

DECISION OF THE DIRECTOR GENERAL OF POST AND TELECOMMUNICATION

NUMBER : 288/DIRJEN/2004

ON

**TECHNICAL REQUIREMENTS OF NETWORK EQUIPMENT EXCHANGE OF
WIDEBAND CODE DIVISION MULTIPLE ACCESS (WCDMA)-CORE NETWORK**

DIRECTOR GENERAL OF POST AND TELECOMMUNICATION

- Considering:**
- a. that within the framework of implementing the building, supervision, protection and securing the provision of telecommunication tools and equipment of Wideband Code Division Multiple Access (WCDMA)-Core Network;;
 - b. that in view of what is stated in point a above, it is considered necessary to define the technical requirements of Network Equipment Exchange of Wideband Code Division Multiple Access (WCDMA)-Core Network by the issuance of the Decision of the Director General of Post and Telecommunication.

- Bearing in mind:**
1. Law of the Republic of Indonesia Number ,36 Year 1999 on Telecommunication (State Gazette of the Republic of Indonesia Number 154 Year 1999, Supplement to the State Gazette of the Republic of Indonesia Number 3881);
 2. Government Regulation of the Republic of Indonesia Number 52 Year 2000 on Provision of Telecommunication (State Gazette of the Republic of Indonesia Number 107 Year 2000, Supplement to the State Gazette of the Republic of Indonesia Number 3980);
 3. Government Regulation of the Republic of Indonesia Number 53 Year 2000 on Use of Radio Frequency Spectrum and Satellite Orbit (State Gazette of the Republic of Indonesia Number 108 Year 2000, Supplement to the State Gazette of the Republic of Indonesia Number 3981);

In case the English translation gives rise to different interpretation, please refer to the original version in Indonesian language

4. Decision of the Minister of Communication Number KM. 2 Year 2001 on Procedure of Certificate Issuance of the Type of Telecommunication Tools and Equipment;
5. Decision of the Minister of Communication Number KM. 3 Year 2001 on Technical Requirements of Telecommunication Tools and equipment;

DECIDES

- To issue** : **DECISION OF THE DIRECTOR GENERAL OF POST AND TELECOMMUNICATION ON TECHNICAL REQUIREMENTS OF NETWORK EQUIPMENT EXCHANGE OF WIDEBAND CODE DIVISION MULTIPLE ACCESS (WCDMA)-CORE NETWORK**
- FIRST** : Approve the technical requirements of network equipment exchange of WCDMA-Core Network, referred to in the Attachment of this Decision,
:
- SECOND** : Apply the technical requirements of network equipment exchange of WCDMA-Core Network, referred to in the FIRST Dictum, as a guideline in implementing certification and testing of telecommunication tools/equipment;
- THIRD** : Any network equipment of WCDMA-Core Network to be used or traded in the Territory of the Republic of Indonesia shall follow the technical requirements of network equipment exchange of WCDMA-Core Network and obtain certificate from the Director General of Post and Telecommunication;
- FOURTH** : If after the issuance of this Decision it turned out that in the technological development there exists a change in the technical requirements of network equipment exchange of WCDMA-Core Network, this Decision will be reviewed accordingly;
- FIFTH** : This Decision shall come into force on the date of its issuance.

In case the English translation gives rise to different interpretation, please refer to the original version in Indonesian language

Done at: JAKARTA
On : , 2004

DIRECTOR GENERAL OF POST AND TELECOMMUNICATION

Signed

DJAMAHARI SIRAT

Copies of this Decision are sent to:

1. Minister of Communication;
2. Secretary General of the Department of Communication;
3. Inspector General of the Department of Communication;
4. Head of Research and Development of the Department of Communication;
5. Directors within the Directorate General of Post and Telecommunication;
6. Boards of Management of Telecommunication Providers;
7. Heads of Technical Implementation Units (UPT) and Services of Post and Telecommunication;
8. Equipment Industry of Network Exchange of WCDMA-Core Network.

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1. GENERAL DESCRIPTION

1.1 Scope

These technical requirements are technical requirements for equipment of *Core Network of Wideband Code Division Multiple Access (W-CDMA)*.

These technical requirements comprise scope, definition, terms, abbreviations, architecture, and equipment, general requirement, signalling and interface requirement, testing requirement, and reference.

1.2. Definition

Core Network equipment consist of *Domain Circuit Switch (CS)* and *Domain Packet Switch (PS)* and are distinguished in their work mechanism vis-à-vis traffic, A PLMN (Public Land Mobile Network) is only allowed to apply one of the *Domains* or both.

Domain Cs is equipment which refer to the provision of circuit type connection for traffic and their signalling such as : MSC, GMSC, VLR.

Domain PS is equipment which refer to the provision of packet type connection for traffic and their signalling, such as : SGSN and GGSN.

1.3 Terms

1.3.1

Public Land Mobile Network (PLMN)

A business established and is led by a business entity that has a special objective to provide mobile telecommunication service for the society.

1.3.2

Core Network (CN) abd Access Network (AN)

A PLMN is logically divided into infrastructure of *Core Network (CN)* and *Access Network (AN)* as defined in TS 23.101 and TS.110.

Core Network consists of physical units which provide support for *network* feature and telecommunication service. The support provided covers the capability such as management on information of user's location, control of the feature and network service, switching and transmission mechanism for *signalling* and for users that produce information.

Access Network consists of physical units which regulate resources of access

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network and users that provide a mechanism to access *Domain core network*.

1.3.3

Circuit Switch (CS) and Packet Switch (PS) Domains

CN consists of CS and PS *Domain* and are distinguished on their mechanism toward traffic. The two *Domains* may and can have *node* which together with PLMN may only apply one of the *Domains* or both.

1.3.3.1

Circuit Switch Domain

A set of tools which refer to the provision of circuit type connection for traffic and their signalling, such as : MSC, GMSC, VLR.

1.3.3.2

Packet Switch Domain

A set of tools which refer to the provision of packet type connection for traffic and their signalling such as :SGSN and GGSN.

1.3.4

Location Register

A function that keeps information of customers, such as *mobile station* location (cellular telephone) at the time of communicating.

The function of *Location Register* is performed by four entities

- *Home Location Register* (HLR)
- *Visitor Location Register* (VLR)
- *Serving GPRS Support Node* (SGSN)
- *Gateway GPRS Support Node* (GGSN)

1.3.5

Location Area (LA)

A location where MS may move without necessarily informing its whereabouts to VLR. LA may consist of one or a number of *cells*.

1.3.6

Routing Area (RA)

A location where MS may move without necessarily informing its whereabouts to SGSN. RA may consist of one or a number of *cells* and exist in LA.

1.3.7

MSC area

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Part of PLMN which is only handled by an MSC. MSC area may consist of one or a number of LA and BSC *area*.

1.3.8

VLR *area*

Part of PLMN which is only handled by a VLR. VLR *area* may consist of one or a number of MSC *areas*.

1.3.9

SGSN *area*

Part of PLMN which is only handled by an SGSN. SGSN *area* may consist of one or a number of routing *areas* and BSC *areas*.

1.3.10

Home Location Register (HLR)

A *database* that functions of keeping information data at an *area* included in an MSC, HLR also keeps location where customers exist and the kinds of services to which they may have access.

1.3.11

Authentication Centre (AuC)

An equipment that functions and cooperates with HLR to keep *identity key* for each *Mobile Station* in the HLR.

1.3.12

UTRAN

Universal Terrestrial Radio Access Network (UTRAN) is a conceptual term that identifies part of the network comprising RNC_s and Node B_s between I_u and U_u interfaces.

1.3.13

MSISDN

Mobile Subscriber ISDN Number.

1.4 Abbreviations

W-CDMA	: Wideband Code Division Multiple Access
3GPP	: Third Generation Partnership Project
AAL	: ATM Adaptation Layer

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AN	: Access Network
ATM	: Asynchronous Transfer Mode
AuC	: Authentication Centre
BICC	: Bearer Independent Call Control
BSC	: Base Station Controller
BSS	: Base Station System
CN	: Core Network
CS	: Circuit Switched
EIR	: Equipment Identity Register
EMC	: Electromagnetic Compatibility
ETS	: European Telecommunication Standard
ETSI	: European Telecommunication Standards Institute
GGSN	: Gateway GPRS Support Node
GMSC	: Gateway MSC
GPRS	: General Packet Radio Service
GSM	: Global System for Mobile Communications
GT	: Global Title
GTP	: GPRS Tunneling Protocol
HLR	: Home Location Register
ID	: Identifier
IEC	: International Electrotechnical Commission
IETF	: Internet Engineering Task Force
IMSI	: International Mobile Subscriber Identity
IP	: Internet Protocol
ISDN	: Integrated Services Digital Network
ISUP	: ISDN User Part
ITU	: International Telecommunication Union
I_u	: Interconnection point between an RNC and a Core Network
I_{ub}	: Interface between an RNC and a Node B
I_{ur}	: A logical interface between two RNC
LA	: Location Area
LMSI	: Local Mobile Station Identity
MAP	: Mobile Application Protocol
MGW	: Media Gateway
MS	: Mobile Station
MSC	: Mobile Switching Centre
MSISDN	: Mobile Subscriber ISDN Number
MSRN	: Mobile Station Roaming Number
NMS	: Network Management Subsystem
PDN	: Public Data Network

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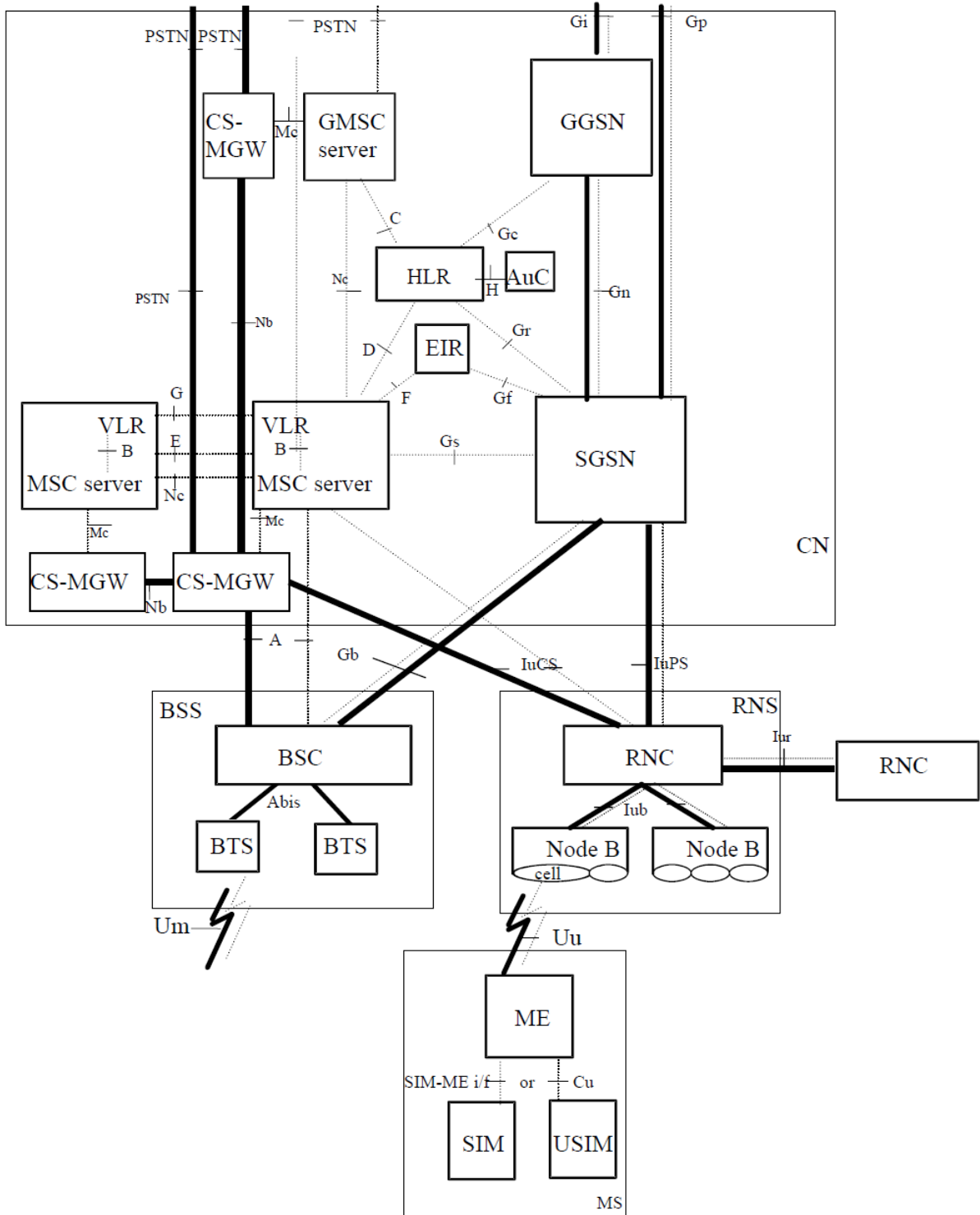
PDP	: Packet Data Protocol
PLMN	: Public Land Mobile Network
PS	: Packet Switched
PSTN	: Public Switched Telephone Network
RA	: Routing Area
RNC	: Radio Network Controller
RNS	: Radio Network Subsystem
RTP	: Real time Protocol
SCCP	: Signalling Connection Control Part
SGSN	: Serving GPRS Support Node
SS7	: Signalling System No. 7
TMSI	: Temporary Mobile Subscriber Identity
TS	: Technical Specification
TUP	: Telephone User Part (SS7)
UDP	: User Datagram Protocol
UTRAN	: Universal Terrestrial Radio Access Network
VLR	: Visitor Location <i>Register</i>

1.5 Architecture and Equipment

1.5.1 Basic Architecture

Basic configuration in general is for W-CDMA network system that provides CS, PS, and interconnection to PSTN/ISDN and PDN as seen in the following figure. The aforementioned configuration shows signal interface and customers' traffic existing in a system. Its implementation may vary, a number of special functions might be united in an equipment. Some interfaces may be in the form of *internal* interfaces.

Ecplana



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Explanation:

- Thick line : interface supporting *user traffic*
 Thin line : interface supporting *signalling*
 NOTE 1 : The figure shows direct interconnection between units.
 The existing links may also be provided by the based network
 (example: SS7 or IP). Need for further study.
 NOTE 2 : When MSC and SGSN are integrated in a single physical unit,
 this unit is called UMTS MSC (UMSC).
 NOTE 3 : A (G)MSC server and the combined CS-MGW may be
 Implemented as a *single node*: (G)MSC.
 NOTE 4 : Gn Interface (between two SGSNs) is also part of architecture
 reference, but does not show only the prescribed *lay out*.

Figure 1: Basic Configuration of PLMN that supports services and CS and PS interfaces.

1.5.2 General Equipment of Core Network

1.5.2.1 Home Location Register (HLR)

This equipment functions as *database* which is responsible for *mobile* customers. PLMN may consist of one or a number of HLR, depending on the capacity of the *equipment* and *design network*.

Some information kept in HLR are as follows :

- Information of customers
- Some information on locations for the purpose of *charging* and *routing* of customers' conversation (example: MSRN, number of VLR, number of MSC, identities of customers)
- Some information on locations for the purpose of *charging* and *routing* of messages in SGSN (example: number of SGSN)
- IMSI
- MSISDN
- PDP address
- Information on Teleservice and *bearer service* of customers
- *Service restrictions* (example: *roaming limitation*)
- List of ID group for *voice group* and *broadcast callinfo*
- GGSN for the purpose of *dynamic allocation* of PDP address

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1.5.2.2 Visitor Location Register (VLR)

This equipment is responsible for one or a number of MSC areas. VLR is *database* comprising information needed for *call setup or call received*.

VLR consists of :

- *International Mobile Subscriber Identity (IMS)*;
- *Mobile Station International ISDN number (MSISDN)*;
- *Mobile Station Roaming Number (MSRN)*, vide TS 23.003 for *Allocation Principles*;
- *Temporary Mobile Station Identity (TMSI)*, when needed;
- *Local Mobile Station Identity (LMS)*, when used;
- *location area where MS is registered*;
- *the end location and the beginning location of MS*.

VLR also consists of parameter of *supplementary service* of MS and received from HLR. Customers' data are regulated by TS 23.008.

1.5.2.3 Authentication Centre (AuC)

This equipment functions and cooperates with HLR and keeps *identity key* for each MS kept at HLR.

Identity key is used to produce :

- *data used to prove International Mobile Subscriber Identity (IMSI)*;
- *cipher communication over the radio path between MS and network*.

1.5.3 The equipment of CS Domain

1.5.3.1 Mobile-services Switching Centre (MSC)

MSC is a connector between *radio system* and *PSTN networks*. MSC carries out all the functions necessary to conduct CS service to and from MS.

MSC forms an *exchange* that carries out all the functions of *switching* and signalling for MS.

At least MSC may conduct the following procedures:

- *procedure for location registration (TS 23.012)*;
- *procedure for handover (TS 23.009)*.

When needed, MSC may be implemented as two (2) different equipment, *MSC server* that handles the signalling process and *CS-MGW* that carries out all the functions of an MSC.

1.5.3.2 MSC Server

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The main task of *MSC Server* is to handle control functions and mobility control function. *MSC Server* conducts control of *mobile-originated* and *mobile-terminated* at *CS Domain*. *MSC Server* also forms the end of *user-network* signal and interpret it to signalling between the related *networks*.

1.5.3.3 CS-MGW

This equipment is a final termination of PSTN/PLMN toward network where MS exists, and interface toward UTRAN to CN through I_u . CS-MGW may also function as termination for carrier canal of *CS network* and media *stream* for packet *network*. I_u at CS-MGW can also support media conversion, control of media carrier and the process function of traffic (example: *codec, echo canceller*).

The functions of CS-MGW are :

- to interact with *MSC Server* and *GMSC* for the purpose of *resource control*.
- to control resource for *echo canceller*
- *Codec*.

1.5.3.4 Gateway MSC

This equipment functions as traffic gateway for PLMN to and/or from external network. *GMSC* will interrogate *HLR* and provide *route* to said traffic to the direction of *MSC*. When needed, *GMSC* can be implemented as two (2) different equipment, *GMSC Server* and CS-MGW.

1.5.3.5 Gateway MSC Server

The main task of *GMSC Server* is to handle the control functions and *mobility control* function of *GMSC*.

1.5.3.6 Equipment of PS Domain

GPRS equipment of *Support Node* consists of *GGSN* and *SGSN*. They together become interface between *Access network* and *Data Packet Network*.

1.5.3.7 Serving GPRS Support Node (SGSN)

This equipment functions as location *register* at *GSN* that keeps subscription information and location information needed for data packet communication.

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1.5.3.8 Gateway GPRS Support Node (GGSN)

This equipment functions as location *register* at GSN that keeps customers' data information obtained from HLR and SGSN.

2. GENERAL REQUIREMENTS

2.1 Design and Construction Requirement

The equipment must comply with the design and construction requirement as under:

- a. Parts of the equipment must be made in the form of modules and are arranged strongly, well, neatly, harmoniously, in the form of compact cabinet (IEC 917-2, ETS 300 119)..
- b. The equipment is protected from the possibility of being penetrated by other unwanted materials.
- c. The equipment must be furnished with measuring/maintenance terminals.
- d. The equipment must be furnished with terminals to support the need of operation, maintenance, administration, and measurement (including statistical report therein).
- e. The equipment must be furnished with *grounding* termination.

2.2 Power Supply

- a. The equipment that works with dc power supply, must be able to work at nominal power supply of -48 VDC with span between -40.5 up to 57.0 VDC.
- b. Equipped with reserve power supply system that complies with and passes the test of prevailing equipment specification..
- c. Equipped with protector against excess current condition.

2.3 Environmental Condition

capable of working at :

Room temperature : 5 – 40° C

Relative humidity : 5 – 85%

and in accordance with specification of ETS 300 019-2-3 and *Telcordia Generic Requirement of GR-63-CORE*, zone 4.

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2.4 Alarm

- a. The system must be able to produce *Alarm* for all operational disturbances.
- b. Depending on the situation, the system must have 3 level disturbances, i.e.:
 - Minor
 - Major
 - Critical.
- c. *Alarm* must be in the form of sound and/or lamp indication according to priority of the problem that occurs..
- d. *Alarm* must be able to be sent to *Network Management System (NMS)*.
- e. *Alarm* must be able to be kept in the *Log File*.

2.5 Transmission Interface Requirement

Transmission interface of equipment must comply with the standard as seen in the table below:

Speed	Name	Standard
2 Mbit/s	E 1	ETS 300 420 ITU G.703/G.704
155 Mbit/s	STM-1	ITU 1.432.2 G.703 ITU G.957
10/100 Mbit/s	<i>Ethernet</i>	IEEE 802.3u

2.6 Electromagnetic Compatibility

The equipment must comply with the specification of EMC *Directive* 89/336/EEC and has been tested in accordance with ETSI EN 300 386.

2.7 Technical Document

The equipment must be furnished with a guide of usage and a guide of specification both for the equipment and for the *Software* of the equipment.

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3. SIGNALLING AND INTERFACE REQUIREMENT

3.1 Core Network interface vis-à-vis Access Network

3.1.1 MSC to BSS (A-interface)

Signalling between MSC and BSS (A-interface) refers to technical standard of GSM serial number 08.

3.1.2 MSC to RNS (I_u_CS-interface)

Signalling between MSC and RNS (I_u_CS-interface) refers to technical standard of 3GPP serial number 25.41X.

3.1.3 SGSN to BSS (Gb-interface)

Signalling from SGSN to BSS (Gb-interface) refers to technical standard of GSM serial numbers 08.14, 08.16 and 08.18.

3.1.4 SGSN to RNS (I_u_PS-interface)

Signalling from SGSN to RNS (I_u_PS-interface) refers to technical standard of 3GPP serial number 25.41X.

3.2 Internal Core Network Interface

3.2.1 HLR to MSC Server (C-interface)

Signalling from HLR to MSC Server (C-interface) using *Mobile Application Protocol* (MAP) and refers to technical standard of 3GPP serial number 29.002 and 23.078.

3.2.2 HLR to VRL (D-interface)

Signalling from HLR to VLR (D-interface) using *Mobile Application Protocol* (MAP) and refers to technical standard of 3GPP serial number 29.002 and 23.078.

3.2.3 Inter MSC Server (E-interface)

Signalling inter MSC Servers (E-interface) using *Mobile Application Protocol* (MAP) and refers to technical standard of 3GPP serial number 23.009 and 29.0002.

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3.2.4 Inter VLR (G-interface)

Signalling inter VLRs (G-interface) using *Mobile Application Protocol* (MAP) and refers to technical standard of 3GPP serial number 29.002.

3.2.5 GMSC to CS-MGW (Mc-interface)

Signalling from GMSC to CS-MGW (Mc-interface) refers to standard H.248, as work basis at ITU-T SG 16 in cooperation with IETF MEGACO WG.

3.2.6 MSC Server to GMSC server (Nc-interface)

Signalling from MSC Server to GMSC server (Nc-interface) refers to ISUP standard or *Bearer Independent Call Control* (BICC) which is an evolution of ISUP . Refer to 3GPP R'00 architecture, various kinds of *transport* media alternatives for this signalling must be able to be done including IP.

3.2.7 Inter CS-MGW (Nb-interface)

This signalling *transport* system may be in the form of RTP/UDP/IP or AAL2.

3.2.8 SGSN to HLR (Gr-interface)

Signalling from SGSN to HLR (Gr-interface) using *Mobile Application Protocol* (MAP) and refers to technical standard of 3GPP serial number 29.002.

3.2.9 SGSN to GGSN (Gn-interface and Gp-interface)

Signalling from SGSN to GGSN (Gn-interface) using UDP, UDP/IP and refers to technical standard of 3GPP serial number 29.060.

3.2.10 GGSN to HLR (Gc-interface)

There exist two alternatives for this signalling:

- If using SS7 at GGSN, *Signalling* from GGSN to HLR (Gc-interface) using *Mobile Application Protocol* (MAP) and refers to technical standard of 3GPP serial number 29.002.
- If not using SS7 at GGSN, other GSN in one PMLN, conversion protocol of GTP to MAP may be used.

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3.2.11 MSC/VLR to SGSN (Gs-interface)

Signalling from MSC/VLR to SGSN (Gs-interface) using SCCP (without TCAP), SCCP *Global Title* (GT) is used as address and refers to technical standard of 3GPP serial number 29.016 and 29.018.

3.3 Interface to External Network

3.3.1 PSTN to MSC

Signalling from PSTN to MSC using SS7 *User Parts* TUP and ISUP.

4. TESTING REQUIREMENTS

4.1 Method of Sampling

Sampling of test materials is done at random.

4.2 Test Method

The testing method is determined by a testing institution which must be capable of showing in a qualitative and quantitative manner that measurement on the test materials is done in accordance with the test procedure and requirements of this standard..

4.3 Conditions for Passing the Test

Testing results are declared to PASS THE TEST, if all the tested materials comply with the provision referred to in these technical requirements.

4.4 Conditions for Safety and Health

W-CDMA equipment must be reengineered in such a way that users are protected from electrical and electromagnetic disturbances.

4.5 Condition for Marking

Every equipment shall be marked, containing name of the manufacturer, manufacturing country, brand/type, and serial number, and comply with certification provision.

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4.6 Method of Packaging

The size of packaging depends on its manufacturer, but elements of safety, aesthetics, and space efficiency must be taken into account.

Done at: JAKARTA
On : 2004
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DIRECTOR GENERAL OF POST AND TELECOMMUNICATION

Signed

DJAMHARI SIRAT

5. REFERENCE

3rd Generation Partnership Project Technical Specification, 3GPP Series, Release 4

In case the English translation gives rise to different interpretation, please refer to the original version in Indonesian language