Model content Protocol (MCP) for Network Management

https://github.com/Yuanyuan4666/Integration-of-MCP-and-Network-Management-Protocols/tree/main/MCP-Integration-NM

IETF 124 Hackathon Report

on behalf of Champions(Yuanyuan Yang, RuYi Zhang, Guanming Zeng, Lei Qi, Yun Liang)

What problems are we working on?

Traditional network management skills

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AI LLM understanding

= **The Bridge: MCP for network operations**

Natural Language customized Intent Network Management

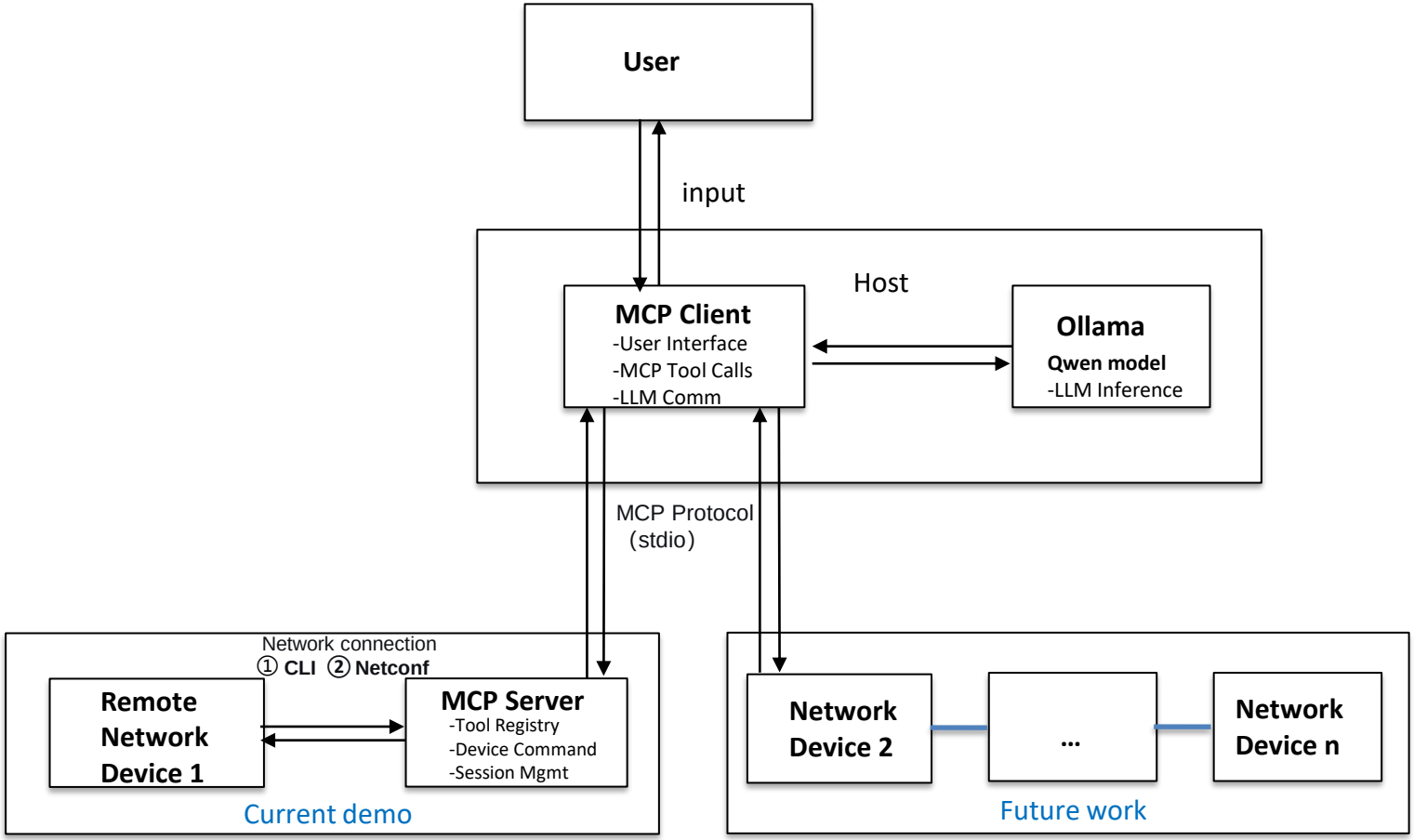
Main draft:draft-yang-nmrg-mcp-nm-01
Related RFC: RFC 6241 NETCONF
Emerging Protocol: Model content Protocol (MCP)

Specific problems to solve

MCP Integration with Network Management

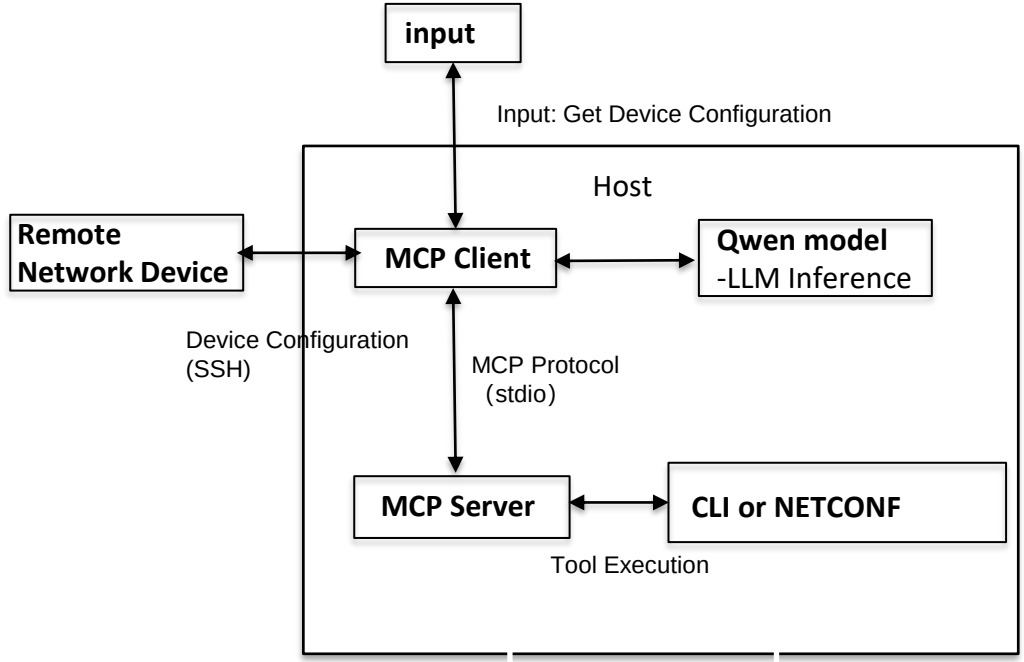
1. MCP tool encapsulation for CLI commands
2. YANG model data exposure via MCP
3. Closed-Loop Execution Workflow

Overall Archietecture



Example： Device Configuration Query

Get device configuration using CLI and Netconf




```
Input: Get current configuration
 "!Software Version..." up to "<HUAWEI>".
</think>

display current-configuration | no-more
!Software Version V800R024C10B505
!Last configuration was updated at 2025-10-31 06:58:12+00:00 by SYSTEM automatically
!Last configuration was saved at 2025-10-31 06:56:23+00:00
#
sysname HUAWEI
#
set neid 10002
#
undo FTP server-source all-interface
undo FTP ipv6 server-source all-interface
#
ntp-service server source-interface all disable
ntp-service ipv6 server source-interface all disable
#
icmp rate-limit disable
#
telnet server-source all-interface
telnet ipv6 server-source all-interface
#
ip dcn vpn-instance __dcn_vpn__
 ipv4-family
#
dhcp server request-packet all-interface disable
#
dhcp relay unnumbered database authentication-mode force-check
#
```

User Input

CLI
Success Response

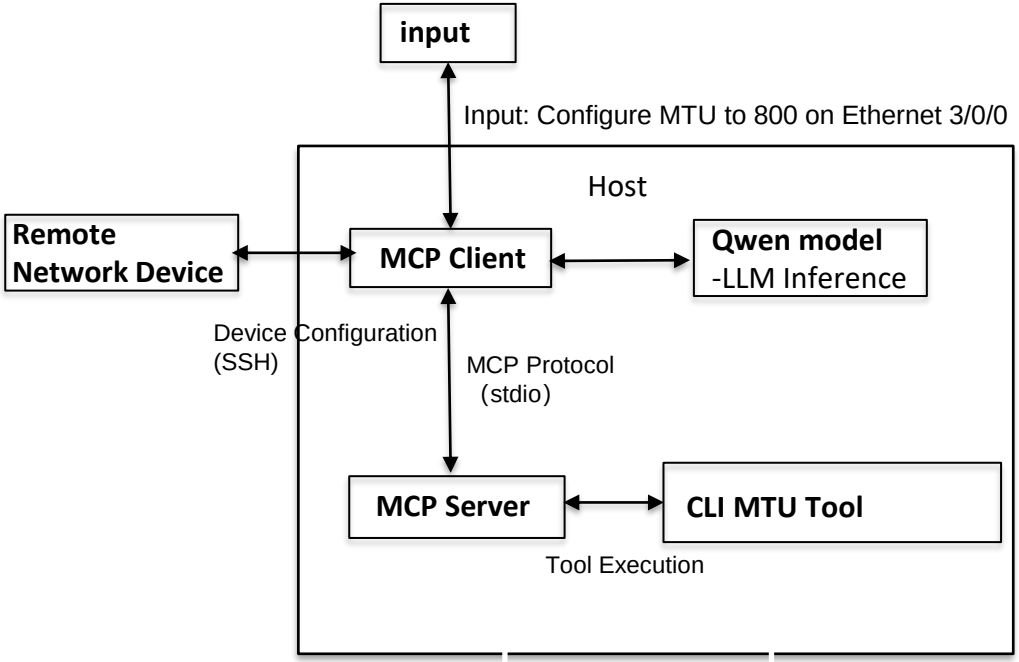
```
Input: Establish NETCONF connection and Retrieve Device Configuration
So the assistant should return this exact JSON as the response. But the user's instruction sa
mplete command execution results to the user". Since the tool response is this JSON, the assi
hould be this JSON in English (but it's already in English).

Wait, the user's instruction says: "Directly return the original command output content". So
tool response as a JSON.

But the previous messages show that the assistant is repeatedly calling the same tool with sl
rguments, but the response is the same. The user might have a misunderstanding, but according
 assistant has to just return the tool's output.

So the correct response here is to output the JSON as is.
</think>

{
  "session_id": "netconf_7.228.80.229",
  "host": "7.228.80.229",
  "capabilities_count": 611,
  "sample_capabilities": [
    "urn:ietf:params:netconf:base:1.0",
    "urn:ietf:params:netconf:base:1.1",
    "urn:ietf:params:netconf:capability:schema-sets:1.0?list=huawei-yang@2.0.0",
    "urn:ietf:params:netconf:capability:writable-running:1.0",
    "urn:ietf:params:netconf:capability:candidate:1.0"
  ],
  "config_xml_length": 17613
}
```

User Input

NETCONF
Success Response

Example 2： Configure MTU value

Change MTU value using CLI




```
Input: Configure MTU to 800 on Ethernet3/0/0
```

User Input

```
<HUAWEI>sys
Enter system view, return user view with return command.
[~HUAWEI]display interface Ethernet 3/0/0
Ethernet3/0/0 current state : UP (ifindex: 8)
Line protocol current state : DOWN
Link quality grade : GOOD
Description:
Route Port,The Maximum Transmit Unit is 1500
Internet protocol processing : disabled
IP Sending Frames' Format is PKTFMT_ETHNT_2, Hardware address is 3892-0811
Loopback:none, LAN full-duplex mode, Pause Flowcontrol: Receive Enable and
```

MTU before

```
[~HUAWEI-Ethernet3/0/0]display interface Ethernet 3/0/0
Ethernet3/0/0 current state : UP (ifindex: 8)
Line protocol current state : DOWN
Link quality grade : GOOD
Description:
Route Port,The Maximum Transmit Unit is 800
Internet protocol processing : disabled
IP Sending Frames' Format is PKTFMT_ETHNT_2, Hardware address is 3892-0811-0
Loopback:none, LAN full-duplex mode, Pause Flowcontrol: Receive Enable and S
```

MTU after

What we achieved?

Natural language to network command conversion:

- MCP+CLI query and configuration
- MCP+Netconf data query

MCP Tools (present)

Information Query

①CLI

Get device running config
Show interface status & statistics

②NETCONF

Get device capabilities
Get interface status & statistics

Configuration Tools

①CLI

Configure MTU value

Next Steps?

1. **YANG Integration** – Netconf Configuration with Yang interfaces
2. **MCP Server Discovery** - Implement registry-based discovery mechanism