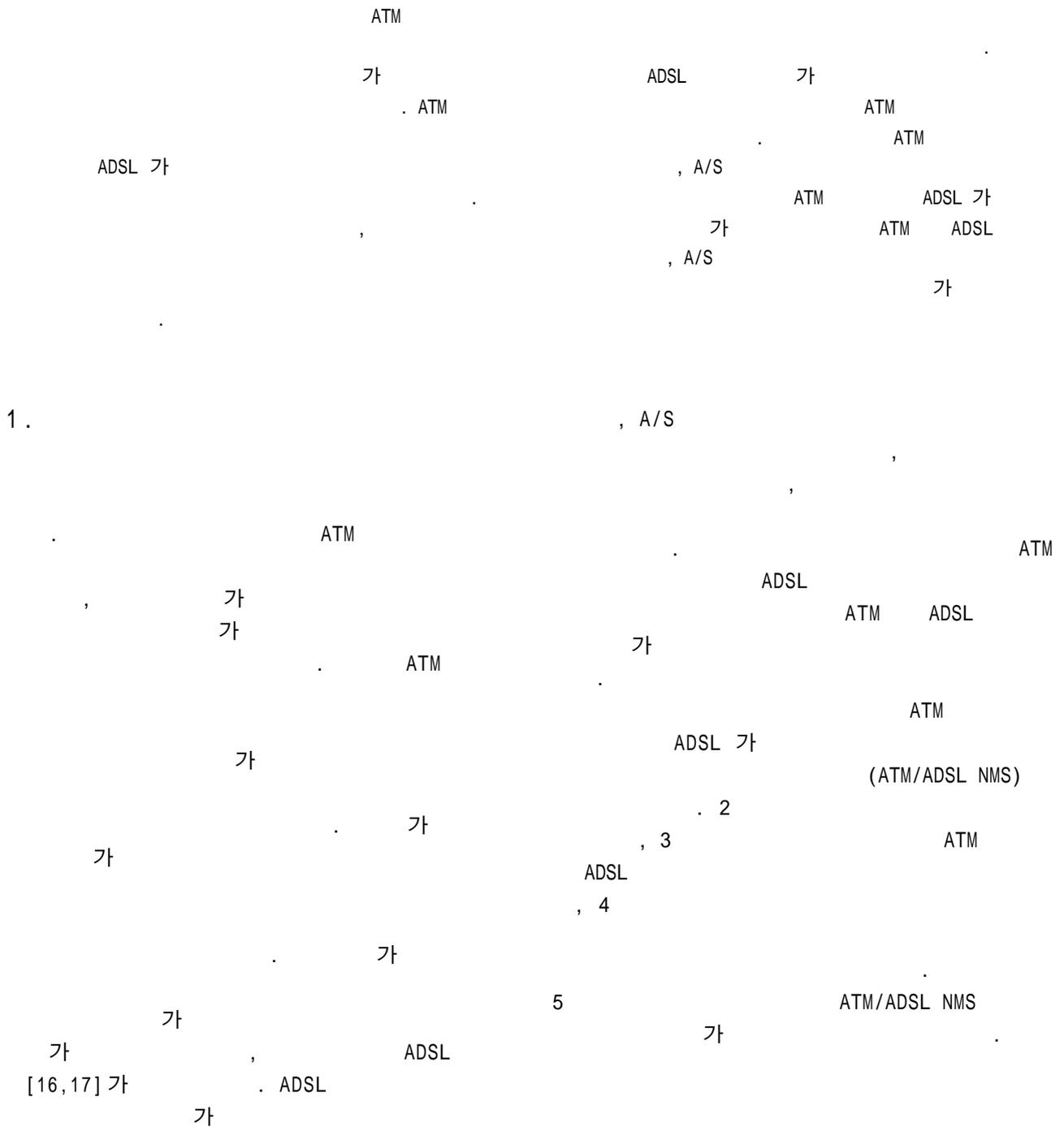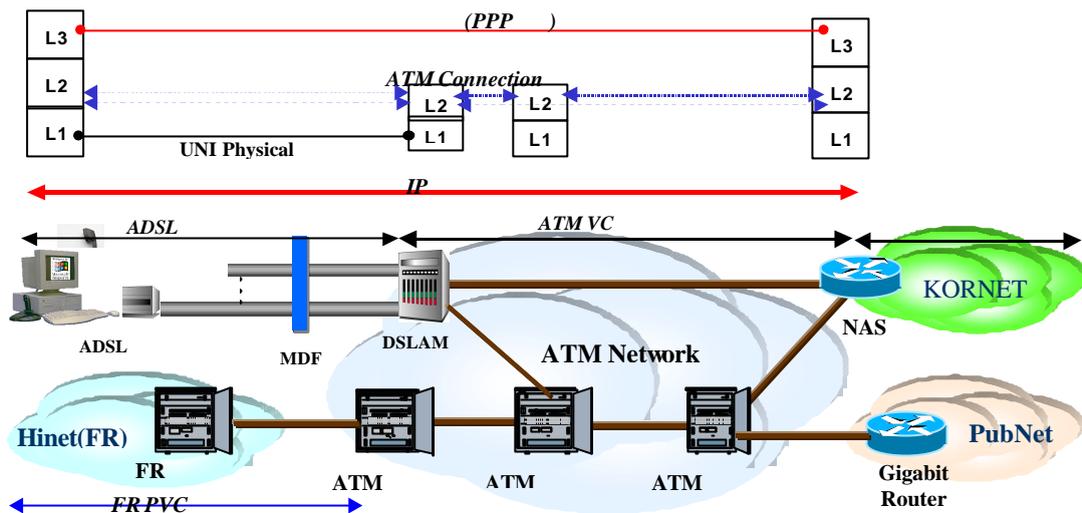# ATM ADSL

(ATM/ADSL Network Management Architecture
in the High Speed Network)

wkhong@kt.co.kr
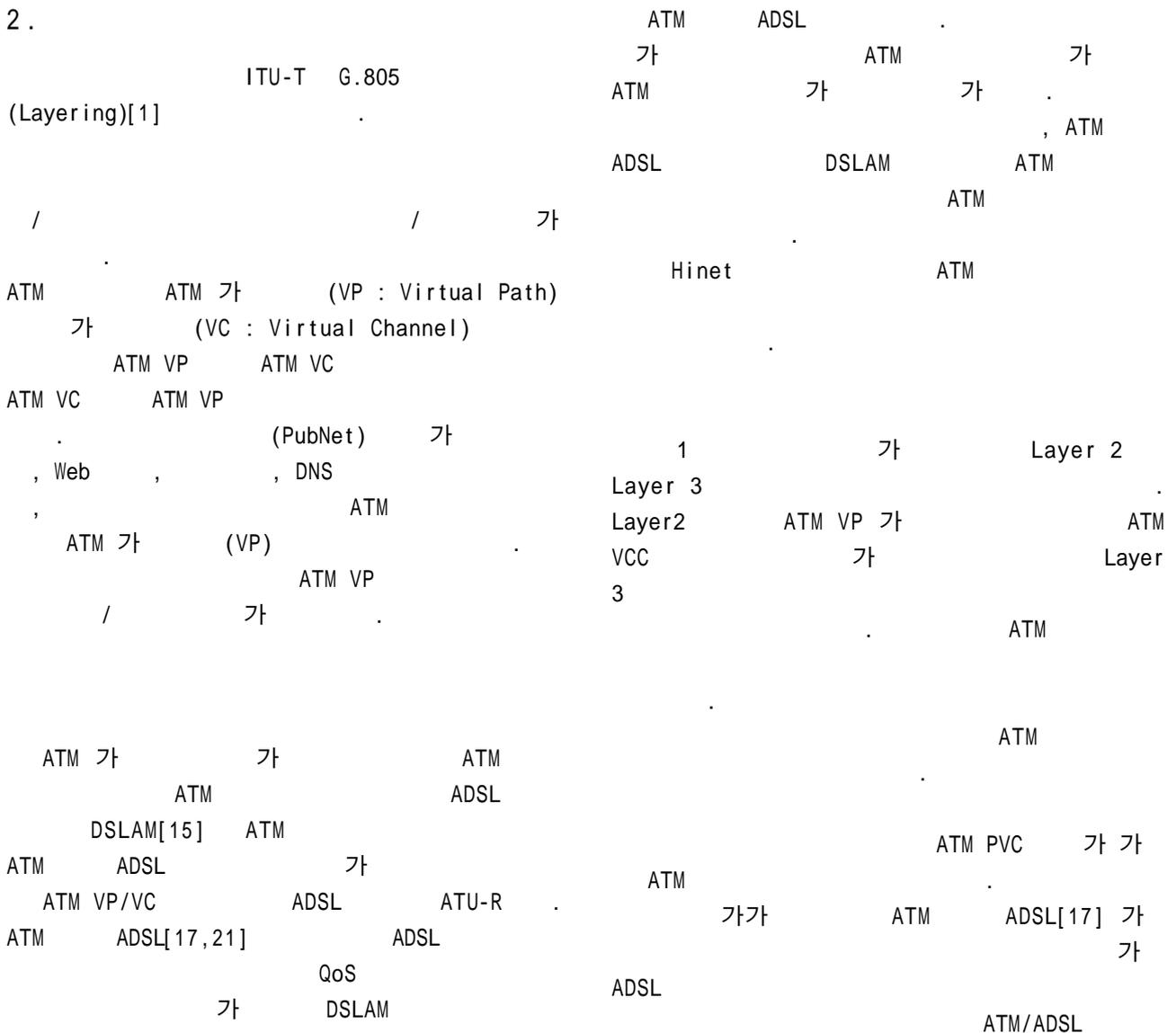
ATM

.

ADSL

. ATM   ATM

.   ATM

ADSL   , A/S

.   ATM   ADSL

,   ATM   ADSL

, A/S

.

1.   , A/S

,

,

.   ATM   .   ATM

ADSL

,   ATM   ADSL

.   ATM   .

ATM

ADSL

(ATM/ADSL NMS)

. 2

.   , 3   ATM

ADSL

, 4

.   .

5   ATM/ADSL NMS

.

,   ADSL

[16, 17]   . ADSL

(그림 1)

2.

ITU-T G.805

(Layering)[1]

/   /

ATM   ATM   (VP : Virtual Path)
              (VC : Virtual Channel)
        ATM VP   ATM VC
ATM VC   ATM VP
     .   (PubNet)
, Web   ,   , DNS
,   ATM
    ATM   (VP)   .
              ATM VP
     /   .

    ATM   ATM
         ATM   ADSL
    DSLAM[15]   ATM
ATM   ADSL
    ATM VP/VC   ADSL   ATU-R   .
ATM   ADSL[17, 21]   ADSL
              QoS
         DSLAM

ATM   ADSL   .
                              ATM
ATM   .
                            , ATM
ADSL   DSLAM   ATM
                              ATM
                                  .
         Hi net   ATM

                              .

         1   Layer 2
Layer 3   .
Layer 2   ATM VP   ATM
VCC   Layer
3
                                  .   ATM

                                  .

                                        ATM
                                      .

                                ATM PVC
                    ATM   .

                                ATM   ADSL[17]
                                ATM/ADSL

.

```
        ┌─────────────────┐
        │  ATM/ADSL NMS   │
        │     (NML)       │
        └─────────────────┘
      CORBA ─ ev      CORBA ─ nv
   ┌──────────┐        ┌──────────────┐
   │ DslamEms │        │   SubNms     │
   │  (EML)   │        │ (NML &EML)   │
   └──────────┘        └──────────────┘
    SNMP ─ ev       CMIP ─ ev    ─ ev    ─ ev
   ┌──────────┐   ┌────────┐ ┌────────┐ ┌────────┐
   │  DSLAM   │   │ AC120  │ │ CANS   │ │ ACE128 │
   │  (NE)    │   │ (NE)   │ │ (NE)   │ │ (NE)   │
   └──────────┘   └────────┘ └────────┘ └────────┘
```

═══*Network View* ──*Element View*

(2)   ATM

ATM

TMN

2   . ATM/ADSL
NMS   NML   SubNms
AC120, CANS, ACE128   ATM
EML
ATM
NML   . DSLAM
ATM
DslamEms   DSLAM[15, 16]
EML   .
ATM/ADSL NMS
.

3. ATM/ADSL NMS

,

.

[2, 3, 4, 5, 6, 7]   .
ATM

.

ATM
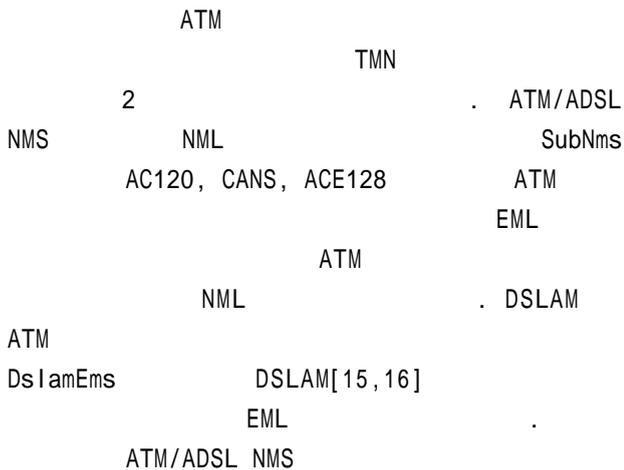
(VP Layer Network : VpLnw)
(VC Layer Network : VcLnw)
/   .
ITU-T G.805   (Partitioning)[1]
. ITU-T G.805

(Administrative Domain)
(Subnetwork : SNW)

[1, 3, 7].
3   VP   4   VC

,   ,   ,   .

3.1

VP/VC

.

▪   *(VpLnw/VcLnw : Layer Network)*   VP/VC

ATM   DSLAM   .
▪   *(Snw)* - VP/VC
VP/VC
VP/VC   .
SubNms   DslamEms
.
▪   *(Node)*   SubNms   DslamEms
ATM   DSLAM   .
▪   *(VpLtp/VcLtp : Link Termination
Point)* -
NNI   .
▪   *(VpLink/VcLink)* -
VcLink   VpTrail
.
▪   *(VpTl /VcTl : Topological Link)* -

VcTl   VpTrail   .
▪   *(VpAccessLtp/VcAccessLtp :
Access Link Termination Point)* - ATM
UNI
.

VP

VpNwttp1   VpTrail1   VpTrail2   VpTrail3   VpSnc3   VpNwttp3

VpNwctp   VpNwctp   VpNwctp   VpNwctp   VpNwctp   VpSnc1   VpSnc2.3   VpSnc3.1   VpSnc3.3   FrNwctp

ATM/ADSL NMS

VP

Node1.1   Node2.2   Node3.2

VpLink   VpLink

Node1.2   Node2.1   Node2.3   VpTl   Node3.1   Node3.3

SNW1   SNW2   SNW3

Node1.3   VpTl   Node2.4   VpLnw   Node3.4

SubNms

DslamEms

△ AdslVpLtp   ⊙ VpLtp   ○ VpAccessLtp   ▣ FrLtp / FrSubPort   ▬ VpTl   ── VpLink

∘ VpNwctp / FrNwctp   ● VpNwttp

（图3）VP 资源视图

VC

VcTrail (ADSL承载)   VcTrail2 (ATM/FR承载)

VcSnc2   FrSnc3

VcSnc1   VcSnc2.1   VcSnc2.2   VcSnc2.3   VcSnc3.1   FrSnc3.3

VcNwctp   VcNwctp   VcNwctp   FrNwctp

ATM/ADSL NMS

VC

Node1.1   Node2.2   Node3.2

VcLink   VcLink

Node1.2   Node2.1   Node2.3   VcTl   Node3.1   Node3.3

SNW1   SNW2   SNW3

Node1.3   VcTl   Node2.4   VcLnw   Node3.4

SubNms

DslamEms

△ VcAccessLtp   ● VcLtp   ▣ FrLtp / FrSubPort   ▬ VcTl   ── VcLink

∘ VcNwctp   ● VcNwttp

（图4）VC 资源视图

▪ *ADSL 上的 VP 链路终端点 (AdslVpLtp)* ：DSLAM 设备上的
ATU-C 端口的一个配置实例。

ADSL 线路 (AdslLine)：ADSL 线路指用户端的
ATU-R 和局端的 DSLAM ATU-C 之间的 ADSL 物理连接，
一条 ADSL 线路对应

▪ *FR 链路终端点 (FrLtp：FR Link Termination Point)*：ATM 交换机上的 FR/ATM

▪ *FR 子端口 (FrSubPort)*：FR
端口是指 Channelized FR
端口上划分出来的一个逻辑子端口。

3.2 网络资源模型

VP/VC

VC

VP   VC/ADSL

VC

.

▪   (VpTrail/VcTraill) - VP/VC

VPC/VCC

VpTrail   VC

VcLink   VcTl   . VpTrail

3

.

-            VpTrail : VP

VP   VpTrail

VpAccessLtp   .   3   VpTrail3

.

- IP   VpTrail : IP

VP

VP

VpAccessLtp   .

3   VpTrail3

,   VpTrail3

VpAccessLtp

.

- VC   VpTrail :

VC

VP   VpLtp   .

3   VpTrail1/VpTrail2

.

VC   VC

3

VcTrail   VcAccessLtp

.   4   VcTrail1

VcAccessLtp   DSLAM   NAS

AcAccessLtp   ADSL

VC   , VcTrail2

FrLtp   ATM/FR

.   VcTrail

ATM   ATM

VcAccessLtp

ATM VCC   .

▪   (VpNwttp / VcNwttp : Network

Trail Termination Point)   VpNwttp/VcNwttp

VpTrail/VcTrail

.

▪   (VpSnc/VcSnc/FrSnc : Subnetwork

Connection) -

ATM

. FrSnc

ATM/FR

.

SubNws/DslamEns   ATM/ADSL NMS

VpTrail/VcTrail

VpSnc/VcSnc/FrSnc

.

▪   (VpNwctp/VcNwctp :

Network Connection Termination Point) -

SubNws/DslamEns

ATM/ADSL NMS

.

▪ FR   (FrNwctp : FR Network

Connection Termination Point)   ATM/FR

FR

SubNws   ATM/ADSL NMS

.

3.3

VP/VC

.

▪   (ActiveEventLog) : ATM/ADSL NMS

SubNws   DslamEns

ATM/ADSL NMS

.

.

▪   (HistoryEventLog)

3   .

▪   (EFD : Event Forwarding

Discriminator)

ATM/ADSL NMS

/   ,

.

3.4

。

■ *(TrafficLoad)*

/ 15

。

■ *(PmLog)* PM OAM VpNwttp,
VpNwctp VcNwttp , UPC
Traffic Load VpNwttp VcNwttp
, TCA VpLtp
VpAccessLtp ,
TCA
。

3.5

ATM/ADSL

ATM/ADSL
NMS
ATM/ADSL NMS

(Identifier) 。
5 。
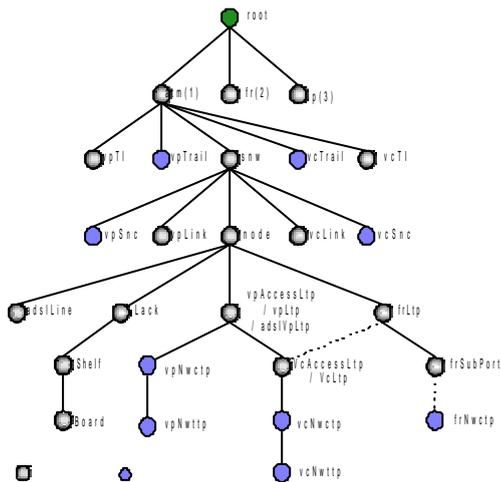
(5)

"。" ,

4. ATM/ADSL NMS

ATM/ADSL NMS

, ,
。

4.1

,

VP VC
。

RCM(Resource Configuration Manager)
. RCM
。

■ VP/VC ,

■

■ VpTl /VcTl
VPI /VCI

■

■

■ ATM/ADSL NMS
DslamEms SubNms

4.2

VP/VC

ATM VP/VC
, *VpCm (VP
Connection Manager)* *VcCm (VC Connection
Manager)*
*VpRim(VP Route Information
Manager)* *VcRim (VC Route Information*
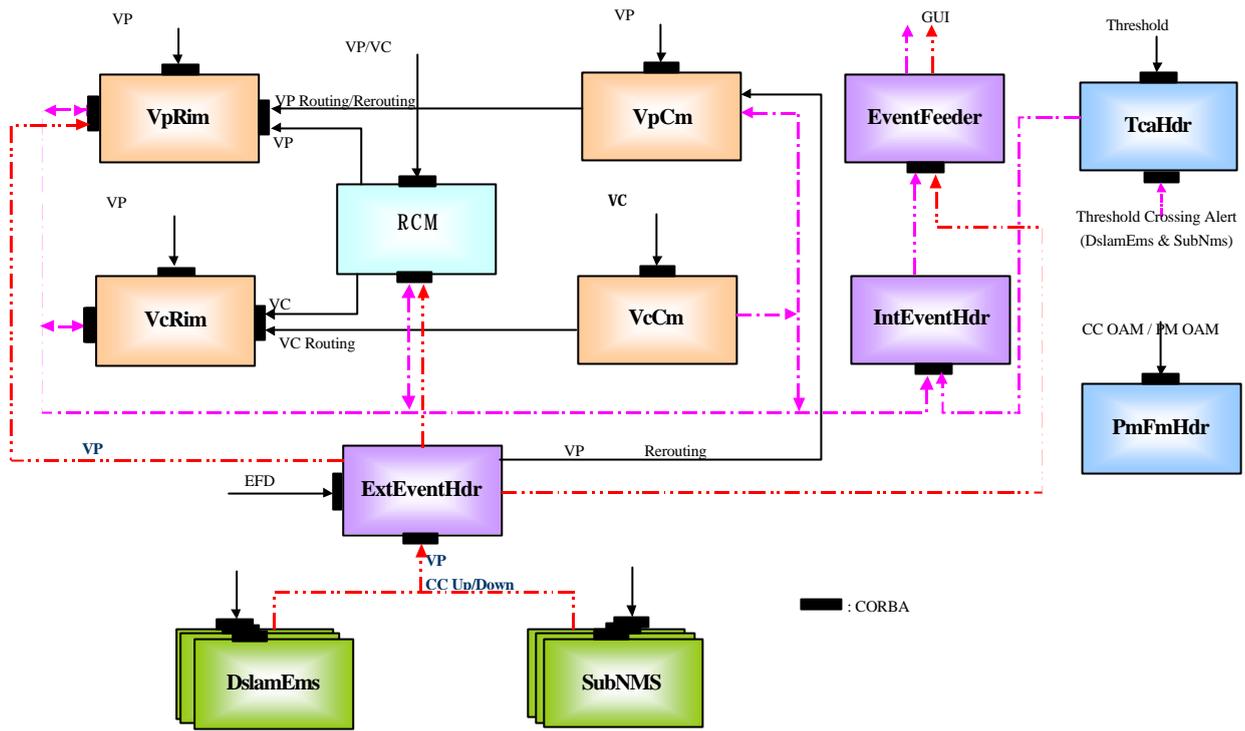
(그림 6) ATM/ADSL NMS

Manager) ■

. ATM/ADSL NMS

.

[12] RCM

■

/ (, E.164)

,

. RIB(Routing Information Base)

VpCm VcCm VpAccessLtp, . RIB
AdslVpLtp, VcAccessLtp, FrLtp, FrSubPort .

E.164 ISRT(In-Service Routing Table)
IRT(Interim Routing Table)

. ISRT

■ , IRT

/

.

. VP/VC

VP/VC

IRT

IRT ISRT

. VpRim VcRim

7 . IRT ISRT

. IRT ISRT . IRT ISRT

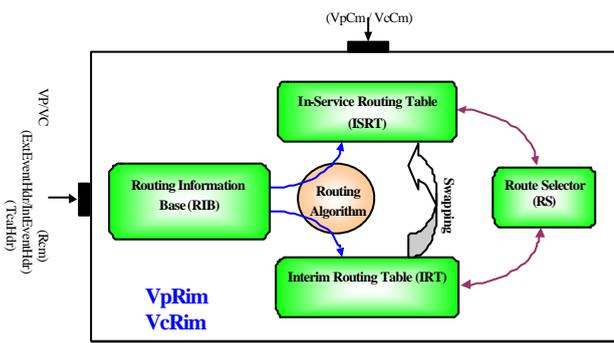.   .   ATM/ADSL NMS
ISRT   .
                    IRT   ▪   (ExtEventHdr : External
                                                           Event Handler)
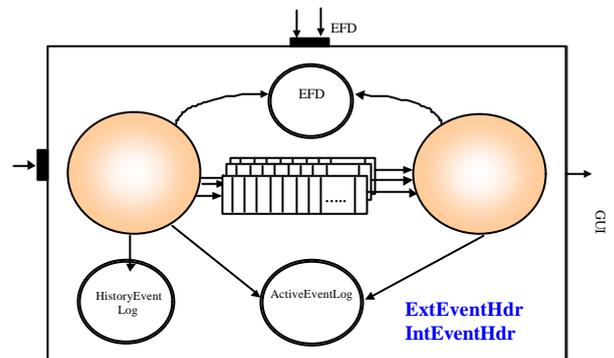   .   2
▪ RS (Route Selector)
                    /
                    CAC   ,   .
                              (,   ,
)   DSLAM   ATM
                    .   ATM/ADSL NMS
        VP   Rerouting   DslamEms   SubNms   ATM/ADSL NMS
    , RS
                                    .   .
                                                           ▪   (IntEventHdr : Internal
                                                           Event Handler)
                                                           DslamEms   SubNms

(7)   (RIM)

                                                                                      ,

▪
                                                                                          .
                    (TcApator)
        (Cross-Connection)

    (AccessLtp, Ltp Adsl VpLtp, FrLtp)
                    (VpSnc, VcSnv, FrSnc)   ,

    (VpTrail/VcTrail)   ,   **(8)**
                                    ATM/ADSL
NMS   VpCm   VcCm   8   .
    ,   DslamEms   EFD
    SubNms   .

4.3   .   EFD

(,

,   ,

)

GUI

(ActiveEventLog)   .
NNI   (VpLtp)   (VpTl/VpLink)
,

VpTrail
VpCm   .

- **(PmFmHdr : PM and FM**
  Handler) -   DslamEms,
      SubNms
                (Reactive Approach)
          (Loop Back),   (Continuity
  Check)   (Proactive
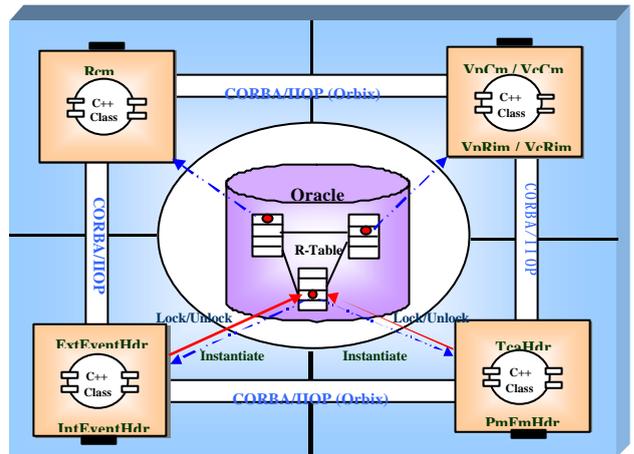 Approach)   .

4.4

- **(PmFmHdr : PM and FM**
  Handler)

                PM OAM   /
                DslamEms, SubNms
                                      /

  VP   (VpTl/VpLink), VP   , VC
                          ,   UNI
  (VpNwttp/VcNwttp)   UPC
        /   .

- **TCA   (TcaHdr : TCA Handler)** TCA

                      DslamEms, SubNms
      TCA
        (IntEventHdr)
                              /
                  .   /

(VpRim/VcRim),

UNI   (VpAccessLtp, AdslVpLtp), NNI
        (VpLtp),   (VpNwttp, VpNwctp,
VcNwttp,   VcNwctp)
(Threshold)   /

        .   DslamEms,
    SubNms

,

4.5

ATM/ADSL NMS
        C++   CORBA
              9   .

(9)

                                              CORBA
  [14]
IONA Orbix 2.3c**[13]**   .

,
          ,   Oracle
    R-   .   C++

            DB

                                                DB

                  .

·

LOCK/UNLOCK ·

ATM/ADSL NMS 500GB SUN
E65000

Tivoli ·

5.

ATM

ATM

· ATM

ADSL DSLAM
ATM

· ATM/ADSL

·

SubNms
ATM/ADSL NMS TMN NML
SubNms CORBA/SNMP[10, 11]
CORBA/CMIP[10, 11]

·

,

·

CORBA
(One Way Interface)

·

[   ]

[1] ITU-T, Generic Functional Architecture Of Transport Networks, Recommendation G.805, November 1995.

[2] ITU-T, Generic Network Information Model, Recommendation M.3100, July 1995.

[3] TINA-C, Network Resource Information Model Specification, Document No. NRIM_v2.2_96_10.31, October 1997.

[4] ATMForum, M4 Network-View Interface Requirements and Logical MIB, AF-NM 0058.000, March 1996.

[5] ATMForum, SNMP M4 Network Element View MIB, AF-NM0095.001, July 1998.

[6] ATMForum, CMIP Specification for the M4 Interface, AF-NM0027.000, September 1995.

[7] ATMForum, M4 Interface Requirements and Logical MIB, AF-NM0020.000, October 1994.

[8] TINA-C, Network Resource Architecture, Document No. NRA_v3.0_97_02_10, February 1997.

[9] ISO 7498-4: Information Processing Systems - Open Systems Interconnection - Basic Reference Model - Part 4: Management Framework, Geneva, 1989.

[10] Subrata Mazumdar, "Inter-domain Management - CORBA, OSI, SNMP", (Tutorial), *Proc of IM'97*, San Diego, May 1997.

[11] OpenGroup/NMF, Inter-Domain Management: Specification Translation, Open Group Preliminary Specification, March 1997.

[12] W.K. Hong, D.S. Yun, "Distributed Connection Management Architecture for Optimal VPC Provisioning on Hierarchical Transport Network", *Proc of DSOM 99*, Zurich, October 1999.

[13] IONA Technologies Ltd., Orbix Programming Guide Release 2.0, November 1995.

[14] OMG, CORBAServices: Common Object Service Specification, March 31, 1995.

[15] Hyundai, SpeedXess Element Management System, Document No. BAS_EMS_UM001, September 1999.

[16] ADSLForum, ADSL EMS and NMS Functional

Requirements, Network Management and
Operations Working Group, July 1999.

[17] ADSLForum, ATM over ADSL Recommendation,
WT-021, March 1999.

[18] ADSLForum, DMT Line Code Specific MIC,
TR-014, December 1998.

[19] ADSLForum, Requirements & Reference
Models for ADSL Access Networks: The
"SNAG" Document, TR-010, June 1998.

[20] ADSLForum, ADSL Forum System Reference
Model, TR-001, May 1996.

[21] ADSLForum, ATM over ADSL Recommendations,
TR-002, March 1997.

[22] ADSLForum, ADSL Network Element
Management, TR-005, March 1998.

1987. 2
1989. 2
1993

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