# SCAN™
# SEISMIC AMBIENT NOISE MONITORING

## INTRODUCTION

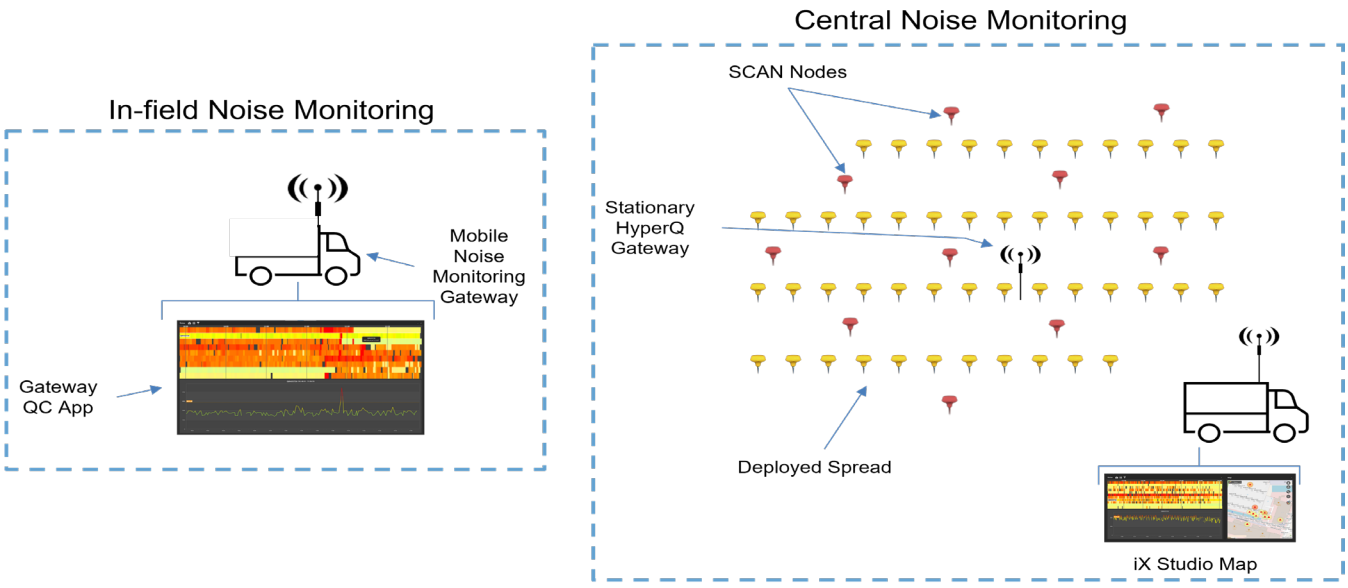
Nodal acquisition systems have proven to provide significant operational advantages over cable-based real time systems. This is primarily due to the elimination of cables and associated ground equipment that deliver continuous connectivity between recording stations in the field and the central system. Nodal systems eliminate interconnectivity between recording stations and the central system to achieve operational efficiency. However, this also removes real time awareness of the status of field equipment. HyperQ was developed to mitigate blind operations by returning status QC from deployed Quantum nodes. SCAN Seismic Ambient Noise Monitoring further leverages the HyperQ network to provide insight into noise on the spread using specially configured standard Quantum nodes

## BENEFITS

- Eliminates the need for a separate, specialized system to monitor noise
- Provides better coverage across the deployed spread
- Utilizes noise detected by the Quantum geophone providing a more accurate assessment of noise impact on the seismic data
- Noise monitoring in instances of borderline signal to noise ratio
  - Difficult geology - near-surface scattering, high velocity layers, interbed-multiples
  - Weak sources - small vibrators, shallow explosives, weight drop
  - High ambient noise sources – wind, rain, facilities, road traffic, airplanes
- Monitoring of natural seismicity on the spread in earthquake prone regions

## OVERVIEW

HyperQ is a long-range, low power wireless network that can be deployed on a Quantum seismic project for centralized node QC. In addition to status QC, the HyperQ network is also used for SCAN. Select Quantum nodes are programmed as SCAN nodes, which enables them to transmit noise values to a HyperQ Gateway. The values can be monitored in-field on a HyperQ Gateway QC tablet or transmitted from the gateway to a central location on the project where noise is displayed graphically and numerically on the associated iX Studio application. Optionally, noise values can be transmitted from a gateway to the cloud, where these values can be accessed via an internet connection, for example from a remote office.

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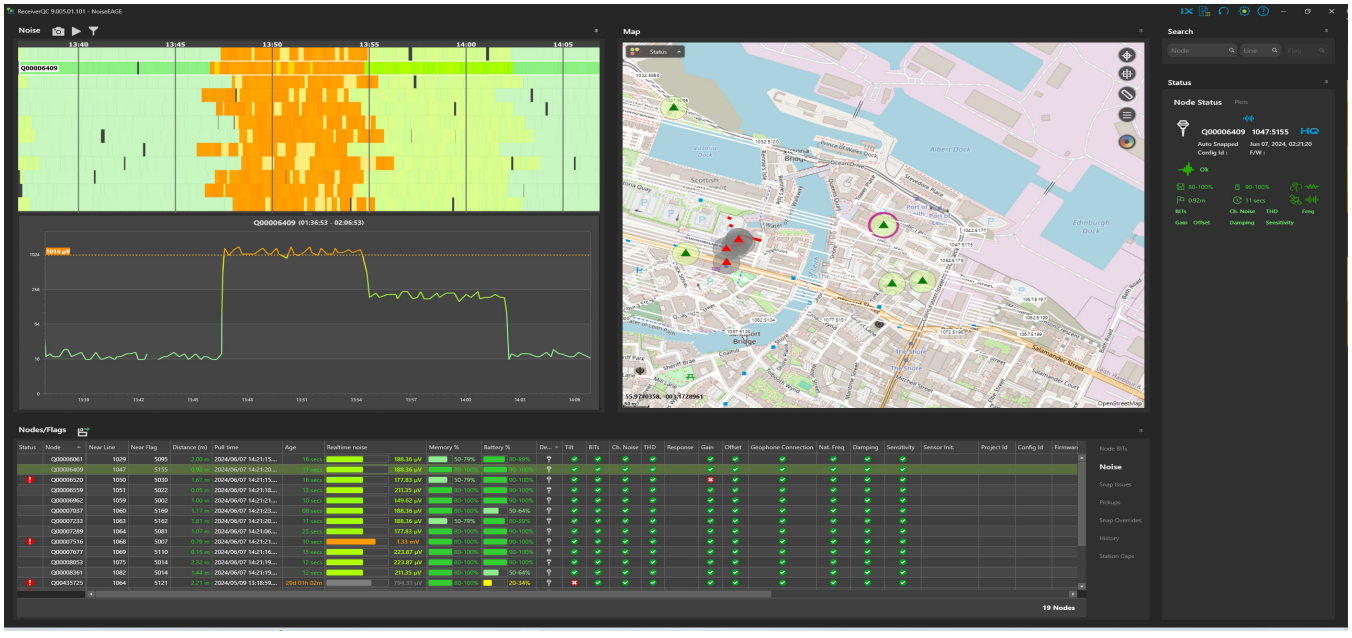
## SOFTWARE APPLICATIONS

Noise value updates are transmitted from the node every 12 seconds when using the EU868 transmission protocol and every 5 seconds when using the US915 protocol. The values are updated on the iX Studio applications running on the gateway QC tablet or the central computer.

## CENTRAL NOISE MONITORING

Below is a screenshot of the noise monitoring display in iX Studio running on a central computer. The colors indicate noise levels in microvolts relative to a user settable threshold level. The color bar chart represents a single bar for each SCAN node being received. Bar charts represent noise values received over a 1-hour rolling window. Clicking on one of the SCAN node bars produces a time series plot that displays the noise level in microvolts for that node. The actual noise value is displayed in millivolts in the tabular view.

The map display shows the position of SCAN nodes on the spread along with a color shaded halo representing the noise level relative to the pre-set threshold value. The map display is useful for analyzing the distribution of noise over the spread, for example to guide decision making on whether to continue source production.



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### IN-FIELD NOISE MONITORING

The screenshot below shows the Noise monitoring tab added to the software that runs on a HyperQ gateway QC tablet. The tablet and gateway are mounted in a truck that can move around the spread, park, then monitor noise in specific areas of the spread. Like iX Studio central noise monitoring, the Noise tab contains a color bar graph of each SCAN node being received and a time series plot for a selected SCAN node. Also, as with central monitoring, noise threshold levels are user settable, and noise is displayed in microvolts over a 1-hour rolling window.