Use Cases of Agent Networking for Network Operation and Management

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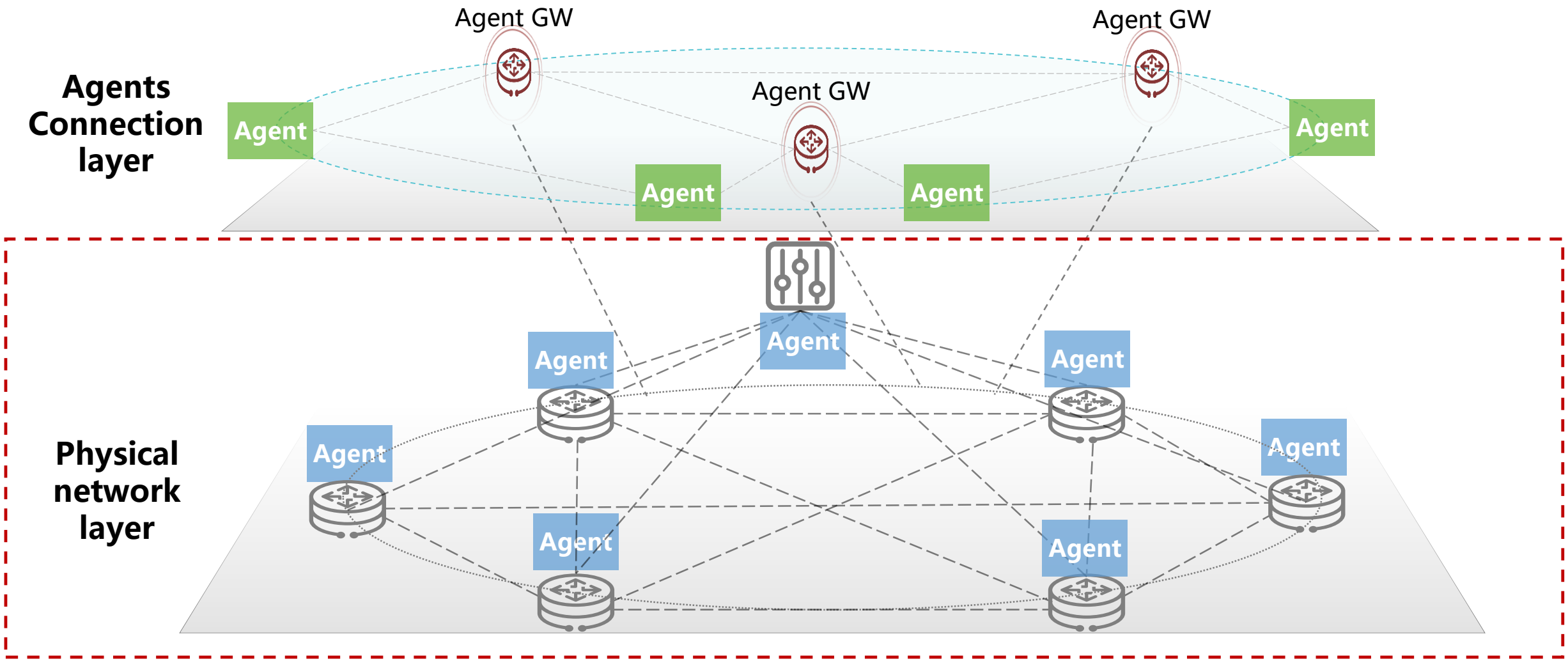
Overall Architecture for Agent Networking

Overall architecture proposed in “Agent networking use cases, requirements, and architecture” on IETF 124 - RTGWG



The focus in this talk

Agents Networking for Network Operation and Management

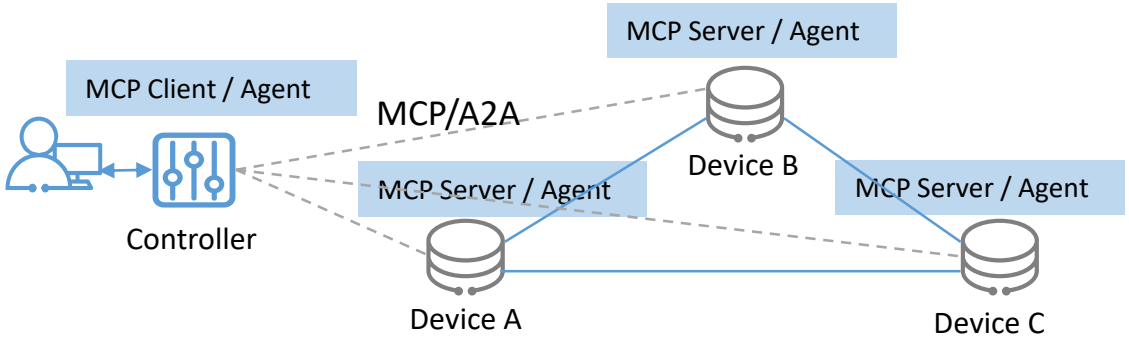
Problem

- Traditional network management approaches often require specialized tools, complex configurations, and expert knowledge.
- As networks grow in complexity and scale, there is an increasing need for more intelligent and automated management solutions.

Key benefits of these approaches:

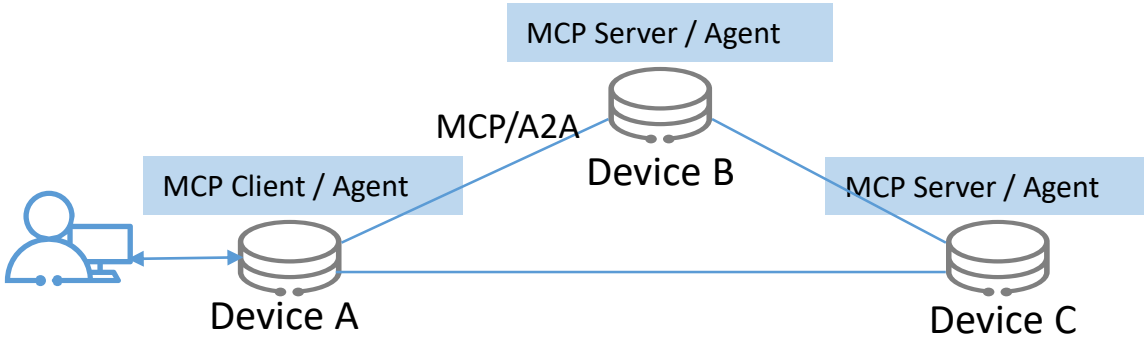
- **Natural Language Interface**: Network operators can perform operations using natural language queries
- **AI-Assisted Analysis**: Intelligent analysis of operation results
- **Standardized Communication**: Uniform protocol across different vendor devices
- **Automated Workflows**: Reduced manual intervention in operation processes

North-south architecture



- Deploying an MCP client or an agent in the Controller.
- Deploying MCP servers or agents in the network devices.

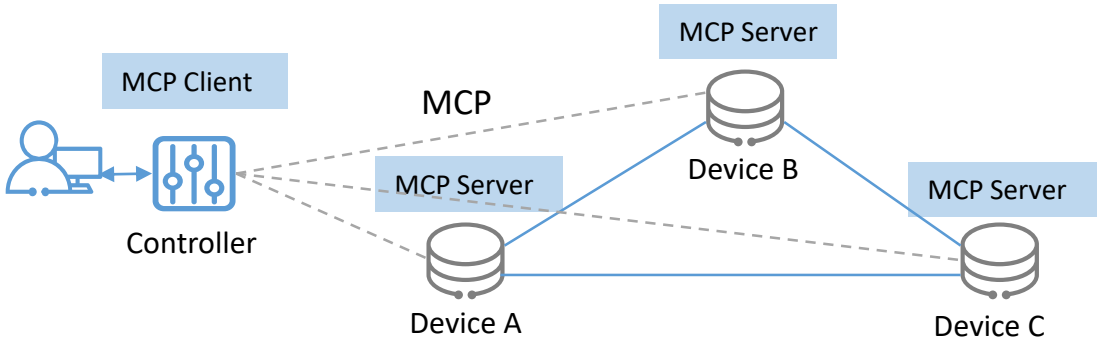
East-west architecture



- Deploying an MCP client or an agent in device A.
- Deploying MCP servers or agents in the other devices.

Use Cases for 4 typical scenarios: Measurement/Troubleshooting/Optimization/Security

Use Cases for Network Measurement



Use case 1: Automated mapping of network topology in AI campus.

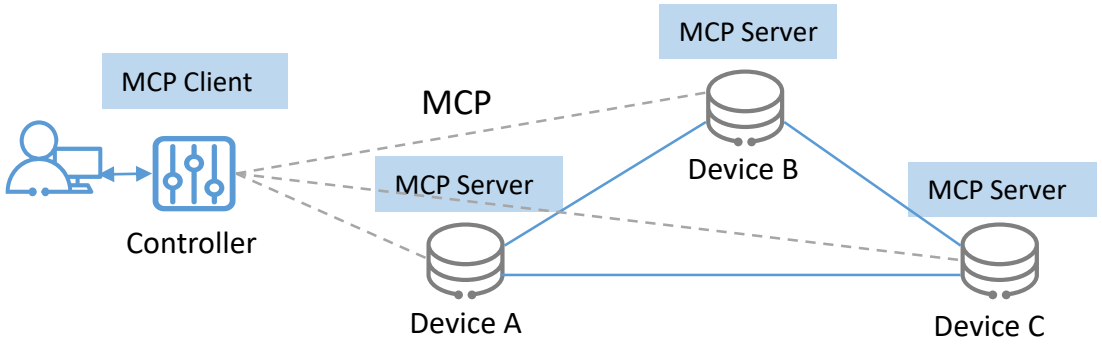
① Operator: "Discover and map the current network topology"
② MCP Client: Requests topology information from seed devices
③ MCP Server: Provides Resources: [neighbors table, interface status, VLAN info]
④ MCP Client: Builds topology graph using AI-assisted correlation

Use Case 2: Network operator wants to check link utilization across core routers.

① Operator: "Show me the current utilization of all core router interfaces"
② MCP Client: Discovers core routers and requests interface statistics
③ MCP Server: Provides Resources containing interface utilization data
④ MCP Client: Aggregates and presents data with AI-generated insights

Note: The use cases above are also applicable and similar when A2A is used or under the east-west architecture.

Use Cases for Network Trouble-shooting



Use Case 1: Intent: "Verify reachability between Site-A and Site-B “ in AI Campus

① Operator enters intent in chat UI.
② Controller's LLM deduces required Tools:
- – ping (Tool) from router1 to 10.2.2.2
- – show interfaces (Resource) on router2

③ Controller issues MCP calls.
④ Devices return results.
⑤ LLM summarizes: "Packet loss 0%; MTU mismatch detected on router2 ge-0/0/0. Recommend 'set interfaces ge-0/0/0 mtu 1500'."

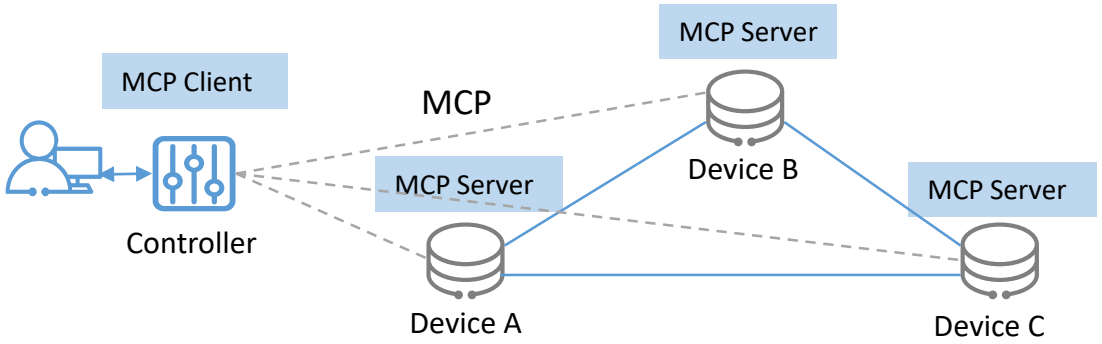
Use Case 2: Intent: "Diagnose why BGP neighbor 1.1.1.1 is down “

① Controller retrieves:
- -/openconfig-bgp:bgp/neighbors/neighbor=1.1.1.1/state
- -/ietf-interfaces:interfaces/interface=loopback0

② Controller calls Tool "tcpdump" filtered on port 179.
③ LLM correlates: "No TCP SYN received; ACL foo on interface loopback0 denies port 179."
④ Controller offers one-click remediation: remove ACL entry.

Note: The use cases above are also applicable and similar when A2A is used or under the east-west architecture.

Use Cases for Network Optimization



Use Case 1: AI Campus experience booster

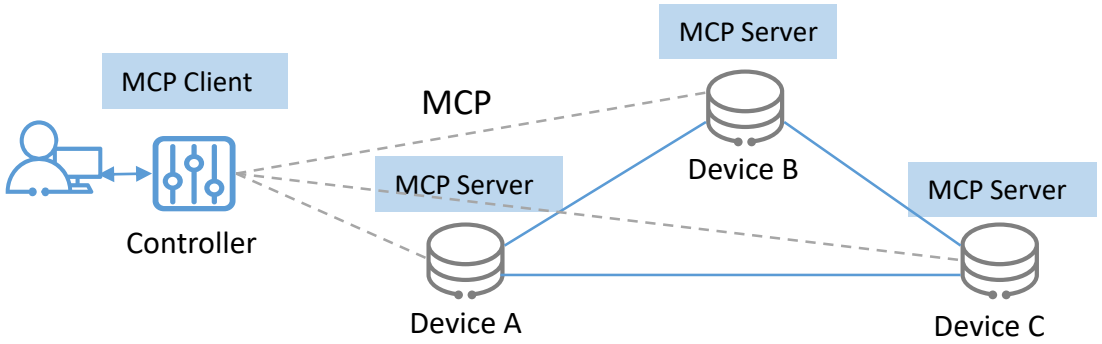
① Operator: "Users in Bldg-3 report poor Teams video, improve it now"
② MCP Client: Requests switch-port and upstream metrics for all endpoints in Bldg-3
③ MCP Server: Provides Resources: [interface utilization, QoS queue drops, DSCP markings, buffer stats, LLDP neighbors]
④ MCP Client: AI re-classifies and re-marks Teams traffic to EF, increases priority queue bandwidth, verifies jitter < 15 ms and packet-loss < 0.1 % within 90 s

Use Case 2: AI-driven data-center fabric auto-tuning

① Operator: "DC1 spine-leaf links are hitting 90 %, rebalance east-west traffic immediately"
② MCP Client: Discovers all leaf switches and requests ECMP group utilization plus VXLAN flow stats
③ MCP Server: Provides Resources: [interface counters, ECMP member list, VXLAN VNI traffic, queue drops]
④ MCP Client: LLM computes new ECMP hash fields & leaf-to-spine weights, pushes incremental config, verifies link load below 70 % within 60 s

Note: The use cases above are also applicable and similar when A2A is used or under the east-west architecture.

Use Cases for Network Security



Use Case 1: Intent: "Check for upcoming cert/firmware expiry " in AI campus

① Operator enters intent in chat UI.
② Controller's LLM deduces required Tools:
- – get_cert_table (Tool)
- – /firmware/version (Resource)

③ Controller issues MCP calls.
④ Devices return expiry dates & versions.
⑤ LLM summarizes: "2 certs expire <30 days; 5 routers on EOS firmware. Recommend renewal & schedule 22:00 upgrade window. "

Use Case 2: Intent: "Any brute-force or port-scan in the last 5 min?"

① Operator enters intent in chat UI.
② Controller's LLM deduces required Resources:
- – /syslog/<device>?last=5m

③ Controller issues MCP calls to all routers.
④ Devices return recent syslog lines.
⑤ LLM summarizes: "3 SSH fail/sec from 198.51.100.15 on router3; TCP 445 sweep detected on router7. Recommend ge-block 198.51.100.15/32 and enable rate-limit."

Note: The use cases above are also applicable and similar when A2A is used or under the east-west architecture.

Thank you!

Let us Keep the Conversation Going

We would love your feedback, use-cases, and co-authorship!

Grab the draft, open issues, or propose text → join the update & discussion work.

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Drafts on Use Cases of Agent Networking for Network Operation and Management:

- draft-zm-rtgwg-mcp-troubleshooting
- draft-zm-rtgwg-mcp-network-measurement
- draft-yuan-rtgwg-security-agent-usecase
- draft-zhang-rtgwg-ai-agents-measurement
- draft-zhang-rtgwg-ai-agents-troubleshooting
- draft-yuan-rtgwg-traffic-agent-usecase