The API Gateway Maturity Matrix

Where Do You Rank?

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April 2, 2025

Let’s start with a story...

Is this Matrix right for you?

Tech leads and architects

→ "I need to make build vs. buy decisions and define an API strategy that scales."

Platform engineers

→ "I’m building an internal developer platform and need to define how API gateways fit into our developer experience."

DevOps and infrastructure engineers

→ "I want to standardized ingress, security, and observability while also enabling others with self-serfice... and not making more incidents to deal with."

Why should you care?

API gateways are the front door of your platform and your business. You need to:

- Think critically about where you are and what you could bring to the table for improvements.
- Evaluate new technologies or what capabilities your current stack provides that you haven't yet turned on.
- Find places where you can invest time as the users of your platform–or the scale of your business–demand.

That requires:

A way to reflect on yourself, your team, and your offering... then find ways to improve or figure out where you're falling behind.

This model is:

- Designed to help you self-assess where your API gateway implementation is today and plan ahead for what's next.
- A way to focus on solving problems and enabling value or return on investment.
- A collaborative effort that needs contributions from *you*!

This model is not:

- A way to judge your implementation or tell you how to do your job.
- A prescriptive, "all or nothing" approach to building a mature API gateway.
- Designed to cover *all* the cultural and technological complexity of building an internal developer platform.
- A way to pitch any particular API gateway product, service, or capability *without a business need*.

Detroit, Michigan.

October 27, 2022.

Our starting point: CNCF's Cloud Native Maturity Model

A framework for starting–and succeeding!–in a cloud native journey, starting with inception into full adoption of cloud native technologies across the CNCF landscape.

- Launched in 2021, reached 3.0 in Autumn 2023.
- Includes five Levels: **Build**, **Operate**, **Scale**, **Improve**, **Adapt**.
- Started with 4 dimensions of **People**, **Process**, **Policy**, and **Technology**, with **Business Outcomes** added later and since promoted to top spot on the model with 3.0.

Our lens: Where maturity and a specific technology meet

Most maturity models, like CNCF's, are built for sweeping cultural change. "Digital transformation" and so on.

What about tactical decisions about a *single* technology?

- "My API gateway offers 100 features. Which ones do I need Day 0, Day 1, and Day 2?"
- "What value does my API gateway offer as part of an internal developer platform?"
- "Things are actually quiet right now... what should I think about building next?"
- "Woof. That outage was a bad one. What do I need to build right now to make sure I never have to experience that again?"

Hold up: What is maturity, anyway?

Well, it's *not* about:

- How old an API gateway product is or how long you've been using it.
- Whether you've written down your processes or not.
- How many features an API gateway offers.

Instead, let's think about:

- How you've adopted new features based on new requirements or inciting incidents.
- Whether your API gateway and processes are flexible enough to deal with new problems.
- How good the ergonomics are when you *do* turn on new features.

As adoption of an API gateway matures, engineers shift *away* from building API gateways for themselves and *torward* enabling others to ship fast without giving up control over policy and governance.

Where do you think you stand?

- 🪨 "I think there's something in front of my APIs... but I'm not totally sure what it's doing."
- 🔒 "Building on the API gateway involves lots of tickets and praying someone still remembers how it works."
- 🚀 "I'm just here to validate how much further along we are than everyone else."

Onto the API Gateway Maturity Matrix™

Build	**Is this thing on?** We have a basic ingress with a reverse proxy masquerading as an API gateway. The infra team (or the one person who understands it) owns the manual configuration, holds all the knowledge, and manages things ad-hoc.
Operate	**Time to make this API gateway thing a little less Swiss cheese-y.** We've upgraded to a dedicated API gateway, managed by our infra or DevOps team, which is declaratively configured with CI/CD and supported by minimal-to-acceptable documentation.
Scale	**How do we make this thing get 10X (or 100X!) bigger... and not terrible to work on at the same time?** Our API gateway now standardizes services from deployment to observability to incident response, and offers reusable configs for developers to ship quickly while our newfangled platform team manages the scale.
Improve	**All the things are important now. And how do I help devs move quick without losing control?** The platform team constantly modulates how the API gateway works to create a golden path for self-service while isolating different teams' work, automating policy enforcement, and providing built-in observability for every service.
Adapt	**How do we keep innovating... without over-engineering?** The API gateway is now fully dynamic, policy-driven, and responsive to signals like traffic patterns, active threats, or cost. It's the foundation of a unified platform that everyone not just relies on, but actually enjoys using.

Five problems to solve (capability threads)

- Traffic management
- Authentication & security
- Observability & debugging
- Developer/team experience
- Governance & compliance

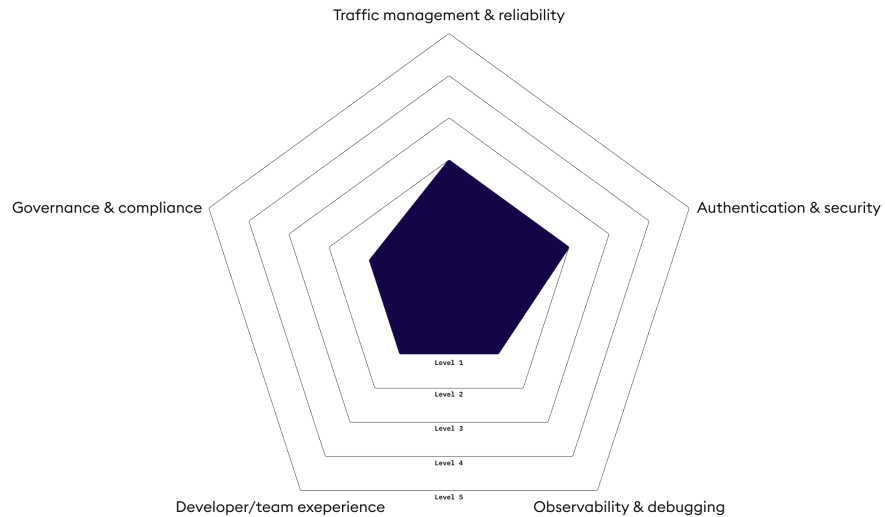
Traffic management

Build	Our APIs are protected from unauthorized access, but the application of AuthN is inconsistent–sometimes at our gateway, sometimes embedded in your services.	Static routing on paths, subdomains, etc	Hardcoded rewrites and redirects	Simple load balancing and manual failover
Operate	We centrally manage, configure, and turn on features like routing on behalf of development teams, some driven by their asks and some driven by protecting our infrastructure.	Basic per-client rate limits for fairness and abuse	Geoblocking and IP restrictions	DDoS protection and global load balancing
Scale	Our APIs can handle high traffic safely and without overloading our upstream services, and we're optimizing for performance and availability... and automatically fail over when things go wrong.	Multi-environment and -region routing (multicloud?)	Weighted traffic splitting for blue/green or canaries	Load balancing: latency-based, or sticky, round robin
Improve	Teams can self-manage routing, rate limits, and other traffic management rules while staying within platform guardrails.	Dynamic throttling based on load or error rates	Custom LB: PEWMA+weighting, proximity+load	Request hedging for latency optimization
Adapt	We can route traffic dynamically based on cost, latency, congestion, usage patterns, availability, and beyond.	Dynamic routing for user priority or slow starts	Dynamic limits based on predicted workload patterns	Multicloud LB based on cost and capacity

A two-person... *thing*?

With a single service and two technical co-founders, it's easy to collaborate and write directly into the app layer rather than blow up the archeticture... and no need for complex automation. Manual deploys and a basic API gateway, TYVM!

- ✅ Can we route API requests correctly?
- ✅ Do we know if things crash because we have basic monitoring?
- ✅ Do we have *any* authentication in place?



Authentication & security

Build	Our APIs are protected from unauthorized access, but the application of AuthN is inconsistent–sometimes at our gateway, sometimes embedded in our services.	API keys and basic authentication	Mix-and-match of AuthN/AuthZ services	TLS termination at the gateway edge
Operate	Security enforcement is increasingly centralized at the API gateway, reducing per-service misconfigurations that lead to risk or breaches.	JWTs or OAuth2	Centralized AuthN/AuthZ via the API gateway	Basic role-based access control
Scale	Our API gateway is a central hardening point, and we have a unified and repeatable security model that supports multiple distributed teams.	Geoblocking and IP reputation filtering	mTLS for service-to-service AuthN/AuthZ	Multi-tenant isolation in gateway routes
Improve	Developers can implement new Zero Trust fundamentals via the API gateway without writing tickets or waiting for approvals.	Self-service policy enforcement via OPA/Kyverno	Automated API posture checks	Fine-grained access control per team or service
Adapt	Our API security model is adaptive and capable of preventing breaches before they happen.	Risk-based authentication and rate limiting	Threat detection/intelligence feeds	Just-in-time access control

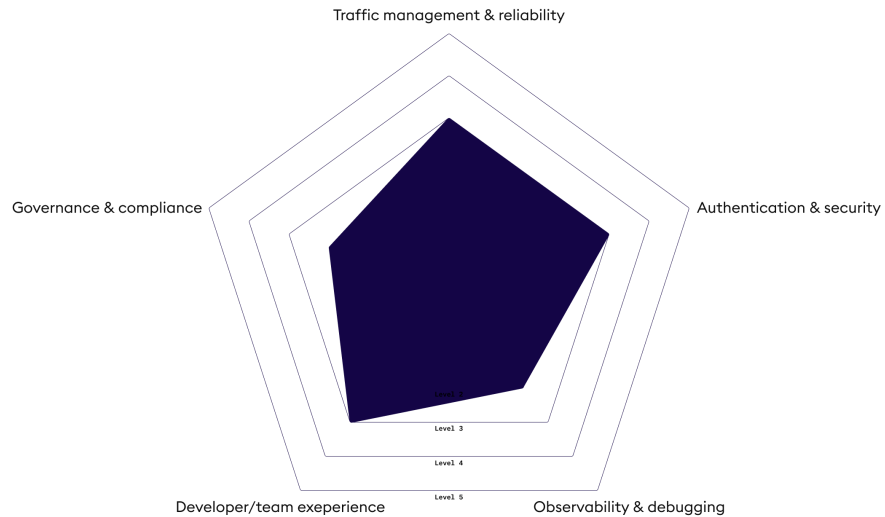
Observability & debugging

Build	We can see *what* our API services are doing, mostly via logs, in a deployed environment to help us identify issues.	Basic logs generated at the API gateway	Error rate monitoring (5xx API errors)	Basic health check endpoints
Operate	We have a unified view *how* our APIs are doing via dashboards, making troubleshooting a lot easier and helping us resolve issues faster.	Gateway metrics published to observability platforms	Structured logs	Unified monitoring for one gateway+environment
Scale	Our API gateway is seen as the first place to look (and often to blame!) when we're monitoring the API landscape or developers need to do distributed debugging.	Unified monitoring across clusters/regions/clouds	Tracing to help find distributed bottlenecks	Real-time incident alerting for relevant stakeholders
Improve	Other teams can extend the API gateway to add their own metrics or tracing based on new requirements without having to change the main API surface beneath everyone's feet.	Automated remediation runbooks	Editable request replay for debugging	Team-specific gateway traffic dashboards
Adapt	API issues are fully self-healing, minimizing the need for us (platform team) or others (API developers) to intervene manually.	AI-driven anomaly detection and automated RCA	Automated incident response and rerouting	Business outcome correlation with ingress patterns

A 50-person startup?

Now they're bigger–like hundreds of thousands of requests every day bigger. They need rate limiting and ways to figure out error rates or percentage of late responses, and the small-but-mighty infra team is getting tired of pulling logs and running queries. All this optimization requires better deployment strategies, too.

- ✅ Can we protect our APIs from excessive traffic or bad actors?
- ✅ Can we deploy API changes without manual intervention?
- ✅ Have me moved past basic metrics and into structured logs?



Developer/team experience

Build

API configurations are managed with manual changes, with developers cobbling together ways to ship to prod. It works, but it's slow.

- No IaC for API gateway configs
- Ticket-based (or YOLO) configuration changes
- Little to no documentation

Operate

API changes have a clearly-defined process, streamlining Linear/Jira/etc board of tickets and freeing up our team's engineering time.

- Standardized API definitions
- IaC + CI/CD for all gateway configurations
- Basic API catalog derived from routing topology

Scale

API management (via automation and IaC) helps us manage APIs at scale across multiple clusters, environments, and growing teams.

- GitOps and CI/CD++ (regions, canaries, rollbacks)
- Many deployment options (K8s, hybrid, multicloud)
- API versioning strategies at the API gateway

Improve

Developers can self-service isolated API gateway configurations while we (now a platform team!) enforce policy, reducing operational overhead on a golden path.

- Golden path templates/recipes for gateway patterns
- Rich documentation of gateway best practices
- Extensive API catalog/developer portal

Adapt

We give developers more than guardrails–we support them with best practices on designing and deploying APIs.

- Support for advanced customization and plugins
- Shift-lefted, AI-driven gateway recommendations
- Automatic detection of unused/deprecated services

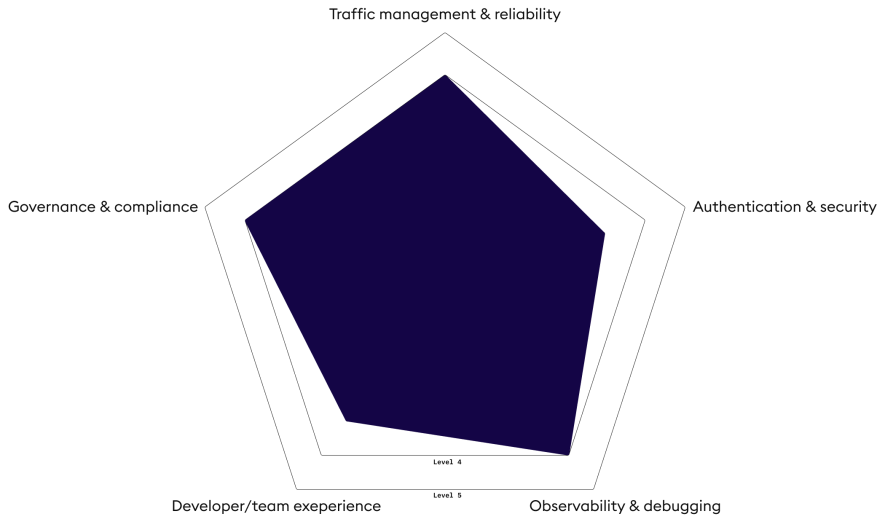
Governance & compliance

Build	APIs meet basic security and compliance standards, but inconsistently, leading to risk and ad-hoc responses.		
	No enforced API standards at the gateway	Infrequent/ad-hoc audits of gateway compliance	Manual configuration reviews
Operate	We enforce standards across multiple APIs and teams to reduce the risk of being non-compliant.		
	Basic API lifecycle management (e.g. versioning)	Standardized security (TLS requirements/versioning)	Semi-regular scanning of API gateway policy
Scale	Governance of API gateways scales across teams and cloud environments without blocking development velocity.		
	Configs controlled with policy-as-code and CI/CD	Traffic auditing across multiple environments	Gateway-enforced data sovereignty
Improve	Anyone can configure APIs within a predefined, platform-wide governance model.		
	Role- or team-based API gateway management	Fine-grained access control for config changes	Configuration change tracking for compliance
Adapt	Our compliance is now automated and capable of adapting to new regulations or security risks dynamically.		
	AI-driven, continuous compliance monitoring	Threat-based security policy updates	Automatic policy updates for regulatory changes

A 200-developer machine?

They handle 10 million requests and need to stand up a new API every day. *All of a sudden, all the things are important*. DDoSes happen every now and then, but also oddities like a single customer hitting them on a loop–same time every day. On top of that, they're also acquiring a company in a new and scary regulatory environment!

- ✅ Are individual teams configuring and deploying APIs without causing chaos?
- ✅ Can we scale API security across multiple regions and teams?



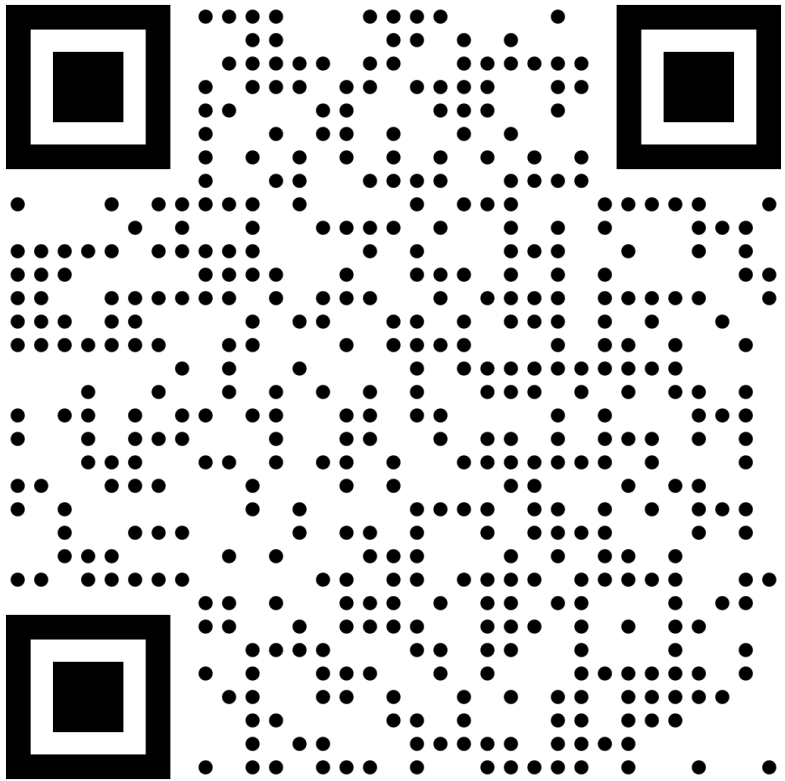
Where do you think you stand now?

- 😅 "We just realized no one actually owns the gateway config."
- 🌱 “We’re maturing, but still figuring out how to scale safely.”
- 🏆 "We’ve got solid foundations and room to grow."

The Matrix is *live*!

A GitHub project with full text (and extra examples!) for self-assessment:

`joelhans/api-gateway-maturity`



Your TODOs

- *Today (okay, tomorrow)*: Take 2 minutes here at KubeCon to rate yourself across the five problem threads. Where are you strong? Where do you wish you could do more?
- *Next week*: Take the model back to your team next week and explore each thread+level to explore where you stand on the:
  - Problems you're solving
  - Value you deliver to your organization
  - Capabilities you've mastered
  - Places you're held back by a lack of business case, resources, or an API gateway that just can't carry you where you need to be.
- *At your leisure*: Help make the Matrix better with your contribution!
- Let me know about your experience! j.hans@ngrok.com

Questions?

Find me *beyond the Matrix*:

- j.hans@ngrok.com
- At the ngrok booth at **N611** (where I have to go right after this and finish up my shift [instead of hiding like I would probably like to])
- Wandering around KubeCon in an ngrok shirt

Thank you to the folks who helped me along the way!

- Alex
- Jeremy
- Alice
- Abdallah
- Peter
- Euan
- Jack