SYMBEEO

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DESIGN STUDY

Citizen-services portal after ingress-nginx: Gateway API, WCAG 2.2 AA, and a read-only door for AI assistants

Complete design on current platforms

CAPABILITY	INDUSTRY	SETTING
Digital	Public Sector	Regional agency
DOCUMENT	**VERSION**	**DATE**
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Document control

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Sign-off	"An engagement under this design is signed by the practice lead before any build proceeds."		

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CONVENTIONS

Source tags. [S] figure read from the standard owner's, project's or vendor's own current page on Sep 24, 2026 · [S*] figure from the owner's page summary where the page itself could not be opened · [A] design assumption · [T] design target (the record's outcome figure and anything derived from it). Every figure carries one tag. No figure comes from any prior engagement, file or asset. A row with more than one tag is counted once: as a published figure if any tag is [S] or [S*], otherwise as an assumption if any tag is [A], otherwise as a design target.

Table 1. Revision history

Date	Version	Change
Sep 27, 2026	1.0	First issue.
Oct 10, 2026	1.1	Approval line now reads: approved by the Founder, issued by Symbeeo. Avinash Dhinakaran remains the author.

1 · Scope

Who it is for. The chief digital officer or the head of infrastructure of a regional government agency whose citizen portal runs behind ingress-nginx, retired in March 2026, who must meet the accessibility standard the agency is audited against, and who is asked by ministers how citizens' AI assistants will reach public information.

Typical buyer [A]. A regional agency in the EU serving 2.1 million residents: 45 online services (permits, benefits, school places, waste collection), one portal, two on-premises Kubernetes clusters on 1.33 with 60 Ingress objects on ingress-nginx. Peak 400 requests/s, 5 × that on the annual tax-deadline day [A].

What is in. Cluster upgrade to a supported Kubernetes minor; replacement of ingress-nginx by a Gateway API implementation with a web application firewall; API contracts and token rules; WCAG 2.2 AA on the portal; one read-only Model Context Protocol server for public service information. **What is out.** The citizen identity scheme (SRA-SEC-001); back-office case systems; content writing; any AI assistant itself.

Assumptions. The clusters are a conformant distribution the agency keeps [A]. The MCP server exposes public information only, no personal data, in phase 1 [A]. The agency is audited against EN 301 549 as cited in the Official Journal [A].

Related documents, read Sep 24, 2026. SRA-DIG-001, SDD-DIG-001, STP-DIG-001 v1.0 (issued Sep 27, 2026) · Kubernetes, Ingress NGINX retirement statement (`https://kubernetes.io/blog/2026/01/29/ingress-nginx-statement/`) · Kubernetes releases (`https://kubernetes.io/releases/`) · Gateway API v1.6 (`https://kubernetes.io/blog/2026/08/03/gateway-api-v1-6-release/`) · NGINX Gateway Fabric changelog, release 2.7.2 (`https://github.com/nginx/nginx-gateway-fabric/blob/v2.7.2/CHANGELOG.md`) · Model Context Protocol specification Jul 28, 2026 (`https://blog.modelcontextprotocol.io/posts/2026-07-28/`) · WCAG 2.2, W3C Recommendation (`https://www.w3.org/TR/WCAG22/`) · EN 301 549 v4.1.1, AccessibleEU (`https://accessible-eu-centre.ec.europa.eu/content-corner/news/european-accessibility-standard-en-301-549-has-been-updated-2026-09-07_en`).

1c · Public implementations this design follows

Each row is labeled. **Public deployment**: a named operator's real deployment, published and dated by the operator, its vendor or a partner, used where one exists. **Our own design**: the dated vendor or standards documentation this design was built from, where no public deployment of the design exists. Labels and dates checked Sep 27, 2026.

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Table 2. Public implementations this design follows

Implementation	Who published it · date	What it settles for this design	URL
Our own design, built from published documentation. Ingress NGINX retirement	Kubernetes project · January 29, 2026	Retired March 2026; "no more releases for bug fixes, security patches, or any updates of any kind"; migration path Gateway API, with the ingress2gateway 1.0 tool announced March 20, 2026	`https://kubernetes.io/blog/2026/01/29/ingress-nginx-statement/`
Our own design, built from published documentation. NGINX Gateway Fabric 2.7.2	F5 NGINX, open-source project · released Sep 16, 2026	Gateway API 1.6.1; Kubernetes 1.32 or later; NGINX Plus R37.1 data plane; F5 WAF for NGINX 5.15.0 in the Plus-with-WAF image. R4 and R7 are these figures	`https://github.com/nginx/nginx-gateway-fabric/blob/v2.7.2/CHANGELOG.md`
Our own design, built from published documentation. EN 301 549 v4.1.1	AccessibleEU, European Commission · Sep 7, 2026	v4.1.1 adopts WCAG 2.2; until cited in the Official Journal, v3.2.1 (WCAG 2.1) remains the reference. WCAG 2.2 AA meets both, so R10 is set there	`https://accessible-eu-centre.ec.europa.eu/content-corner/news/european-accessibility-standard-en-301-549-has-been-updated-2026-09-07_en`

No public, dated migration of a government portal from ingress-nginx to Gateway API was found on Sep 27, 2026; every row is documentation used to build our own design.

2 · Requirements register

Table 3. Requirements register

#	Requirement	Value	Source
R1	Estate	45 services · 60 Ingress objects · 2 clusters · peak 400 requests/s, 2,000 on deadline day	[A]
R2	Kubernetes minor	1.35–1.37, the three upstream-maintained minors on Sep 24, 2026; target 1.36	[S] Kubernetes
R3	ingress-nginx on a traffic path	0; retired March 2026, no security fixes	[S] Kubernetes
R4	Gateway API version	1.6.1, as supported by the chosen implementation release	[S] NGINX Gateway Fabric
R5	Routes migrated	60 of 60 Ingress objects to HTTPRoutes, each moved and rolled back once in test	[T]
R6	Latency added by the edge	≤ 10 ms p95 at 2,000 requests/s	[T]
R7	Web application firewall	on every citizen-facing listener	[S] NGINX Gateway Fabric; [T]
R8	API contracts	45 of 45 service APIs in OpenAPI 3.2.0 in the catalog	[S] SRA-DIG-001 R2
R9	MCP server	1, stateless, read-only tools only, behind the same edge	[S] MCP Jul 28, 2026; [A]

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#	Requirement	Value	Source
R10	Accessibility	0 WCAG 2.2 Level A or AA failures on the portal at audit	[S] W3C; [T]
R11	Sign-in accessibility	WCAG 2.2 3.3.8 Accessible Authentication (Minimum) met on citizen sign-in	[S] W3C
R12	Cut-over	every route on the new edge before the tax-deadline day	[T]

Twelve rows; eight carry a standard's, project's or vendor's figure (three with a target or assumption beside it), one is a design assumption, three are design targets.

3 · Architecture overview

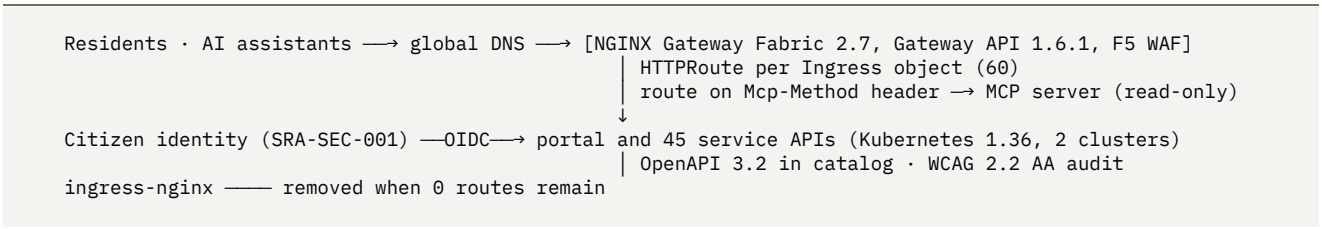


Figure 1. Portal edge on Gateway API

One Gateway per cluster replaces ingress-nginx; the MCP server is one more route on it, under the same token and firewall rules.

Table 4. Architecture overview

Role	Component (exact name)	Qty	Capacity used	Why this unit
Platform	conformant Kubernetes 1.36	2 production clusters	45 services	upstream-maintained to Jun 28, 2027 [S]
North–south edge	NGINX Gateway Fabric 2.7.2, NGINX Plus data plane with F5 WAF for NGINX 5.15.0	1 Gateway per cluster, 3 replicas	2,000 requests/s peak [A]	Gateway API 1.6.1, Kubernetes 1.32+ [S]; implementation choice [A]
Migration tool	ingress2gateway 1.0	1	60 Ingress objects	announced by the Kubernetes project Mar 20, 2026 [S]
Agent interface	MCP server, specification Jul 28, 2026	1 (one instance in each cluster)	public information tools [A]	stateless; routable on headers [S]
Accessibility measure	WCAG 2.2 Level AA	1 portal	45 services	meets EN 301 549 v3.2.1 and v4.1.1 [S]

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4 · Design by subsystem

4.1 Cluster upgrade.

1.33 → 1.34 → 1.35 → 1.36, one minor at a time, non-production first [A]; 1.36 is maintained upstream to Jun 28, 2027 (R2) [S]. Rejected: jumping minors — Kubernetes upgrades one minor at a time [S] (version-skew policy).

4.2 Edge.

NGINX Gateway Fabric 2.7.2 on Gateway API 1.6.1 [S], one Gateway per cluster. The agency runs NGINX Plus with F5 WAF for NGINX on citizen-facing listeners (R7) [S]; the open-source data plane is kept for internal routes [A]. Rejected: staying on ingress-nginx — no security fixes since March 2026 (R3) [S]. In an engagement the implementation is the buyer's comparison slot (SRA-DIG-001 D2); this design draws on one to show the figures [A].

4.3 Migration.

ingress2gateway converts the 60 Ingress objects to HTTPRoutes [S]; each is reviewed by hand, because annotations specific to ingress-nginx do not carry over one to one [A]. DNS moves one service per window with rollback to the old ingress (R5) [T]. ingress-nginx is removed when no route remains on it.

4.4 Tokens and contracts.

Citizens sign in through the agency's identity scheme; the edge checks issuer and audience per route; implicit and password grants refused [S] (SRA-DIG-001 R3). No route merges without its OpenAPI 3.2.0 contract (R8) [S].

4.5 MCP server.

The Jul 28, 2026 specification is stateless and carries `Mcp-Method` and `Mcp-Name` headers so that "gateways can route and authorize on headers directly" [S]. The Gateway matches those headers and passes only the listed read-only tools — service finder, opening hours, document checklist — to the MCP server [A]; any other method is refused at the edge. Clients validate the issuer before redeeming codes, per the specification [S]. No personal data in phase 1 (R9) [A].

4.6 Accessibility.

The portal is audited against WCAG 2.2 AA (R10) [S]. Citizen sign-in meets 3.3.8 Accessible Authentication (Minimum), new at AA in 2.2 (R11) [S]. The audit runs on the 10 highest-traffic services first, then the rest [A].

5 · Failure behavior

Table 5. Failure behavior

Failure	Behavior	Source
One edge replica down	remaining replicas serve; no resident-visible error beyond retries	[A] SRA-DIG-001 F1
Edge tier down in one cluster	global DNS moves traffic to the other cluster ≤ 60 s	[A] SRA-DIG-001 F2
WAF blocks a legitimate form post	request logged with rule ID; rule tuned in non-production; no silent allow	[A]
MCP request with an unlisted method	refused at the edge on the header; logged	[A]
Migrated route misbehaves	DNS back to ingress-nginx for that service only, until fixed	[A]

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Failure	Behavior	Source
Citizen identity scheme unreachable	sign-in fails; public pages and the MCP server keep serving	[A]

6 · Limits

- F5 WAF for NGINX runs only in the NGINX Plus data plane, per the release's image list; the license cost sits outside this document.
- ingress2gateway output was not tested against this estate's annotations; review effort per route is an assumption.
- The MCP tool list is a design assumption; which public information the agency exposes to AI assistants is a policy decision, not an engineering one.
- EN 301 549 v4.1.1 is not yet the legal reference; the audit report cites both versions.
- No figure here has been measured; every rate, count and date is an assumption, a target or a published figure.

7 · Lessons learned

None yet — this is a design study; populated after the first build against it.

8 · The author

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Signed off by Edwin Ozer, Founder.

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SYMBEEO

Each vendor's tool shows you their option. We show you all of them against one requirement.

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Figures are as published by their sources on the dates given in this document; figures marked [A] are assumptions.

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