The RufRoot Breach & Stateless MCP

Why shared, long-lived API keys can create serious enterprise evidence gaps - and the fail-closed architecture needed for MCP 2026-07-28 deployments.

CVE-2026-59726 | CVSS 10.0 · GitHub CNA | MCP 2026-07-28 | OAuth 2.0 / OIDC | Resolvable Accountability

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tools reportedly exposed through Ruflo's unauthenticated MCP bridge

1 POST

was sufficient to reach arbitrary shell-command execution in the bridge container

3.16.3

Ruflo 3.16.3 contains the published fix.

THE OPERATING PRINCIPLE

Resolve before reliance.

Every remote tool call should be authenticated, authorised, attributable, logged and re-checkable.

EXECUTIVE BRIEF

The lesson is bigger than one vulnerable project

RufRoot is a clean demonstration of what happens when a powerful MCP tool surface is treated as an ordinary internal webhook. The exposed bridge did not merely leak data; it gave unauthenticated callers a path to execute commands, recover provider secrets and alter persistent agent memory.

> **Critical distinction:** MCP becoming stateless does not remove the need for identity. It removes protocol-level session state, which makes deployment-layer authentication and authorisation more explicit and more important.

What RufRoot exposed

- Unauthenticated network access to MCP bridge endpoints.
- Remote invocation of privileged tools, including shell execution.
- Access to provider API keys and sensitive runtime material.
- Persistent compromise through poisoning of AgentDB learning-store patterns.

What enterprise buyers will ask

- Who or what invoked each tool?
- Was the caller authorised for this resource and action?
- Can credentials be revoked quickly and independently?
- Can logs prove the decision made at the time of execution?

Stateless transport is a scaling decision. Anonymous execution is an architecture failure.

PROCUREMENT IMPACT	A shared, long-lived secret can make it difficult to demonstrate unique identity, least privilege, timely revocation and reliable attribution. Those are the questions that surface in SOC 2, ISO/IEC 27001 and enterprise security reviews.
RECOMMENDED RESPONSE	Place a fail-closed authorisation gateway in front of every remote MCP endpoint; validate short-lived, audience-bound credentials per request; enforce tool-level policy; and preserve a tamper-evident audit trail.

SECTION 1

01

The anatomy of a 10.0 CVSS nightmare

CVE-2026-59726, codenamed RufRoot by Noma Labs, affected Ruflo deployments before version 3.16.3. GitHub, acting as the CVE Numbering Authority, assigned CVSS 3.1 10.0. NVD lists the CVE but had not published its own assessment when this briefing was reviewed.

STEP 01
Open bridge
POST /mcp and POST /mcp/:group were exposed without authentication in the default docker-compose deployment.

STEP 02
Tool invocation
An unauthenticated caller could send tools/call requests to privileged capabilities such as ruflo__terminal_execute.

STEP 03
Container shell
Command execution inside the bridge container enabled access to secrets, application data and writable runtime paths.

STEP 04
Secret theft
Provider API keys could be read, allowing the compromise to extend beyond the initial service.

STEP 05
Memory poisoning
AgentDB learning-store patterns could be modified, creating persistence in the agent's future behaviour.

STEP 06
Rogue agent estate
The attacker could potentially weaponise agent workflows, harvest conversations or establish further persistence.

Illustrative attack shape (not a copy-paste exploit):

```
POST /mcp
Content-Type: application/json

{ "method": "tools/call", "params": { "name": "ruflo__terminal_execute", ... } }
```

Why this matters: MCP tools often sit next to credentials, databases, deployment systems and agent memory. A missing authorisation boundary can therefore become a control-plane compromise, not a narrow endpoint bug. Noma Labs disclosed responsibly; Ruflo published an advisory and the 3.16.3 fix rapidly.

SECTION 2

The stateless trap in MCP 2026-07-28

The 2026-07-28 revision moves Streamable HTTP to a stateless model designed for ordinary horizontal scaling. The final specification removed protocol-level sessions and retired the **initialize / notifications/initialized** exchange and the Mcp-Session-Id header.

Before: protocol session context

- Client and server performed an **initialize / notifications/initialized** exchange.
- Servers could return an Mcp-Session-Id.
- Subsequent requests could be associated with that protocol session.
- Load balancers often required sticky routing for in-memory session state.

Now: each request stands alone

- No protocol-level Streamable HTTP session.
- No Mcp-Session-Id header in the new revision.
- Each request carries its own protocol and client metadata.
- Interactive work uses explicit request-state patterns such as MRTR.

The security mandate: For protected or privileged remote MCP deployments, authentication and authorisation should be enforced at the HTTP deployment boundary and evaluated for every request. Stateless does not mean trustless; it means identity cannot be inferred from a transport session.

What a production request should establish

1. **Issuer**
   Which trusted authorisation server issued the credential?
2. **Subject / client**
   Which user, workload or agent is making the call?
3. **Audience**
   Was the credential minted for this specific MCP resource server?
4. **Scope**
   Is the caller allowed to invoke this tool with these privileges?
5. **Freshness**
   Has the token expired, been revoked or fallen outside policy?
6. **Evidence**
   Can the decision and resulting action be reconstructed later?

Illustrative secure request boundary:

```
Authorization: Bearer <short-lived, audience-bound access token>
MCP-Protocol-Version: 2026-07-28
Mcp-Method: tools/call
Mcp-Name: <tool-name>
Content-Type: application/json
```

SECTION 3

Why shared, long-lived API keys create procurement evidence gaps

Precision matters: static API keys are not categorically banned by SOC 2 or ISO/IEC 27001. The problem is the common pattern of shared, long-lived, broadly privileged keys with weak rotation and incomplete attribution.

When multiple agents, tenants or operators use the same secret, the system may prove only that "someone possessing the key" made the request. It may not prove which actor initiated it, whether that actor was still authorised, or whether the key was being replayed after compromise.

BUYER QUESTION	SHARED, LONG-LIVED KEY WEAKNESS	CONTROL EXPECTED
Who invoked the tool?	One secret may represent many users, agents or tenants.	Unique subject or workload identity bound to each request.
Was the caller authorised?	Possession of the key can become the only test.	Tool-, resource- and tenant-level policy evaluated at execution time.
Can access be revoked?	Rotation can break every integration sharing the key.	Short-lived tokens, granular revocation and automated lifecycle controls.
Can misuse be investigated?	Logs may show the same key identifier for every action.	Identity-rich, time-synchronised audit events with decision context.
Can replay be limited?	Long-lived bearer secrets remain useful until rotated.	Expiry, audience restriction, proof-of-possession where appropriate, nonce or replay controls for sensitive actions.

The procurement issue is not the header format. It is whether the control environment can prove identity, authority, scope, freshness and accountability.

SOC 2 relevance

A SOC 2 examination evaluates whether the organisation's controls are suitably designed and, for Type II, operating effectively over time. Weak identity, access, change and logging controls can create evidence gaps.

ISO/IEC 27001 relevance

ISO/IEC 27001 uses a risk-managed information security system. Strong identity management, restricted access and auditable activity support the control environment expected by enterprise customers and assessors.

SECTION 4

A fail-closed enterprise MCP control architecture

A secure design separates standards-based access control from resolvable accountability. OAuth 2.0 / OIDC credentials authorise the immediate call; ECZ-ID can provide a re-checkable identity, authority, state and evidence layer that procurement systems can resolve before relying on the caller.

A

Agent or client

Requests a short-lived credential and sends a self-contained MCP POST request with its identity and requested action.

G

Fail-closed gateway

Validates signature, issuer, audience, expiry and scopes; evaluates tenant and tool policy; denies by default when evidence is missing or stale.

M

MCP resource server

Receives only authorised calls, executes the selected tool, and records the verified identity and policy decision with the result.

ECZ-ID Resolvable accountability layer: the gateway or relying party can resolve the caller's current business identity, authority, operational state, custody and supporting evidence before reliance. This supplements - rather than replaces - OAuth/OIDC authorisation; ECZ-ID is not the authorisation server and not an identity provider.

Minimum controls for a fail-closed deployment

- ✓ **Default deny** — Reject missing, invalid, expired or ambiguous credentials.
- ✓ **Least privilege** — Authorise at tool, resource, tenant and operation level.
- ✓ **Version governance** — Pin, test and monitor MCP protocol and SDK revisions.
- ✓ **Per-request validation** — Do not infer trust from a prior MCP session or network location.
- ✓ **Credential lifecycle** — Use short expiry, automated rotation and rapid revocation.
- ✓ **Evidence-grade logs** — Record caller, claims, policy, tool, arguments classification, outcome and timestamps.

Result: every tool invocation is linked to a validated caller, an explicit policy decision and a re-checkable accountability context - closing the gap exposed by unauthenticated MCP bridges.

ACTION PLAN

Prepare stateless MCP for enterprise review

CISOs and enterprise IT teams will increasingly examine MCP endpoints as privileged remote execution surfaces. Your readiness pack should demonstrate that the service is authenticated, authorised, segmented, observable and governable across protocol revisions.

Immediate containment

- Patch Ruflo to 3.16.3 or later where applicable.
- Remove public exposure of unauthenticated MCP bridges.
- Rotate provider keys and investigate potentially exposed secrets.
- Review AgentDB and other persistent state for poisoning or unexpected changes.

Enterprise hardening

- Put an authorisation gateway in front of remote MCP endpoints.
- Replace shared long-lived secrets with short-lived credentials.
- Implement tool-level policy, tenant isolation and evidence-grade logging.
- Test the 2026-07-28 stateless request model, version negotiation and fallback behaviour.

FIXED-SCOPE ASSESSMENT

MCP Readiness Audit

£395

We map the authentication boundary, authorisation model, MCP 2026-07-28 compatibility, evidence gaps and prioritised remediation required for a defensible stateless MCP deployment.

Review scope & start — £395

mcp.ecocitizenz.com/audit

No sales call required. Written intake begins after payment and scope confirmation. Readiness assessment only. It does not certify SOC 2, ISO/IEC 27001, MCP compliance or implementation security.

Architecture

Authentication, authorisation, gateway and resolver mapping.

Evidence

Audit-ready controls, gaps and remediation priorities.

Roadmap

Sequenced actions for production and procurement readiness.

SOURCES & NOTES

Primary references

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https://www.aicpa-cima.com/resources/download/2017-trust-services-criteria-with-revised-points-of-focus-2022

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https://www.iso.org/information-security/identity-management

Important: This briefing is educational and architectural guidance, not legal advice, a penetration-test report, a SOC 2 opinion, an ISO/IEC 27001 certification statement or a guarantee of procurement approval. SOC 2 and ISO/IEC 27001 are control- and risk-based frameworks; the suitability of any authentication method depends on the organisation's complete control design, implementation, evidence and operating effectiveness. ECZ-ID should be positioned as a resolvable accountability layer that complements standards-based authentication and authorisation.

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