ShakeAlert™

ShakeAlert® Communication, Education, Outreach, and Technical Engagement

"Earthquake early warning for all"

Washington - Oregon - California

Technical Engagement

ShakeAlert® Technical Performance Review Criteria for License to Operate Conversion March 2022

The goal for the ShakeAlert pilot phase is for technical partners to be granted License to Operate (LtO) status for a given product, service, process, application, etc. as described in Appendix A of a Pilot Phase License Agreement (PLA). Before an LtO can be granted by the USGS, all candidates must develop a written plan that addresses (1) technical and (2) education and training elements and present this plan to the USGS. This document focuses on technical criteria only. Every system (i.e. proposed use of ShakeAlert Messages) is unique and additional elements may be needed if the product, service, etc. has special features not addressed by this outline. This is a suggested template and if another format is used the elements listed here should still be addressed. For questions regarding the components of the technical review criteria please reach out to Robert de Groot, ShakeAlert Coordinator for Technical Engagement at: rdegroot@usgs.gov.

1. Introduction
    a. System purpose
    b. System description and architecture
    c. Scope of expected uses
    d. Geographic area to be served
    e. Maximum number of clients (end-users) to be supported
    f. Level of service to be provided (e.g. life safety, guaranteed deliver, best effort, situational awareness)
    g. Level of availability to be provided (e.g. 3-nines, 4-nines, etc.)
2. General Test Approach
3. Test Elements
    a. System Service Level
        i. Redundancy: Demonstration of system server redundancy and automatic failover
            1. Tests performed
            2. Test results
        ii. State of Health Monitoring: Automatic monitoring of system health and status
            1. Tests performed
            2. Test results
        iii. Operator Notification and Response: Automatic notification of operators and operator response
            1. Tests performed
            2. Test results

iv. Connection Management and Recovery: Server detection and recovery after loss of connection to the ShakeAlert Message (alert) Servers
    1. Tests performed
    2. Test results

b. Change Management: Describe what tests are done when changes are made to your system
c. Alert Thresholds: Demonstrate that USGS mandated magnitude and intensity thresholds for ShakeAlert-powered alert delivery are implemented in your system. See *ShakeAlert.org* for alert delivery threshold grid.
    i. Tests performed
    ii. Test results
d. Alert Area Management: Demonstrate that alert delivery occurs only within USGS authorized areas and within your intended service area (as documented in your license agreement).
    i. Tests performed
    ii. Test results
e. ShakeAlert Message Handling:
    i. Stress Test: ShakeAlert Message updates may be published by USGS at a rate of up to two Messages per second. Demonstrate that your system can process the maximum expected Message volume.
        1. Tests performed
        2. Test results
    ii. Alert Delivery Updates: Demonstrate that your system can handle delivery of alert updates to end-users. Note that updates may contain significant changes to important values like location, magnitude, and/or ground motion estimates.
        1. Tests performed
        2. Test results
    iii. ShakeAlert Message Follow-Ups: Demonstrate that your system can handle follow-up Messages. (Especially, notice of a false ShakeAlert Message). See GitLab for more information.
        1. Tests performed
        2. Test results
    iv. Discrepancies: If your system subscribes to multiple ShakeAlert Message (alert) Servers simultaneously, demonstrate that your system can handle differences in the Messages received.
        1. Tests performed
        2. Test results
f. Latency and Performance Measurement
    i. Measuring Latency: Describe how your system measures the time between receipt of a ShakeAlert Message when your system takes action or delivers an alert to end-users. (See Appendix B, ShakeAlert Performance Reporting)
        1. Tests performed
        2. Test results
    ii. System Scalability (Volume): Demonstrate that your system can meet ShakeAlert System latency benchmarks when it reaches the maximum number of clients to be supported.
        1. Tests performed
        2. Test results

g. Security: Describe how overall system security will be maintained in your system, including:
    i. Server room physical security (if not a cloud service)
    ii. Server security update and patching plan
    iii. Intrusion detection
    iv. Protection of USGS ShakeAlert Message (alert) Server credentials
    v. Security of the communications channels for your server(s) to endpoints (clients or devices)

Appendix A: Performance Benchmark

5. Performance Benchmarks (see: ShakeAlert Pilot Phase License Agreement – 1/2022 v2)

5.1 Alerting Speed. Licensee will make reasonable efforts to ensure the fastest possible delivery time of a ShakeAlert-powered alert to end-users. Licensee will 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.

5.2 Recordkeeping. Licensee will record and retain performance information sufficient to meet its obligations under Section 6. Reporting.

Appendix B: ShakeAlert Performance Reporting

- For M4.5+ events the Licensee will report:
    - Total number of phones alerted (USGS can share this publicly)
    - Any unexpected behavior observed?

- For M5.0+ events, alerts to more than 10k users, or at USGS request in special cases the Licensee will report:
    - Time ShakeAlert Message(s) were received by the Licensee from ShakeAlert Message (alert) Servers
    - Time ShakeAlert-powered alerts were received by devices in one (1) second bins and further broken down by now they were connected, WiFi™ or cellular.
    - Any unexpected behavior observed?
- Special circumstances may warrant additional exchange of information.
- The Licensee will provide reports within 7 days of an event or request.