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# A gRPC Transport for Model Context Protocol

Pawan Bhardwaj
gRPC Maintainer
Sr. Software Engineer Google

# Why gRPC for MCP?



## Reliable Communication

AI agents are moving from test environments into enterprise operations, requiring reliable structured communication with external tools and services

## The MCP Standard

The Model Context Protocol (MCP) is the standard that enables agents to communicate with tools.

## The gRPC Gap

Many enterprises rely on gRPC for their services. MCP's default JSON-RPC transport requires transcoding gateways - adding complexity and overhead.


# gRPC as Transport Backbone

# Performance and Efficiency



**10x**

**Smaller Messages**

Protobuf vs JSON

## Binary Encoding (Protobufs)

Shrink message size - lower latency, reduced network costs

## HTTP/2

Client and server continuously send data over a persistent connection

## Built-in Flow Control

Native backpressure in transport.

# Enterprise grade security and Authorization



## Identity & Encryption

Mutual TLS and SPIFEE Identity support ensures secure, verified communication between services.

## Strong Authentication

Native hooks for JWT and OAuth provide industry-standard access control integration.

## Granular Control

Method level authorization allows for fine-grained permissioning across your entire service mesh.

# Operational Maturity



## Unified Observability

OTEL integration for full-stack insight.

## Robust Resiliency

Deadline, timeout, and built-in flow control.

## Schema Validation

Protobuf strict typing rejects malformed inputs.

## Polyglot Development

C++, Go, Python, Java, Node, PHP, and Rust.

## Metadata Support

Extensible context for every request.

## xDS Support

Proxyless service mesh integration.

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# Implementation

# Mapping the Specification: mcp-grpc-transport-proto

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**Repository:** https://github.com/GoogleCloudPlatform/mcp-grpc-transport-proto

## Canonical Source of Truth

Will be used for all language implementations.

## Synchronized Evolution

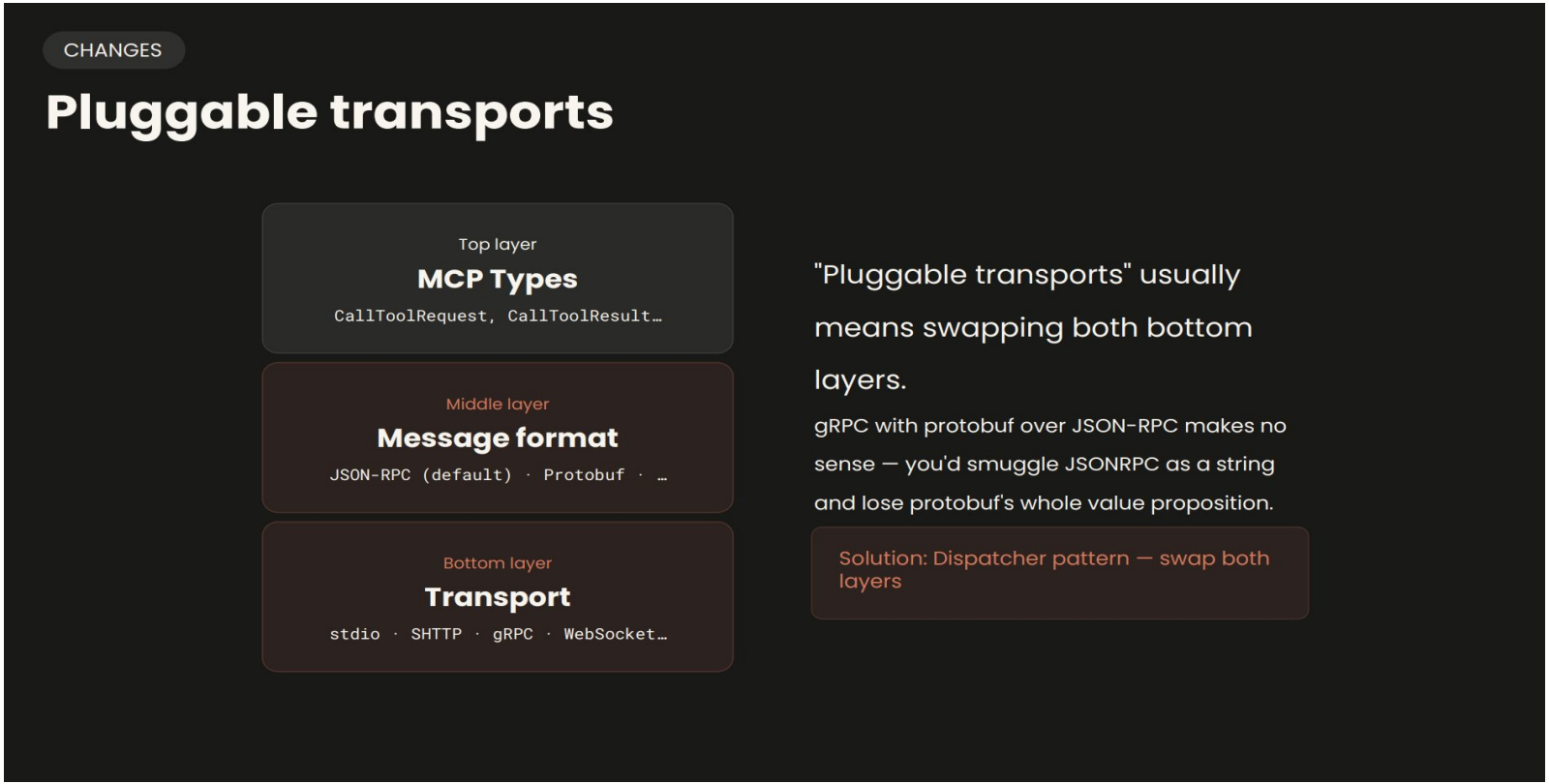
Updates are driven by MCP transport workgroup to maintain parity with the latest MCP Specification releases.

## Native gRPC Service Definition

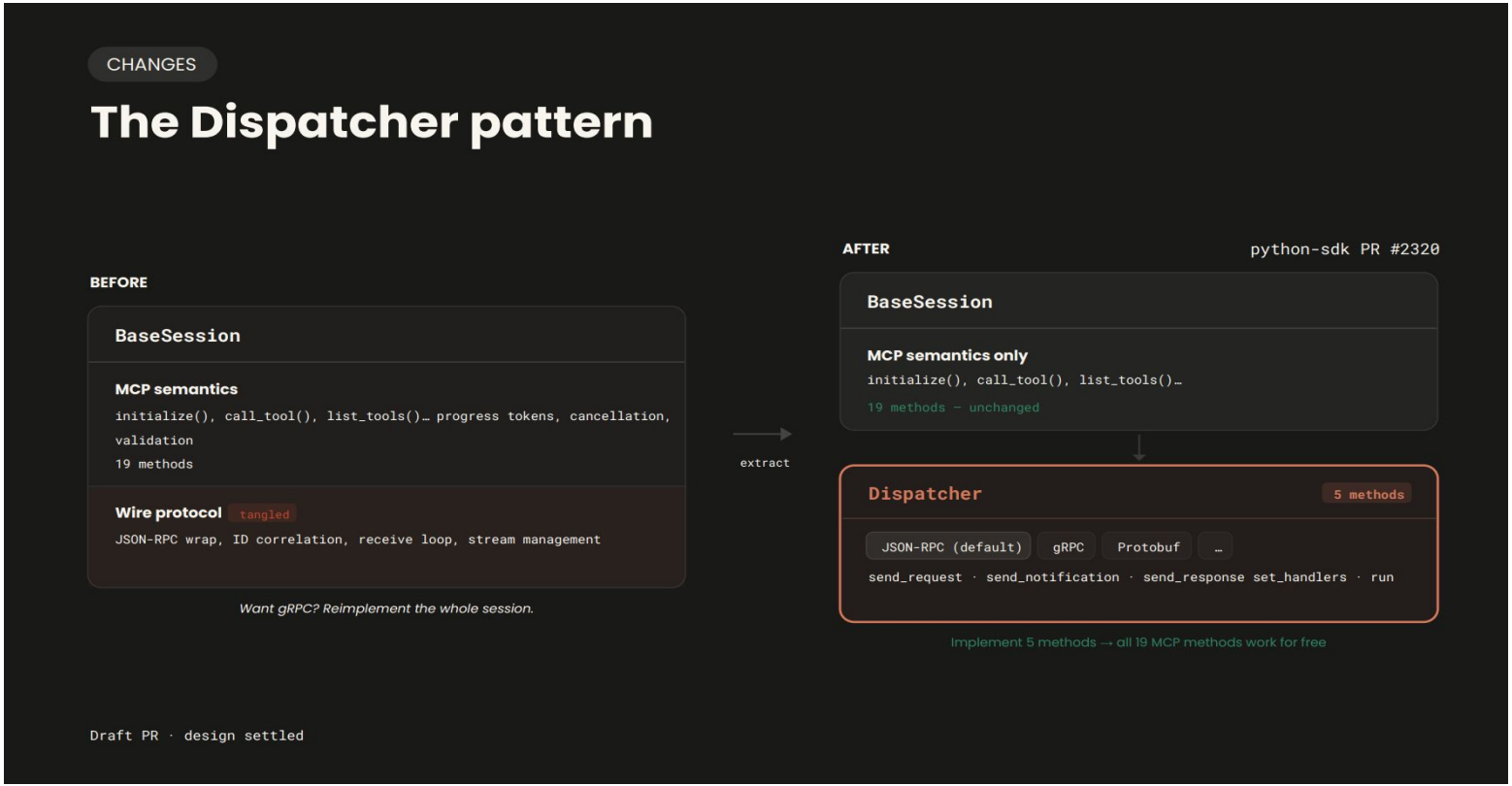
Implemented as a first-class service Mcp with dedicated RPC methods for ListResources, CallTool, and GetPrompt, replacing JSON-RPC 2.0 wrappers.

## Semantic Parity via Direct Mapping

Direct mapping of MCP primitives to typed Protobuf messages (e.g., Resource, Tool) ensures strict contract safety.




# Reference: Path to V2 for MCP SDKs - Max Isbey, Anthropic

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# MCP gRPC Python

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**Repository:** https://github.com/GoogleCloudPlatform/mcp-grpc-transport-py

## Status: Active Development

Work in Progress: Providing a pluggable transport implementation for the MCP Python SDK.

## Dispatcher-Based Architecture

Based on official transport dispatchers, facilitating the addition of MCP endpoints to existing gRPC services.

## Standard Evolution

Built in lockstep with mcp-grpc-transport-proto and official python libs to maintain strict parity with evolving MCP specs.

## Unified Developer Experience

Tool definitions remain identical. Developers simply swap `JSONRPCDispatcher` for `GrpcDispatcher` during session initialization.

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# What's Next

# Roadmap

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### SEP-2598: Pluggable Transports (Under Review)

https://github.com/modelcontextprotocol/modelcontextprotocol/pull/2598

### Language Support

Python under-development, will be followed up with others.

### Expansion beyond Python

Strategic growth of the SDK ecosystem to multi-language support.

### Conformance Testing

Development of comprehensive tests for gRPC Transport verification.

### Migration Playbook

Guidelines for migrating existing gRPC services to tools and changing transports.

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# Thank You !!

## Resources

Site: grpc.io
YouTube: youtube.com/@grpcio

## Github

Site: https://github.com/grpc/grpc
Mailing List: groups.google.com/g/grpc-io

## Upcoming Events

**gRPC Conf NA:** 3 September, 2026
**gRPC Conf Bangalore:** To be announced (2026)

## Join the Community

Meetup: meetup.com/grpcio
Meetup Bangalore: meetup.com/grpc-bangalore