Technical Performance Report Guidelines for License to Operate Conversion (May 2025)

The goal for the ShakeAlert™ Pilot Phase is for Technical Partners to achieve a License to Operate (LtO) for the product, service, process, application, etc., described in Appendix A of their Pilot License Agreement (PLA). Before an LtO can be granted by the USGS, all candidates must deliver a written two-part Performance Report that describes successful completion of all (1) technical elements and (2) education and training elements. The report must be presented to the USGS for review prior to a live Performance Review. The purpose of the Performance Report is to document that the LtO candidate has successfully completed and tested the proposed ShakeAlert-powered product and/or service as described in Appendix A of the PLA.

This document provides an outline for a typical Performance Report for technical criteria only. Education & Training Plan Guidelines are provided in a separate document. Because every ShakeAlert-powered product and/or service is unique, some technical criteria may not apply to the product and/or service or additional technical criteria may be needed. Below is a suggested template; if another format is used, the elements listed here should still be addressed.

For questions regarding the components of the technical review criteria, please contact Robert de Groot, ShakeAlert Coordinator for Technical Engagement, at rdegroot@usgs.gov.

1. Introduction

1.1 Purpose of the proposed ShakeAlert-powered product and/or service.

1.2 Description and architecture of product and/or service.

- **1.2.1** Server component.
- **1.2.2** Endpoint component(s) (e.g. actuators, human alerting presentation devices). Include a description of the user presentation(s) if any and how it handles ShakeAlert Message updates.

1.3 Scope of expected uses.

1.4 Geographic area to be served.

1.5 Maximum number of end-users to be supported.

1.6 Level of service to be provided (e.g., life safety, guaranteed delivery, best effort).

1.7 Level of availability to be provided (e.g., 3-nines, 4-nines, etc.).

2. General Test Approach

3. Performance Testing

3.1 Server Component

3.1.1 *Redundancy:* Demonstration of redundancy and automatic failover to backup.
- Tests performed.
- Test results.

3.1.2 *State of Health Monitoring:* Automatic monitoring of system health and status
- Tests performed.
- Test results.

3.1.3 *Operator Notification and Response:* Automatic notification of operators and operator response
- Tests performed.
- Test results.

3.1.4 *Connection Management & Recovery:* Server detection and recovery after loss of connection to USGS ShakeAlert Message (Alert) Servers
- Tests performed.
- Test results.

3.2 Client Component (assumes smartphone app but may be applicable to other endpoint devices)

3.2.1 *Installation Testing*
- Tests performed.
- Test results.

3.2.2 *Cross-Platform Testing:* different hardware and software
- Tests performed.
- Test results.

3.2.3 *Compatibility Testing*
- Tests performed.
- Test results.

3.2.4 *UX/Usability Testing*
- Tests performed.
- Test results.

3.2.5 *Adverse Conditions:* test performance under adverse conditions like impaired connection, loss of location service, low battery.

3.3 Change Management: Describe what tests are done when changes are made to the product and/or service.

3.4 Alert Delivery Thresholds: Demonstrate that USGS-mandated ShakeAlert magnitude and intensity thresholds are implemented in the product and/or service.
- Tests performed.
- Test results.

3.5 Area Management: Demonstrate that alerts occur only within the intended service area and within the geographic limits established by USGS.
- Tests performed.
- Test results.

3.6 Message Handling:

3.6.1 *Stress Test:* ShakeAlert Message updates may be published at a rate of up to two (2) Messages per second for several minutes. Demonstrate that the product and/or service can process the maximum expected Message volume.

- Tests performed.
- Test results.

3.6.2 *ShakeAlert Message updates:* Demonstrate that the product and/or service can handle ShakeAlert Message updates. Note that updates may contain significant changes to important values, such as location, magnitude, or ground motion estimates.

- Tests performed.
- Test results.

3.6.3 *Post ShakeAlert Message Follow-up Messages:* Demonstrate that the product and/or service can handle Follow-up Messages, especially notice of false alerts.

- Tests performed.
- Test results.

3.6.4 *Discrepancies:* If the product and/or service subscribes to multiple USGS operated ShakeAlert Message (Alert) Servers simultaneously, demonstrate that the product and/or service can handle any differences in the Messages received.

- Tests performed.
- Test results.

3.6.5 *Concurrent Events:* Demonstrate that the product and/or service can correctly handle concurrent events (e.g. a new stream of ShakeAlert Messages for a later event or events that overlap in time with earlier events that are still updating.

- Tests performed.
- Test results.

3.7 Latency and Performance Measurement

3.7.1 *Measuring Latency:* Describe how product and/or service measures and records the time between receipt of a ShakeAlert Message from USGS and when the product and/or service takes an action or presents an alert to end-users.

- Tests performed.
- Test results.

3.7.2 *System Scalability (Volume):* Demonstrate that the product or/or service can meet ShakeAlert latency benchmarks when it reaches the expected maximum number of end-users (and/or clients) to be supported.

- Tests performed.
- Test results.

3.8 Security: Describe how overall security will be maintained for licensee product and/or service, including:

3.8.1 Server room physical security (if not a cloud service)

3.8.2 Server security update and patching plan

3.8.3 Intrusion detection

3.8.4 Protection of USGS ShakeAlert Message (Alert) Server credentials

3.8.5 Security of the communications channels between licensee server(s) and endpoints (clients or devices).

Appendix A: Performance Benchmarks

Excerpted from ShakeAlert Pilot License Agreement (December 2023)

Performance Benchmarks

- *Alerting Speed.* Licensee must make reasonable efforts to ensure the fastest possible delivery time of ShakeAlert-powered alerts to end-users. Licensee must strive to maintain an average time to receive and process ShakeAlert Messages from the ShakeAlert system and deliver alerts to its clients of no more than five (5) seconds, for at least ninety-five (95) percent of end-users.
- *Recordkeeping.* Licensee must record and retain performance information sufficient to meet its obligations under Section 6. Reporting.

Reporting

Post Alert Delivery Performance Reporting

- Licensee must provide performance data to USGS within ten (10) business days of an alert or upon written request by USGS, in accordance with Appendix A, Section 3.VI. (Performance Reporting).
- The USGS is free to share report data not classified as proprietary or confidential with ShakeAlert Partners as identified in Appendix D: Confidential Information.

Appendix B: ShakeAlert Performance Report Aligned with ShakeAlert Thresholds

The following reporting requirements apply only to applications where ShakeAlert-powered alerts are delivered to cell phones or other devices (e.g. tablet, computer, etc.).

1. For any alert delivered with a ShakeAlert system estimated magnitude of 4.5 and larger Licensee must report:
   - **1.1** The total number of devices alerted and;
   - **1.2** Any notable or unexpected behavior in alert delivery that was observed.
2. For any alert delivered with a ShakeAlert system estimated magnitude of 5.0 and larger, or alerts that are delivered to more than 10,000 users, or for any event specifically requested by USGS, Licensee must report:
   - **2.1** The time ShakeAlert Messages were received by Licensee from ShakeAlert Message (Alert) Servers; and
   - **2.2** The time alerts were delivered to all devices in one (1) second bins and further broken down by mode of delivery, WiFi™ or cellular.
   - **2.3** Any notable or unexpected behavior in alert delivery that was observed
3. For any alert with a magnitude of 4.5 and larger Licensee must report:
   - **3.1** The total number of devices alerted and;
   - **3.2** Any notable or unexpected behavior in alert delivery that was observed.