Schlumberger

# WellWatcher Stim

## Stimulation monitoring service

### APPLICATIONS

- Plug-and-perf operations
- Ball dropping and setting operations
- Multistage fracturing operations
- Diversion stimulation operations
- Real-time multiwell monitoring of well-to-well communication

### BENEFITS

- Optimizes stimulation operations by enabling rapid design changes to suit downhole conditions
- Rapidly confirms downhole events such as actuation ball landing, frac sleeve opening, plug setting, fluid entry into the reservoir, and fluid diversion
- Eliminates remedial operations at a later date by allowing immediate response to missing or unexpected events
- Enables execution of the planned completion strategy by identifying stress shadowing and well-to-well communication events—such as frac hits—in real time

### FEATURES

- Cost-effective wellbore event monitoring
- Minimal footprint on location
- No interruption to operations

WellWatcher Stim* stimulation monitoring service improves fracturing, acidizing, and other well operations via near-real-time confirmation of downhole events. The operator can take immediate action and avoid subsequent remedial operations or loss of production from a zone because an event does not occur as expected. The service can also provide insights leading to improvements in perforation, completion, or stimulation designs.

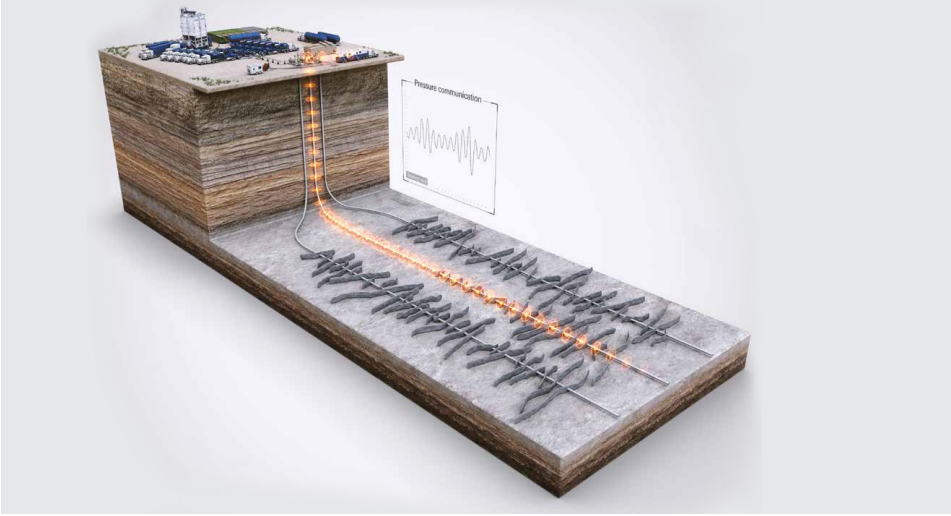
Using the service to monitor interwell communication enables real-time decision making to minimize the detrimental effects of frac hits and stress shadowing. Combining it with Kinetix Shale* reservoir-centric stimulation-to-production software and BroadBand Shield* fracture-geometry control service provides a comprehensive portfolio for asset protection and maximized recovery.

### Familiar technique with an advanced algorithm

The oil and gas industry has long used surface pressure trends to optimize treatment designs and estimate reservoir properties such as permeability and closure stresses. However, slurry density and pump rate changes can affect surface pressure even in the absence of downhole events. Pressure transient analysis also becomes unreliable in unconventional formations because of fluid transmissibility. These factors make conventional pressure monitoring inaccurate for determining the depth or occurrence of downhole events.

However, while pumping, powerful pressure pulses travel downhole and back to the surface at approximately 5,000 ft/s [1,524 m/s]. When the pulse meets a downhole restriction, such as a fracture or tubing diameter change, part of the pulse is reflected to the surface. Proprietary algorithms can decode these return pulses during stimulation treatments to detect and verify critical events such as interstage diversion, interstage isolation, and fracture hits in offset wells.

WellWatcher Stim service uses proprietary technology to analyze the high-frequency pressure pulse data for visualization in the treatment van. The technology has been proven in wells up to 20,000-ft [6,100-m] MD with an accuracy of 150 ft [46 m] or better.




*WellWatcher Stim service speeds up and facilitates stimulation treatment optimization by analyzing high-frequency pressure pulse data. Proprietary technology uses the pressure signals to rapidly detect downhole events such as sleeve opening, plug setting, fracture hits, and fluid diversion.*

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