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1. \[1\]

1980 \[1\] Internet Engineering Task Force (IETF) \[1\] Simple Network Management Protocol (SNMP) \[1\] Open System Interconnection (OSI) \[1\] Common Management Information Protocol (CMIP) \[2\]

Internet Engineering Task Force (IETF) \[1\] Simple Network Management Protocol (SNMP) \[1\] Open System Interconnection (OSI) \[1\] Common Management Information Protocol (CMIP) \[2\] Telecommunication Management Network (TMN) [3, 4]

International Telecommunication Union (ITU) \[1\] CMIP \[1\] Telecommunication Management Network (TMN) [3, 4] (interoperability)

International Telecommunication Union (ITU) \[1\] CMIP \[1\] Telecommunication Management Network (TMN) [3, 4] (interoperability)

International Telecommunication Union (ITU) \[1\] CMIP \[1\] Telecommunication Management Network (TMN) [3, 4] (interoperability)

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Internet Engineering Task Force (IETF) \[1\] Simple Network Management Protocol (SNMP) \[1\] Open System Interconnection (OSI) \[1\] Common Management Information Protocol (CMIP) \[2\]

International Telecommunication Union (ITU) \[1\] CMIP \[1\] Telecommunication Management Network (TMN) [3, 4] (interoperability)

International Telecommunication Union (ITU) \[1\] CMIP \[1\] Telecommunication Management Network (TMN) [3, 4] (interoperability)

International Telecommunication Union (ITU) \[1\] CMIP \[1\] Telecommunication Management Network (TMN) [3, 4] (interoperability)
Open Management Group (OMG) [5] and Common Object Request Broker Architecture (CORBA) [6] have been instrumental in the development of these interface specifications. [7], [8] CORBA TMN implementation. [9], [10] OMG(R) (Telecommunication Facilities: TF) and CORBA implementation. [11], [12]. [13], [14], [15], [16]. Joint Inter Domain Management (JIDM) implementation. [10, 11, 12]. [13], [14], [15], [16]. TeleManagement Forum (TMF) Advanced Communications Technologies and Services (ACTS) and CORBA/TMN implementation. [14, 15, 16]. [13], [14], [15], [16]. 

1 Network Management Forum (NMF)
2. 2.1

2.1 2.1

Manager

Config Fault Perform Security Account

Response Event Request

Agent

MIB

Real Managed Resources

1: 1:
### 1: Management Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Detailed Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault Management</td>
<td></td>
</tr>
<tr>
<td>Configuration Management</td>
<td></td>
</tr>
<tr>
<td>Accounting Management</td>
<td></td>
</tr>
<tr>
<td>Performance Management</td>
<td></td>
</tr>
<tr>
<td>Security Management</td>
<td></td>
</tr>
</tbody>
</table>

- Fault Management: Simple Network Management Protocol (SNMP)
- Configuration Management: Internet Management Framework
- Accounting Management: Common Management Information Protocol (CMIP)
- Performance Management: OSI Management Framework

[17]. OSI
2.1.1 インターネット管理フレームワーク


MIB：Structure and Identification of Management Information (SMI)についても記述されています。MIB、SNMP、CMIP、CMIPv2、SNMPv1などの管理情報を扱っています。
2.1.2 OSI Management Framework (OSI Management Framework)

OSI ISO ITU-T X.700 [29] CMIP

CMIP Event Report, Get, Set, Action, Create, Delete, Cancel-Get

Specific management functional areas

Faults management Accounting management Configuration management Performance management Security management

Object management State management Relationship management Alarm reporting

Event-report management Log control Security-alarm reporting Security-audit trail Access control

Accounting meter Workload monitoring Test management Summarization

Systems-management functions

Event report Get Set Action

Create Delete Cancel-Get

CMISE services

2 : OSI Management Functions

Faults management, Accounting management, Configuration management, Performance management, Security management

Object management, State management, Relationship management, Alarm reporting


Accounting meter, Workload monitoring, Test management, Summarization

Systems-management functions

Event report, Get, Set, Action, Create, Delete, Cancel-Get

CMISE services

2 : OSI Management Functions

2.2 Telecommunication Management Network (TMN)

Telecommunication Management Network (TMN) [34] includes TMN, OSI, TCP/IP, and ISO. TMN is described in [35-39]. Open System Interconnection (OSI), CMIP, and SNMP are part of TMN. TMN is discussed in [3].

3: Telecommunication Network

TMN includes TMN, OSI, TCP/IP, and ISO.
2.2.1 TMN Layer

TMN [TMN] is a key component of the network management system. It is essential for the overall management of the network. The TMN layer is responsible for monitoring, controlling, and managing network elements and services. It interfaces with other layers of the protocol stack to provide comprehensive management services.

Diagram:

OSF: Operation System Function
MF: Mediation Function

Layer 4: TMN

Layer 4 of the TMN model encompasses elements such as Service Management, Network Management, and Network Element Management.

Layers 3 and 1 (Business Management Layer) and Layer 2 (Operation System) are also integral to the TMN model.
ÀÓ¹«¸¦ | »ç¾÷°ü¸®°èÃþÀÇ | ÁÖ¿äÇÑ | ¸ñÇ¥´Â | ÀÌÀ±À» | Áõ´ë½ÃÄÑ

±Ã±ØÀûÀ¸·Î | ¼­ºñ½º | Á¦°øÀÚ (Service Provider) | ¼­ºñ½º°ü¸®°èÃþÀÇ | µ¥ | ÀÖ´Ù.

?? (Service Management Layer): °ü¸®ÀÚÀÇ | ¼­ºñ½º°ü¸®ÀÚÀÇ | ¼­ºñ½º°ü¸®ÀÇ | ¼­ºñ½ºÀÚü°ü¸® µîÀ» | ¼öÀÔÀ» ¿Ã¸®´Â | µ¥ | ÀÖ´Ù.

?? (Network Management Layer): °ü¸®ÀÚÀÇ | ¼­ºñ½º°ü¸®ÀÚÀÇ | ¼­ºñ½º°ü¸®ÀÇ | ¼­ºñ½ºÀÚü°ü¸® µîÀ» | ¼öÀÔÀ» ¿Ã¸®´Â | µ¥ | ÀÖ´Ù.

?? (Network Element Management Layer): °ü¸®ÀÚÀÇ | ¼­ºñ½º°ü¸®ÀÚÀÇ | ¼­ºñ½º°ü¸®ÀÇ | ¼­ºñ½ºÀÚü°ü¸® µîÀ» | ¼öÀÔÀ» ¿Ã¸®´Â | µ¥ | ÀÖ´Ù.

2.2.2 TMN

ÀϹÝÀûÀ¸·Î ±¸Á¶ (architecture) ±¸Á¶ (functional architecture), ±¸Á¶ (physical architecture), ±¸Á¶ (information architecture) [3].

2.2.2.1

TMN ±¸Á¶ OSF: Operation System Function), WSF: Work Station Function, MF: Mediation Function, NEM: (Network Element Function), Q
Q Adapter Function (reference point)
2.2.2.2

In this context, TMN can be seen as an integrated system that supports the operation, administration, and maintenance of telecommunications networks.

?? DCN (Data Communication Network) can be seen as OSI's TMN.

?? Within the TMN framework, there are other sub-systems such as (EMS), (NMS), (SMS), and (BMS).

?? In terms of OSI, TMN is an integral part of the higher level.

2.2.2.3

In this context, TMN can be seen as an integrated system that supports the operation, administration, and maintenance of telecommunications networks.

?? DCN (Data Communication Network) can be seen as OSI's TMN.

?? Within the TMN framework, there are other sub-systems such as (EMS), (NMS), (SMS), and (BMS).

?? In terms of OSI, TMN is an integral part of the higher level.

2.2.3 TMN

ITU-T is a standardization body for TMN, which includes the operation, administration, and maintenance of telecommunications networks. TMN can be seen as an integral part of the higher level.

?? DCN (Data Communication Network) can be seen as OSI's TMN.

?? Within the TMN framework, there are other sub-systems such as (EMS), (NMS), (SMS), and (BMS).

?? In terms of OSI, TMN is an integral part of the higher level.

[34]
6: TMN

Overview of TMN Recommendation (M.3000)

TMN IF Spec Methodology (M.3020)

Generic Network Information Model (M.3100)

Catalogue of TMN Mgmt. Information (M.3180)

TMN Mgmt. Services: Overview (M.3200)

TMN Mgmt. Capabilities at F IF (M.3200)

TMN Mgmt. Functions (M.3400)

Prototype Profiles for the Q3 IF (Q.811/Q.812)

Mgmt. of ISDN (M.36xx)

Mgmt. of Transport Networks (G.7xx/G.8xx)

SS No7 Mgmt. (G.75)

Stage 2&3 Description for the Q3 IF (Q.821/Q.822)

X.700
X.701
X.720
X.721
X.722
X.730
X.710
X.711
X.712

?? : TMN ITU-T M.3010 , TMN M.3020 , TMN M.3200 , TMN M.3400 [3].

?? : M.3010 , TMN ITU-T M.3020 [36].

?? : M.3200 , TMN M.3400 [37].

?? : M.3000 , M.3100 , M.3180 , M.32xx , M.3400 , TMN M.3400 [35].

?? : M.3100 , M.3180 [38, 39].

?? : ITU-T
2.3 Common Object Request Broker Architecture (CORBA)

Common Object Request Broker Architecture (CORBA) was developed in 1989 by Object Management Group (OMG) along with Object Management Architecture (OMA) [41].

OMA includes Object Management Common Facilities, Application Objects (Application Objects) and Common Objects Service Specification (COSS), which is the backbone of CORBA. The OMA provides a framework for the development of object-oriented applications.
2.3.1 CORBA

CORBA is an Object Management Architecture, Object Request Broker (ORB) is a distributed component model that provides services for persistence, concurrency, naming, lifecycle, security, printing, mail, ... and more [1].
ORB Core, ORB Core, ORB Core (Object Implementation)

Naming Service

(Dynamic Invocation), (Client Stub), (Interface Repository), ORB (Object Implementation).

IDL: IDL

ORB (Object Implementation).

(Idl Implementation Skeleton), (Object Adaptor), ORB (Object Implementation).

Dynamic Skeleton Interface (DSI)

IDL
2.3.2  Common Object Service Specification

CORBA® Common Object Service Specification (COSS) [42].

?? Life Cycle Service: CORBA® ORB® Naming Context® ...

?? Naming Service: CORBA® ORB® Naming Context®
Naming Context

- Name binding set
- (Name)
- Naming Context
- (Reference)
- (Bound)
- (Resolve)

?? Event Service: CORBA
- (One way)
- Event Service
- Event Channel
- Push
- Pull

?? Properties Service: CORBA
- IDL
- Common Facilities
- OMG
- JIDM

2.3.3 Common Facilities

ORB
COS S
Common Facilities [6]
Common Facilities
Horizental
Common Facilities
Vertical
Common Facilities
JIDM

18
### 2.4 CORBA コーラ TMM および CORBA

インターネット上の TMN の管理は、ITU-T、ITU-T、TMN、OSI および OSI の要素が組み合わされています。TMN、OSI、CMIP、SNMP、CORBA は互いに関連しています。

#### 2：SNMP、CMIP、CORBA

<table>
<thead>
<tr>
<th></th>
<th>IETF SNMP</th>
<th>TMN CMIP</th>
<th>CORBA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SNMP SMI (ITU-T)</td>
<td>GDMO (ITU-T)</td>
<td>IDL (ITU-T)</td>
</tr>
<tr>
<td></td>
<td>Get, GetNext, Set, Trap</td>
<td>M-GET, M-SET, M-ACTION, M-CANCEL-GET, M-CREATE, M-DELETE</td>
<td>Request, Response, CancelRequest, LocateReply, CloseConnection, MessageError</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M.3400</td>
<td></td>
<td>COS Specification</td>
</tr>
<tr>
<td>Scoping Filtering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trap</td>
<td>M-EVENT-REPORT</td>
<td>Event Service</td>
<td></td>
</tr>
</tbody>
</table>

TMN、SNMP、CMIP は互いに関連しています。TMN、Scoping、Filtering は互いに関連しています。
2.4.1 Object Management Group (OMG) TMN CORBA


[43]

9: OMG Object Request Broker(OMG CORBA)

Common Facilities

Managed Objects

Management Applications

Object Request Broker(OMG CORBA)

Application Objects

Managed Facilities

System Management Facilities
Policy Collections Instance Manager Customization

Management Object Interfaces

Telecommunications Management Facilities

User-Interface

JIDM Activities

Management Services

Naming Relationship Event Query Collections Trader Transactions etc.
2.4.1.1 CORBA

OMG [Object Management Group] is a standard for creating a distributed management platform (Gateway) for CORBA. MAF (Management Application Function) of TMN (Telecommunication Management Network) is a standard for CORBA. OMG [Object Management Group] and OMA (Open Management Architecture) are standards.

Management Facilities: X/Open System Management Facilities: JIDM (Java IDL) Telecommunication Management Facilities: TMN (Telecommunication Domain Task Force) are standards.

2.4.1.2 CORBA

OMG [Object Management Group] is a standard for CORBA. CORBA is a standard for creating distributed applications. IDL (Interface Definition Language) is a standard for CORBA. OSI (Open Systems Interconnection) standards, GDMO (Generalized Data Model), IETF (Internet Engineering Task Force) SMI (Simple Management Information) IDL, JIDM (Java IDL), OMA (Open Management Architecture), Translation, Managed Object, Service Object are standards.
2.4.2 Joint Inter-Domain Management (JIDM)

JIDM working group OMG “Interworking between CORBA and TMN System RFP” [8] X/Open TeleManagement Forum (TMF) AND SMI, CMIP CORBA/IDL Specification Translation (ST) Interaction Translation (IT) 1998 11 OMG JIDM OMG CORBA/TMN JIDM (Gateway Approach)

2.4.2.1 Specification Translation

Specification Translation CMIP MIB GDMO, SNMP MIB SMI CORBA Interface Definition Language (IDL) Specification Translation ASN.1, SNMP SMI, CMIP GDMO
2.4.2.1.1 ASN.1→IDL変換

ASN.1はCCITT、ISOの規格を基に作られ、SNMPやCMIPなどのネットワーク管理プロトコルで使用される。ASN.1は、各コンポーネントが特定の名前で表されるように定義されている。

2.4.2.1.2 OSI GDMO→IDL変換

OSI GDMOは、Internet Engineering Task Force (IETF)が定義したプロトコルの一部である。
11 : GDMO to IDL translator

GDMO document

ASN.1 module

GDMO/ASN.1 document

Attribute
Action
Notification
parameters

ASN.1 module

GDMO to IDL translator

Interface types + constants
Primary Interface support for attributes & actions
Interface for support of actions with multiple replies
Interface for the support for notifications
types + constants
types + constants
types + constants

technicalities

2.4.2.1.3 IETF SMI to IDL
SNMP MIB, SMI, IDL (Object Based) in SNMP SMI.idl.

12: SMI IDL

SNMP MIB, IDL, MIB, IDL

SNMP to IDL Compiler

MACROS

SNMP_SMI.idl

SNMP to IDL Compiler

MACROS

SNMP_SMI.idl

SNMP MIB, IDL, MIB, IDL

SNMP to IDL Compiler

MACROS

SNMP_SMI.idl

2.4.2.2 Interaction Translation

Specification Translation (ST) MIB, IDL

JIDM, IT

JIDM, IT

JIDM, IT

JIDM, IT

JIDM, IT
2.4.3 ACTS· PROSPECT  

¿ë¿¡°Ô ´ë¸®ÀÚ¿¡ ´ëÇÑ °ü¸® ±â´É°ú µ¥ÀÌÅÍ Á¦°øÇÑ´Ù . ¿Ä´äÅÍ °´Ã¼°¡ ÇϳªÀÇ °ü¸®´ë»ó¿¡ ´ëÇÑ µ¥ÀÌÅÍ ÂüÁ¶¿Í´ÜÀÏ ¿ÀÆÛ·¹À̼ÇÀ» Á¦°øÇÑ´Ù . ¿øÇÏ´Â ¹Ý¸é , º¹ÇÕ °´Ã¼´Â °´Ã¼ ±×·ì°ú ÀÏ·ÃÀÇ ¿ÀÆÛ·¹À̼ÇÀ» Á¦°øÇÑ´Ù . Áö´ÉÀû °´Ã¼ (Intelligent Objects) . ¿µ¿ªÀ¸·Î OSI ÀÇ °ü¸® Çø´çÇØ °ÔÀÌÆ®¿þÀÌÀÇ ¾Æ´äÅÍ °´Ã¼ ¿¡ Á¢±ÙÀ» Á¦°øÇÑ´Ù .

¿ë¸®ÀÚ¸¦ °ü¸®Çϱâ À§ÇÑ °´Ã¼¸¦ Á¤ÀÇÇÏ¿´´Ú . Common Service ºÍ Ëê·ÌÇÑ °´Ã¼µé¿¡ ´ëÇØ Áö¿ø ±â´ÉÀ» Á¦°øÇÑ´Ù .

¿ë¸®ÀÚ¸¦ MSF ºÍ ACTS ¿¬±¸¿¡¼­ CMIP Àû ¿ë ÇÏ¿© À§¿Í °°Àº ±â´ÉÀ» Á¦°øÇÑ´Ù .

?? EventManager[] Adapter Object[] EventPort [] Event Port [] Event Forwarding Discriminator (EFD) [30] . ¿û ¨û EventManager, LogManager [] QueryManager[] ÅëÇÑ .

?? LogManager[] . ¿û ¨û EventManager, LogManager ÅëÇÑ .

?? QueryManager[] OSI[] . ¿û ¨û EventManager, LogManager, CORBA COSS [42] .

ACTS PROSPECT[] . ¿û ¨û CORBA/TMN ÅëÇÑ .

ACTS PROSPECT[] . ¿û ¨û SMF .

2.4.4 Westphall[] Alarm Surveillance

Westphall et al[] TMN . ¿û ¨û CORBA .

¿û ¨û 14] . TMN Alarm Surveillance .
Current Alarm Summary Control  Management Operation Schedule  ATM Switch . [45]

Management Application

Agent Proxy
Management Operation Schedule  Current Alarm Summary Control

OSI Agent
Management Operation Schedule  Current Alarm Summary Control

14: Westphall  Alarm Surveillance system
3. TMN 与 CORBA 的互操作性

TMN 与 CORBA 的互操作性是 TMN 的一个关键方面。TMN 的网络管理层（Network Management Layer: NML）与其他协议如 SNMP, CMIP 兼容。TMN 可以使用 CORBA[46] 的互操作性（Interoperability）来与其他系统交互。

3.1 互操作性
3.1.1 Naming Addressing

CORBA® ORB® CORBA® ORB® Naming® ORB® CORBA® Naming® TMN® SNMP® (Domain Name: DN)

3.1.2 Scoping Scoping

CORBA® OSI® SNMP® OSI® CORBA® OSI® CORBA® OSI® CORBA® (Containment Relationship: CR)

3.1.3 Scoping Filtering

OSI® CORBA® Scoping OSI® CORBA® Coronavirus Scoping® Inheritance Relationship: IR)

Scoping, Scoping® Filtering, Filtering
3.1.4  "CORBA"  "TMN"  "\(\text{Event Forwarding Discriminator} (\text{EFD})\)"

OSI  "CORBA"  "TMN"  "\(\text{Event Service}\)"

\[\text{TMN} \quad \text{CMIP} \quad \text{SNMP} \quad \text{\(\text{(Trap)}\)} \]

3.1.5  "CORBA"  "TMN"  "\(\text{ITU-T M.3400}\) [35]"  "\(\text{TMN} \quad \text{\(\text{GDMO}\)}\)"  "\(\text{\(\text{TMN} \quad \text{\(\text{CORBA}\)}\)}\)"

\[\text{\(\text{TMN} \quad \text{\(\text{CORBA}\)}\)}\]
Naming, Event [42], CORBA TMN [29]. OMG TMN CORBA TMN CORBA CORBA.

3.2 TMN 15. TMN CORBA ORB.

Gateway proxy CMIP, SNMP proxy CMIP, ORB. CORBA.
Correlation and Data Exchange (CORBA)

Various integration mechanisms are CORBA/SNMP, CORBA/CMIP, and CORBA/Proprietary.

gateway proxy

SMF

Correlator

Management Functions

Management Services

System Management Function

TMN
(Business Management Layer) [36] TMN Management Function. TMN Management Information Repository (MIR)

Java-Based Application. Web browser. Web server


Management Information Repository (MIR), Management Information Tree.

Web server, Web browser, User Interface, Java Application, Web browser.
4. Alarm Surveillance System

Alarm Surveillance System TMN Alarm Surveillance System (Fault Management) [35, 46].

4.1 Alarm Surveillance

16 : TMN management function set group

Alarm Surveillance (Function Set) (Functions)

3 : TMN Alarm Surveillance

<table>
<thead>
<tr>
<th>Function Set</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm Reporting</td>
<td>?? Alarm ?? Alarm ?? Alarm ?? Alarm</td>
</tr>
<tr>
<td></td>
<td>?? Alarm ?? Alarm ?? Alarm ?? Alarm</td>
</tr>
<tr>
<td></td>
<td>?? Alarm ?? Alarm ?? Alarm ?? Alarm</td>
</tr>
<tr>
<td>Log Control</td>
<td>?? Alarm ?? Alarm ?? Alarm ?? Alarm</td>
</tr>
<tr>
<td>Alarm Summary</td>
<td>?? Alarm ?? Alarm ?? Alarm ?? Alarm</td>
</tr>
<tr>
<td>Event Criteria Management</td>
<td>?? Alarm ?? Alarm ?? Alarm (Severity)</td>
</tr>
<tr>
<td>Alarm Indication Management</td>
<td>?? Alarm ?? Alarm ?? Alarm ?? Alarm</td>
</tr>
</tbody>
</table>

36
4.2 Alarm Surveillance

Alarm Surveillance is supported by a variety of modules and interfaces. The following diagram illustrates the architecture of the system:

- **User Interface (Java Applet)**: Provides a graphical interface for users to view and manage alarms.
- **Alarm View**: Interface for viewing alarms.
- **MIB Browser**: Tool for browsing and managing MIB (Management Information Base) information.
- **SMF**
  - **Alarm Monitoring Module**: Monitors alarm states.
  - **Log Control Module**: Controls log operations.
  - **Alarm Reporting Module**: Handles alarm reporting.
- **Event Reporting Management**: Manages event reporting operations.
- **Proxy Coordinator**: Coordinates communication between agents.
- **CORBA/SNMP Gateway**
- **CORBA/CMIP Gateway**
- **ORB (Object Request Broker)**
- **MIR (Management Information Tree)**
- **Common Object Service**

This system supports various communication protocols including SNMP, CMIP, and CMIP(Trap).

**17**: Alarm Surveillance System

User Interface provides access to various modules including Alarm Viewing and Reporting.
Alarm Viewer
MIB Browser

Web Server Java applet code
Java applet code

SMF Alarm Surveillance Event Reporting Management
Event Channel Alarm COSS Event Service
Alarm Event Reporting Log Control Log Control Event Reporting Management
Alarm Alarm Reporting Log Control Event Reporting Management
Alarm Summary Alarm

Proxy Coordinator JIDM Facilities [10].

CORBA/SNMP Gateway Internet CORBA JIDM SNMP Management Facilities [10].

CORBA/CMIP Gateway OSI CORBA JIDM OSI Management Facilities [10].

Management Service SMF Management Functions
4.2.1 User Interface


MIB Browser, (Management Information Tree) CORBA Naming Service, JIDM, Facilities [10].

4.2.2 SMF

Alarm Surveillance, SMF, Alarm Reporting, Event Reporting Management, Alarm Summary, Log Control. 4.2.2.1 Alarm Reporting module

Alarm Reporting, Event Reporting Management.
module AlarmReportingModule {
    interface AlarmReporting {
        AdminState alarm_reporting_state_get();
        void alarm_reporting_state_set();
        void report_alarm(in AlarmRecord alarm);
        short alert_alarm(out AlarmRecord alarm);
    }
};
4.2.2.2 Log Control module


Log Control module: 19 : Log Control Function

Log Control module: 19 : Log Control Function

Event Reporting Management

log

Alarm Info

Alarm History

Alarm Record

logging filter

logging Policy Check

Log Control

?? Alarm (criteria)
module LogControlModule {
    interface LogControl {
        AdminState log_control_state_get ();
        void log_control_state_set ();
        void retrieve_log (in string hostname, out long HOWMANY, out AlarmRecordList alarmlist);
        void logging (in AlarmRecord alarmrecord );
    };

    interface LogFilter {
        boolean set_filter (in AlarmType filter);
        boolean delete_filter (in AlarmType filter);
        boolean check_filter_list (in AlarmType filter);
        void get_current_log_filter_list (out LogFilterList filterlist)
    };
};

4.2.2.3 Event Reporting Management module
Event Reporting Management Function

module EventReportingManagementModule {
    interface EventReportingManagement {
        AdminState event_reporting_management_get ();
        void event_reporting_management_set ();
        void init_ERM ();
    };
}
interface AlarmFilter {
    boolean add_alarm_filter (in AlarmType filter);
    boolean delete_alarm_filter (in AlarmType filter);
    boolean check_alarm_filter_list (in AlarmFilter filter);
    void get_current_alarm_filter_list (out AlarmFilterList filterlist);
};

4.2.2.4 Alarm Summary module


21: Alarm Summary Function
module AlarmSummaryModule {
  interface AlarmSummary {
    void get_alarm_summary (out AlarmRecordList alarmsSummaryList, out long HOWMANY);
    void insert_alarm_summary (in AlarmRecord alarm);
    void delete_alarm_summary (in AlarmRecord alarmRec);
  };
};

4.2.3 Proxy Coordinator module

22: Proxy Coordinator module

Proxy Coordinator module [269] Proxy Agent, Proxy Agent Controller, Proxy Agent Finder, Domain Port, Domain Port Factory, Event Port, Event Port Factory, Event Port Finder.


4.2.4 CORBA/SNMP Gateway module

4.2.5 CORBA/CMIP Gateway module

CORBA/CMIP Gateway module Specification Translation (ST) Interaction Translation (IT) ST CMIP GDMO/ASN.1 CORBA IDL GDMO/ASN.1 CORBA IDL GDMO CMIP Adapter Object Managed Object Factory Managed Object Factory CORBA/CMIP Gateway module Event Port
5. System Management Function

5.1 Alarm Surveillance System

Alarm Surveillance System

Solaris 2.5 

Sun Ultra 1

CORBA C++

ORION CORBA IDL

IONA Orbix 2.3 [47]

Orbix 2.3

IDL

C++

stub

skeleton

C++

5.2 System Management Function

SMF Alarm Reporting module, Log Control module, Event Reporting Management module, Alarm Summary module, SMF module
5.2.1 Alarm Reporting module

Alarm reporting is an integral part of the system. CORBA is used in conjunction with IDL compiler.

```cpp
class AlarmReporting_i:public SMF::AlarmReportingModule
    ::AlarmReportingBOAImpl {
    AdminState AlarmReportingState;
    short IsAlarm;
    AlarmRecord AR;
public:
    AlarmReporting_i();
    ~AlarmReporting_i();
    virtual AdminState alarm_reporting_state_get
        (CORBA::Environment &IT_env);
    virtual void alarm_reporting_state_set
        (AdminState state, CORBA::Environment &IT_env);
    virtual void report_alarm
        (const AlarmRecord& alarm, CORBA::Environment &IT_env);
    virtual CORBA::Short alert_alarm
        (AlarmRecord*& alarm, CORBA::Environment &IT_env);
};
```
5.2.2 Log Control module

Log Control module Log Control Log Filter

class LogControl_i:
    public SMF::LogControlModule::LogControlBOAImpl {
        AdminState LogControlState;
    public:
        LogControl_i();
        ~LogControl_i();
        virtual AdminState log_control_state_get
                           (CORBA::Environment &IT_env);
        virtual void log_control_state_set (AdminState state,
                                             CORBA::Environment &IT_env);
        virtual void retrieve_log
                           (const char * hostname,
                            CORBA::Long& HOWMANY,
                            AlarmRecordList*& alarm,
                            CORBA::Environment &IT_env);
        virtual void logging
                           (const AlarmRecord& alarmrecord,
                            CORBA::Environment &IT_env);
    };

class LogFilter_i: public SMF::LogControlModule::LogFilterBOAImpl {
    LogFilterList LogFilterList[12];
    public:
        LogFilter_i();
        ~LogFilter_i();
        virtual CORBA::Boolean set_filter
                           (const char * filter, CORBA::Environment &IT_env);
        virtual CORBA::Boolean delete_filter
                           (const char * filter, CORBA::Environment &IT_env);
        virtual CORBA::Boolean check_filter_list
                           (const char * filter, CORBA::Environment &IT_env);
        virtual void get_current_log_filter_list
                           (LogFilterList*& filterlist,
                            CORBA::Environment &IT_env);
    };

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5.2.3 Event Reporting Management module

class EventReportingManagement_i
:public SMF::EventReportingManagementModule
:public SMF::EventReportingManagementBOAImpl {
    AdminState EventReportingManagementState;
    CosEventChannelAdmin::EventChannel_var channelVar;
    CosEventChannelAdmin::ConsumerAdmin_var conadminVar;
    CosEventChannelAdmin::ProxyPullSupplier_var proxy_pull_supplier;
    CosEventComm::PullConsumer_var pull_consumer;
public:
    EventReportingManagement_i();
~EventReportingManagement_i();
    virtual AdminState event_reporting_management_get
        (CORBA::Environment &IT_env);
    virtual void event_reporting_management_set
        (AdminState state, CORBA::Environment &IT_env);
    virtual void init_ERM (CORBA::Environment &IT_env);
};

class AlarmFilter_i: public SMF::EventReportingManagementModule
:public SMF::EventReportingManagementBOAImpl {
    AlarmFilterList _AlarmFilterList[12];
public:
    AlarmFilter_i();
~AlarmFilter_i();
    virtual CORBA::Boolean add_alarm_filter
        (const char * filter, CORBA::Environment &IT_env);
    virtual CORBA::Boolean delete_alarm_filter
        (const char * filter, CORBA::Environment &IT_env);
virtual CORBA::Boolean check_alarm_filter_list
   (const char * filter, CORBA::Environment &IT_env);

virtual void get_current_alarm_filter_list
   (AlarmFilterList* & filterlist,
    CORBA::Environment &IT_env
   );

Alarm Filtering

CMIP communicationsAlarm, equipmentAlarm, environmentalAlarm, processingErrorAlarm, qualityOfServiceAlarm,
SNMP coldStart, warmStart, linkDown, linkUp, authenticationFailure, egpNeighborLoss, enterpriseSpecific Alarm.

Event Reporting Management
```c++
    b = proxy_pull_supplier->try_pull(has_event);
} catch ( const CORBA::SystemException& se) {
}

//
if ( has_event == 1 ) {
    // AlarmReporting[] AlarmSummary, LogControl[]
    
}
}
```

5.2.4 Alarm Summary module

class AlarmSummary_i:
    public SMF::AlarmSummaryModule::AlarmSummaryBOAImpl {
        public:
            AlarmSummary_i();
            ~AlarmSummary_i();
            virtual void get_alarm_summary
                (AlarmRecordList*& alarmsummarylist,
                 CORBA::Long& HOWMANY,
                 CORBA::Environment &IT_env);
            virtual void insert_alarm_summary
                (const AlarmRecord& alarm,
                 CORBA::Environment &IT_env);
            virtual void delete_alarm_summary
                (const AlarmRecord& alarmrec,
                 CORBA::Environment &IT_env);
    };

5.3  Proxy Coordinator   Gateway proxy

Proxy Coordinator  Gateway proxy

User Interface
MIB browser

char* host = "tigris"
my_orb = ORB_init(argv, my_ORB_id);
obj = my_orb->resolve_initial_references("JIDM::ProxyAgentFinder");
agent_finder = ProxyAgentFinder::narrow(obj);

a_key.id = "Internet Management";
a_key.kind = " ";
a_criteria[0].name(host);
CORBA::Any any_str_value;
any_str_value <<= "Snmpv1";
a_criteria[0].value(any_str_value);

agent = agent_finder->access_domain (a_key, a_criteria);

finding_key[0].id = "tigris";
finding_key[0].kind = "object interface";

ff = agent->get_domain_factory_finder();
mo = ff->find_factories(finding_key);
object = mo->create("system");

object_ptr = RFC1213_MIB::system::_narrow(object);
cout << "sysName = " " << object_ptr->sysName() " endl;
6. Alarm Surveillance System

Alarm Surveillance System is an integral part of the overall Alarm System. It is primarily responsible for monitoring the network and identifying any abnormal conditions that may affect service quality. The system uses various protocols such as SNMP, CMIP, and CORBA to facilitate communication between different components of the network.

TMN and CORBA play significant roles in the implementation of the Alarm Surveillance System. TMN provides the framework for managing network resources, while CORBA offers a platform for inter-process communication. Together, these technologies enable the system to detect and respond to network anomalies in a timely manner.

Alarm Surveillance System is designed to be scalable and adaptable to the evolving needs of the network. It is supported by Inter ORB Protocol (IIOP) and Java applets, which facilitate seamless integration with other systems. The system is also equipped with SMF (System Management Facility) for monitoring the operational status of various components.

The Alarm Surveillance System is crucial for ensuring the reliability and quality of service. It continuously monitors the network for any signs of malfunction and initiates appropriate actions to restore normal operation. By leveraging advanced technologies such as SNMP, CMIP, and CORBA, the system ensures a high level of network efficiency and availability.
从9.2版SMF至9.3版SMF，TMN至CMIP的转换步骤如下。

1. SNMP至CMIP的转换步骤如下：...


[29] ISO/IEC, CCITT, Information Technology-OSI, OSI Basic Reference Model


