

# NETwork CONFiguration

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

# NETCONF pre-history

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- 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

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- 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

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- 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

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- 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

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## 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.)

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## □ Operations

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

# <get-config>

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```
<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>

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```
<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

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- 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

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- <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...

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- 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?
- ...