NEW APPROACHES

OVERVIEW:

SNMP USAGE CAN BE DIFFICULT
• EXAMPLE: CONFIGURATION MANAGEMENT

COPS-PR

NETCONF

WEB-SERVICES
SNMP USAGE CAN BE DIFFICULT

EXAMPLE:

1) SELECT / CREATE INDEX

2) SET RowStatus OBJECT TO createAndWait

3) SET COLUMN FIELDS POSSIBLY INCLUDE IN EVERY SET PDU snmpSerialNo

4) SET RowStatus OBJECT TO active

IN CASE OF ERRORS
RESTORING A PREVIOUS STATE MAY BE DIFFICULT
FUNDAMENTAL PROBLEM

FOR CONFIGURATION MANAGEMENT
FUNDAMENTAL DESIGN CHOICES MAY BE NON-OPTIMAL:

IF EVERYTHING FAILS, MANAGEMENT SHOULD STILL FUNCTION

NO USE OF TCP
• MESSAGES / OBJECTS ARE LIMITED IN SIZE (SCALARS)
  • GRANULARITY LEVEL MAY BE TOO LOW

NO USE OF EXISTING SECURITY MECHANISMS
• SECURITY / KEY MAINTENANCE IS HARD

MULTIPLE MANAGERS MAY OPERATE CONCURRENTLY
• SYNCHRONIZATION MAY BE HARD
NEW APPROACHES

EVOLUTIONARY

IRTF
• NETWORK MANAGEMENT RESEARCH GROUP (NMRG)
  • SNMP OVER TCP
  • EFFICIENT RETRIEVAL OF BULK DATA
  • IMPROVED SMI

IETF
• EVOLUTION OF SNMP (EOS) WG
• SMI NEXT GENERATION (SMIng) WG
• COMMON OPEN POLICY SERVICES PROTOCOL - POLICY PROVISIONING WG

REVOLUTIONARY

IETF
NETWORK CONFIGURATION (NETCONF) WG
• XML BASED

RESEARCH COMMUNITY
• WEB-SERVICES BASED
COPS-PR

COMMON OPEN POLICY SERVICES PROTOCOL - POLICY PROVISIONING

POLICY INFORMATION BASE

STRUCTURE OF POLICY PROVISIONING INFORMATION

SPPI
COPS-PR

- INTENDED FOR CONFIGURATION MANAGEMENT

- TECHNOLOGY COMPARIBLE TO SNMP

- OBJECTS HAVE HIGHER GRANULARITY (TABLE ROWS)

- SINGLE OPERATION TO ADD OR DELETE TABLE ROWS

- RELIABLE COMMUNICATION BETWEEN PDP AND PEP (BECAUSE OF TCP)

- EACH PEP IS CONNECTED TO SINGLE PDP
NETCONF

• INTENDED FOR CONFIGURATION MANAGEMENT

• BASED ON XML TECHNOLOGY

• OPERATES ON DOCUMENTS, INSTEAD OF OBJECTS
  GRANULARITY LEVEL IS THEREFORE HIGH

• DATA MODEL NOT (YET?) DEFINED

• MULTIPLE OPERATIONS ARE DEFINED

• SECURITY IS PROVIDED AT LOWER LAYERS
  USE OF TCP
  USE OF EXISTING SECURITY MECHANISMS
NETCONF LAYERED MODEL

<table>
<thead>
<tr>
<th>LAYERS</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTENT</td>
<td>XML CONFIGURATION DATA</td>
</tr>
<tr>
<td>OPERATIONS</td>
<td>&lt;get-config&gt;, &lt;edit-config&gt;</td>
</tr>
<tr>
<td>RPC</td>
<td>&lt;rpc&gt;, &lt;rpc-reply&gt;</td>
</tr>
<tr>
<td>TRANSPORT</td>
<td>BEEP, SSH, HTTPS</td>
</tr>
</tbody>
</table>

CONFIGURATION DATA:
- COMPLETE SET
  - <RUNNING> CONFIGURATION
  - <STARTUP> CONFIGURATION
  - <CANDIDATE> CONFIGURATION
NETCONF OPERATIONS

- GET-CONFIG (SOURCE, FILTER)
- EDIT-CONFIG(TARGET, OPTIONS, CONFIG)
- COPY-CONFIG(SOURCE, TARGET)
- DELETE-CONFIG(TARGET)
- GET(FILTER)
- VALIDATE(SOURCE)
- LOCK(SOURCE)
- UNLOCK(SOURCE)
- COMMIT(CONFIRMED, CONFIRMED-TIMEOUT)