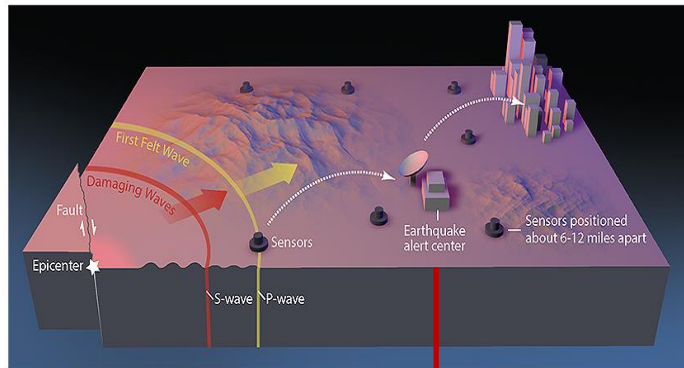


Television Datacasting for Public Safety Alerting and Warning

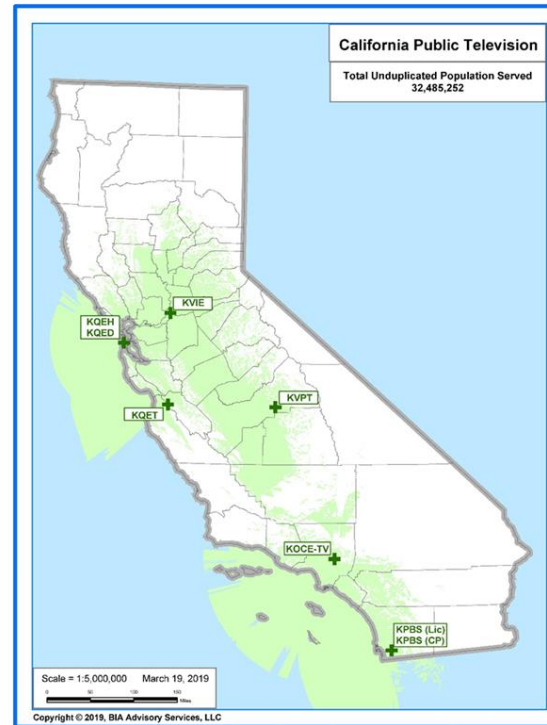


Use-case for Datacasting: California Earthquake Early Warning

Once a quake is detected by sensors, an electronic warning can arrive seconds, or even a minute, before the shaking arrives, depending on distance.



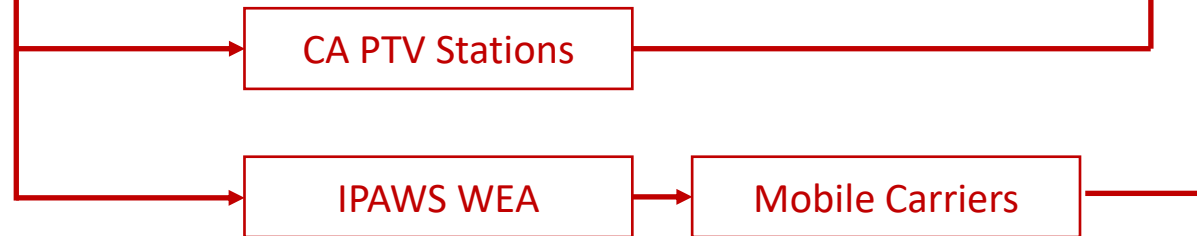
Shake!lert™



< 2 sec



**~4-10 +++
sec**



Why Television Datacasting

Television datacasting for public alerting:

- High-power, high tower = massive reach from a single station (e.g., in CA just six stations reaches ~32M residents)
- Very low latency with simultaneous delivery
- High bandwidth (supports speed and rich-media alerts/updates)
- Leverages existing fortified, survivable broadcast infrastructure
- Adds another parallel path to reach households and residents

Same technology and infrastructure can be used for other public alerting

ATSC3 potential:

- More robust signal and reach
- Device wake-up, even for battery-only devices

Uses for Earthquake Early Warnings

Government - Activate emergency plans and coordinate response efforts.

Fire Stations – Open roll-up doors automatically so they're not shaken out of their frames. Response vehicles won't be stuck behind doors that won't open.

Electrical Utilities – Shut down transmission lines, preventing blackouts and equipment damage.

Water Treatment Plants – Shut down pumps, motors, and other equipment to prevent damage to prevent water contamination and ensure the plant can operate after the earthquake.

Railways/Public Transit – Slow down and stop trains and buses.

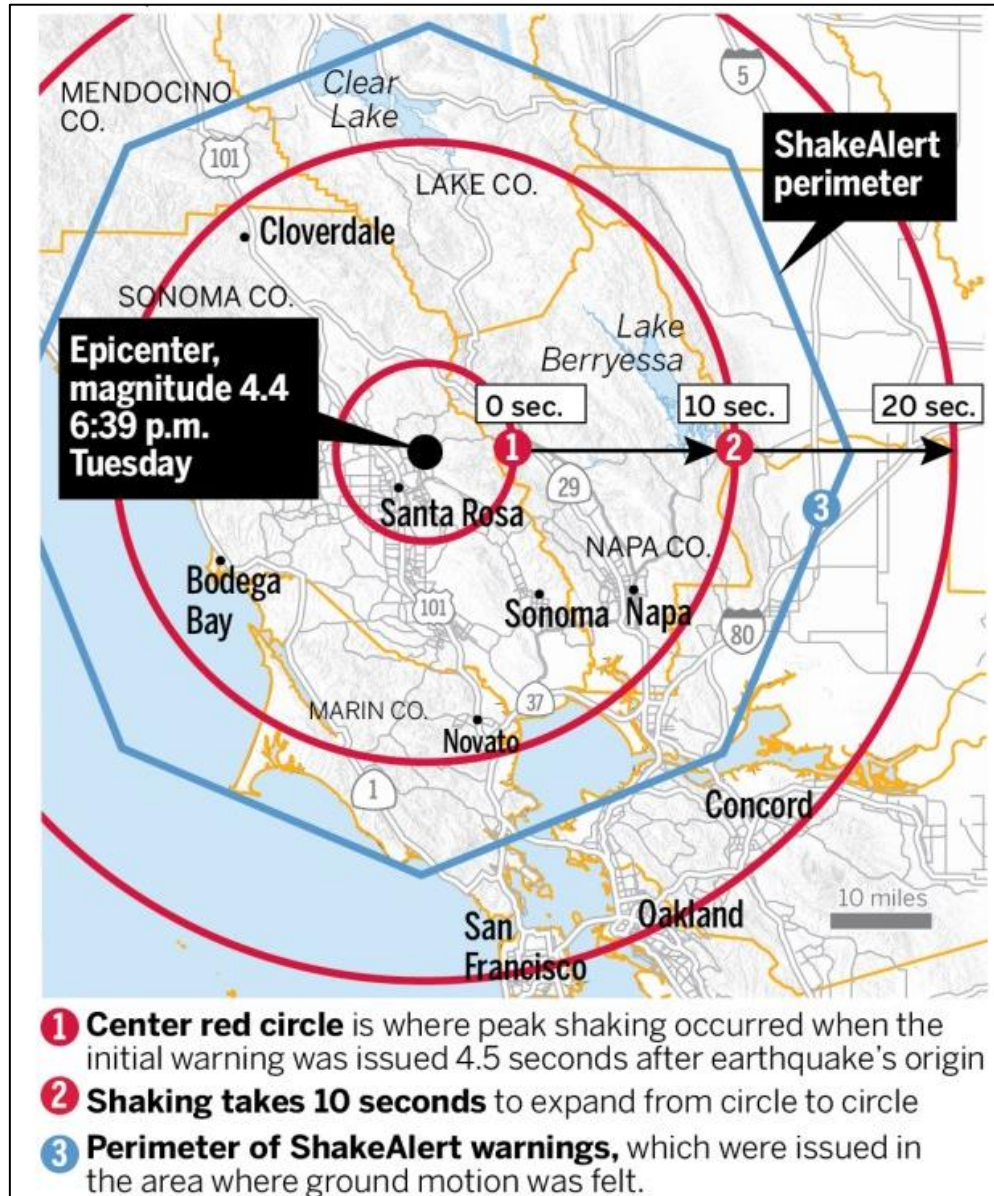
Oil/Gas Refineries – Reduce pressure in pipes and lines.

Manufacturing - Shut down production lines and protect equipment, preventing costly damage and downtime.

Healthcare - Activate emergency plans and protect patients and staff. Evacuate patients from high-risk areas, shutting down equipment, stopping patient procedures.

Education - Ensure the safety of students and staff by evacuating buildings or taking cover.

Real-world example: Santa Rosa

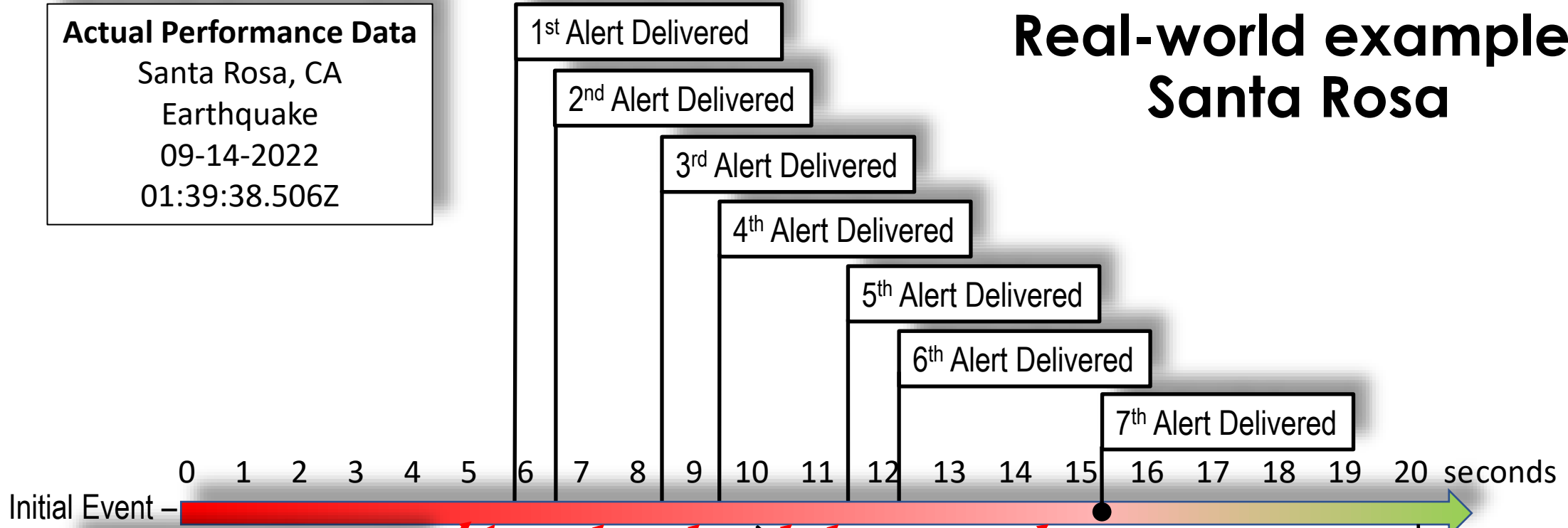


- Santa Rosa, California
- September 13, 2022
- 6:39pm
- Magnitude 4.4

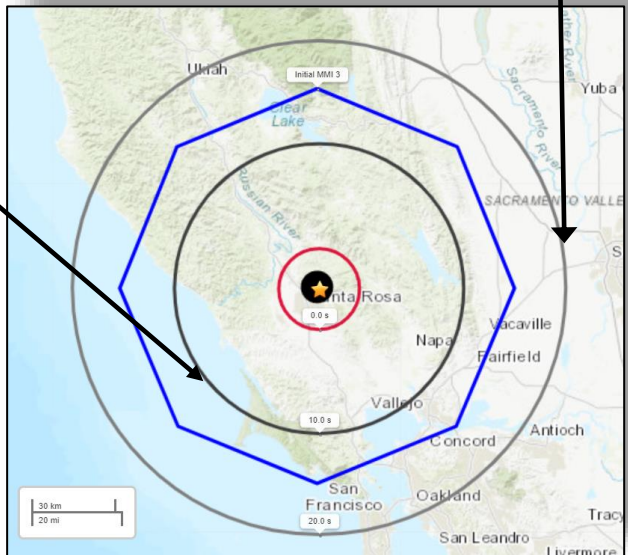
- Time matters:
 - USGS Alert issued 4.5 seconds after origin
 - Entire alert perimeter was shaking within 15 seconds of the alert

Real-world example: Santa Rosa

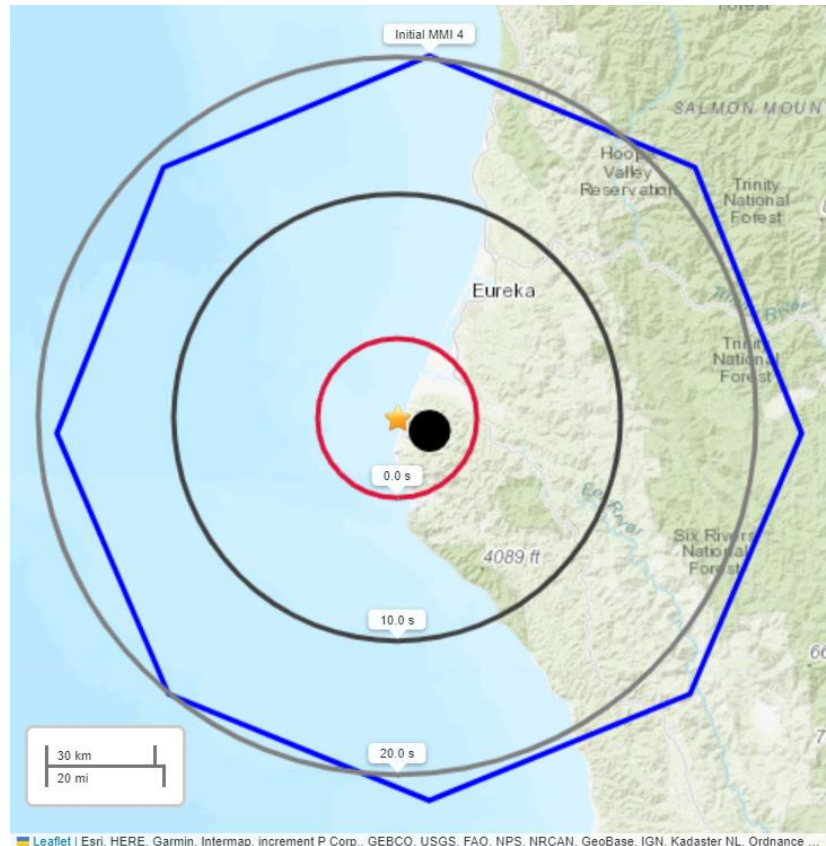
Actual Performance Data
Santa Rosa, CA
Earthquake
09-14-2022
01:39:38.506Z



- USGS 1st Alert Received
- USGS 2nd Alert Received
- USGS 3rd Alert Received
- USGS 4th Alert Received
- USGS 5th Alert Received
- USGS 6th Alert Received
- USGS 7th Alert Received



Real-world example: Ferndale

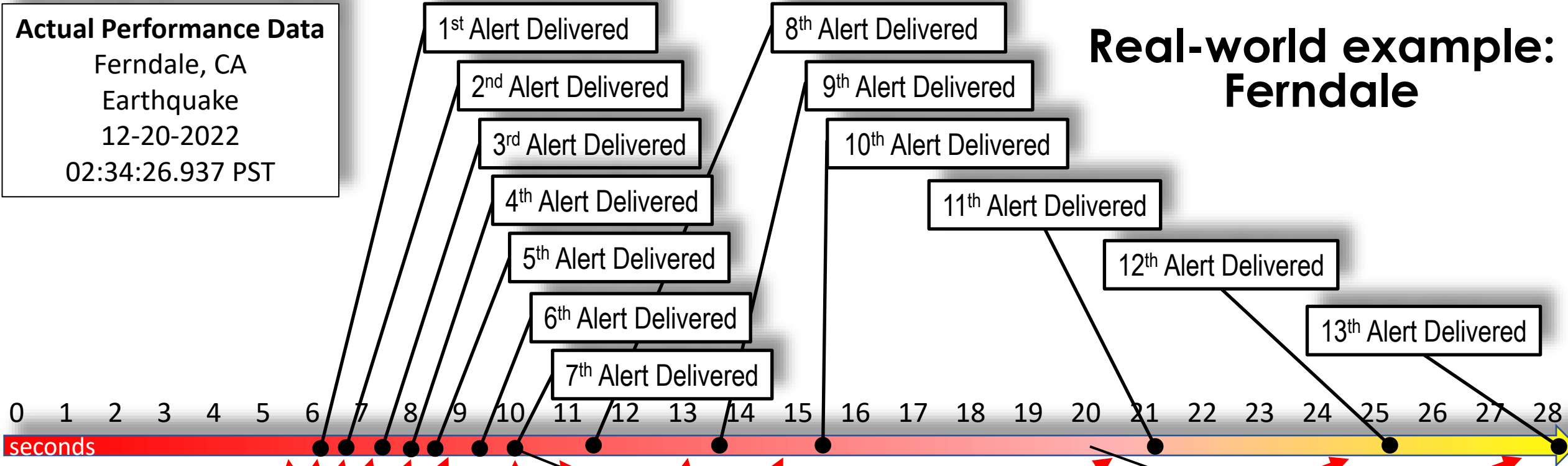


ShakeAlert initial earthquake location (black dot). Polygon shows estimated MMI 4 shaking intensity area. Red circle is front of peak shaking when the message was released. Shaking takes 10s to expand from circle to circle.

- Off the coast near Ferndale, CA
- December 20, 2022
- 02:34am
- Magnitude 4.6
- Time matters:
 - USGS Alert issued 4.5 seconds after origin
 - Alert perimeter edge was shaking within 20 seconds of the alert

Actual Performance Data
Ferndale, CA
Earthquake
12-20-2022
02:34:26.937 PST

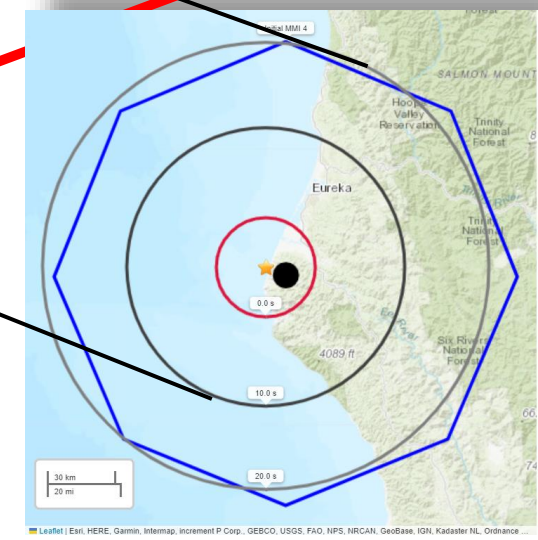
Real-world example: Ferndale



- USGS 1st Alert Received
- USGS 2nd Alert Received
- USGS 3rd Alert Received
- USGS 4th Alert Received
- USGS 5th Alert Received
- USGS 6th Alert Received

- USGS 7th Alert Received
- USGS 8th Alert Received
- USGS 9th Alert Received
- USGS 10th Alert Received

- USGS 11th Alert Received
- USGS 12th Alert Received
- USGS 13th Alert Received



Approximate Geographic Coverage of California Public Television

Phase 1 – Datacasting Pilot Deployment

Phase 2 – Datacasting Full State Deployment

