

NETwork CONFiguration

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- Prior and current IETF activities
- Discussion of practices and requirements

NETCONF pre-history

- 1990: SNMPv1, MIB-1
- 1990-2000:
 - SNMP evolution (SNMPv3 Full Standard in 2003)
 - Proliferation of standard and enterprise MIBs
 - Work on alternative approaches
 - ▷ DTMF/CIM, DEN, WBEM, COPS-PR/PIBs...
- ca. 2000: Perceived disconnect between
 - Network management protocol work in the IETF and
 - Network operators community
- 2001: IETF meets operators
 - NANOG 22, RIPE 40
 - ▷ focus on backbone network operators
 - LISA-XV
 - ▷ focus on campus/enterprise operators

NETCONF pre-history

- June 2002: IAB Network Management Workshop
 - 25 participants (protocol developers and operators)
 - Documented in RFC 3535
- Some observations:
 - SNMP used for monitoring, but not configuration
 - SNMP MIBs lag (years) behind feature implementation
 - SNMP doesn't distinguish config from non-config data
 - Operators use (proprietary) CLI for many tasks
 - In particular those involving configuration(s)
 - Problems with unstable and hard-to-parse CLI

IETF NETCONF Working Group

- Chartered May 2003
 - One outcome of IETF/operator dialog
- Current charter:
 - Standardize a protocol for network configuration
 - ▷ based on XML
- **NOT** in current charter:
 - Information model (schema) for device configurations
- Chairs:
 - Andy Bierman (Cisco, SNMP veteran)
 - Simon Leinen (SWITCH, operator)
- Web page:
 - <http://www.ops.ietf.org/netconf/>

NETCONF WG status

- Will meet for the second time at IETF 58
 - Minneapolis, November
- Four WG drafts:
 - draft-ietf-netconf-prot-00.txt
 - ▷ NETCONF Configuration Protocol
 - draft-ietf-netconf-beep-00.txt
 - ▷ BEEP Application Protocol Mapping for NETCONF
 - draft-ietf-netconf-soap-00.txt
 - ▷ NETCONF Over SOAP
 - draft-ietf-netconf-ssh-00.txt
 - ▷ Using the NETCONF Configuration Protocol over Secure Shell (SSH)
- Design team to work on those

draft-ietf-netconf-prot-00.txt

Concepts

- Configuration datastores
 - running (mandatory)
 - startup
 - named files
- Sessions
 - Provide security association
- Multiple channels per session
 - Management
 - Operations
 - RPC (Remote Procedure Calls)
 - Notifications (opt.)

draft-ietf-netconf-prot-00.txt (cont.)

□ Operations

- <get-config>
- <edit-config>
- <copy-config>
- <delete-config>
- <get-state>
- <kill-session>

<get-config>

```
<rpc message-id="106" xmlns="http://ietf.org/xmlconf/1.0/base">
  <get-config>
    <source><running/></source>
    <config xmlns="http://example.com/schema/1.2/config">
      <users>
        <user>
          <name>fred</name>
        </user>
      </users>
    </config>
    <format>xml</format>
  </get-config></rpc>
```

```
<rpc-reply message-id="106" xmlns="http://ietf.org/xmlconf/1.0/base">
  <config xmlns="http://example.com/schema/1.2/config">
    <users>
      <user>
        <name>fred</name>
        <type>admin</type>
        <full-name>Fred Flintstone</full-name>
      </user>
    </users>
  </config></rpc-reply>
```

<edit-config>

```
<rpc message-id="107" xmlns="http://ietf.org/xmlconf/1.0/base">
  <edit-config>
    <target>
      <running/>
    </target>
    <config xmlns="http://example.com/schema/1.2/config">
      <interface>
        <name>Ethernet0/0</name>
        <mtu>1500</mtu>
      </interface>
    </config>
  </edit-config>
</rpc>
```

```
<rpc-reply message-id="107" xmlns="http://ietf.org/xmlconf/1.0/base">
  <ok/>
</rpc-reply>
```

NETCONF Current Issues

- Choice of substrate (transport/"session") layer
 - SSH - operators like it
 - SOAP - developers like it
 - BEEP - protocol designers (router vendors) like it
 - ...cannot select ONE (mandatory) substrate now.
- Extent of alignment to Web Services protocols
 - SOAP/WSDL
- Granular locking
- Naming within configurations

Further reading

- <http://www.ops.ietf.org/netconf/>
 - Please consider joining the Mailing List!
- NANOG 28 XML-based configuration BOF
 - Rob Enns' presentation has nice examples

A few questions for you...

- Do you configure devices?
- Do you have automated systems to support this?
 - Revision management (e.g. RANCID)
 - Scripts that check configs
 - Scripts that generate (partial) configs
 - Higher-level provisioning tools
- If not, would having those help you?
- If yes, are you happy with them?
- ...