IMT2000
Study of the Management Information Modeling Method in IMT2000

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*   -   ,   **

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,

.   TMN   .

IMT2000   /   3GPP/3GPP2   IMT2000

TMN   .   TMN

, IMT2000

.

TMN   (Management Information)

(OSF)

.   ,   .

,   ,

TMN   .

IMT2000   TMN

"   "   .

TMN   ,   IMT2000

IRP(Integration Reference Point)   .
TMN

.

1.

.

,   IMT2000   /

.   3GPP/3GPP2   IMT2000

TMN(Telecommunication   Management   TMN   .   TMN
Network)[16]   .

TMN   ITU-T M.3000

,   ,   ,   , IMT2000

,   ,

.   ,

(QoS)   3GPP   TIP(Technology Integration

Point)[23]   IRP(Integration   Reference

,   Point)[3]   .   TMN

TMN

IMT2000

.   .

.   "

TMN   (Management   "   ,   ITU-T
Information)   X.700[10]   ODMA
                                                                                TMN
                    (OSF)

                                                  .   ITU-T   X.700[10]
                                                ETR230 TMN   [15]

                            .   ,   .

        .

            ,   .
                                ,   NMF
                                        Ensemble

                    TMN
        .   GDMO[14]
                                                                        .
IMT2000   TMN   TMN
                        "   IMT2000   3
                    "   .
    . 2   TMN   (MIM   :   Management
                            ,   Information Models)   TMN
IMT2000

        IRP(Integration   Reference   Point)   .
                            . 3
GSM   3GPP
                "GSM call and event data for the circuit   .
switched   domain"   [4]   "   "
            TMN   ,   "   "   .
                                                                /
                                            ,
                        .
        , 4   .   .   TMN

2.   [1]
                                                                            .
TMN   (MIM)   TMN
                                :
        ●   .
                            .   . TMN
        ●
                        .   (MO)

                (MO   :   Managed   Object)
                    .   ,   .

TMN   TMN

。

：

- ITU-T   M.3020
                (Definition of Management
  Services)[9]   ，   .
- NMF   Ensemble
                          (Definition of   ，
  Management Functions)
- ITU-T   G.851-1   ： CMIP   ，
                (ODP)   -
              [18]   .

                              .

                    :

-

        （ ）
-

                                                                    .

OSI   ，
        (configuration   management),
        (fault   management),
        (performance   management),
        (security   management)
        (accounting   management)

                              .

                                                  . ［   2-1］

，

                                                          [9].

                              .   **(2) Describe TMN management services task**
                                                      TMN

，   .

，   TMN
        ，   ，

                              .   **(3) Describe TMN management context task**

                                            ，
                                                .   (relationships)

，   .

，   **(4) Perform information modelling task**

                                  .

2.1   M.3020 TMN Interface Definition
Methodology   (generic   and
                                                technology-specific)
        TMN   ITU-T
        M.3020[9]   .   .

2.1.1 Definition Process
(1) Tasks, information and relationships
                          ITU-T   M.3020
                TMN
                              .
                                          (
)
- TMN
- TMN   (context)
-
-
-
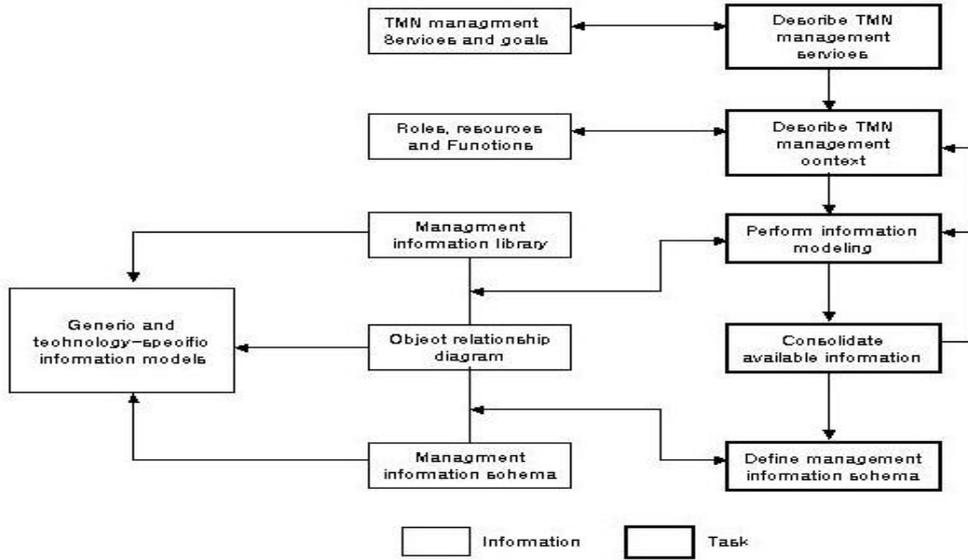
2- 1 TMN interface specification process and information

(5) Consolidate available information task

.

.   .

.   .

(6) Define management information schema task   (product

descriptor)   .

.   ,   ,

(containment   naming)

.   TMN   .

.   .   ,

.

2.2 Ensemble – Specification Framework   (CMIP, SNMP   )

"   (Ensemble)   " NMF(Network   .

Management   Forum)   (ensemble

structure)   4   ,

.

TMN   ● Introduction :

TMN   ,   ,

.   ● Management context :

NMF   "   (solution set)"

.   NMF   (   )

．
[1].

● Information model : ，

．

．

． TMN ITU-T M.3010[16]

．

．

ITU-T

X.701[11]

． TMN

． Manager Agent

● Conformance requirements : ．

， ， MOCS ．

(proforma) CMIS

．

(template) NMF ．

"The Ensemble Concepts and Format" **(2) Resources**

． ，

．

2.2.1 Management context

(1) Management view and level of abstraction (descriptions)

TMN

LLA(Logical Layered Architecture) ITU-

TM.3010 OSI ITU-T ，

X.701 ( )

． TMN LLA ．

．

．

Ensemble network management layer

configuration management ， ，

	Fault	Configuration	Accounting	Performance	Security	Other (note)
Business Management						
Service Management						
Network Management		✓				
Element Management						
Note : A new function area is defined is defined where the existing function areas are inappropriate						

1 Identification of general Ensemble management view and level of abstraction

.

(TMN
LLA ITU-T M.3010[16] Element
Management Layer)
, logs record,
(event forwarding discriminators)
.

(3) Functions

ITU-T M.3020
3 .

- (MSs : Management
Services)
- (MFSs : Management
Function Sets)
- (MFs : Management
Functions)

. MF ITU-T
X.710[17] CMIS
. MF
, (attribute), (operation),
(action) (notification)
.

MS, MFS, MF
name/identifier, description, inter-relationship

.

.

, ,
.

2.2.2 Information model

ITU-T X.722
GDMO .

2.2.3 Scenarios

,
(management context)

.

,

.

(description) .
manager agent
(ITU-T X.701) CMIS

request/response (primitive) (ITU-
T X.710) ,
(function) .

[2-
2] .

TMN

ITU-T G.851-1 (ODP)
- .

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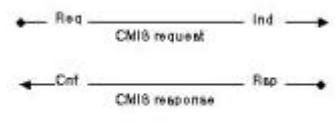
**2-2 General format for message flow
diagram**

2.3 IMT2000
- Integration Reference Point (IRP)

OSI "FCAPS" ,
IRP "FCPS"(Fault, Configuration,
Performance, Security management)
. TMF TOM(Telecom
Operation Map)[22] ,
IRP EML-NML(Element Management Layer –
Network Management Layer)
. 3GPP/SA5 ,
EM-NM NE-NM "N-
interface" .

IRP 3 :
- Top-down, Process Driven
: IRP TMF
TOM

.
"one step at a time"
.

- Protocol-independent modelling :
IRP (IRP
)
(IRP solution set)

.

-
: IRP (CMIP,

SNMP,   WBEM   )

.

2.3.1 Integration levels

/

.

-      /   -

.   ,

.

:

● (Screen   Integration)   :

(   )

GUI(Graphic User Interface)   .
GUI
(seamless)   . Screen
integration
.

● (Application
Integration)   :

end-to-end
-
.   ,

3

● High-level generic interface :

.

.

● High-level(technology-independent to the
extent   possible)   interface   :

. Top-down

,

(1)
, (2)

.

.

,   ,
.

IRP   Network Infrastructure
IRPs   .

● Detailed(product-specific) interface :

.

bottom-up

,

.   (element
management)   TMN

.

,

.

2.3.2 Network infrastructure IRPs

, NE

.   Telecom
Network   Infrastructure   IRP

.

IRP   NE
NE,   EM(element   manager),
SNM(Sub-Network Manager)

.

NE   (element
management application)

.

embedded EM(element manager)
.

IRP   [2-3]

(PSA :
Product-Specific   Applications)

,

.

IRP

:

● (FM : Fault Management)
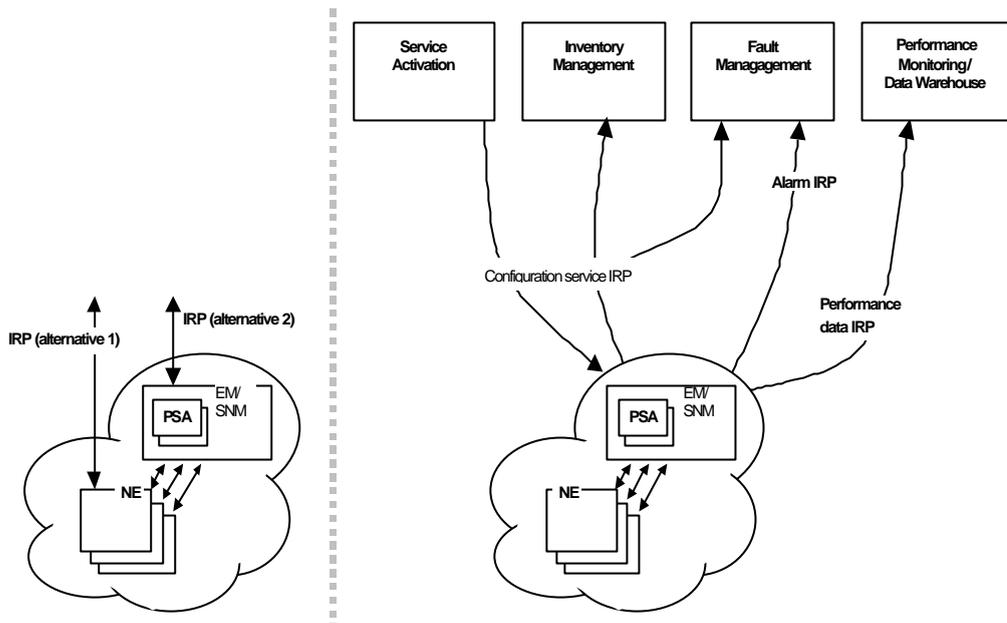
2-3 IRPs for application integration

(notification)

(alarm surveillance)

.   .

NE   "Notification   IRP"   .

FM   ,

"Alarm   IRP"   ,

.

● "Basic Configuration Management IRP"   .

●   ,   "Name   Convention   for
(NE   ).   Managed   Objects"

,

,   .

service activation application   ,

2.3.3 Defining the IRPs

(inventory

management)   ,

.   IRP   IRP   .

(IRP   information   service)   ;

(NRM : Network

Resource   Model)

IRP   .   ,

●   (PM : Performance

Monitoring)   "Performance   Data   .

IRP"   .   ,   IRP   2

● Alarm IRP, Performance Data IRP   . TMF   SMART   TMN

Basic   Configuration   Management   IRP   :

Alarm IRP: Information Service

- *Alarm reporting parameters* consistent with ITU-T M.3100, X.721, X.733, X.736 and ETSI GSM 12.11 standards, and UMTS-specific probable causes (Text)

- *Operations* possible over the Alarm IRP (UML/Text)

IRP Information Service

Protocol independent
Protocol specific

SNMP solution set

- Alarm IRP SNMP (SMIv2) MIB

- IRP operation mapping matrix to SNMP

Corba solution set

- Alarm reporting parameters mapped to OMG Structured Event
- Corba IDL files defining IRP operations

CMIP solution set

- Profile of relevant ITU-T/ ETSI standards

IRP Solution Sets

SNMP

CMIS

CMIP

Corba/IIOP

Application Layer

UDP

TCP

OSI transport protocol

Transport Layer

IP

OSI network protocol

Network Layer

2-4 IRP example

● Information model :

. OMG ●

,

(: CIM) ●

UML(Unified Modelling PLMN

Language) .

● Solution Set : ●

(CORBA/IDL, ●

SNMP/SMI,

NE ,

CMIP/GDMO, COM/IDL) MSC

. . TS

IRP . 22.086[33] TS 22.024[32]

[2-4] IRP AoC(Advise of Charge)

. , MS

.

3. IMT2000 GDMO

, ITU-T M.3010[16] GSM

12.00[38] TMN

3.1

.

MSC(Mobile Services Switching Center), ,

BSS(Base Station System) MSC, BSS

(HLR/VLR) NEF(Network Element Function)

.

: NEF

● OSF(Operation

System   Function)
.

,
NEF
(tariff)   OSF
.

OSF   ,
ADC(Administration   Center)
NE   .
IMT2000 GDMO
(event)
(call   data)   (administration)
[4].   NE

.
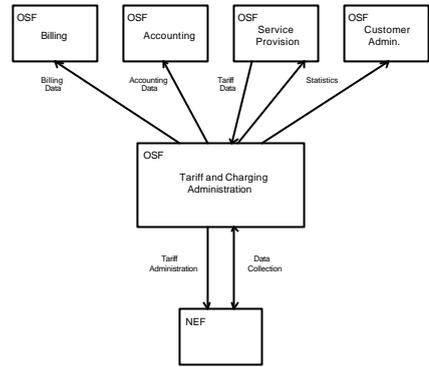
(IMSI : International Mobile
Subscriber   Identity)   (IMEI :
International   Mobile   Equipment   Identity)

(billing)/   (accounting),

.
NE   (tariff)
"Advise of Charge[1]"
.
IMT2000 GDMO

,
(tariff)   administration
"AoC(Advise of Charge)"   .

3.2 TMN management services –
Tariff/charging administration

ITU-T   M.3200[26]   TMN
"Tariff and Charging Administration"
NE

.

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[1] Advise of charge :

.
.
MS   ,
.
AoC service : advise of charge

,

[3-1]   .

3-1 Tariff and charging administration

3.2.1 Service Provision
NE

.

,
(tariff)
AoC   NE   (tariff)
.

3.3 TMN management service component
– Tariff and charging administration

TMN   (TMN-
MSC)   .
● Tariff   Administration   :
(tariffing,   : AoC)
● Data Collection Management :

,
[3-2]
(ITU-T M.3400   ).
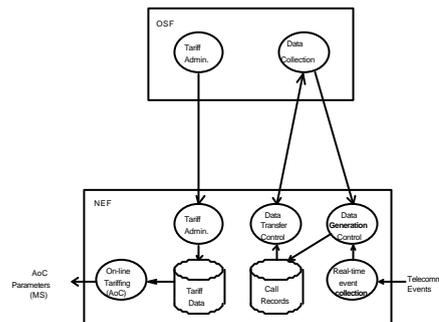
3-2 Management Service Components

Tariff administration
NE(NEF)   (tariff)   OS
     .   .

AoC
                    (tariff)
          MSC   .

3.4 TMN management functions

     (tariff)
                                        :   Tariff administration   Data collection
                                                              TMN
- ●   .
- ●   origin/destination (charging zone)
- ●   ## 3.5 Naming(containment) hierarchy
- ●   (: full/half
  rate radio traffic channel)   Naming(containment)   [3-3]   .
- ●   "managedElement"
           (transparent/non-transparent)   .
- ●   /   (: MOC/MTC)   "managedElement"   "mscFunction"
- ●   (containment)
                                        (tariff administration   GSM 12.00[38]
service)

Note: The objects marked as (*) are defined in GSM 12.00
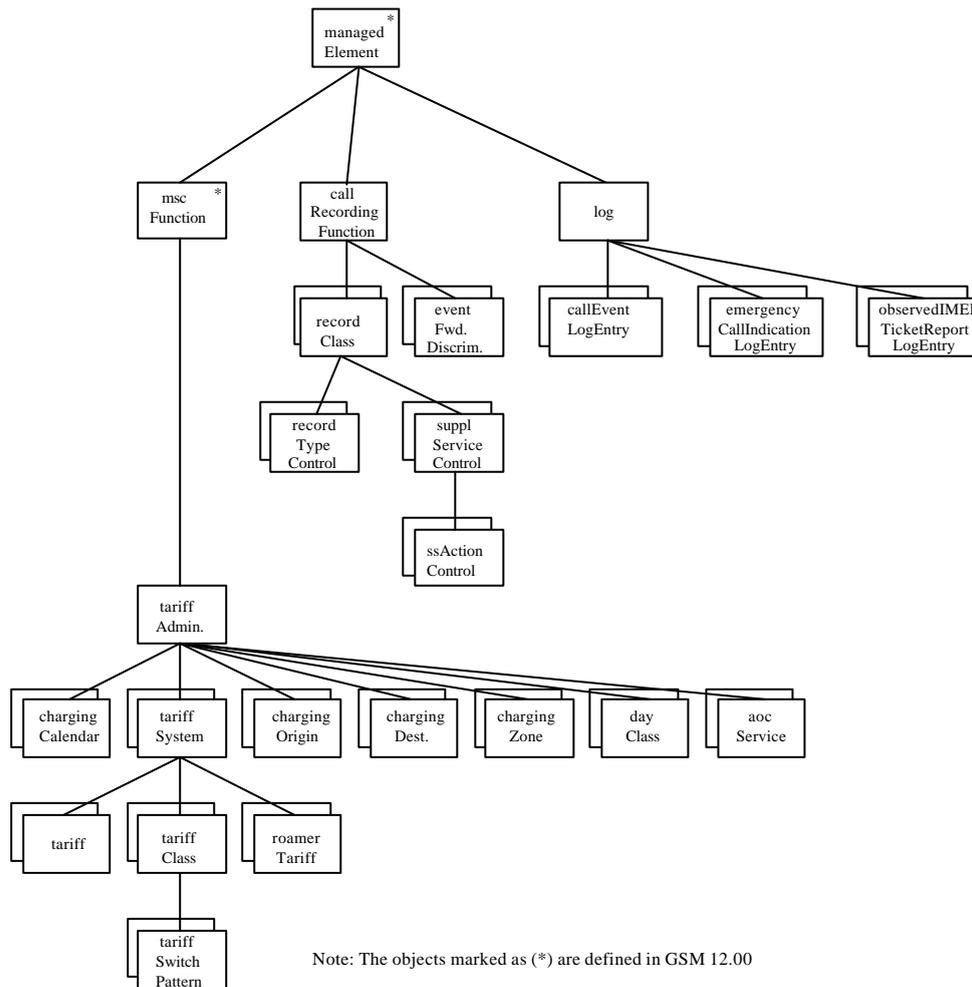
3-3 Naming Tree
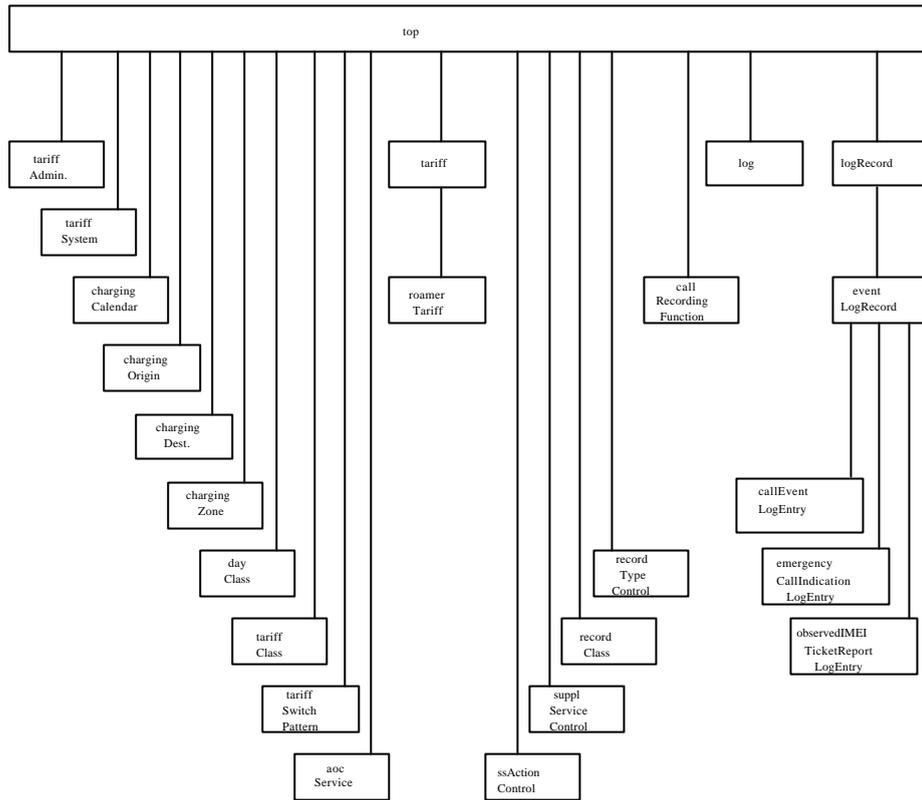
3-4 Inheritance Tree

. Log
ITU-T X.721[13]   .

3GPP/3GPP2   IMT2000
TMN   . TMN

,
IMT2000

3.6 Inheritance

(Inheritance)   [3-4]   .
"mscFunction"
"managedElement"
GSM 12.00[38]   .
,   "log", "logRecord",
"eventLogRecord"
"eventForwardingDiscrimininator"   ITU-T
X.721[13]   .

.

IMT2000

TMN

TMN

,   IMT2000

IRP(Integration Reference Point)
.   GSM   3GPP
"GSM call
and event data for the circuit switched domain"
[4]
TMN

3.7   GDMO

GDMO
managed object classes, attributes, actions,
notifications,   name bindings
.

.

4.

IMT2000   /

5.

[1] ETSI TR 101 648 v1.2.1 "TMN ; Managed Object modeling guidelines".

[2] 3GPP TSG/SA : 3G TS 32.101: "3G Telecom Management principles and high level requirements".

[3] 3GPP TSG/SA : 3G TS 32.102, "3G Telecom Management Architecture"

[4] 3GPP TSG/SA : 3G TS 32.005, "GSM call and event data for the circuit switched domain"

[5] http://www.plasticsoftware.com, Unified Modelling Language

[6] http://www.cs.ucl.ac.uk/research/osimis/describe.htm, OSIMIS

[7] http://www.fokus.gmd.de/minos/sig/damocles.html, DAMOCLES

[8] ITU-T Recommendation M.3100: "Generic Network information Model (1 st revision)".

[9] ITU-T Recommendation M.3020: "TMN interface specification methodology".

[10] ITU-T Recommendation X.700: "Management framework for Open Systems Interconnection (OSI) for ITU-T applications".

[11] ITU-T Recommendation X.701: "Information technology – Open Systems Interconnection – Systems management overview".

[12] ITU-T Recommendation X.720: "Information technology – Open Systems Interconnection – Structure of management information: Management information model".

[13] ITU-T Recommendation X.721: "Information technology – Open Systems Interconnection – Structure of management information: Definition of management information".

[14] ITU-T Recommendation X.722: "Information technology – Open Systems Interconnection – Structure of Management Information: Guidelines for the definition of managed objects".

[15] ETR 230: "Network Aspects (NA); Telecommunications Management Network (TMN); TMN standardisation overview".

[16] ITU-T Recommendation M.3010: "Principles for a Telecommunications management network".

[17] ITU-T Recommendation X.710: Information technology – Open Systems Interconnection – Common Management Information Service

[18] ITU-T Recommendation G.851-1: "Management of the transport network – Application of the RM-ODP framework".

[19] ITU-T Recommendation Q.811 (1993): "Lower layer protocol profiles for the Q3 interface".

[20] ITU-T Recommendation X.200 (1994): "Information technology – Open Systems Interconnection – Basic reference model: The basic model".

[21] ITU-T Recommendation M.3400 : "TMN management functions".

[22] TMF GB910. Smart TMN Telecom Operations Map (Release 1.1).

[23] TMF GB909. Smart TMN Technology Integration Map (Issue 1.1).

[24] ITU-T D.93 (1988): " Charging & Accounting in the international land mobile telephone service provided via cellular radio systems".

[25] ITU-T E.164 (1988): " Numbering Plan for the ISDN Era".

[26] ITU-T M.3200: " TMN Management Services: Overview".

[27] ITU-T X.730 (ISO/IEC 10164-1): "Information technology - Open Systems Interconnection - Systems Management: Object Management Function".

[28] ITU-T X.731 (ISO/IEC 10164-2): "Information technology - Open Systems Interconnection - Systems Management: State Management Function".

[29] ITU-T X.733: "Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function".

[30] ITU-T X.734 (ISO/IEC 10164-5): "Information technology - Open Systems Interconnection - Systems Management: Event Report Management Function".

[31] ITU-T X.735 (ISO/IEC 10164-6): "Information technology - Open Systems Interconnection - Systems Management: Log Control Function".

[32] TS 22.024: "Description of Charge Advice Information (CAI)".

[33] TS 22.086: "Advice of charge (AoC) supplementary services - Stage 1".

[34] TS 23.003: "Numbering, addressing and identification".

[35] TS 23.040: "Technical realization of the Short Message Service (SMS) Point to Point (PP)".

[36] TS 24.008: "Mobile radio interface layer 3 specification".

[37] TS 29.002: "Mobile Application Part (MAP) specification".

[38] GSM 12.00: "Digital cellular telecommunication system (Phase 2); Objectives and structure of Network Management (NM)".

[39] GSM 12.01: "Digital cellular telecommunication system (Phase 2); Common aspects of GSM Network Management (NM)".

[40] GSM 12.02: "Digital cellular telecommunication system (Phase 2+); Subscriber, Mobile Equipment (ME) and services data administration".

[41] ETS 300 196-1: "Integrated Services Digital Network (ISDN); Generic functional protocol for the support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[42] TS 29.078: "Customised Application for Mobile network Enhanced Logic (CAMEL); CAMEL Application Part (CAP) specification - Phase 2".

NAS LAB.
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