**MCPX‑KendoBridge — Monitoring, SLOs & Post‑Release Verification**

**Document:** docs/11\_monitoring.docx  
**Project Code:** MCPX‑KendoBridge  
**Version:** 2.0.0 (Kendo Migration)  
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**Owner:** SRE Lead (Responsible) — DoSE (Accountable) — DocFactory (Author) — Dev/QA/SecLead (Consulted)

**Purpose.** Define **service‑level indicators (SLIs)**, **service‑level objectives (SLOs)**, alerting, dashboards, **24‑hour post‑release checks**, and **evidence capture** for MCPX‑KendoBridge across **Alpha → Beta → RTM → Prod**. This plan aligns with the Technijian GitHub‑first SDLC, required CI/CD gates, and the project’s FR/NFR budgets (JSON p50≤300 ms / p95≤800 ms; **SSE TTFB≤200 ms**; restart‑to‑ready≤30 s; availability≥99.9%).

**DB & Secrets Compliance (applies to all instrumentation and logs):**

* **Add‑only** schema; **Stored‑procedure‑only** access; **No‑Hard‑Coding** of dynamic values (timeouts/keep‑alive/origins/child args)—all come from **AppConfig/FeatureFlag** via **sp\_Config\_\***, **sp\_Feature\_IsEnabled**, **sp\_Lookup\_Get**.
* **No secrets** in logs, metrics, dashboards, or evidence. Secrets live only in **GitHub Environments**.

**1) Scope & Environments**

* **Service under monitor:** MCPX‑KendoBridge API (Streamable‑HTTP + SSE) and the read‑only **Admin Portal** (KendoReact Fluent v12).
* **Environments:** **Alpha → Beta → RTM → Prod** with **RTM validating on the Prod DB (read‑only)** for parity and drift detection prior to Prod promotion.

**2) SLOs (targets) & SLIs (how we measure)**

**2.1 SLO summary (per environment; Prod enforces error budgets)**

| **Domain** | **SLO Target** | **Notes** |
| --- | --- | --- |
| **Availability** | **≥ 99.9% monthly** | Any 5xx for /mcp, /healthz, /ready counts against |
| **Latency (non‑streaming)** | **p50 ≤ 300 ms; p95 ≤ 800 ms** | Measured on /mcp JSON responses |
| **Streaming TTFB** | **p95 ≤ 200 ms** | First byte for POST /mcp with Accept: text/event-stream |
| **Readiness** | **restart‑to‑ready ≤ 30 s** | From container start to /ready=ok |
| **Concurrency** | **≥ 200 concurrent sessions/replica** | CPU‑bound before memory (watch saturation) |

Error budget for 99.9% avail ≈ **43.2 min/month**. Burn alerts trigger when consumption slope indicates breach risk.

**2.2 SLIs & instrumentation (vendor‑neutral naming; example Prometheus metrics)**

| **SLI** | **Source & Metric(s)** | **Calculation / Notes** |
| --- | --- | --- |
| **Availability** | `http\_requests\_total{path=~"/mcp | /ready |
| **Latency (JSON)** | http\_server\_duration\_ms\_bucket{path="/mcp",mode="json"} | p50/p95 from histogram |
| **Streaming TTFB** | sse\_ttfb\_ms\_bucket{path="/mcp",mode="sse"} | Histogram across streamed calls |
| **Heartbeat Cadence** | sse\_heartbeat\_gap\_ms\_bucket{session\_id!=""} | Expect modal near Network:SseKeepAliveSeconds × 1000 |
| **Readiness** | `ready\_status{value=0 | 1}; restart\_to\_ready\_seconds` |
| **Sessions/Children** | session\_count, child\_up{session\_id}, child\_restart\_count | Per‑pod gauges/counters |
| **Config Fetch** | config\_fetch\_duration\_ms\_bucket | From SP call to cache update; p95 ≤200 ms target |
| **Security** | Counters by error code: `errors\_total{code="origin\_forbidden" | "feature\_disabled" |

**Structured logs (JSON)** must include: timestamp, level, requestId, sessionId, childPid, path, status, latency\_ms, mode=json|sse, and **never** include payload bodies or secrets.

**3) Alerting Policy (P1/P2/P3)**

Page on **P1**, notify on **P2**, ticket on **P3**. All alerts include runbook links and recent requestIds/sessionIds.

| **Sev** | **Condition (sustained)** | **Action & Runbook** |
| --- | --- | --- |
| **P1** | **Availability < 99% (rolling 10 min)** OR /ready failing > 2 min OR **TTFB p95 > 200 ms for 15 min** | Page on‑call; evaluate rollback vs forward‑fix; follow **Incident** runbook; consider **rollback** runbook |
| **P2** | Error rate ≥ 1% (5 min); surge in origin\_forbidden unrelated to abuse; child\_restart\_count rising | Notify SRE & Dev; investigate ingress buffering, config drift; open issue |
| **P2** | Heartbeat gap p95 > 2× configured interval (15 min) | Check ingress text/event-stream buffering and timeouts; verify DB Network:SseKeepAliveSeconds |
| **P3** | config\_fetch\_duration\_ms p95 > 200 ms (30 min) | Observe DB contention; plan tuning; verify SP grants |
| **P3** | Front‑end synthetic failing (3/5 checks) | Investigate Admin Portal routing/build; not user‑facing outage unless API down |

**Runbooks referenced:** runbooks/incident.docx, runbooks/rollback.docx, runbooks/scale\_out.docx, runbooks/deploy.docx.

**4) Dashboards (curated panels)**

Maintain one per environment; panels marked **(Key SLI)** feed SLO summaries.

**4.1 Backend Overview (Key)**

* **Availability (Key SLI)** by endpoint (/mcp, /ready, /healthz)
* **Latency (Key SLI):** /mcp JSON p50/p95
* **Errors by code:** origin\_forbidden, feature\_disabled, timeout, internal\_error
* **Readiness timeline:** status and **restart‑to‑ready** durations
* **Resource:** CPU/Mem/Network per pod; **session\_count** per pod

**4.2 Streaming Quality**

* **TTFB p50/p95 (Key SLI)** for streamed calls
* **Heartbeat gap histogram** and time‑series (expected ≈ Network:SseKeepAliveSeconds)
* **Active streams** & **disconnects** per minute
* **Child restarts** vs streams

**4.3 Sessions & Child Processes**

* **session\_count** per replica (expect steady under HPA)
* **child\_up/child\_restart\_count** progression
* **Sticky routing hit ratio** (requests with same Mcp-Session-Id reaching same pod)

**4.4 Config Parity (RTM)**

* Snapshot diff of /config/effective (non‑secret) against expected **Prod** values; any drift blocks promotion.

**4.5 Admin Portal (Front‑end Synthetic)**

* Availability of UI shell
* Browser‑measured **SSE TTFB** probe (optional)
* JS error rate (scrubbed; no secrets)
* Axe a11y smoke summary (if exported)

**5) 24‑Hour Post‑Release Checks (Prod)**

Within **24 hours** after Prod rollout:

1. **Availability** ≥ 99.9%; **error rate** < 1%.
2. **Latency (JSON)** p50/p95 within budget.
3. **Streaming TTFB** p95 ≤ 200 ms; **heartbeat gap** nominal.
4. **Readiness** steady; no flapping.
5. **Sessions/Children** stable; **child\_restart\_count** flat.
6. **Security**: No unexpected spikes in origin\_forbidden/feature\_disabled.
7. **Config**: /config/effective matches expected (non‑secret) values.
8. **Evidence**: Export dashboard snapshots (images/PNGs or PDFs) and attach to the Release. **Retention ≥ 1 year**.

**6) Synthetic Monitoring & Probes**

* **API**:
  + GET /ready (every 30s) → expect 200 with {status, uptimeSeconds, sessionCount, childProcesses}.
  + POST /mcp JSON ping (every 60s) → latency check.
  + POST /mcp **SSE** ping (every 60–120s) → compute **TTFB** and heartbeat cadence.
* **Front‑end** (optional):
  + Load / and /sessions; assert no console errors; optional browser probe for SSE TTFB.

Synthetic jobs **must not** include secrets or dump payloads; capture only envelope fields and timings.

**7) Observability: Logging, Metrics, Tracing**

**Logging (JSON):**

* Required fields: timestamp, level, requestId, sessionId, childPid, path, method, status, latency\_ms, mode=json|sse, origin\_allowed: true|false.
* **No payload bodies**, no secrets, no license content.

**Metrics:** Implement via OpenTelemetry Metrics or Prometheus client as indicated in §2.2.

**Tracing (optional):**

* Propagate traceparent if present; correlate to requestId. Do not include payload bodies in spans.

**8) Alert Definitions (example PromQL / pseudo)**

Replace {job="mcp-proxy"} etc. with your labels.

* **P1 Availability:**
* (sum(rate(http\_requests\_errors\_total{job="mcp-proxy",status=~"5.."}[10m]))
* / sum(rate(http\_requests\_total{job="mcp-proxy"}[10m]))) > 0.01
* **P1 Readiness down:**
* avg\_over\_time(ready\_status{job="mcp-proxy"}[2m]) < 0.5
* **P1 Streaming TTFB p95 > 200ms:**
* histogram\_quantile(0.95, sum(rate(sse\_ttfb\_ms\_bucket{job="mcp-proxy"}[15m])) by (le)) > 200
* **P2 Heartbeat gap drift:**
* histogram\_quantile(0.95, sum(rate(sse\_heartbeat\_gap\_ms\_bucket{job="mcp-proxy"}[15m])) by (le))
* > (Network\_SseKeepAliveSeconds\*2000)

**9) Evidence Pack (Monitoring Artifacts)**

Attach to the **Release** (Prod) and retain **≥ 1 year**:

* SLO dashboard screenshots (Availability, Latency, **TTFB**, Readiness).
* Alert timeline with links (if applicable).
* /ready and /config/effective outputs (non‑secret).
* Post‑release (24 h) checklist results.
* Version metadata: image digest, OpenAPI lint/diff, CodeQL/DepReview/SBOM references.

**10) Roles & RACI (Monitoring)**

| **Activity** | **A** | **R** | **C** | **I** |
| --- | --- | --- | --- | --- |
| SLO definition & review | DoSE | SRE Lead | Dev Lead, QA Lead, SecLead | All |
| Dashboard ownership | DoSE | SRE Lead | Dev Lead | QA |
| Alert tuning | DoSE | SRE Lead | Dev Lead | QA |
| Post‑release verification | DoSE | SRE + QA | Dev Lead | All |
| Evidence export | DoSE | DocFactory | QA Lead | All |

**11) Cross‑References**

* **FR/NFR:** docs/05\_fr.docx, docs/06\_nfr.docx (budgets, streaming, readiness).
* **Test Strategy:** docs/09\_test\_strategy.docx (SSE TTFB harness, axe smoke).
* **CI/CD:** docs/10\_ci\_cd.docx (gates and promotion; RTM parity on **Prod DB (read‑only)**).
* **Error Catalog:** docs/error\_catalog.docx (code taxonomy for panels).
* **Runbooks:** deploy/rollback/incident/scale\_out (alert response and drain behavior).

**12) Assumptions**

1. Ingress passes **text/event-stream** without buffering, and idle/read timeouts accommodate heartbeats.
2. RTM environment uses **Prod DB (read‑only)**; config parity diffs block promotion.
3. App exposes metrics and logs per this spec and **never** logs secrets.

**13) Next Steps**

* Implement sse\_ttfb\_ms and sse\_heartbeat\_gap\_ms histograms; wire dashboards/alerts per §4–§8.
* Add synthetic probes for streamed and non‑streamed calls in Beta/Prod.
* Automate the **24‑hour post‑release** evidence export in the deploy workflow.

**Footer (optional for Word header/footer):**  
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