# RockPigeon WITSML Store

Capabilities and technology differentiators across WITSML 1311, 1411 and 2.1

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## Overview

**SigmaStream goes beyond storing and exchanging well data.** RockPigeon, the SigmaStream WITSML store, works with Verás data quality to give operators an interoperability and intelligence layer. It consumes legacy WITSML and modernizes it to WITSML 2.1. It standardizes multi-vendor information, preserves high-frequency data, validates quality and delivers trusted information to downstream applications.

Two editions are available. RockPigeon supports WITSML 1311 and 1411 through the standard SOAP store interface. RockPigeon 2.1 implements WITSML 2.1 over ETP 1.2 and adds completions objects including frac. The SigmaStream Sync Module connects the two so each operator can move to 2.1 on its own schedule.

Both editions sit on YellowHammer, the SigmaStream high-frequency aggregation platform. Most of what sets RockPigeon apart comes from that foundation. Data reaches the store with its mnemonics already standardized and its quality already scored. Consumers can then ask for it at whatever frequency they need.

## Key Technology Differentiators

### Legacy WITSML to WITSML 2.1 Conversion

The Sync Module consumes WITSML 1311 and 1411 data and converts it to WITSML 2.1. Operators get a practical modernization path without requiring every rig, service company or legacy source system to produce WITSML 2.1 natively.

### Operator Standardization

Multi-vendor channel names, units, metadata, structures and conventions are normalized into one operator-defined standard. Different vendor formats go in and a single operator standard comes out.

### SigmaStream Sync Module

The interoperability and synchronization layer between legacy and modern WITSML sources, Verás and operator downstream systems. It bridges existing WITSML 1.x environments into the operator's WITSML 2.1 strategy.

### Expanded GetFromStore

Up to 86,400 records in a single getFromStore call, which is one full day of one-second data. Historical synchronization, recovery and downstream processing need far fewer requests.

### Custom Logs Across Source Frequencies

One log can combine mnemonics from sources publishing at different rates. A 100 Hz time log can draw on a one-second drilling recorder, a 20 Hz surface sub and a 200 Hz vibration sensor.

### Virtual Logs and Log Splicing

Fragmented logs or data streams are spliced logically into one continuous virtual log. Engineers and applications work from a unified dataset that stays traceable to the original sources.

### High-Frequency Data and Wireline Aggregation

Higher-resolution data supports casing deformation analysis, event detection, equipment monitoring and advanced analytics. Wireline depth, line speed, tension, pressure and tool status are correlated with simultaneous pumpdown operations.

### Verás Data Quality

Data is scored on dimensions including min/max value, precision, latency, data gap, stale value, frequency and data count. You learn whether it can be trusted before it reaches calculations, dashboards, automation or AI.

### Native WITSML 2.1 with Completions

RockPigeon 2.1 implements WITSML 2.1 over ETP 1.2 natively. It carries the completions objects that 1311 and 1411 lack, including frac treatment data.

### Operational Intelligence and Beyond

Operational information becomes accessible and actionable in real time for engineers, managers and executives. Decisions move faster, more of the data gets used and knowledge transfers across teams.

### 24/7 Operational Support

Around-the-clock support and escalation for synchronization, connectivity, mapping, data quality and delivery issues across drilling, wireline and completion operations.

### Proven Technology

The technology has run in a supermajor operating environment and has proven itself within a demanding operator data architecture.

## The Difference

| Approach | Data path |
|---|---|
| Traditional WITSML store | Store → Retrieve → Exchange |
| SigmaStream | Consume legacy WITSML → Convert to WITSML 2.1 → Standardize → Synchronize → Preserve high frequency → Splice → Validate → Operationalize → Support 24/7 |

# RockPigeon for WITSML 1311 and 1411

## Standards coverage

RockPigeon implements WITSML 1311 and 1411 and exposes the full store interface: getFromStore, addToStore, updateInStore and deleteFromStore. Clients discover what the server holds through the standard capabilities call. Existing WITSML clients connect without modification.

The supported data objects cover the drilling and real-time domain.

| Group | Data objects |
|---|---|
| Well context | well, wellbore, rig |
| Time and depth data | log, mudLog, trajectory |
| Well construction | wbGeometry, tubular, bhaRun, cementJob, fluidsReport |
| Geology and planning | formationMarker, target, risk |
| Operations | message |

## A full day of data in one request

RockPigeon returns up to 86,400 records in a single getFromStore call. That is one full day of one-second data delivered in one response. Most 1311 and 1411 stores cap a log response far below this number. Their clients have to loop through many paged requests to rebuild the same day, and every round trip adds latency and another chance for a gap.

You will feel the difference during backfill after a connectivity outage, during bulk export to an analytics platform and in any application that pulls long time windows on demand. Fewer calls mean less client code and less load on both ends of the connection.

## Custom logs across source frequencies

RockPigeon can build a log from mnemonics that originate in different sources publishing at different rates. A 100 Hz time log can combine a one-second drilling recorder feed with a 20 Hz surface sub and a 200 Hz vibration sensor. The same approach works in the other direction. Channels arriving at 10 Hz and 1 Hz can be merged and served as a single log at a five-second interval.

The log is assembled at subscription time. RockPigeon subscribes to each constituent channel from YellowHammer at the frequency the log calls for, and YellowHammer handles the alignment. A store built on a conventional database holds only what each source wrote at the rate it was written. Producing the same log there means exporting the data, aligning it outside the server and loading it back in. Almost no other WITSML store offers this capability.

## Virtual logs and log splicing

Data for one well often arrives in pieces. A tool gets swapped, a connection drops or a new service company takes over mid-section, and the result is several partial logs. RockPigeon splices these fragments logically into one continuous virtual log. Applications query a single dataset while every segment stays traceable to its original source.

## The Platform Behind the Store

### YellowHammer and operator standardization

YellowHammer is an industrial aggregation platform that handles data at up to 1 kHz through more than 30 protocol connectors including WITSML, ETP, OPC-UA, Modbus and MQTT. Flat-file CSV sources stream into it through the SigmaStream Data Acquisition Tool. Channel names, units, metadata and structures from each vendor are mapped to the operator's standard before data reaches the store. Every consumer sees one consistent vocabulary whichever service company produced the channel.

### High-frequency data and wireline operations

YellowHammer keeps each source at its native rate, so the store can hold the resolution that engineering work needs. Casing deformation analysis, event detection and equipment monitoring all depend on it. The same capability extends to wireline operations. Available high-frequency depth, line speed, tension, pressure and tool-status channels are aggregated and correlated with simultaneous pumpdown operations. Engineers get one time-aligned view of both.

### Data quality before the store

Verás is the SigmaStream real-time data quality platform. It scores incoming streams across eight quality dimensions including min/max value, precision, latency, data gap, stale value, frequency and data count. The results roll up into a Data Quality Index. Problems are caught as data arrives, and automated alerts reach the responsible people while the well is still being drilled. Tiered dashboards and a fleet-wide wellboard show quality across every active rig. You control what reaches the WITSML store and you know the quality of everything already in it.

### Deployment, security and support

RockPigeon runs on premises, at the rig edge or in the cloud. High availability editions serve operations that cannot tolerate a store outage, while lite editions suit smaller deployments. SigmaStream holds ISO 27001 certification. Its technology is deployed across North America, the Middle East and Central Asia and has run in a supermajor operating environment. SigmaStream provides 24/7 support and escalation for synchronization, connectivity, mapping, data quality and delivery across drilling, wireline and completion operations.

## RockPigeon 2.1

### Native WITSML 2.1 over ETP 1.2

RockPigeon 2.1 is a native implementation of WITSML 2.1 over ETP 1.2. The data model follows the 2.1 schema directly. Growing objects such as logs and channels are held in MongoDB and

contextual objects such as wells, wellbores and rigs are held in PostgreSQL. A 2.1 client reads and writes the stored object itself with no translation layer in between.

All seven core WITSML 2.1 objects are supported: Well, Wellbore, Rig, Log, ChannelSet, Channel and Trajectory. More than 20 extended types add coverage for cement jobs, drilling reports, mud logs, BHA runs and completions.

## Completions and frac

Completions is the largest addition over a legacy store. WITSML 1311 and 1411 have no completions objects. The closest 1411 comes is stimJob for stimulation treatments. RockPigeon 2.1 carries the WITSML 2.1 completions objects including WellCompletion, WellboreCompletion and DownholeComponent, and it supports frac treatment data.

On the acquisition side YellowHammer Completions already captures telemetry from frac, wireline, coiled tubing, plug drillout, pressure testing and flowback operations. The platform that feeds your drilling data can feed your completions data into the same store.

## What WITSML 2.1 changes

The case for 2.1 rests on five capabilities that 1311 and 1411 cannot provide.

| Capability | What it means in practice |
|---|---|
| Atomic multi-object transactions | A set of related objects commits together or not at all. Dependent objects are never left half updated. |
| Server-initiated change notification | The server tells subscribed clients when an object changes. Clients no longer poll to find out. |
| Multi-consumer pub/sub with dataspace isolation | Many consumers subscribe to the same channels at once. Dataspaces keep each partner's data separate. |
| URI-based global object identity | Every object has a formal address that is unique across servers. Per-server uid chains stop being a source of ambiguity. |
| Real-time delivery of structured, authenticated objects | Complete WITSML objects stream in real time over an authenticated ETP session. |

## Security and deployment

RockPigeon 2.1 supports three identity backends. Permission revocation takes effect immediately through a Redis-backed cache. Pilots deploy on Docker Compose and production runs on Kubernetes with auto-scaling.

## Practical Modernization Path

Moving to 2.1 does not require a hard cutover. Existing rigs and vendor systems keep publishing what they publish today while the operator's own environment moves forward.

EXISTING RIG AND VENDOR SYSTEMS

**WITSML 1311 / 1411**

↓ **SigmaStream Sync Module**

**Conversion and operator standardization**

↓ **WITSML 2.1**

**Verás data quality, virtual logs and high-frequency data**

↓ **Operator applications, data lake, analytics and AI**

The Sync Module offers two paths and an operator can use both.

**One-time migration.** Historical data held in a 1311 or 1411 store is transformed into WITSML 2.1 objects and loaded into RockPigeon 2.1. Wells that finished drilling years ago become available to 2.1 applications alongside the wells being drilled today.

**Live translation.** Requests that arrive in 2.1 form are translated and served against a 1311 or 1411 server. Your newer applications speak 2.1 while rigs and service companies that still publish 1411 keep doing so. Each data source moves to 2.1 when it is ready.

**Core technology differentiator:** SigmaStream bridges the operator's existing WITSML 1311 and 1411 infrastructure into a standardized WITSML 2.1 environment without requiring legacy sources to be replaced first. The result is a practical path from today's fragmented multi-vendor WITSML environment toward a standardized, vendor-neutral WITSML 2.1 architecture.

## Replacing an Incumbent Store

Kongsberg SiteCom is a common incumbent. Its published material makes several claims, and each one deserves a direct answer.

| SiteCom claim | RockPigeon response |
|---|---|
| Fastest insert, update and access speeds in the industry, with several hundred thousand log rows returned in milliseconds. | Those figures describe aggregated queries such as averages, minimums, maximums and interpolated values. RockPigeon returns 86,400 raw records in one standard getFromStore call. Ask any vendor for its raw-record limit per request. |

| SiteCom claim | RockPigeon response |
|---|---|
| Non-WITSML sources are converted to WITSML during aggregation. | YellowHammer does the same across more than 30 connectors at up to 1 kHz and keeps each source at its native frequency. That fidelity is what makes custom logs across source frequencies possible. |
| Global mnemonics govern well identity and channel naming. | YellowHammer maps channel names, units and metadata to the operator's standard before data reaches the store. In RockPigeon 2.1 every object also carries a formal URI that is unique across servers. |
| Data quality tools validate planning, real-time and historical data. | Verás scores live streams across eight quality dimensions, alerts the responsible people and shows fleet-wide quality on tiered dashboards. Quality is measured continuously as data arrives. |
| WITSML 2.1 dual support. | Dual support usually places a 2.1 interface over a store designed for 1411. RockPigeon 2.1 stores the 2.1 object model natively, and the Sync Module covers the legacy side through migration or live translation. Ask whether a vendor's 2.1 objects are stored or translated on every request. |

## What a Replacement Delivers

An operator that replaces its incumbent store with RockPigeon gains the following.

- Every 1311 and 1411 capability its current clients depend on, plus full-day retrieval in one call, custom logs across source frequencies and virtual logs.
- Completions coverage including frac through RockPigeon 2.1, held in the same store as its drilling data.
- Standardized, quality-scored data from every vendor with 24/7 support behind it.
- A path to WITSML 2.1 at its own pace through one-time migration, live translation or both.

**SigmaStream, LLC**
2001 Timberloch Place, Suite 500, The Woodlands, TX 77380
solutions@sigmastream.com | +1 713-234-6345 | sigmastream.com