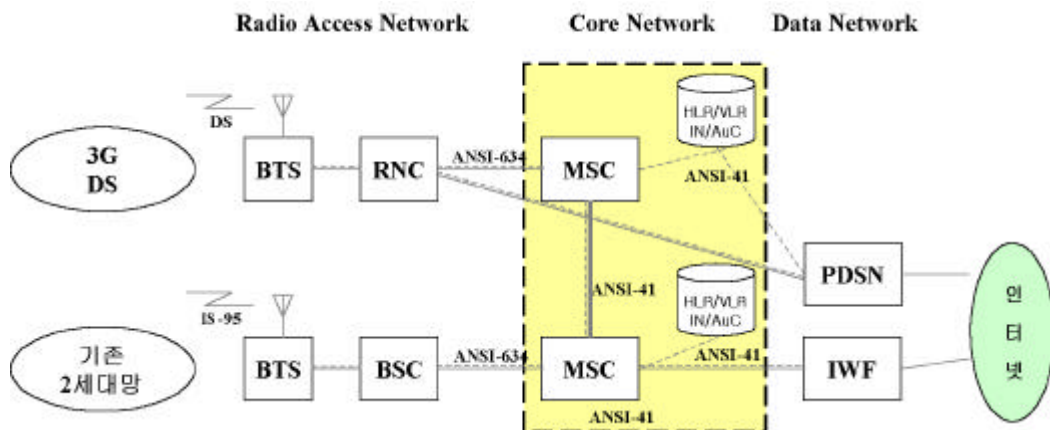
4- 10

DS- MAP

2

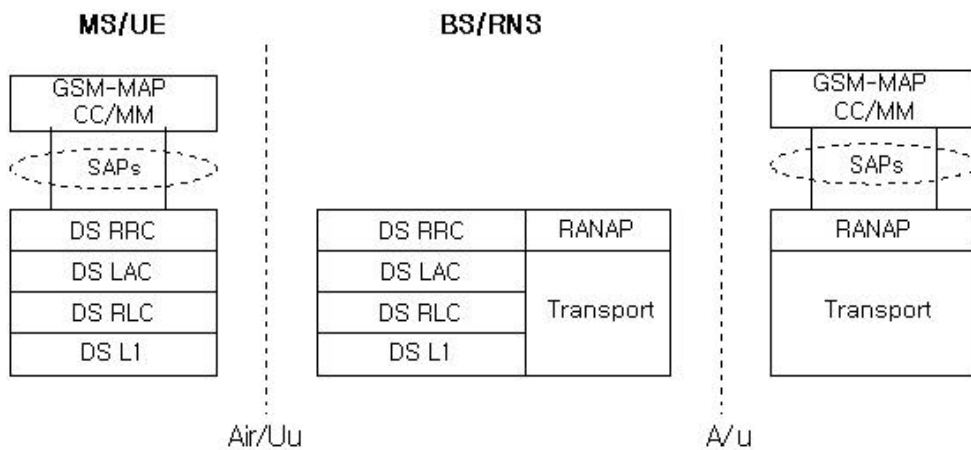


4- 9. DS- MAP



4- 10. DS- MAP

| | | | |
|-------|--------|-------|----------|
| | | 4- 11 | CC/MM |
| MS/UE | MSC | , | 4- 8 |
| | BS/RNS | . | , Air/Uu |
| | | | BS |
| | MSC | . | , BS/RNS |
| | RRC | | . |



4- 11. DS- MAP

. MC- MAP

OHG Hook

Extension . 4- 12

4- 11 . ,

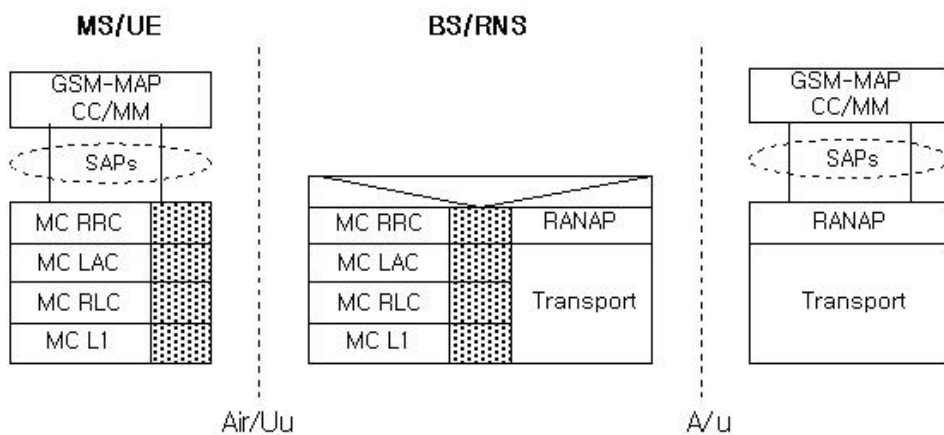
CC/MM BS/RNS MC

RRC RANAP (interworking module)

Hook & Extension

RANAP MC RRC가 MC RRC 3GPP2

RR



4- 12. MC- MAP

· DS- 41

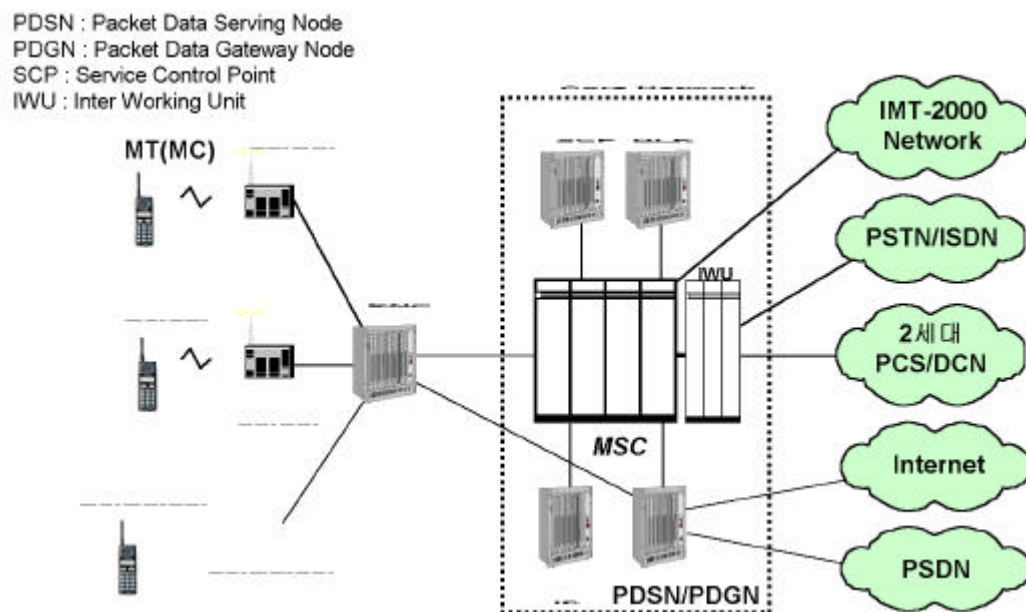
DS- 41

4- 13

, Hook & Extension

, Hook & Extension

, GSM ANSI- 41



4- 13. DS- 41

DS- 41

4- 14

3

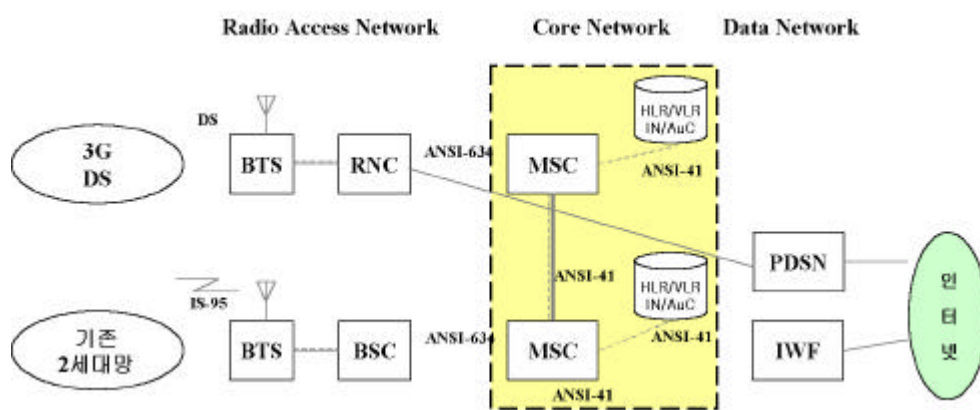
2

가 가

2

Hook & Extension

가 , 가



4- 14. DS- 41

4.

MC- 41, DS- MAP, DS- 41

4- 2

. MC- MAP

가

4- 2

가

MC- 41

CDMA

, MC

가

DS- MAP

가

CDMA

DS- 41

가

DS

가

Hook Extension

4- 2.

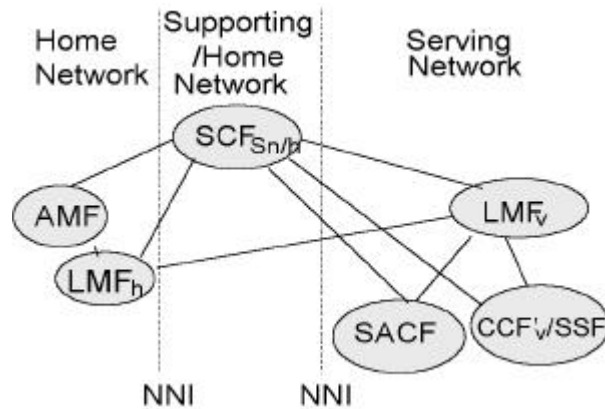
| | MC-41 | DS-MAP | DS-41 |
|------|---------------------|---------|---------------------------------|
| | cdma2000 2G 가 | - | ANSI-41 가 |
| CDMA | | | |
| IPR | 가 | | . |
| | 3X | | |
| | | GSM-MAP | Hook Extension |
| | | | DS-41 DS-MAP 가 . |
| | . | , | , |
| | 가 | | 가 |
| | 가 | | . Hook & Extension , . |

2 VHE

VHE IMT - 2000 가 ,
가
.
가
가 VHE
가
가
VHE 2
.
UPT

VHE

가 . ITU-T VHE Direct Home
Command(DHC) Relay Service Control(RSC) 2가



4- 15. DHC

Q.1711 “ Network Functional Model for IMT - 2000”

DHC

SSF가

SCF

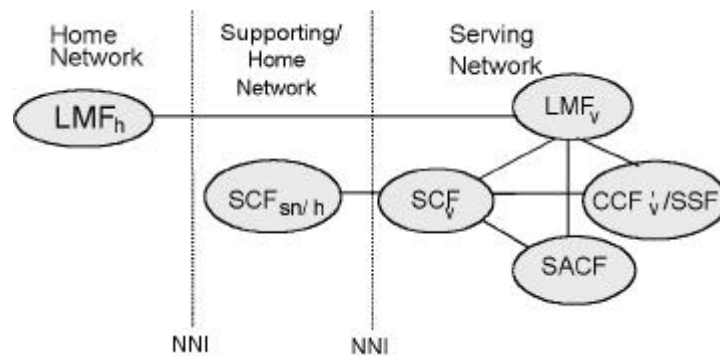
/

가

,

가

, SSF- SCF



4- 16. RSC

RSC SSF가 SCF , SCF가 /
SCF , . SSF
- SCF 가 가 , DHC
가 , ,
가 . 가
. RSC SSF SCF SCF
가 , SSF- SCF
SCF- SCF 가 . SSF- SCF
SCF- SCF SCF- SCF SCF-
SCF 가 . SCF
. .
. .
, SSF- SCF,
SCF- SCF 가 .

5

1

, PDA
 가 ,
 . , LAN
 ,
 .
 , , ,
 . Mobile IP,
 MANET, WAP(Wireless Access Protocol), W-TCP
 .
 , , cdma 2000
 , IMT - 2000 .

1. Mobile IP

가

가

가

IP

.

가

가

.

IP

,

가

IP

.

IP

IETF (WG)

, Mobile IP가

.

MIP(Mobile IP) WG

.

WG

98

Mobile IP

firewall, home agent

foreign

agent

,

Mobile IP

Internet- Draft가 . 98 IPv6
Draft가 mobile
node home agent Draft
. 가 99 2 Mobile IP
cellular mobile IP .
99 2 Draft mobile IP
mobile node가 foreign agency
가
challenge/ response . mobile IP

ISP NAI (network Access interface)
. IP mobility 가 99 2
.

Mobile IP가 .
1) 가 IP ,
.
2) , 가
.
3) 가
가
.
4) Mobile IP
.

Mobile IP 가 .
1) (Mobile Host, Mobile Node):
,
2) (Home Agent: HA): 가
,
.
3) (Foreign Agent: FA): MN가

. FA HA IP MN

Mobile IP

- 1) HA FA Agent Advertisement MN(Mobile Node)가 Agent Solicitation .
- 2) MN Advertisement Home Foreign Home Mobile IP .
- 3) MN가 Foreign FA Advertisement COA (Care- of- Address) , FA가 DHCP(Dynamic Host Configuration Protocol) COA COA Co- located COA .
- 4) MN COA FA HA Registration , Co- located COA MN HA Registration .
- 5) MN HA Registration HA COA 가 , COA HA FA , Co- located COA HA MN .
- 6) MN Home HA가 MN COA .

Mobile IP IETF LAN ,
 IMT- 2000 Mobile IP , Mobile Internet
 가 [13,14].

2. MANET

MANET(Mobile Ad-hoc Network)

,

.

,

. , CDMA

. IP
 가
 . MANET
 .
 MANET , ,
 , ,
 가 . MANET
 ,
 가 , 가
 가 , 가
 MANET
 ,
 , 가
 .
 12가
 .
 MANET (graph) (union)
 AS(Autonomous System) . WG
 . 98 MANET
 . Mobile, multihop, wireless
 TORA(Temporally- ordered Routing Algorithm),
 ZRP(Zone Routing Protocol), DSRP(Dynamic Source Routing Protocol),
 CBRP(Cluster Based Routing Protocol), AMroute(Ad hoc Multicast Routing
 Protocol) 가 . MANET
 , ,
 Internet MANET Encapsulation Prorotocol 99
 , Ad hoc mobile node Ad
 hoc On Demand Distance Vector Routing protocol 98 11
 . WG

3. TCP

가

. IP

.
. UDP 가 . TCP
가
TCP 가
TCP 가

1) Fast Retransmission:
, 가
fast retransmission .

2) I- TCP(Idirect TCP): 가
MSR(Mobile Support Router)

3) SNOOP:
IP

4) M- TCP:
, MSS(Mobile Support
Station), SH(Supervisor Host) 3

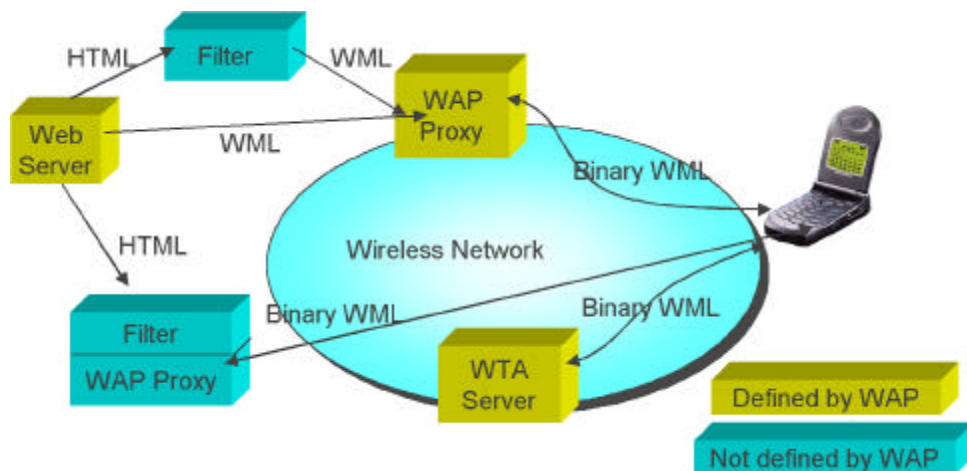
Multiple acknowledgement Hierarchical mobility management

4. WAP(Wireless Application Protocol)

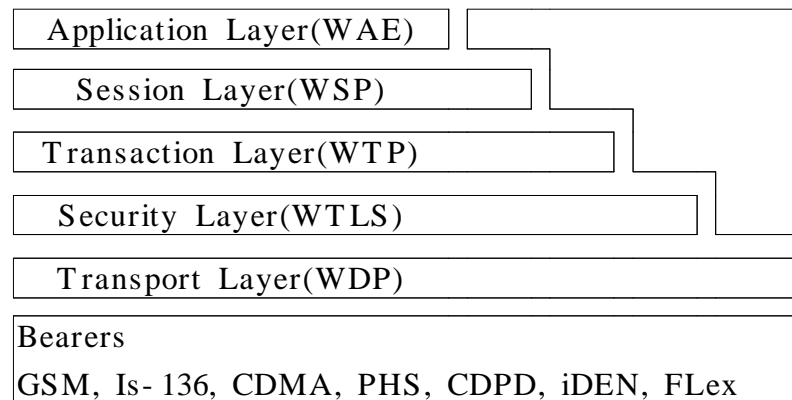
Unwired
Planet HDTP(Handheld Device Transport Protocol) HDML
(Handheld Device Markup Language) , Nokia TTML
(Tagged Text Mark- up Language) , Ericsson
ITTP(Intelligent Terminal Transfer Protocol) .
가 .

'97 6 Ericsson, Motorola, Nokia, Unwired Planet 4 가
WAP , '99 6 107
가 , 가 . WAP

MANET
가 . MANET CPU, , MANET
TCP/IP
가 . 5- 1 WAP
WAP WAP Proxy
WAP , WAP
가
WAP
WAP WAP TCP/IP



5- 1. WAP



5- 2. WAP

1) WAE(Wireless Application Environment)

WAE는 WML(Wireless Markup Language), WMLScript,

2) WSP(Wireless Session Protocol) HTTP/1.1

WSP는 HTTP/1.1과 유사하며, suspend/resume 기능을 지원합니다.

3) WTP(Wireless Transaction Protocol)

4) WTLS(Wireless Transport Layer Security) TLS

5) WDP(Wireless Datagram Protocol) end-to-end port UDP

2

1. Packet Data Service

IMT - 2000

○ IP - IP

○ - 가 ,

○ -

IP IP 가

, IP 가 . IP

가

. IP , 가

가 가 . , IP

가 가

IP Domain

Name Server 가 .

,

.

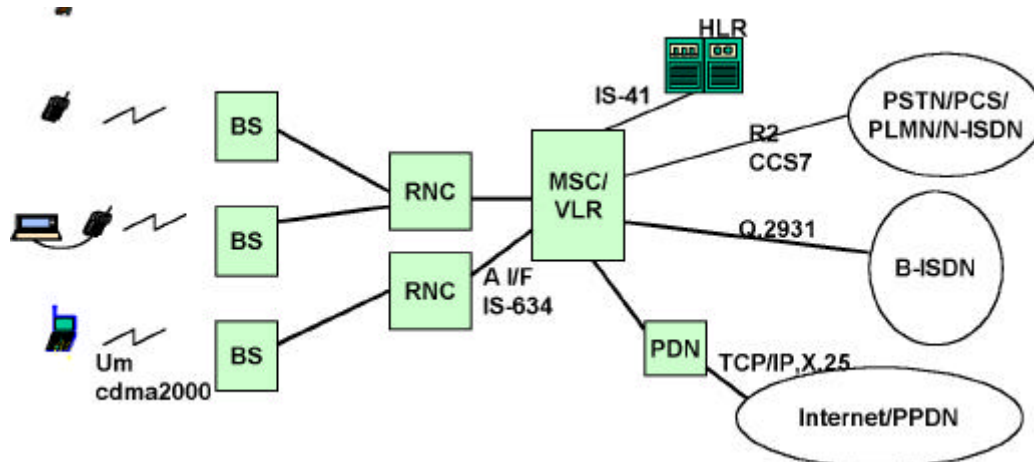
PPP PAD

5-3 가

.

MSC

PDN .



5- 3. IMT - 2000

2. 3GPP2

가. Network Architecture

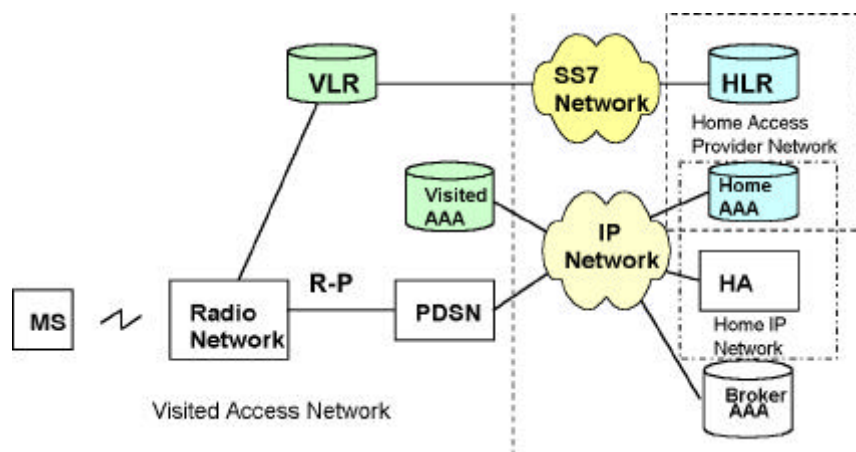
TR45.6 3GPP2/TSGP Internet Access

5- 4 . IETF Mobile IP IP

, NAI(Network Access Identifier)

Public Internet, Home ISP, Private Intranet

network



5- 4. TR.45.6

MS(Mobile Station)

MT(mobile Terminal)

TE(Terminal

Equipment) . MS

MT (Active, Standby, Dormant), Mobile IP Packet Zone ID , Packet registration 가 . TE PDSN(Packet Data Serving Node) PPP link protocol data link 가 TCP/IP 가 .

Radio Network(RN) BSS(Base Station Sub-system) , packet data terminal MAC , , Packet Zone , Packet data service profile , PDSN Data , Packet Buffering, Handoff PDSN Packet Session , R-P link .

VLR(Visitor Location register) HLR(Home Location Register) , 가 MS Radio Network MS 가 , Internet access 가가 .

PDSN(Packet Data Serving Node) MS Data protocol stack MS가 Internet , RN R-P interface link layer MS link layer mobility . , MS가 PDSN IP FA (Foreign Agent) Network layer mobility , MS Internet access NAI 가 , AAA(Authentication, Authorization, Accounting) server .

HA(Home Agent Function) MS IP mobility Mobile Agent MS가 IP MS가 PDSN(FA) IP tunnel MS IP datagram MS Mobile IP Home AAA server broker AAA server .

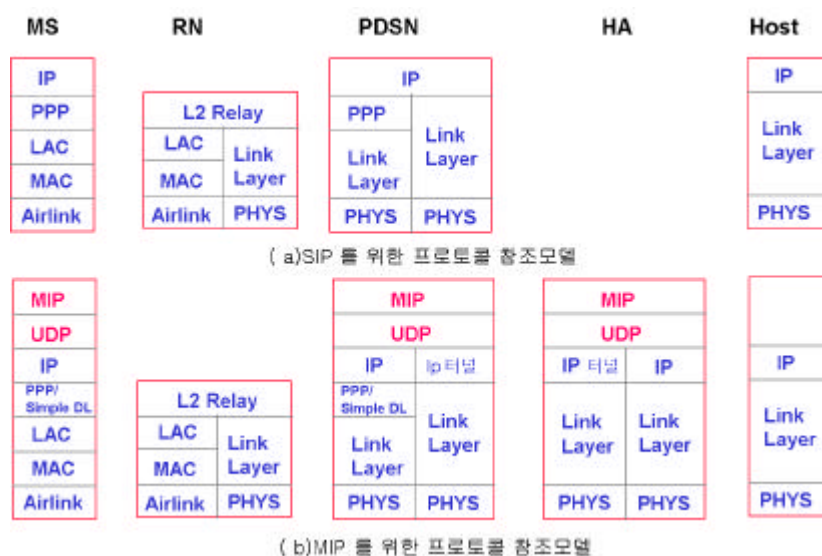
AAA server MS Internet , 가, NAI MS SIP(Simple IP) access , MIP (Mobile IP) access user profile PDSN, HA MS dynamic IP address .

5-4 MT 가 Home access network NAI 가 Home IP network , MT NAI

MT 가 , NAI ISP 가
 . 5-4 Visited Access Network MS가
 , MT MT가 가
 Home Network . MT Home access provider가
 Home IP network AAA server가 NAI , Home AAA
 server Visited AAA server , NAI
 가 ISP MT visited AAA server Home
 AAA server Internet ISP roaming
 Internet .

. Network Protocol Configuration

5-4 network Internet data
 protocol 5-5(a) SIP service 5-5(b) MIP
 service . SIP service MS가 MIP client
 , PDSN Internet IP PDSN
 visited AAA server . RN
 PDSN IP
 , S/W ISP
 IP 가 Internet Access



5- 5.

5- 5 Internet Packet Data

link layer MT RN , R-P

link layer RN PDSN . MS Data link layer

PPP link layer bearer channel . MS MIP client S/W

가 MIP service , MS가 PDSN Mobile IP

HA FA HA ,

HA FA PDSN IP in IP encapsulation tunnel

HA가 MS IP Push

service IP IP

LAN .

5- 6 ,

RN PDSN R-P BSC

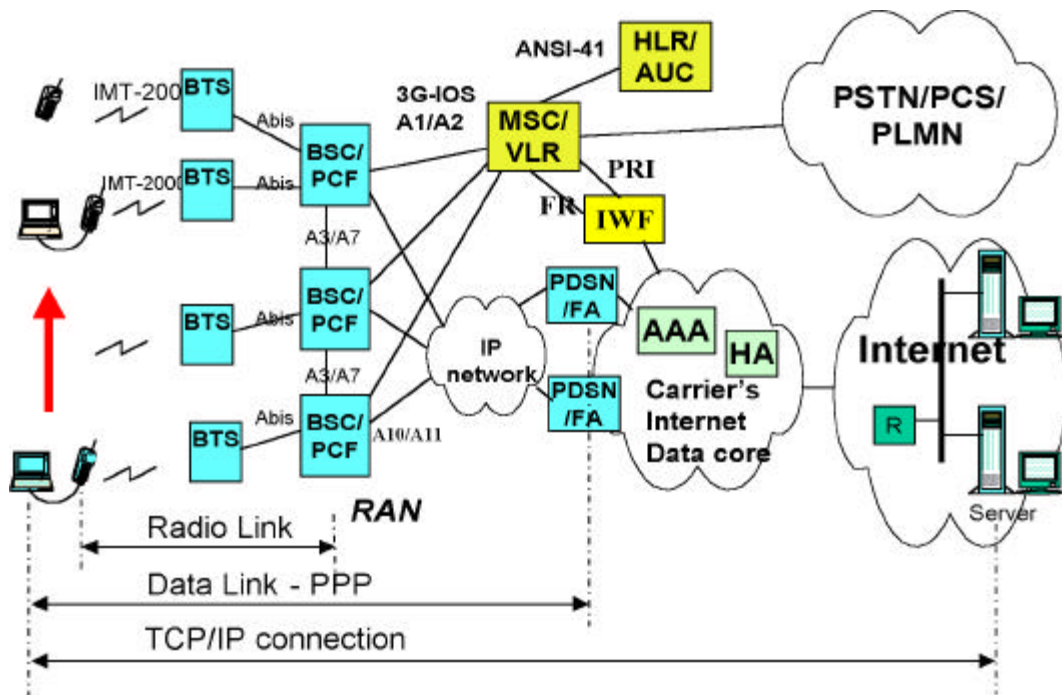
PDSN MS PPP /

PPP

, R-P

R-P RPTP(R-P

Tunneling Protocol)



5- 6.

3. IMT - 2000

ITU-T가 IMT-2000

PDSN(Packet Data Service Node) PDGN(Packet Data Gateway Node)
 . (Q.1711 ver 12.2)

PDSN PSCF(Packet Service Control Function)

service context, routing context ,

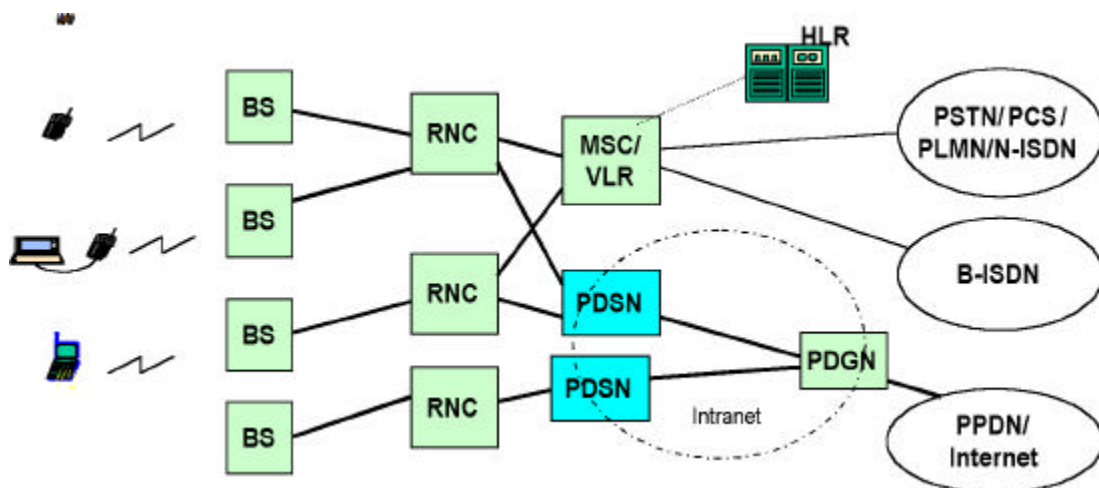
. PDGN PSGCF(Packet service gateway control function)

() IMT-2000

, routing context ,

. , IMT-2000

PDGN IP



5- 7. IMT- 2000

PSDN PDGN

mobile IP

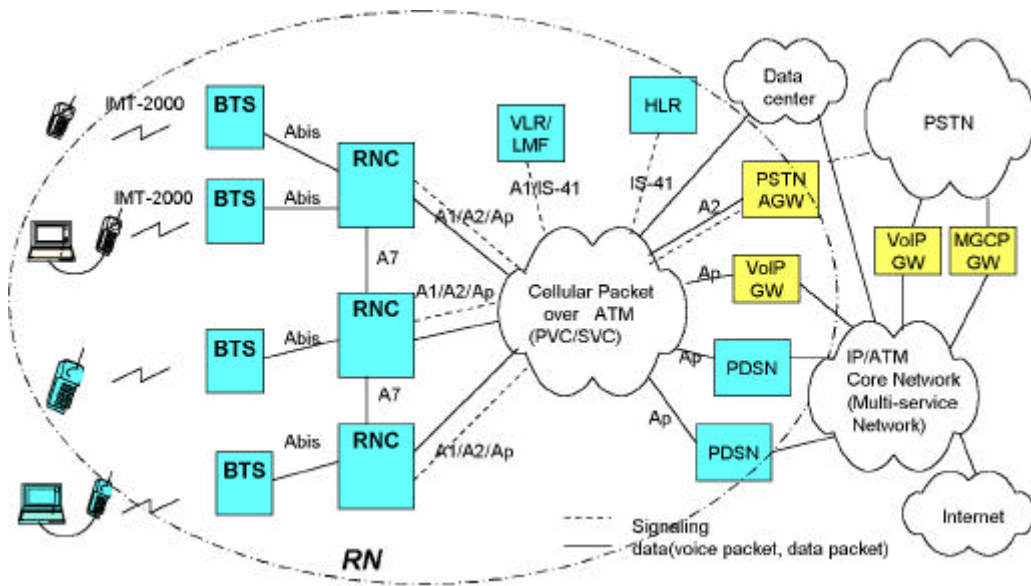
, IMT-2000

IMT-2000

(location area)

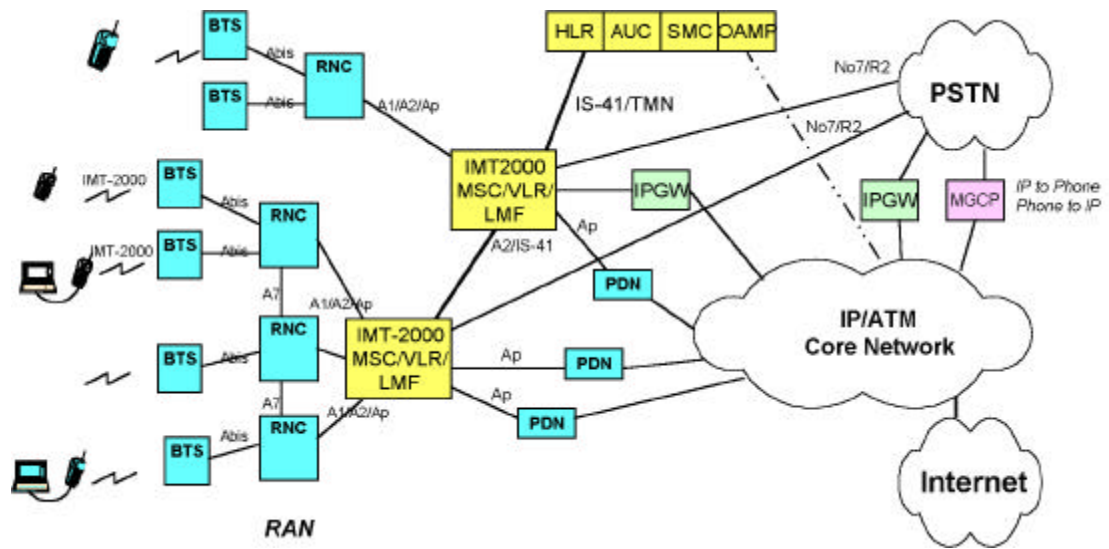
(cell area)

PDSN(, VLR) , PDSN , PDSN routing area , PDGN(HLR) .
 IMT - 2000 Core network ATM



5- 8. IMT - 2000

5- 8 5- 7 IMT - 2000
 , IMT - 2000 ATM
 , ATM 가 (SVC), 가
 (PVC) . IMT - 2000 IP/ATM
 , 가 ,
 5- 9 IMT - 2000 가



5- 9. IMT - 2000

가

, IMT - 2000
 가 가
 , IP
 ,
 QoS , IP QoS
 , ATM , IP over ATM, MPLS
 Scalability 가
 , 가
 , IMT - 2000
 IP
 ,
 , 가 VoIP
 , VoIP IP
 , VoIP IP
 , VoIP IP
 , VoIP IP
 , IMT - 2000 VoIP
 , MS

VoIP 가 . ETSI가 TIPHON
 UPT, UMTS, GSM VoIP
 , ITU IP
 6 , 7 .

4. 3GPP

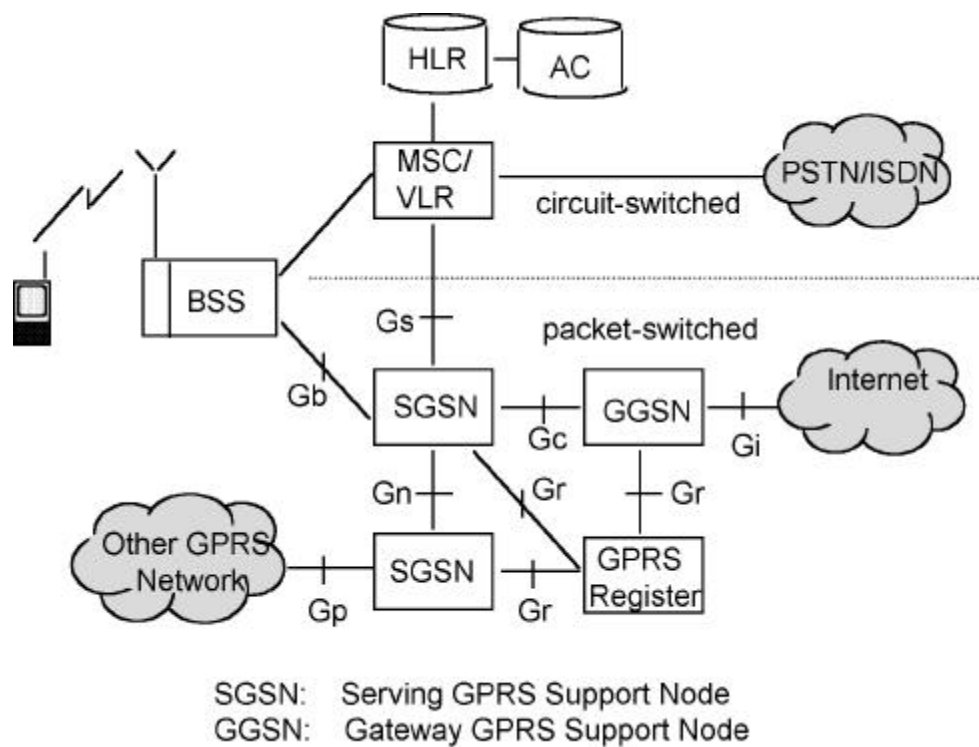
3GPP 2 GSM
 GPRS , GSM/GPRS 가 3
 UMTS . GPRS
 , UMTS .

가. GPRS

,
 , 가 . GPRS
 (general packet radio service)
 가 . Bulk ,
 , 가 GPRS VoIP
 가 .
 , TDMA 가 ,
 .

1 8 TS(time slot)
 , ,
 .
 GSM 3 GPRS 0.5- 1
 . IP , X.25 ,
 . GSM ,
 GPRS 가 .
 GPRS 5- 10
 . GPRS support node(GSN) Core
 . Gateway GPRS support node(GGSN) PDN

가 , X.121 IP , GPRS
 . PDN IP X.25 . Serving GPRS
 support node(SGSN) , Gb
 BSS . SGSN
 GGSN 가 . SGSN GGSN
 IP 가 IP .



5- 10. GPRS

5- 11 GPRS . PLMN GSN
 가 . SGSN MSC/VLR
 , Gs .
 GPRS ,
 5- 12 . GGSN GPRS Tunneling
 Protocol(GTP) GSN tunnel .

. UMTS

3GPP 3 UMTS , UMTS 5- 13

. UMTS GSM/GPRS

. UMTS GPRS

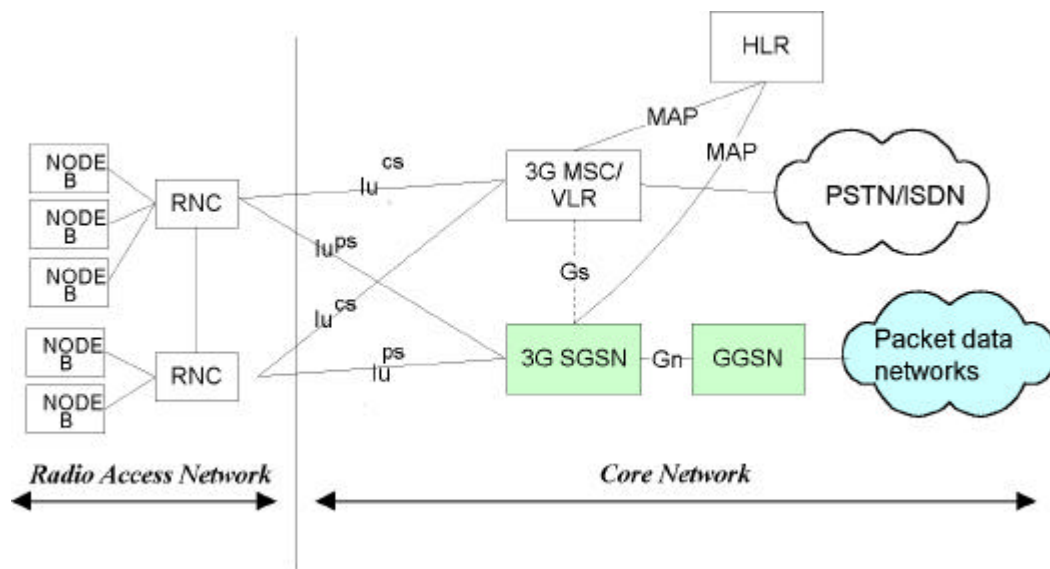
PSTN/ISDN

, MSC/VLR, GMSC

가

SGSN

(Serving GPRS Support Node), GGSN(Gateway GPRS support node)



5- 13. UMTS

UMTS RNC(Radio Network Controller) 2Mbps

QoS

. RNC Iu

IWF

2

. RNC

Iur

가

MIP

IP

. FA, HA,

MIP

IP

/

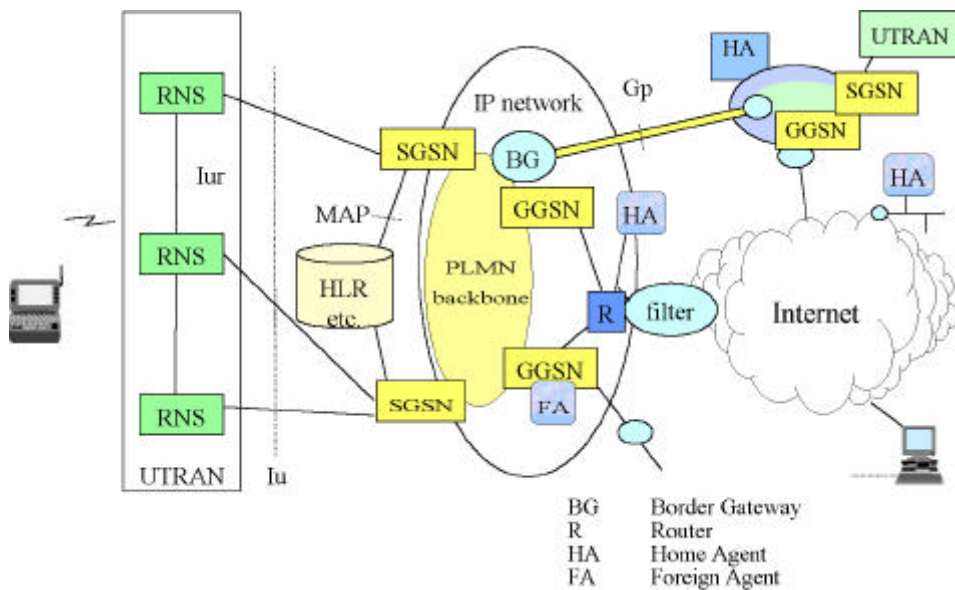
GPRS MIP IP

,

가 .
 가 . UMTS MIP GPRS overlay
 IP , GPRS PDP context
 GSN GPRS ,
 IETF MIP . UMTS MIP
 GPRS 가 가 , MIP
 GPRS
 . UMTS 3 ,
 MIP MIP-GPRS ,
 MIP
 GPRS ,
 , MIP ,
 가 MIP IP .

1) MIP

가 MIP .
 GPRS FA HA
 가 UMTS LAN MIP
 . 5- 14 1 .

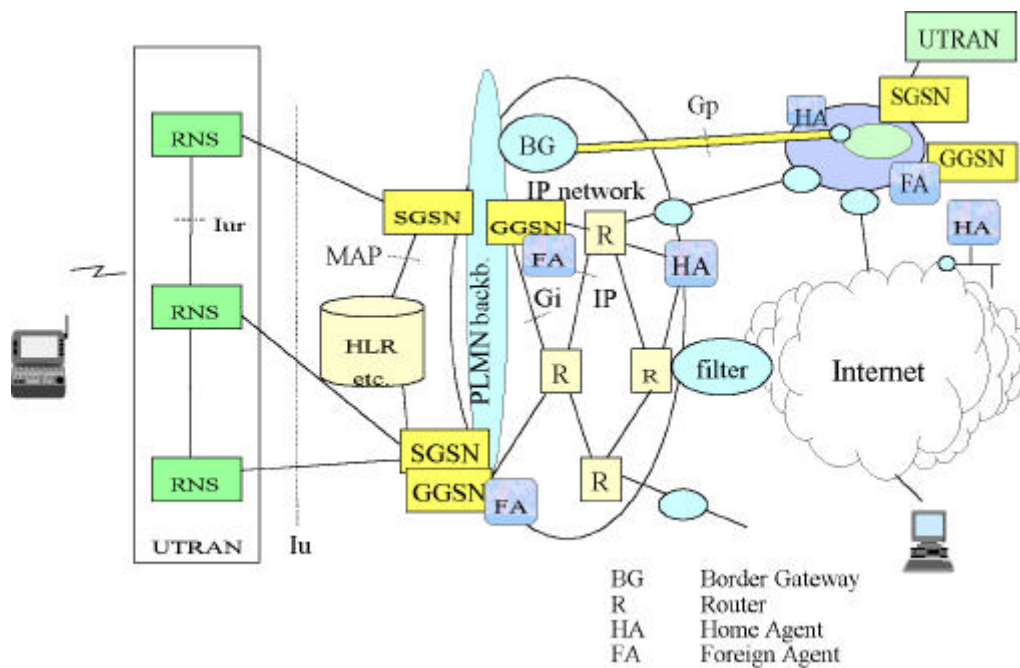


5- 14. MIP 1

FA GGSN . GGSN FA
 . FA PLMN .
 MIP FA PLMN . MIP
 PDP context activation FA GGSN Context
 setup . PDP Context가 Setup
 FA COA(Care Of Address) . MIP 가
 . FA GGSN ,
 .
 가 . GGSN/FA FA
 Detunnel GGSN PDP
 Context (Mapping) . FA
 가 , Gp
 GGSN/FA . FA 가
 GGSN/FA Gp GGSN/FA .

2) MIP- GPRS

2 FA GGSN , SGSN
 GGSN/FA .
 SGSN , GGSN/FA가 ,
 . , SGSN 가 가
 GGSN FA . 5- 15 2
 .
 SGSN 가 GGSN
 / . SGSN
 GGSN/FA PDP Context GGSN/FA
 . GGSN/FA COA , MIP
 SGSN GGSN/FA
 .
 /
 GGSN/FA GGSN/FA PDP Context
 . 1 가
 FA Gp Gn
 GGSN/FA .



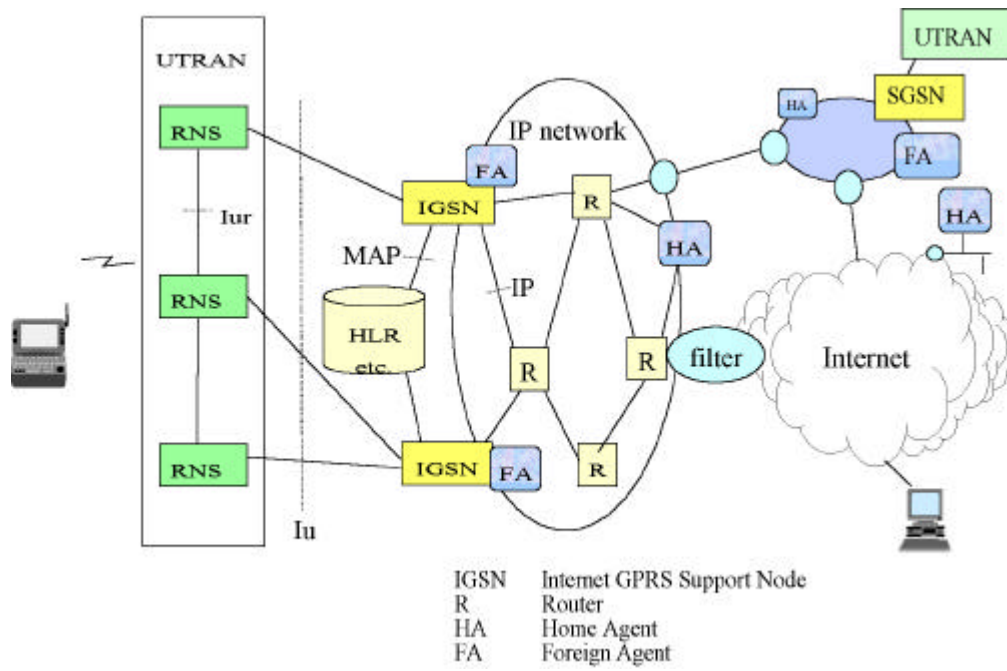
5- 15. MIP 2

3) MIP

3 SGSN GGSN IGSN(Inter GPRS Support Node)
 . FA IGSN . IGSN/FA
 PDP Context IP MIP FA
 . 3 MIP IGSN
 . PLMN , PLMN , PLMN
 IP MIP . 5- 16 3

IGSN SGSN, GGSN BSS/UTRAN
 GGSN PDP Context MIP가 IP
 . IGSN HLR, EIR, SMS- MC
 MAP . IGSN UMTS/GPRS IETF
 . IGSN MIP UMTS
 . IGSN FA IETF
 NAI(Network Address Identifier) RADIUS, DIAMETER, AAA

Server, IPsec 가 . 3 가
 가 MIP 가
 GPRS 가 , IGSN
 SGSN/GGSN 가



5- 16. MIP 3

6 VoIP

7 All IP
IMT-2000
VoIP
VoIP
IMT-2000
VoIP

1 VoIP

1. IETF(Internet Engineering Task Force)

IETF

(Document)
IETF
1998 VoIP WG(Working Group)

가. SIP(Session Initiation Protocol)

SIP MMUSIC, SIP WG
SIP Name Server,
SIP H.323 Client- Server 가
Hold, Transfer, Mute (Feature Invocation)
SIP HTTP (Syntax)
(Semantics)

SIP- message = Request | Response ; HTTP/1.1 messages
Request- Line = Method SP Request- URI SP SIP- Version CRLF

, SIP HTTP

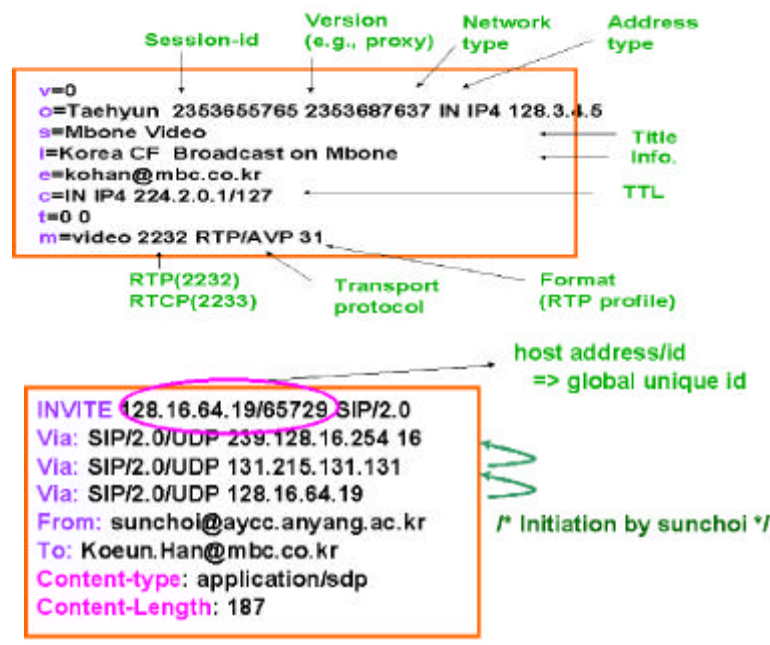
INVITE, ACK, BYE,

CANCEL, REGISTER,

OPTION

MBone SDP(Session

Description Protocol) 6- 1 SIP



6- 1. SIP

SIP 6- 2 User Agent Network

Server . User Agent H.323

, UAC(User Agent Client)

UAS(User Agent Server) . , Network Server

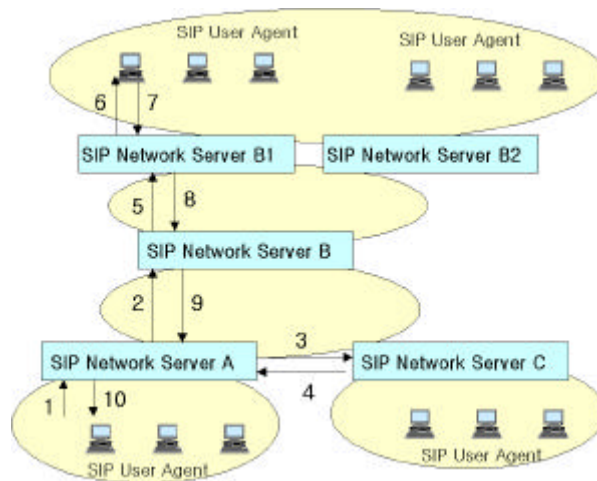
Registration Server, Proxy Server, Redirection Server .

Registration Server

. Proxy Server

. Redirect Server

가 Proxy Server
Redirect Server H.323



6- 2. SIP Network Server

6-2 SIP Network Server . A, B, C
SIP Network Server
A “ ” ““ ””
, Call Invitation 가 A SIP Network Server
(1), Request B C
““ ” , Request가 C (3), 가
Error Response (4). , Request가 B
(2), SIP Network Server Request가
(5), UAS, “ ” (6) 가
Response (7, 8, 9, 10).
UAC가 UAS , ,

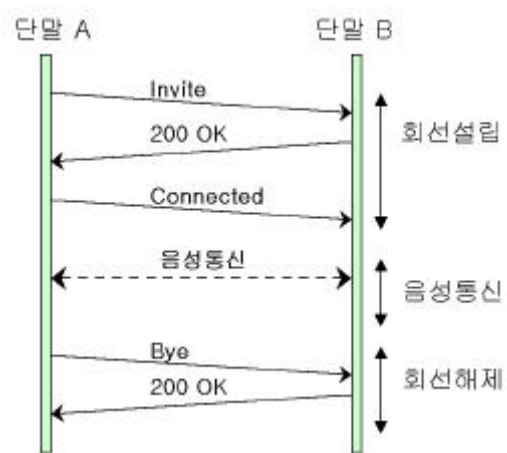
6- 3

H.323 . Endpoint A INVITE ,
Endpoint B 200 OK ,
Endpoint A Confirm CONNECTED
가 . , Endpoint A
BYE , Endpoint B 200 OK

SIP

REGISTER, SIP Network Server

UNREGISTER



6- 3. SIP

SIP draft

Session Initiation Protocol (RFC 2543)

- SAP Security Using Public Key Algorithms
- SIP Call Control Services
- SIP Security Using Public Key Algorithms
- A Message Bus for Conference Systems
- Session Announcement Protocol
- Reliability of Provisional Responses in SIP
- SDP Extensions for Fax over IP Using T.38
- The multipart/sip-id media type
- The SIP INFO Method
- SIP Session Timer
- SIP Caller Preferences and Callee Capabilities
- Establishing QoS and Security Preconditions for SDP Sessions

. IP Telephony(iptel)

IP Telephony

WG (supportive protocol)

IP Telephony PSTN IP

IP IP , PSTN

(Call) (Call)

가 , IP

Telephony 가 (Call)

(Call Routing)

Telephony

가 가 (Call)

, ‘ (Call Routing, Problem)’ 가 가

가

IETF IPTEL

Gateway Attribute Distribution Protocol

가 Draft ,

GLP(Gateway Location Protocol) TBGP(Telephony Border Gateway Protocol)

CPS(Call Processing Syntax)가

GLP 가

CPL(Call Processing Language) XML

, CPL DAG(Directly acyclic graph) 가 . GLP

(SCSP) 가

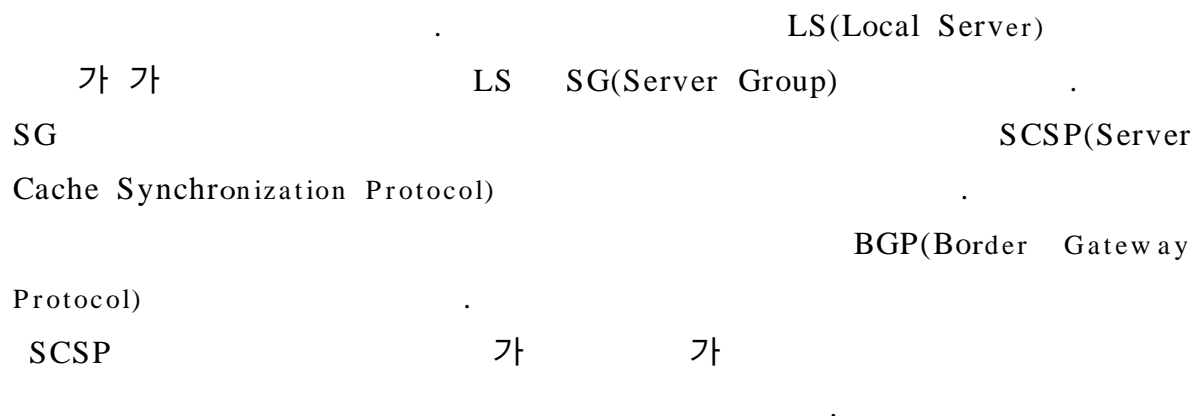
IPtel Draft

- A Framework for Gateway Location Protocol
- Call Processing Language Requirements

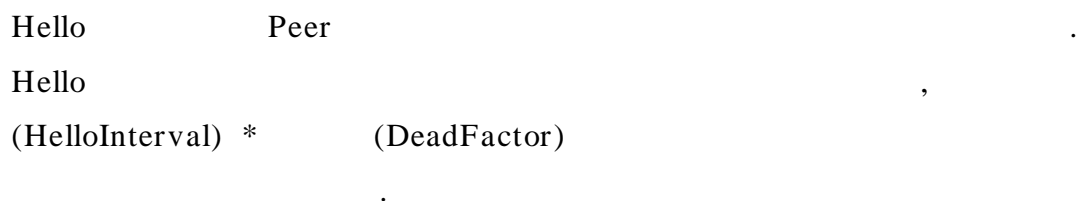
- A Framework for a Peer Gatekeeper Routing Protocol
- A Gateway Location Protocol
- The IP Telephony Border Gateway Protocol Architecture
- CPL : A Language for User Control of Internet Telephony Services
- Transporing User Control in SIP REGISTER Payloads
- Attributes for a Gateway Location Protocol
- Call Processing Language Framework and Requirements

1) Gateway Location Protocol(GLP)

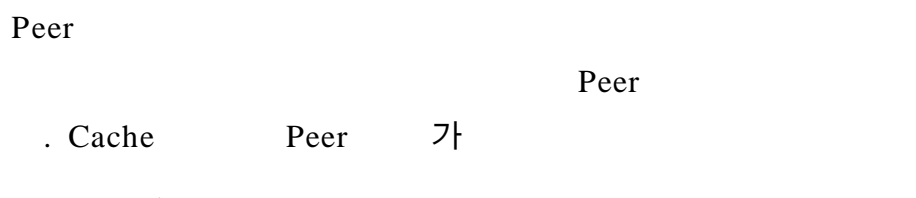
GLP Inter-domain Protocol



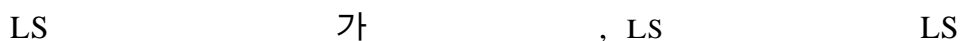
(1) Hello



(2) Cache



(3) Cache Update



. LS Ack
.

2) Telephony Border Gateway Protocol(TBGP)

TBGP IP PSTN
Routing . TBGP
VoIP (H.323, SIP) ,
 , BGP-4(Border
Gateway Protocol 4)
TBGP PSTN 가
 , IP (H.323 SIP)
TBGP Speaker . TBGP Gateway
(Capacity and Cost) IP Path . PSTN
Locating Gateway GLP(Gateway Location Protocol)
.
TBGP TBGP Speakers
TBGP Speaker Hop-by-Hop ,
Hop Path Path .
TBGP Speaker 가
가 . 가 , TBGP Speaker
Hop . Hop Proxy Gateway
가 . Gateway
 , TBGP H.323, SIP IP Telephony
Signaling .

. PSTN and Internet Internetworking(pint)

PINT PSTN WG .
FAX
WG . PSTN
가 FAX
 , PSTN
가 가 .

PINT WG 97 8 PINT SIP, SDP
 ID(Internet Draft) 3 PINT
 RFC 1 . 43 IETF (98 12)
 PINT PINT , PINT
 (call queueing) , SIP

. Media Gateway Control(megaco)

PSTN ,

가

. IETF PSTN

. 1998 8 Transport Area

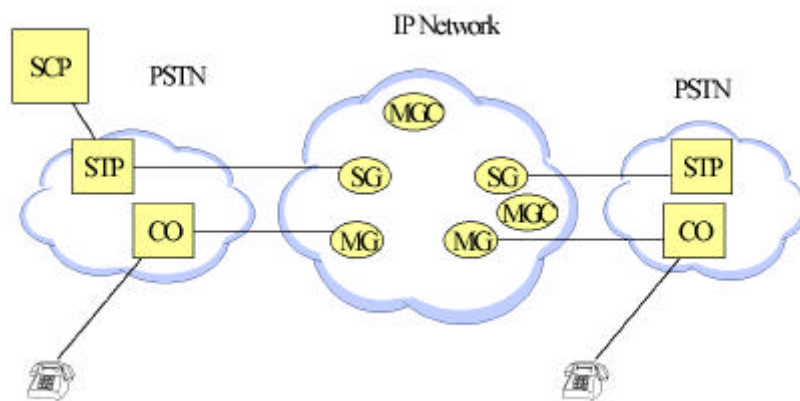
SS7 Bof Meeting

TIPHON

SIGTRAN MEGACO WG

. MEGACO WG MGC(Media Gateway Controller)

MG(Media Gateway)



MG: Media Gateway
 MGC: Media Gateway Controller
 SG: Signaling Gateway

SCP: Service Control Point
 STP: Signal Transfer Point
 CO: Central office

6- 4. IP

IETF

6-4 IP Gateway system IETF . MG
 IP
 . MG IP
 Trunking Gateway , PRI
 IP network (access gateway)
 .
 MEGACO MGC MG IPDC, SGCP
 IPDC SGCP MGCP , 1999 3
 MEGACO 가 . MEGACO
 MGCP 5 1999 10 RFC2705 .
 MGC MG , MGC
 MG MGC MG
 MGC MG ,
 , (Tone) ,
 . Megaco draft

Media Gateway Control Protocol (RFC 2705)

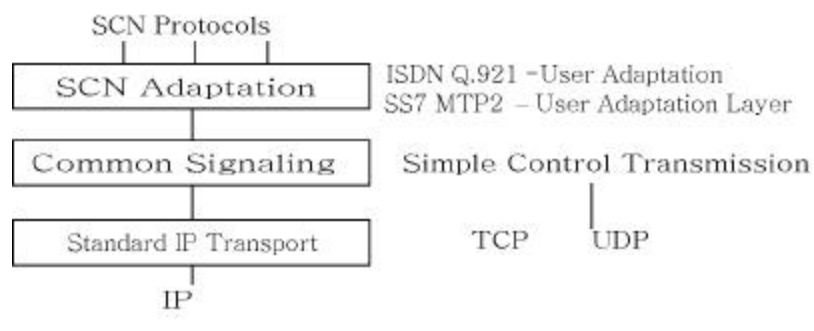
- Media Gateway Control Protocol Architecture and Requirements
- MEGACO Protocol
- R2 Package for MEGACO Protocol
- MEGACO IP Phone Media Gateway
- Multiservice Switching Forum requirements input to MEGACO

. Signaling Transport(sigtran)

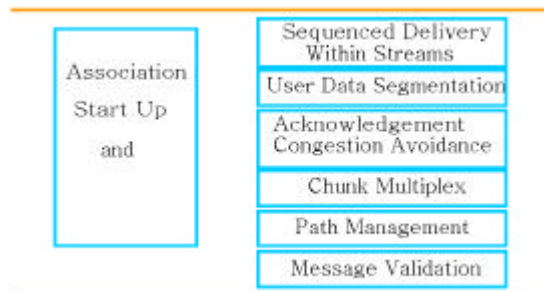
IETF Sigtran WG “PSTN
 IP packet-based PSTN
 ” . PSTN , IP Q.931 SS7 ISUP
 IP
 .
 , PSTN IP telephony ,
 . IETF QoS , IP

QoS

PSTN IP SG, MGC MG
 IP Q.931, R2, ISUP 가
 SIGTRAN IP
 WG SG가
 PSTN IP 6- 5
 , SCN (SCN Adaptation Module),
 (Common Signaling Transport),
 (TCP UDP) SIGTRAN WG
 SCN Adaptation Module Common Signaling Transport
 , Common Signaling Transport
 UDP



6- 5.



6- 6. SCTP

6- 6

가

가

SCTP(Simple Control Transmission Protocol) .
 SCTP UDP SCTP / ,
 . ,
 SACK .
 MTU(Maximum Transmission Unit) , ,
 TCP Slow Start Congestion Avoidance
 , UDP SCTP
 , Heartbeat
 Transport Address . ,
 (Validation tag)

Sigtran WG draft .

- Multinetwork Datagram Transmission Protocol
- Architectural Framework for Signaling Transport
- The Application/ISUP media Type
- Signaling Backhauling Protocol
- Performance Requirements for TCAP Signaling in Internet Telephony
- SS7 ISUP Tunneling
- Framework for SIGTRAN Common Transport Protocol

2. IMTC

IMTC(International Multimedia Teleconferencing Consortium)

145 , .

H.320 . IMTC (Activity Group) ,

. 7 .

○ Conferencing over IP - H.323 LAN/WAN , ,

, H.323 VoIP

Packet Network Conferencing

.

○ Interworking & Network Services - H.320, H.323, H.324

IMTC

○ Switched Network Conferencing

○ Data Conferencing

○ Marketing

○ iNOW 1

○ Mobility

IMTC VoIP ITU-T Study Group 16, ETSI
TIPHON, IETF, H.323

3. TIPHON

ETSI(European Telecommunication Standard Institute) VoIP

TIPHON (Internet Protocol Harmonization Over Network)

, IP PSTN, ISDN, GSM

. ETSI EN(European- Norm), ETS(ETSI Standard), ETR(ETSI Report), TS(Technical Specification), TR(Technical Report)

. TIPHON TS TR .

TIPHON ITU-T IETF

,
H.323,
(), ,
, QoS , E.164 IP , ,
, 4가

.
○ 1: IP H.323 가 PSTN/ISDN/GSM

SCN 가
○ 2: SCN 가 가 IP H.323

○ 3: 가 SCN IP

○ 4: 가 IP SCN

8 WG

. , TIPHON
H.323

IETF

.

- WG1: Requirements
- WG2: Architecture
- WG3: Signaling/Call Control
- WG4: Numbering/Naming/Addressing
- WG5: End- to- end QoS
- WG6: Verification, Demonstration and Interoperability
- WG7: Wireless and Mobility
- WG8: Security

TIPHON net .

(1) 1

WG1

Business Role .

가 ,

, 가 .

(2) 2

6- 7 ,

ITU- T SG16 inter- gatekeeper inter- domain

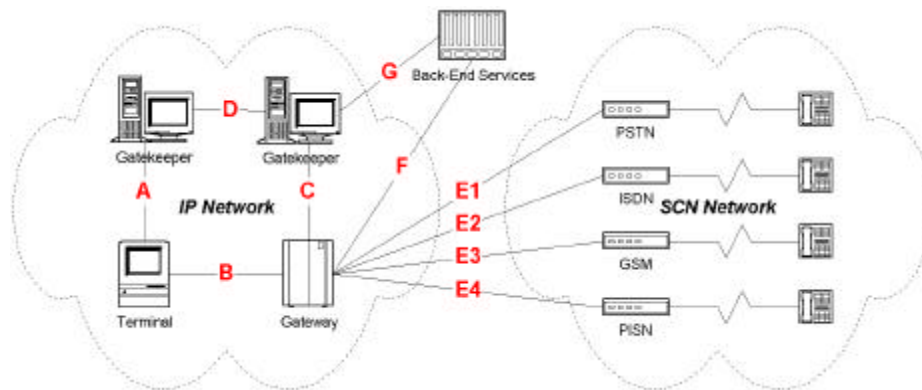
가 ,

, , .

(3) 3

WG 3 , , ,
, RAS , Q.931

, H.245 , H.323 GSM .



6- 7. TIPHON

(4) 4

WG 4 Naming, Numbering Addressing

, E.164 ITU- T SG2
가 , 가

. , TIPHON

ITU- T

SG 2 E.164 12

가 /

. E.164- IP E.164

IP

E.164

IP

2

.

(5) 5

WG 5

.

.

(6) 6

WG 6

TIPHON- NET

,

,

.

IP SS7

,

,

,

, QoS

,

/

,

.

TIPHON TIPHON

TIPIA(TIPHON IP Telephony Implementation Association)

. TIPIA

FT(Focus Teams)

, TIPIA

IMTC

- FT1: IP Telephony and Real Time Multimedia Applications
- FT2: System Integration and Deployment
- FT3: Billing, Accounting and Settlement and Fraud
- FT4: Quality of Service (QoS) Implementation
- FT5: Security
- FT6: Operation, Administration, Maintenance & Provisioning

(7) 7

WG7 Global Multimedia Mobility(GMM)

UPT

GMM

가

, 6- 8

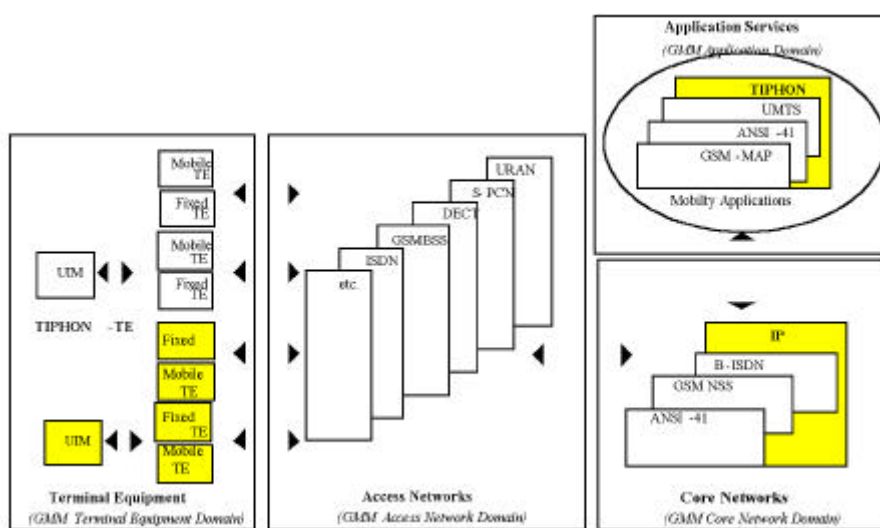
4가

. TIPHON

, IMT - 2000

3GPP

“All IP”



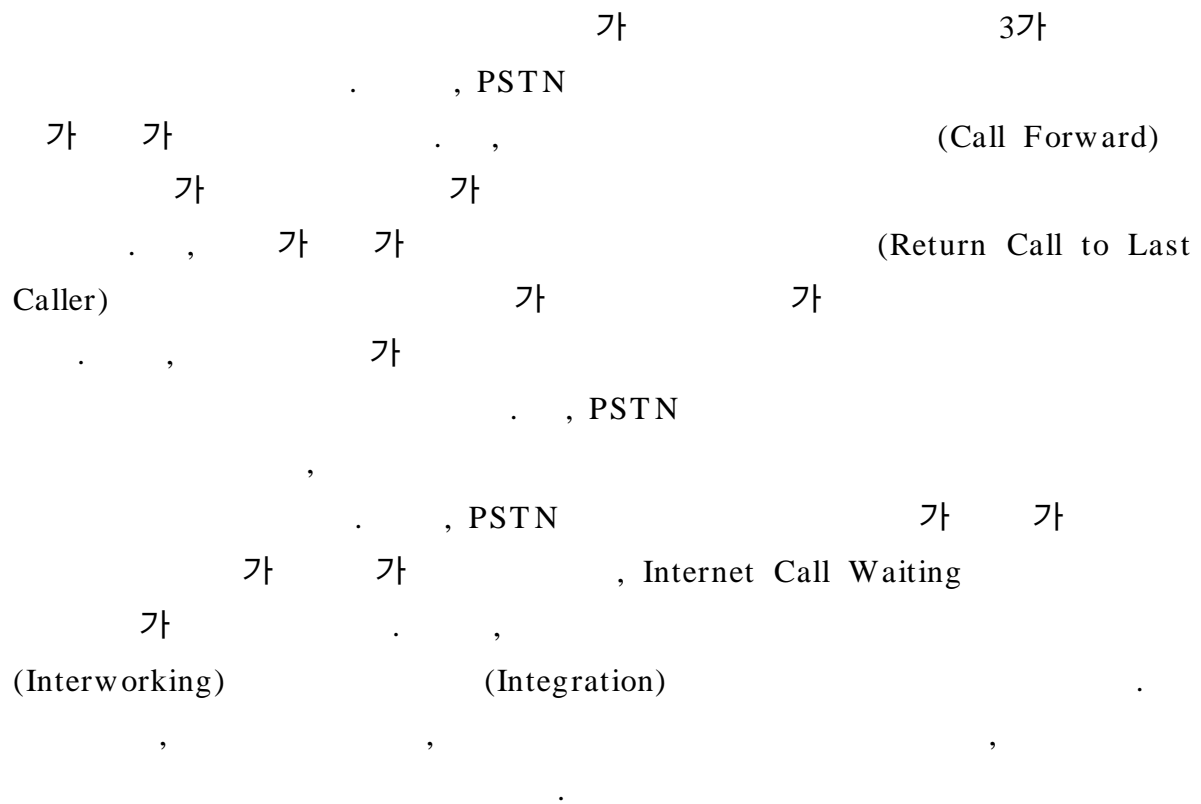
6- 8. GMM

(8) 8

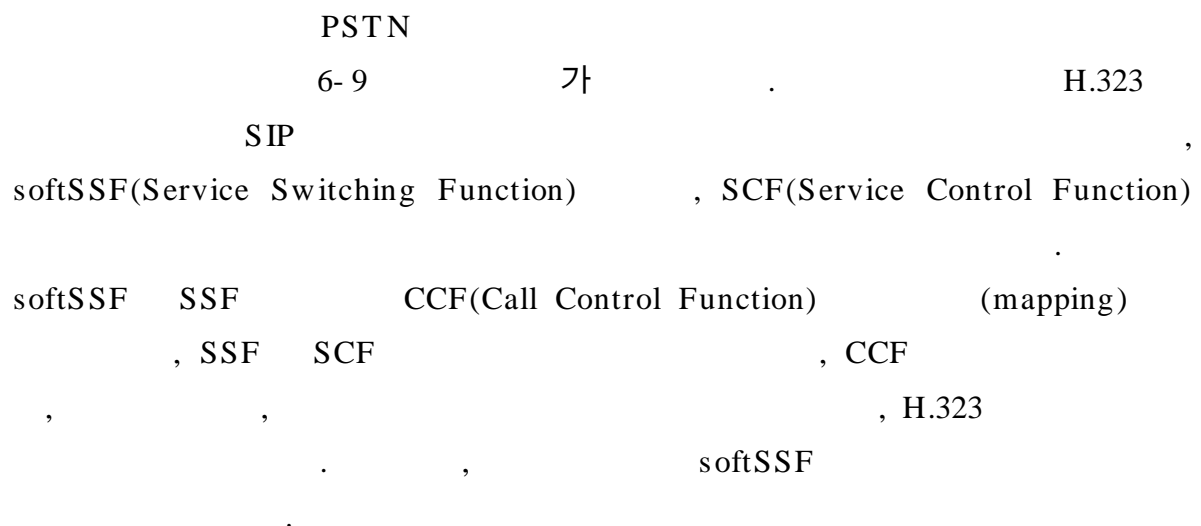
가 8

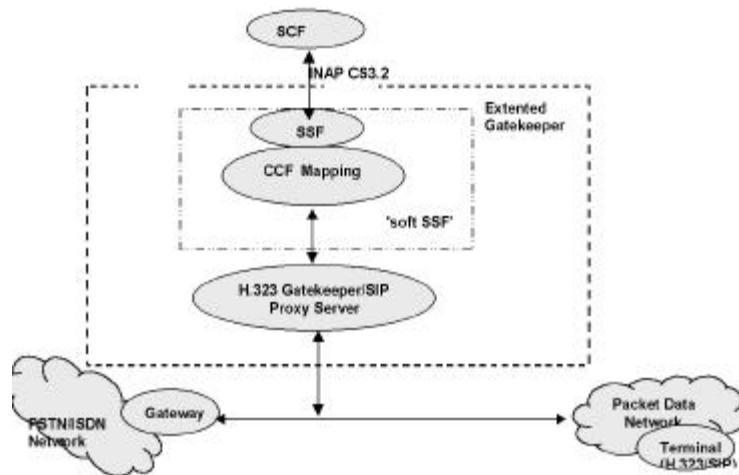
.

2 VoIP



1.





6- 9.

2.

Tiphon H.323

H.323

- SM (, Service Manager): SM
 , SCF
- CM (, Call Manager): CM
 , CM SM RAS . CM Gatekepper-routed Call
 , Direct- routed Call
 (6- 10, 6- 11)
- RM (, Resource Manager): RM
 MGC , MGCP .
- MM (, Media Manager): MM
 , H.323 .
- BES (Backend Service): BES ,

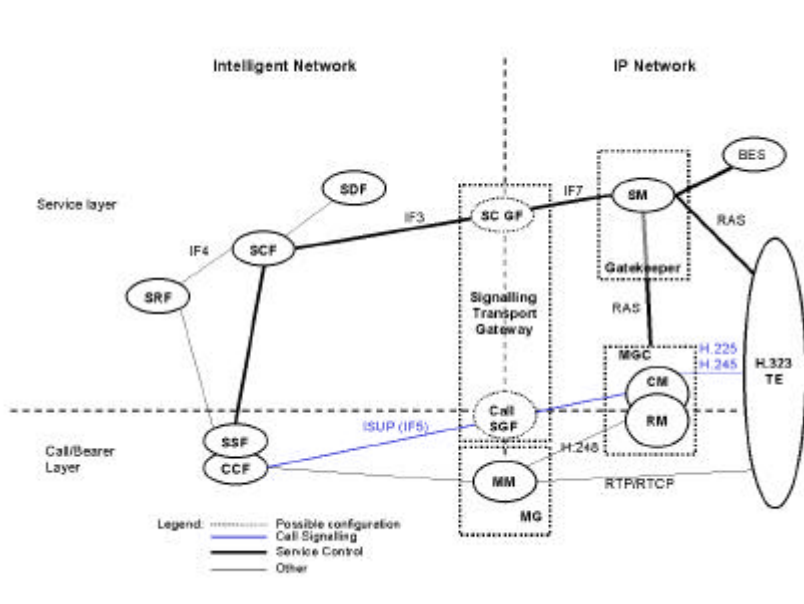
6- 10

6- 11

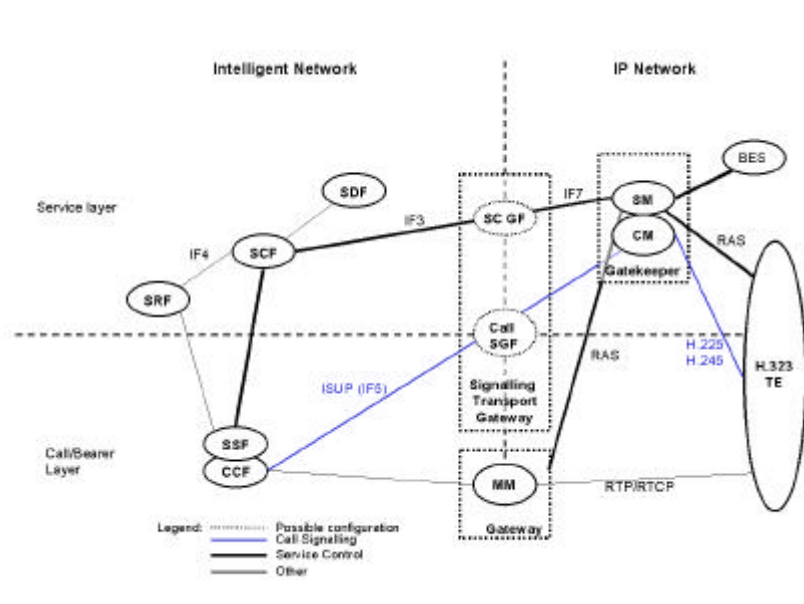
Direct- routed Call

Gatekeeper- routed Call

가



6- 10. Direct- routed Call



6- 11. Gatekeeper- routed Call

3.

가

가. PINT

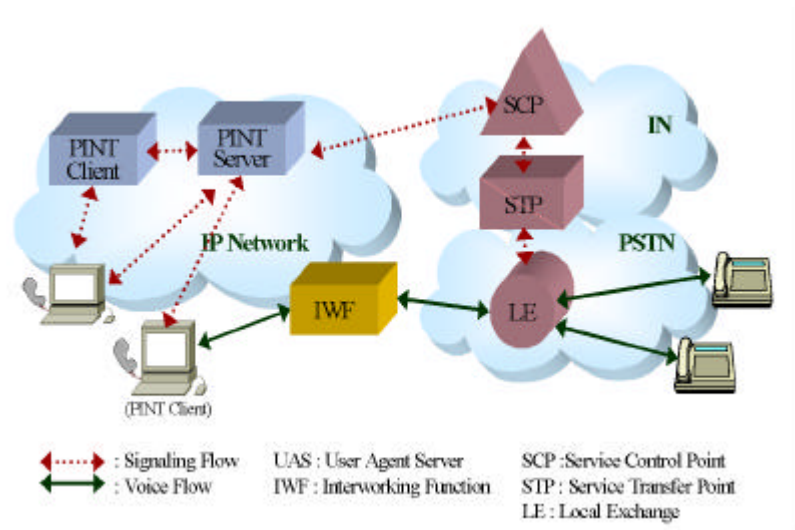
PSTN/IN IETF PINT WG(PSTN and Internet Interworking Working Group)

. PINT SIP SDP(Session Description Protocol)

(, , ,)

가 , SIP PINT PINT Request

6- 12 PINT , PSTN PINT



6- 12. PINT

PINT 가

가 가

(1) Request- to- Talk (R2T): IP 가 가

(2) Request-to-FAX (R2F): IP FAX
 FAX over IP , FAX IP
 . FAX FAX
 . Request-to-FAX Back (R2FB)

(3) Request-to-Hear Content (R2HC): 가
 A

(4) Internet Call Waiting: 가
 가 .

VoIP

(5) Click-to-Message: SMS 가 가 .

(6) Multiparty Service

. ITU-T

H.323
 가 가 H.450.x

- H.450.2 Call Transfer
- H.450.3 Call Diversion
- H.450.4 Call Hold
- H.450.5 Call Park/pickup
- H.450.6 Call Waiting
- H.450.7 Message Waiting
- H.450.8 Name Identification

가 IP ISDN

[2].

, ,
 Peer-to-Peer . ISDN

가 .

, , ISDN

, H.323 Endpoint

. ISDN

. ,
가 가 .

, 가

.

3

VoIP

.

IMTC , ETSI TIPHON

.

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.

(Softswitch Consortium), MSF(Multiservice

Switching Forum)

가

가

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가

MSF가

.

MSF

MSS(Multiservice Switching)

.

1.

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PSTN/IN

,

,

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1999

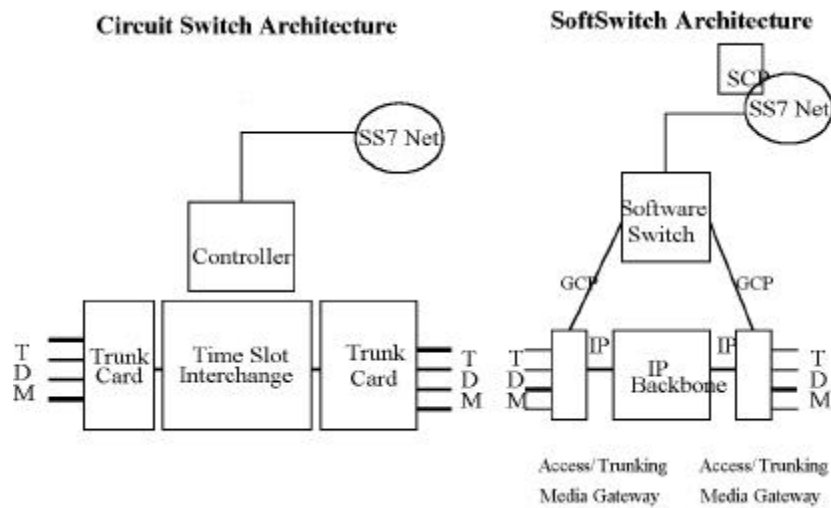
IP

, softswitch

4

(SIP

WG, Device Control WG, Application WG, Architecture WG)



6- 13.

6- 13

가

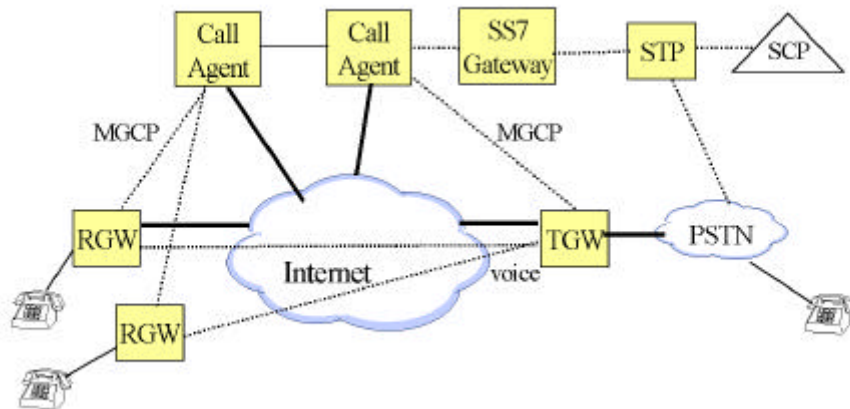
PSTN IP

SS7, ISDN/CAS,

, H.323, SIP/SDP, MGCP

2.

6- 14 Telcordia(Bellcore)
 , RGW(Residential Gateway), TGW(Trunking Gateway)
 Call Agent 3 , Call Agent가
 . Call Agent RGW TGW MGCP (Media
 Gateway Control Protocol) . SS7 PSTN
 SS7 , Call Agent



6- 14.

1) RGW

가 , Call Agent
 . RTP(Real Time Protocol)
 (End- to- end) . RGW
 , IP , ADSL, HFC,
 ATM 가 . VoDSL(Voice over Digital Subscriber Line)

Cable Modem

VoIP

.

2) TGW

TGW PSTN

가 . , TDM

RTP

가 . TGW MGCP

, Call Agent가 TGW

.

.

3) Call Agent

Call Agent H.323

.

,

,

,

,

,

. Call Agent

, MGCP

RGW TGW

가 .

Call Agent

, Call Agent MGCP

. Call Agent

SS7

, PSTN

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가

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. Call Agent

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, Call Agent

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가

Call Agent

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Call Agent

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PSTN

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ISUP

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ISUP

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IP

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가

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Call Agent

SDP

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ISUP

ISUP

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,

가

.

, Call Agent

SIP

. SIP ISUP

Call Agent

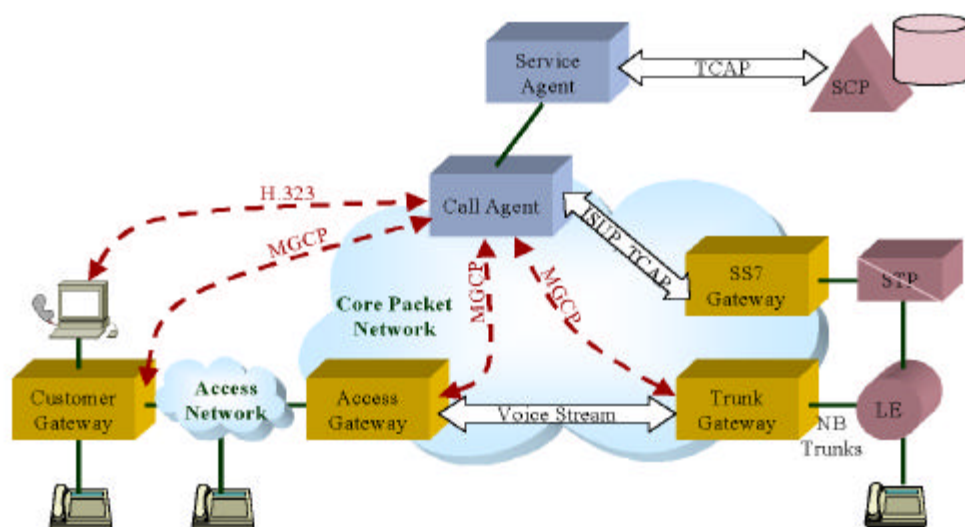
SDP

. SIP

Call Agent
가
, Call Agent

3. MSS

Telcordia
NGN(Next Generation Network) . NGN
(TE,
Transit Exchange) (LE, Local Exchange) .
NGN , H.323
가 ,
NGN VoP(Voice over Packet) , IP
ATM
6- 15 가
SS7
PSTN LE
가 MGCP 가 ,



6- 15. NGN

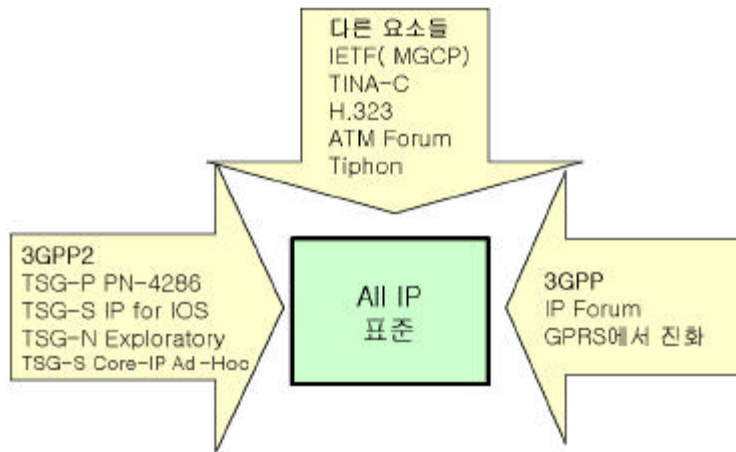
1998 11 BT, MCI WorldCom, AT&T, Cisco,
 Bellcore 55 MSF(Multiservice Switching Forum)
 . NGN VoP
 .
 /
 . IMT - 2000 All IP
 , All IP 가 .

7 All IP

1 All IP

1.

IP . 1999 6
Ericsson 8 3G.IP 3
(core network) IP
IP
가 , , 가
, 가 IP 가 ,
(Next Generation
Network: NGN) IP
, 3 IMT - 2000 IP
IP “All IP”
All IP IP
IP
All IP
/ IP IP
IP 가 가 3 RAN , 4
가 IP
, All-IP
All-IP 3GPP 3GPP2 가
, IETF,
7-1



7- 1. All- IP

, All IP , All IP
IP
.
가 , IP 가 가
가 ,
가 , All IP
가 .

2 3GPP All IP

1.

1999 3GPP 가 TSG- SA(service architecture)
, IP(internet Protocol) 3
All IP 가
. All IP
. GPRS ,
IP , All IP
GPRS , IP
. IP
OA&M ,
All IP GPRS UTRAN

ERAN

. UMTS

All IP

- GPRS
- UTRAN ERAN
- IP
- IP
- , ,

가

All IP

. UMTS

/ , 가 가 ,

IP ,

IP

- IP (, LAN, HIPERLAN, cable,)
- IP , 가
- , ,

-
- IP 가 가
- IP가

2.

All- IP

. All IP

가. All IP

GSM

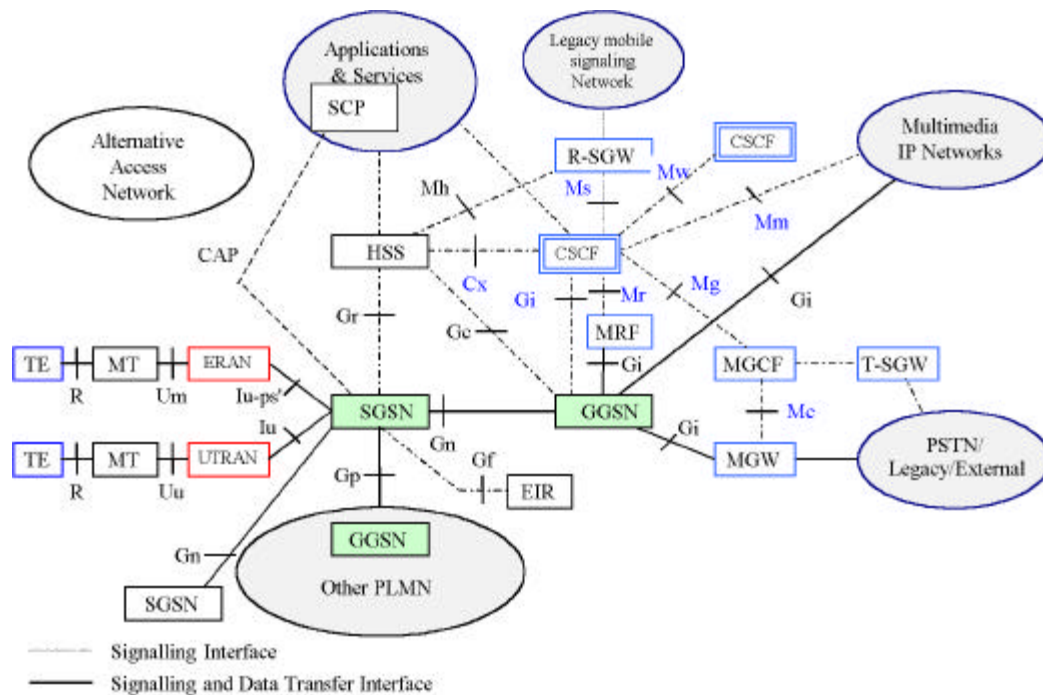
. , All IP

GSM

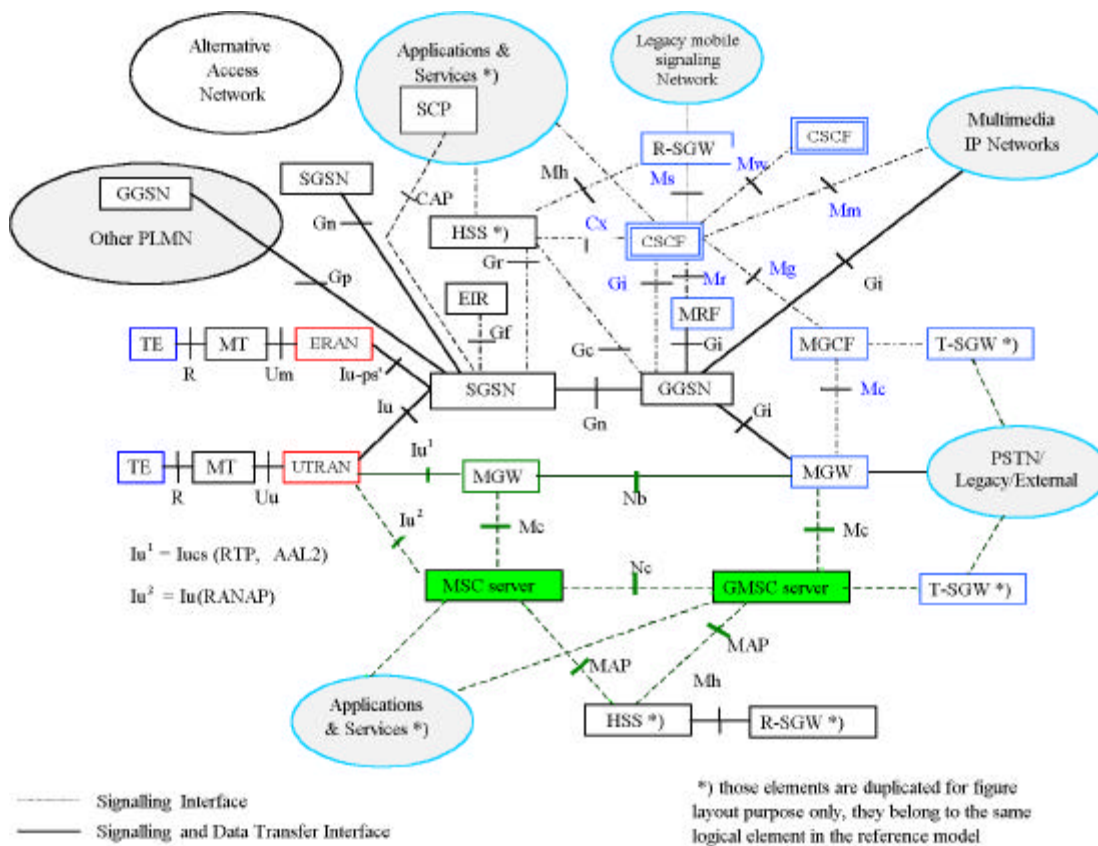
. All IP GSM
 .
 . All IP
 가
 .
 . IP ,
 가
 .
 . (,)
 All IP
 . All IP UMTS/GSM ,
 가 가
 .

3.

3GPP All IP 3GPP TSG SA ,
 All IP IP
 ,
 . , GPRS/
 Option 1 2 2가
 . Option 1 3
 IP 가 ,
 IP 가 7-2
 . Option 2 option1 99 (R99)
 가 , 가 R99 R00
 . option 1 MSC
 GMSC(gateway MSC) 가 , 7-3 . ,
 , MGW , MSC
 .



7-2. 3GPP option 1 All IP



7-3. 3GPP option 2

All IP

- (Radio network)
- GPRS (GPRS network)
- Call control
- (Gateway to external network)
- (service architecture)

가 가

. All IP

(UTRAN,

ERAN, HIPERLAN2)

GPRS

PDP context

R99

. , 2

HLR

HSS(Home subscriber server)

All IP 가

, CSCF(Call State Control

Function), MGCF, R-SGW, T-SGW

가

. CSCF H.323 Gatekeeper SIP(Session Initiation Protocol)

. HSS 가

, CSCF

가 . MRF

GGSN, MGCF, MGW, R-SGW, T-SGW

R-SGW,

CSCF, MGCF, T-SGW, HSS

MGW

PSTN

CSCF, MGCF, T-SGW

MGW

All IP

(1) CSCF(Call state control function)

ICGW(Incoming call gateway) CCF(Call control function), SDP(Serving profile database), AH(Address Handling) . ICGW

Incoming

screening(triggering),

, HSS

. CCF

, MRF

, , , ,
 , , CSCF SPD
 가 , HSS
 .
 ,
 VLR . AH
 , . AH All IP
 Address .
 (2) HSS(Home Subscriber Server) .
 ,
 . HSS HLR Super set
 .
 (3) T-SGW(transport signalling gateway) All IP PSTN/PLMN
 . PSTN/
 PLMN All IP T-SGW
 MGCF , PSTN PLMN IP
 .
 (4) R-SGW(roaming signaling gateway function) All IP
 SS7 IP
 . IETF Sigtran 가
 .
 (5) MGCF(Media gateway control function) MGW
 ,
 CSCF , ISUP,
 R2 IP ,
 CSCF MGW .
 (6) MGW All IP ,
 . All IP
 . MGW , ,
 Iu
 .
 (7) MRF(Media resource function)
 . MRF H.323 MCU . MRF

CSCF

4.

All IP 가 , SRNS(Serving RNS) Relocation packet service 가 . , All IP , , All IP , All IP 가 . All IP 가 . , 가 , , , All IP 가 All IP 가 . 가 All IP 가 . 가 All IP All IP All IP SGSN, GGSN, PDP context MSC, GMSC , 가 .

5.

All IP , IP , . IP , , , All IP 가 QoS가 가 . , IP , , .

6.

가.

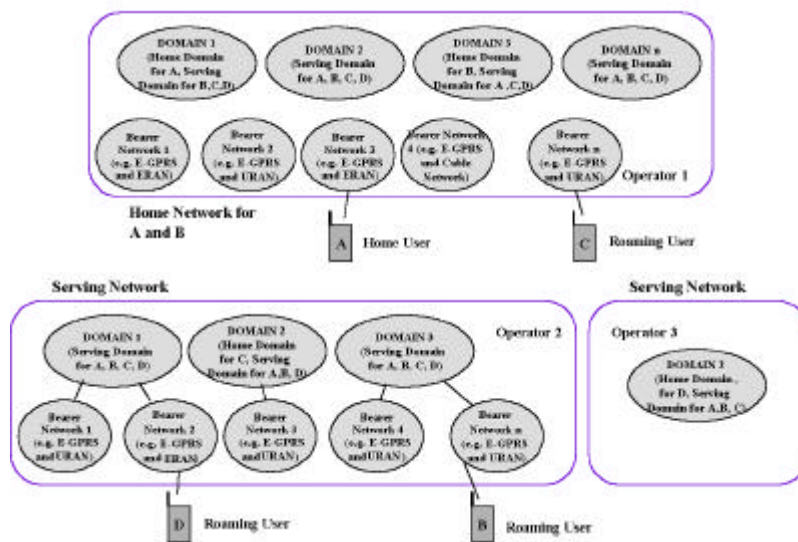
All IP

가
HSS, CSCF, MGW
가

가

가

7- 4



7- 4.

All IP

가

가

가

, 가

, 가

HSS

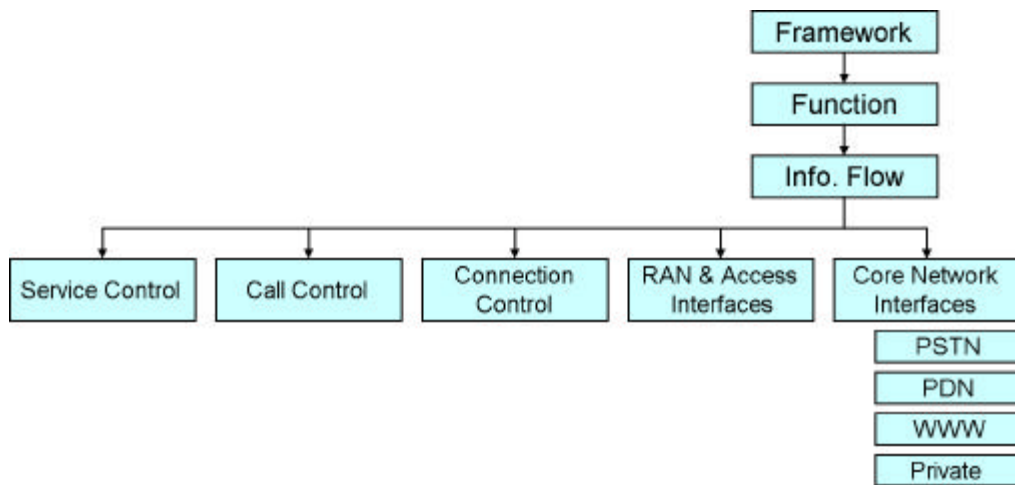
-
-
-
- PSTN / (DN:directory number)
MGCF
- All IP All IP 가 DN PSTN
· , All IP All IP
· , IP
· DN
가 .
- All IP HSS 가 가
ICGW . Incoming Call Screening Relay
· , 가 CSCF
· HSS
CSCF .
- All IP CSCF CSCF
가 Home CSCF .

3 3GPP2 All IP

1.

- 3GPP2 TSG-S All IP Ad Hoc , All IP
· , All IP ,
· 3GPP ,
· , IETF IP , 가
IETF . All IP
ITU-T Model , 4가 .
- Q.FIN - Framework for IP Network
 - Q.FNA - Functional Network Architecture for IP
 - Q.FIF - Functional Information Flows
 - Q.xxx - for appropriate design areas

7- 5



7- 5. 3GPP2 All- IP

2. 가

3GPP2 All IP , 가

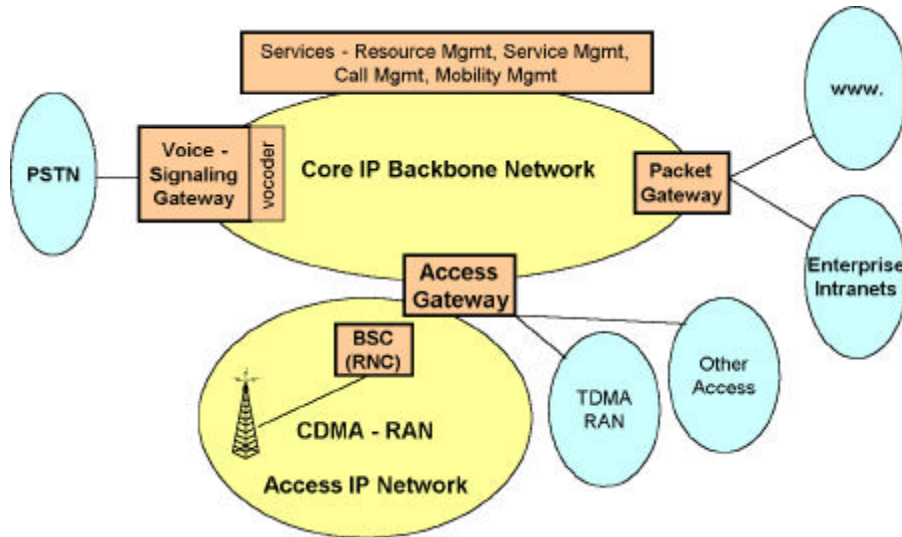
- 가
 - cdma2000 QoS
 - TR45.6 Mobile IP
 - IOS (A , SDU) , IP ATM
 - UMTS/EDGE 3GPP IP
- 가
 - cdma2000 가
 - H.323
 - All IP
 - All IP
 - , , 3가

3.

3GPP2 7- 6

IP

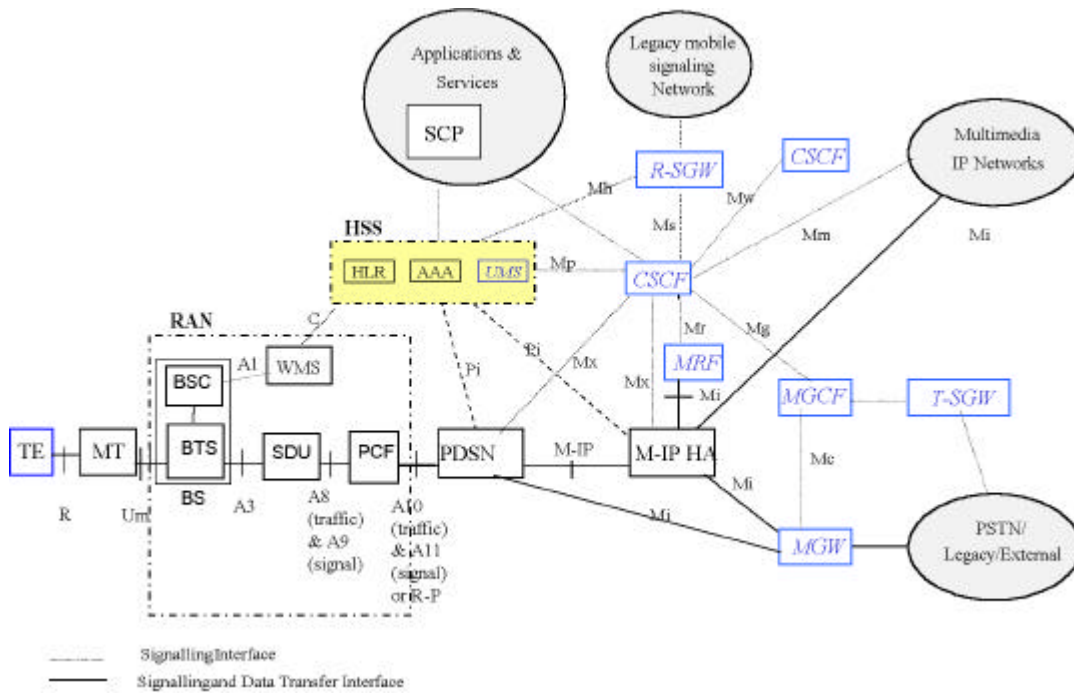
가 Access gateway , IP gateway , PSTN PSTN gateway IP 가 .



7- 6.

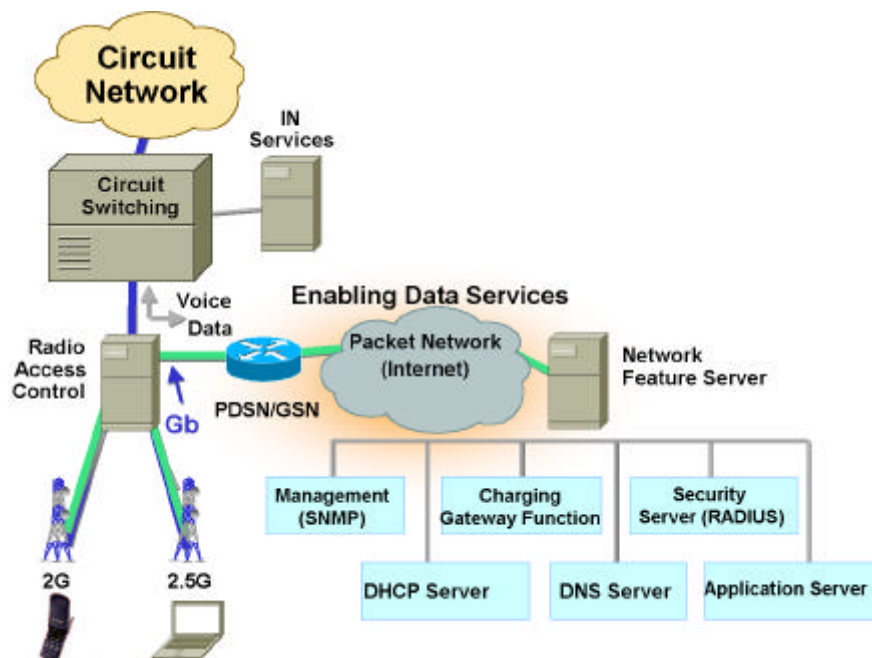
7-7 RAN HSS 3GPP2 All IP
 . 3GPP2 3GPP 가
 . , SGSN PDSN , GGSN M-IP HA
 . HSS(Home Subscriber Server) HLR, AAA, UMS(User Mobility Server)
 . All IP
 CISCO All IP 3
 , 7- 8, 7- 9, 7- 10 .
 7- 8 1 2 , 2.5 (Radio Access Control)
 , IP
 IP .

•



7- 7. cdma2000 All IP

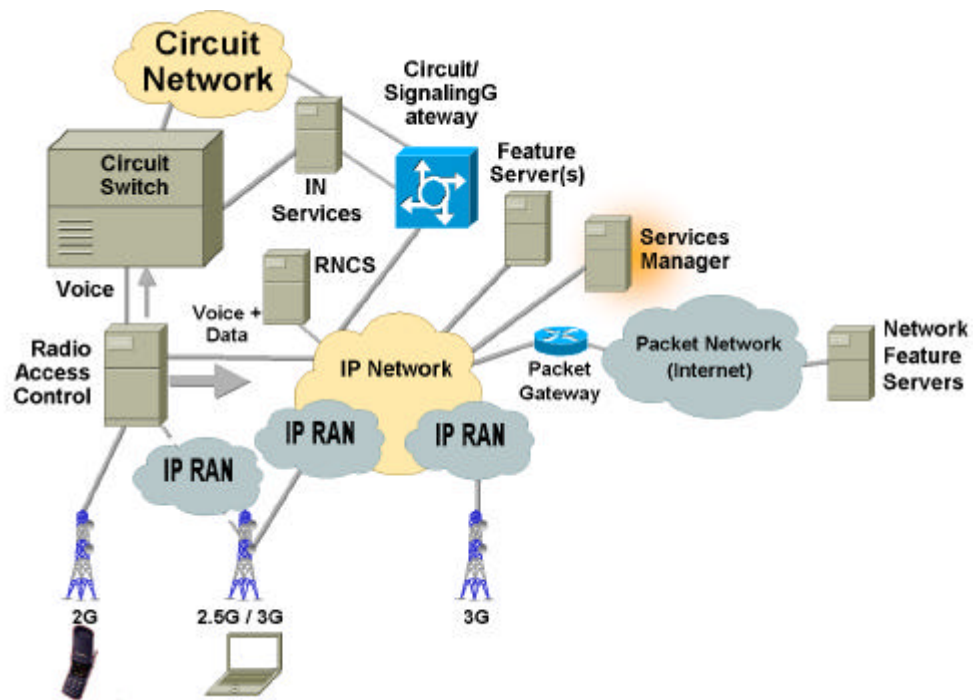
(3GPP2)



7- 8. CISCO

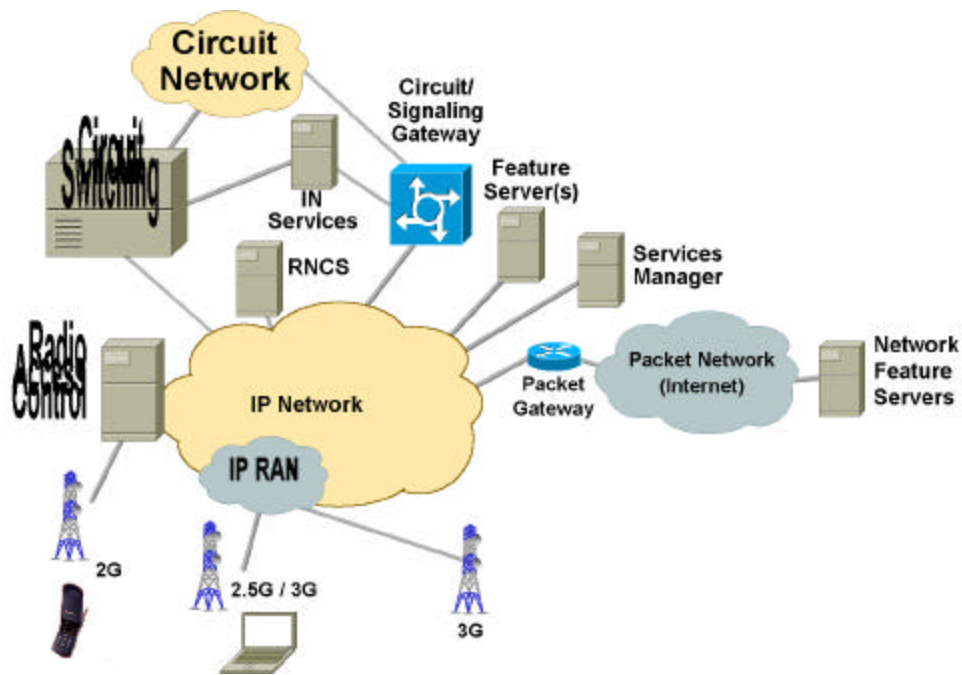
1

7-8 2 2.5 3 (RAN)
 IP , IP , IP
 . ,
 IP .



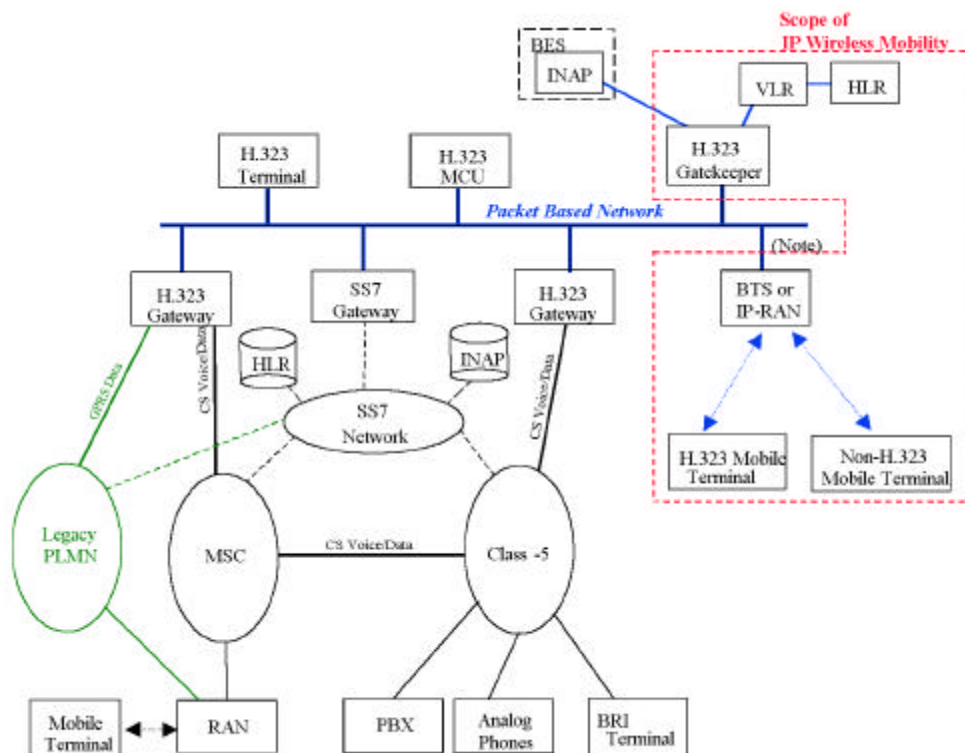
7-9. CISCO 2

7-10 3 IP 3 가
 가 , 가 .
 ,
 , 가
 가 .



7- 10. CISCO 3

, 7- 10 TiPHON .
 TiPHON VoIP ,
 ,
 . All IP , H.323
 , IP , , ,
 ,



7- 11. TiPHON

8

, ,

, ,

, 1999 IMT - 2000 가 .

, 3GPP 3GPP2 가 OHG

, .

3GPP DS 3GPP2 MC ,

GSM- MAP ANSI- 41 , 4가

, DS- GSM , MC- ANSI41

DS- ANSI41가 가 .

.

, .

. 2

, 2.5 , 3

가 ,

MAC .

, IMT - 2000 All IP .

가 IP ,

IP ,

가 IP 가

, ,

, ,

, , 가 ,

, 가

.

| | |
|-----------|---|
| AIN | Advanced Intelligent Network |
| AMPS | Advanced Mobile Phone Service |
| ANSI | American National Standards Institute |
| BNF | Backus-Naur Form |
| BS | Base Station |
| BSC | Base Station Controller |
| BSS | Base Station System |
| CAMEL | Customized Applications for Mobile Network Enhanced Logic |
| CDMA | Code Division Multiple Access |
| CN | Core Network |
| CS1 | Capability Set- 1 |
| CAMEL | Customized Applications for Mobile network Enhanced Logic |
| DECT | Digital Enhanced Cordless Telecommunications |
| DHCP | Dynamic Host Configuration Protocol |
| FE | Functional Entity |
| FPLMTS | Future Public Land Mobile Telecommunication Systems |
| GK | Gatekeeper |
| GII | Global Information Infrastructure |
| GGSN | Serving GPRS Support Node |
| GSM | Global System for Mobile communications |
| GW | Gateway |
| GTSI | Group TETRA Subscriber Identity |
| HDB | Home DataBase |
| HLR | Home Location Register |
| HPLMN | Home Public Land Mobile Network |
| H/V- PLMN | Home/Visited PLMN |
| IMSI | International Mobile Subscriber Identity |
| IMT- 2000 | International Mobile Telecommunications 2000 |
| IMUI | International Mobile User Identity |
| IN | Intelligent Network |
| INAP | Intelligent Network Application Part |
| IP | Internet Protocol |
| IPCP | IP Control Protocol |
| IS- 41 | Interim Standard 41 |
| ISDN | Integrated Services Digital Network |
| ISUP | ISDN User Part |
| ITSI | Individual TETRA Subscriber Identity |
| IWF | Interworking Function |
| IWMSC | Interworking Mobile Switching Centre |
| LAN | Locale Access Network |
| LAI | Location Area Identifier |

| | |
|--------|--|
| MAP | Mobile Application Part |
| MCU | Multipoint Control Unit |
| MD-BS | Mobile Data Base Station |
| MD-IS | Mobile Data Intermediate System |
| M-ES | Mobile End System |
| MExE | Mobile Station (Application) Execution Environment |
| MGK | Mediation GateKeeper |
| MIN | Mobile Identification Number |
| M-INAP | CAMEL Application Part = INCS-1 Core INAP for CAMEL |
| MS | Mobile Subscriber |
| MSC | Mobile Switching Center |
| MT | Mobile Terminal |
| MTP | Message Transfer Part |
| NAI | Network Access Identifier [24] |
| NAMPS | Narrowband Advanced Mobile Phone Service |
| NNI | Network to Network Interface |
| NPA | Numbering Plan Area (Area Code) used in the North America Dialing Plan |
| NSS | Network Sub System |
| PAMR | Public Access Mobile Radio |
| PCCH | Paging Control Channel |
| PCS | Personal Communications Service (System) |
| PDN | Public Data Network |
| PDP | Packet Data Protocol |
| PLMN | Public Land Mobile Network |
| PMR | Private Mobile Radio |
| PPP | Point to Point Protocol |
| PRA | Primary Rate Access |
| PSTN | Public Switched Telephone Network |
| QoS | Quality of Service |
| RADIUS | Remote Authentication Dial In User Service |
| RAS | Registration, Admission and Status |
| RAN | Radio Access Network |
| RTP | Real-time Transport Protocol |
| SCCP | Signaling Connection and Control Part |
| SCF | Service Control Function |
| SCP | Service Control Point |
| SCN | Switched Circuit Networks |
| SDP | Session Description Protocol |
| SGSN | Serving GPRS Support Node |
| SIM | Subscriber Identification Module |
| SMS | Short Message Service |
| SME | Service Mediation Environment |
| SS | Supplementary Service |
| SS7 | Signaling System number 7 |

| | |
|---------|---|
| SSP | Service Switching Point |
| SwMI | Switching and Management Infrastructure |
| TCAP | Transaction Capabilities Application Part |
| TCP/IP | Transmission Control Protocol / Internet Protocol |
| TDMA | Time Division Multiple Access |
| TD-CDMA | Time Division Code Division Multiple Access |
| TEI | Terminal Equipment Identity |
| TETRA | Terrestrial Trunked Radio |
| TSI | TETRA Subscriber Identity |
| TUP | Telephony User Part |
| UDP | User Datagram Protocol |
| UIM | User Identity Module |
| UMTS | Universal Mobile Telecommunications System |
| UNI | User to Network Interface |
| UPT | Universal Personal Telecommunications |
| UTRAN | UMTS Terrestrial Radio Access Network |
| VHE | Virtual Home Environment |
| VLR | Visitor Location Register |
| VPLMN | Visited Public Land Mobile Network |
| WCDMA | Wideband CDMA |
| WIN | Wireless Intelligent Network |
| VDB | Visitor DataBase |

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