

XML

0, ,

{siwa, mjchoi, jwkhong}@postech.ac.kr

가 , 가 가
가 , 가
가
(Configuration Management System)
XML XML (Xml-based CONFIGuration Management X-CONF)
XML SOAP
가 SOAP

1.

(Configuration Management System)
가 가 SNMP(Simple Network Management Protocol)[1] Management (operation)
(subsystem) SNMP MIB
가 3
XML(Extensible Markup Language)[2]
XML 가 (tag)
가 XML

XML

XML (manager) (agent)

XML

XML

CONF(Xml-based CONFiguration Management System)

W3C (Simple Object Access Protocol)[12]

X-CONF

CONF 3

X-CONF

2

X-CONF

3

4

5

6

2.

XML

XML

IETF Networks

Cisco XML

Juniper

2.1 XML

X-CONF

XML

2.1.1 XML

HTML

W3C XML(Extensible Markup Language)[2]

XML

2.1.2 XSL XSLT

HTML (view) XML

(StyleSheet)가 XSL(XML StyleSheet Language)[4] XML

가 XSLT(XSL Transformations)[5] XML

가 XSL Formatting (transformation)

2.1.3 XMLDB

XMLDB[23] XML

가 XMLDB XML

(parser)[6,7]가 XML XPath[9], XQuery[10], XUpdate[11]

XMLDB XML (collection)

XML (container), XML (document)[24]

2.1.4 SOAP

SOAP(Simple Object Access Protocol)[12] XML

SOAP

- SOAP envelope:
- SOAP encoding rules:
- SOAP RPC: SOAP RPC(Remote Procedure Call)

SOAP XML HTTP (FTP, SMTP)

HTTP RPC CORBA RPC ORB

XML SOAP RPC

가 가 [25].

RPC

2.2

XML

IETF

XML

가

가

1)

2.2.1 IETF XML Configuration

XMLCONF(XML Configuration)

가,

가

2)

XML SOAP, WBEM[29], SyncML[17], JUNOScript[18]

가

XML

3)

가 Internet-Drafts[19, 20, 21]

가

1), 2), 3)

2.2.2 Cisco Configuration Registrar

Cisco Configuration Registrar[22]

Cisco IOS

가

가

CNS(Cisco Networking Services)

가 Configuration

Registrar

HTTP

4)

가

XML

XML

XML

5)

가

2.2.3 Juniper Networks JUNOScript

JUNOScript[18] API(Application Program Interface)

6)

가

Juniper Networks

가, 가,

XML

XML-RPC

JUNOScript

, 가,

가

JUNOScript

JUNOScript

가

(rebooting)

RPC

DTD

7)

DTD

JUNOScript

1),

, DTD

JUNOScript

2), 3)

4), 5), 6), 7)

가

4), 5), 6), 7)

XML

XMLDB

3.

5), 6)

XMLDB

XPath[9]

DB

가

가

가

가

DB

7)
XML

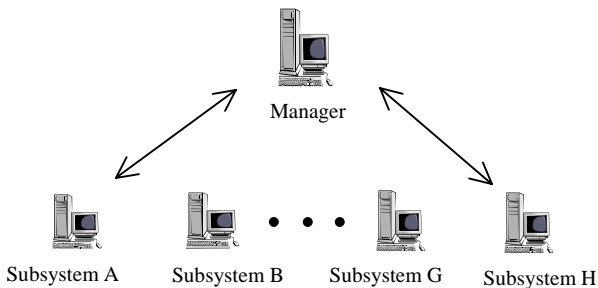
W3C

SOAP

4.

3

XML [26]
DB XMLDB



1. X-CONF

가

X-CONF

1

2

XML

group

'1..∞'

subsys

가

가

subsys

group

가

Configuration

all_info

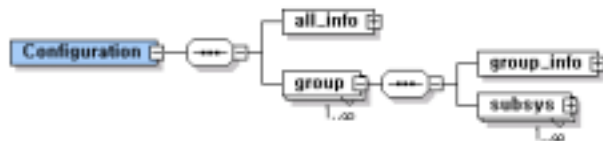
all_info

가

group_info

group_info

subsys



2.

XML

3 XMLDB

XML

가

(a)

(b)

XMLDB

XML

XML

가

SubsysList

group

subsys

가

,

subsys

가

가

가 DB

가

가,

ConfigList

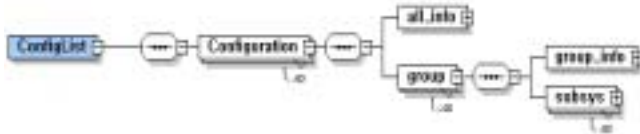
DB

가

가



(a)



(b)

3. XMLDB XML

4

X-CONF

X-

CONF

XMLDB

, XSL/XSLT

, SOAP

, Functions

XMLDB

DB

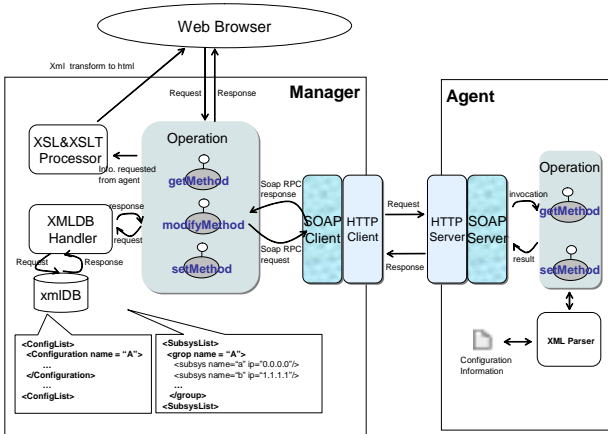
가

XMLDB

XML

XPath, XQuery, XUpdate XML
 가 . XSL/XSLT
 가

XML HTML
 . SOAP
 가 RPC
 .
 가 Functions



4. X-CONF

가 RPC
 SOAP
 Functions , XML
 . Functions

XML
 . XML
 가 XML
 XPath

A
 가
 가 A
 ,
 B, C
 가
 A
 A
 A

5.

X-CONF
 NG-MON[27]
 X-CONF

X-CONF
 800 MB PC OS
 ,
 X-CONF
 XML
 Apache[28]
 Apache
 JAVA
 XML
 API XML (Parser)[6,7] Xerces[14],
 XSLT Xalan[15], XML
 Xindice[24],
 SOAP RPC
 SOAP AXIS[16]
 SOAP
 W3C SOAP
 HTTP FTP, SMTP
 (payload) SOAP
 SOAP
 가 HTTP
 HTTP

X-CONF
 XML
 Apache[28]
 Apache
 JAVA
 API XML (Parser)[6,7] Xerces[14],
 XSLT Xalan[15], XML
 Xindice[24],
 SOAP RPC
 SOAP AXIS[16]
 SOAP
 W3C SOAP
 HTTP FTP, SMTP
 (payload) SOAP
 SOAP
 가 HTTP
 HTTP

Jakarta Apache[29]
 TOMCAT
 SOAP

SOAP
 X-CONF
 5 2
 NG-MON XML

XML
 MON[27]
 141.223.11.1

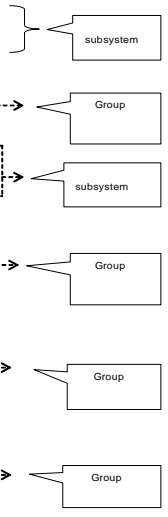
(configuration)
 (ng-mon)
 , IP (141.223.11.1)
 IP 가
 (packetcapture)
 target

가

```

<configuration name="ng-mon" ip="141.223.11.1"
  target="packetcapture">
  <all_info>
    <admin name="mount"
      email="mount@postech.ac.kr" />
    <database user="root" password="pwd" />
  </all_info>
  <group name="packetcapture">
    <group_info>
      <device name="eth1" />
    </group_info>
    <group_info>
      <subsys ip="141.223.11.1" />
      <database user="siwa" passwd="123" />
    </subsys>
    <subsys ip="141.223.11.2" />
    <database user="mjchoi" passwd="aaa" />
  </subsys>
</group>
<group name="flowgenerator">
  <group_info>
    <time interval="2" />
  </group_info>
  <subsys ip="141.223.11.3" />
  <subsys ip="141.223.11.4" />
</group>
<group name="flowstore">
  <group_info>
    <p2p file="p2p.xml" />
  </group_info>
  <subsys ip="141.223.11.5" />
  <subsys ip="141.223.11.6" />
</group>
<group name="trafficanalyzer">
  <group_info>
    <p2p file="p2p.xml" />
  </group_info>
  <subsys ip="141.223.11.7" />
  <subsys ip="141.223.11.8" />
</group>
</configuration>

```



5.

5

group_info
subsys

all_info

가

XML
XSL/XSLT[4, 5]

```

<ConfigList>
  <configuration name="ng-mon"
    ip="141...1" target="packetcapture">....</configuration>
  .....
  <configuration name="ng-mon"
    ip="141...8" target="presenter">....</configuration>
</ConfigList>

```

6. 가

6 가

XMLDB
가
XML
가
DB
가
X-CONF
DB
가
1
2

```

<SubsysList>
  <group name="packetcapture">
    <subsys name="packetcapture1" ip="141..." />
  </group>
  .....
  <group name="flowstore">
    <subsys name="flowstore1" ip="141..." />
    <subsys name="flowstore2" ip="141..." />
  </group>
  .....
</SubsysList>

```

7. 가

7 XMLDB[23] XML
가
subsys ip
name ip
IP , name

XMLDB
가

5.1

4 Java servlet
XMLDB

DB
가,
XML
가
DB
XPath
가
DB
가
IP
가
8
XPath

```

//configuration[@ip="ip"]/subsys[@name="target"]/host/@ip
: host IP
//database/@user | //database/@password
: database password 가
// time/parent::subsys/subsys/@name
: time element

```

8. XPath

XSL/XSLT
(stylesheet)

XML

XML

XML
HTML

XSL

XML
가

가
HTML

XML HTML

가
10 (a)

XSL
XSL

가

SOAP

URL

10 (b)

9 SOAP

SOAP

```

<?xml version="1.0" encoding="UTF-8"?>
<SOAP-ENV:Envelope xmlns:xsd=http://www.w3c.org/...
  xmlns:SOAP-ENV=http://schemas....
  xmlns:x = "http://www.w3c.org/....">
  <SOAP-ENV:Body>
    <ns1:get:ns1=http://soapinterop.org/>
      <arg0 xsi:type="xsd:string">141.223.1.1</arg0>
    </ns1:get>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>

<?xml version="1.0" encoding="UTF-8"?>
<SOAP-ENV:Envelope xmlns:xsd=http://www.w3c.org/...
  xmlns:SOAP-ENV=http://schemas....
  xmlns:x = "http://www.w3c.org/....">
  <SOAP-ENV:Body>
    <ns1:getResponse:ns1=http://soapinterop.org/>
      <result xsi:type="xsd:string">
        <configuration name="ng-mon" ip="141.223.1.1"
          target="packetcaputre">
          .....
        </configuration>
      </result>
    </ns1:getResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>

```

9. SOAP

5.2

SOAP Functions

XML SOAP

AXIS[16] JWS(Java Web Services)

SOAP

Functions

XML

가 XML

XPath

XML

XPath

SAX

DOM

가

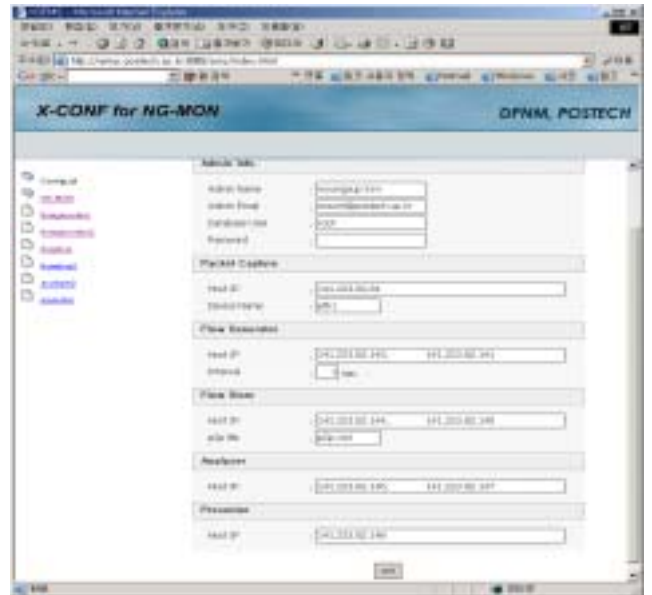
DOM

5.3

X-CONF



(a)



(b)

10.

6.

XML

가

X-CONF

SOAP XML 가 ,
 (consistency) XML
 HTTP
 가 , HTTP
 , SOAP
 HTTP
 , RPC 가 가 가
 SOAP SOAP
 RPC CORBA, RMI 가
 , CORBA ORB
 RMI JAVA
 X-CONF NG-MON
 , NG-MON
 가
 XML
 가
 가

[]

[1] J. Case, M. Fedor, M. Schoffstall, and J. Davin (Eds.), "A Simple Network Management Protocol (SNMP)", RFC 1157, IETF, May 1990.
 [2] W3C, "Extensible Markup Language (XML) 1.0", W3C Recommendation, October 2000.
 [3] W3C, "XML Schema: Part 0,1,2", W3C Recommendation, May 2001.
 [4] W3C, "Extensible Stylesheet Language (XSL) Version 1.0", W3C Recommendation, October 2001.
 [5] W3C, "XSL Transformations (XSLT) Version 1.0", W3C Recommendation, November 1999.
 [6] W3C, "Document Object Model (DOM) Level 2 Core Specification", W3C Recommendation, November 2000.
 [7] W3C, "Document Object Model (DOM) Level 2 Traversal and Ranges Specification", W3C Recommendation, November 2000.

[8] W3C, "Simple API for XML Version 2.0", WC3 Recommendation, November 1999.
 [9] W3C, "XML Path Language (XPath) Version 2.0", W3C Working Draft, April 2002.
 [10] W3C, "XQuery 1.0: An XML Query Language", W3C Working Draft, April 2002.
 [11] XML:DB, "XUpdate", Working Draft, <http://www.xmldb.org/xupdate/xupdate-wd.html>, September 2000.
 [12] W3C, "SOAP Version 1.2", W3C Working Draft, December 2001.
 [13] First Peer, Inc., "XML-RPC for C and C++", <http://xmlrpc-c.sourceforge.net/>.
 [14] Apache XML project, "Xerces Java parser", <http://xml.apache.org/xerces-j/>.
 [15] Aache XML project, "Xalan Java", <http://xml.apache.org/xalan-j/>.
 [16] Aache XML project, "Axis", <http://xml.apache.org/axis/>.
 [17] SyncML Initiative, <http://www.syncml.org/>.
 [18] P. Shafer and R. Enns, "JUNOScript: An XML-based Network Management API", <http://www.ietf.org/internet-drafts/draft-shafer-js-xml-api-00.txt>, August 2002.
 [19] M. Wasserman, "Concepts and Requirements for XML Network Configuration", Internet-Draft, <http://www.ietf.org/internet-drafts/draftwasserman-xmlconf-req-00.txt>, June 2002.
 [20] T. Goddard, "Towards XML Based Management and Configuration", <http://www.ietf.org/internet-drafts/draft-goddard-xmlconf-survey-00.txt>, June 2000.
 [21] S. Hollenbeck, et. al, "Guidelines for the Use of XML within IETF Protocols", <http://www.ietf.org/internet-drafts/draft-hollenbeck-ietf-xmlguidelines-06.txt>, August 2002.
 [22] Cisco Systems, "Cisco Configuration Registrar", http://www.cisco.com/univercd/cc/td/doc/product/rtr mgmt/ie2100/cnfg_reg/index.htm.
 [23] XMLDB Initiative for XML Database, "XMLDB", <http://www.xml.org/>.
 [24] Aache XML project, "Xindice", <http://xml.apache.org/xindice/>.
 [25] IBM Software Group, "Web Services Conceptual Architecture (WSCA1.0)", <http://www.ibm.com/software/solutions/webservices/pdf/WSCA.pdf>.
 [26] W3C, "XML Schema: Part 0,1,2", W3C Recommendation, May 2001.
 [27] Se-Hee Han, Myung-Sup Kim, Hong-Taek Ju and James W. Hong, "The Architecture of NG-MON: A Passive Network Monitoring System", Lecture Notes in Computer Science 2506, Edited by M. Feridun, P. Kropf and G. Babin, 13th IFIP/IEEE International Workshop on Distributed Systems: Operations and Management (DSOM 2002), Montreal, Canada, October, 2002, pp. 16-27.
 [28] Apache Group, "Apache", <http://www.apache.org/>.
 [29] WBEM, "WBEM Initiative", <http://www.dmtf.org/wbem/>.