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CASE STUDY # 138

JIO PLATFORMS LIMITED

Jio FraudX

Abstract

The rapid growth of digital communications has transformed telecommunications into one of the most critical pillars of the digital economy. However, this expansion has also led to increasingly sophisticated fraud mechanisms that threaten subscriber safety, network integrity, regulatory compliance and telecom revenues. To address these challenges, Jio Platforms Limited developed Jio FraudX, an AI-powered, real-time fraud-detection and prevention platform created to safeguard India's largest telecom ecosystem.

Operational nationwide, Jio FraudX protects more than 450 million subscribers by processing approximately 60 billion records daily. The platform combines real-time analytics, machine learning, anomaly detection and automated case management to detect and prevent telecom fraud, including SIM Box operations, Wangiri scams, IRSF, bypass fraud, de-duplication fraud, recharge fraud, roaming fraud, telemarketing fraud and dealer fraud. Achieving more than 95 percent detection performance with fewer than 3 percent false positives, the platform has transformed fraud management from a reactive activity into an active, AI-driven defense mechanism at national scale.

Introduction

Jio FraudX was created to address the growing complexity of fraud in India's rapidly expanding telecom landscape. Traditional fraud management systems relied heavily on static rules, manual investigations and delayed reporting, allowing fraudsters to operate undetected for extended periods. With a subscriber base exceeding 450 million and billions of daily telecom transactions, Jio needed a scalable, intelligent, real-time platform to identify emerging fraud patterns before they caused major financial and brand damage.

The solution combines rule-based detection with machine learning models, including Isolation Forest for anomaly detection and XGBoost classifiers for fraud identification. Supported by Apache Kafka streaming infrastructure and containerised microservices, the platform processes approximately 60 billion records per day while maintaining near-real-time response times.

Beyond fraud prevention, Jio FraudX strengthens subscriber trust, enhances compliance with TRAI and Department of Telecommunications mandates, reduces revenue leakage and establishes a scalable AI-powered fraud-detection framework across the wider Reliance ecosystem.

The Problem Statement

Telecommunications fraud has evolved into a highly sophisticated and rapidly changing threat landscape. Fraudsters increasingly exploit network vulnerabilities, subscriber behaviour and operational gaps to conduct activities ranging from illegal call termination and SIM box operations to Wangiri scams, IRSF fraud, telemarketing abuse, roaming fraud and fraudulent recharge activities. These activities result in major financial losses for operators and expose subscribers to harassment, scams and reputational harm.

Prior to FraudX, conventional fraud management approaches were largely reactive. Fraud detection often depended on manual investigations, static threshold-based rules and delayed analysis of transaction data. As fraud techniques evolved, these systems struggled to detect previously unseen attack vectors and frequently generated large numbers of false positives, reducing business efficiency.

The challenge was compounded by scale. With more than 450 million subscribers generating billions of daily transactions for voice, SMS, data, recharges and usage, identifying suspicious activity in near real time required a new technological architecture. The growing need for proactive, AI-driven fraud prevention turndhas become vital to protect revenues, preserve customer trust, maintain regulatory compliance and strengthen the security of India's digital communications infrastructure.

Strategic Vision

Jio Platforms envisioned creating a next-generation fraud-prevention ecosystem to protect India's largest telecommunications network through artificial intelligence, automation and real-time data analysis.

The objective was to move past traditional rule-based fraud management and establish an intelligent platform that learns, adapts and responds autonomously to emerging fraud threats.

The organisation sought to combine machine intelligence with human expertise to create an active defense framework that could operate at national scale while preserving high accuracy and low false detection rates. By processing approximately 60 billion records daily and protecting more than 450 million subscribers, Jio FraudX was designed as a strategic capability to build subscriber trust, protect revenue, ensure regulatory compliance and improve long-term digital security.

The vision also extended to future deployment across other Reliance businesses, enabling unified fraud prevention through a common AI-driven platform.

Solutions Stack

At the core of Jio FraudX is a real-time information processing architecture built on Apache Kafka. The platform ingests voice CDRs, SMS records, data usage records, subscriber information, network data and external fraud data feeds, processing approximately 60 billion events every day.

The first layer of intelligence consists of a configurable rules engine that detects known fraud signatures and established attack patterns. This layer is complemented by machine learning models, including Isolation Forest for anomaly detection and XGBoost classifiers for fraud categorisation. Together, these capabilities enable the platform to identify both known and previously unseen fraud patterns.

A behavioural profiling engine continuously analyses subscriber and network behaviour to identify variations from normal usage patterns. These insights are integrated into a centralised fraud detection engine that generates risk scores and automated alerts in near real time.

To guarantee operational effectiveness, Jio FraudX implements an automated alarm management workflow that ranks cases by severity, assigns them to analysts, tracks investigations and records resolution outcomes. This well-structured workflow improves response times and operational output.

The platform is deployed through a containerised microservices architecture using Docker, enabling scalability, resilience, rapid upgrades and zero-downtime releases. The infrastructure includes 11 application nodes, 13 data nodes, 2 database servers and more than 600 TB of combined storage capacity across multiple layers.

Jio FraudX also includes advanced analytics dashboards featuring geographic visualisations, trend analysis, drill-down investigations, fraud correlation, automated reporting and API integrations with CRM, billing and regulatory systems. The platform provides more than 10 smart features, including natural language search, predictive fraud analytics, self-learning rules, AI-assisted query development, graph analytics, automated case prioritisation and smart dashboard generation. Six of these capabilities are powered directly by artificial intelligence.

Implementation Journey

The initiative began in the fourth quarter of 2024 with an extensive review of fraud patterns throughout Jio's network. The analysis identified major threats including SIM Box fraud, Wangiri scams, IRSF, bypass fraud and other telecom-specific attack vectors. Based on these conclusions, the organisation decided to build an AI-powered fraud management system integrating rule-based and machine-learning detection mechanisms.

During the first quarter of 2025, the technical architecture was finalised. Key decisions included adopting Apache Kafka for streaming analytics, implementing a Data Lake architecture, using Isolation Forest models for anomaly detection and deploying XGBoost algorithms for fraud classification.

The second quarter focused on development and integration. Core modules, including ingestion services, machine learning engines, alarm management workflows, behavioural profiling systems and dashboarding capabilities, were developed and integrated with existing telecom infrastructure. During testing, behavioural models achieved a fraud detection rate exceeding 95 percent.

A pilot deployment was undertaken during the third quarter of 2025 across selected telecom circles. Feedback from fraud analysts enabled fine-tuning of detection thresholds and further reduction of false positives. Following successful pilot outcomes, the platform was rolled out across all circles during the fourth quarter of 2025 and continues to undergo continuous model retraining and optimisation.

Highlights

- Jio FraudX is an AI-powered fraud detection and prevention platform developed by Jio Platforms to protect India's largest telecom ecosystem and strengthen network security.
- It safeguards 450+ million subscribers by processing approximately 60 billion records daily in near real time.
- It detects multiple fraud types, including SIM Box fraud, Wangiri scams, IRSF, bypass fraud, recharge fraud, roaming fraud, telemarketing abuse and dealer fraud, helping reduce exposure to fraud.
- Jio FraudX combines rule-based detection, Isolation Forest anomaly detection, XGBoost machine learning models and behavioural profiling to identify both known and emerging fraud patterns more effectively.
- Built on Apache Kafka and a scalable microservices architecture, it delivers automated alerts, risk scoring, case prioritisation and investigation workflows to speed fraud response.
- The solution achieves over 95 percent fraud-detection accuracy, maintains less than 3 percent false positives and delivers 99.9 percent uptime across all 22 telecom circles, providing reliable protection at scale.

Outcomes

Jio FraudX has delivered significant operational, financial and customer-protection outcomes, strengthening fraud response across the organisation.

The platform achieves more than 95 percent fraud-detection accuracy whilst maintaining a false-positive rate below 3 percent. This exactness enables analysts to concentrate on genuine threats while limiting unnecessary investigations.

Processing capacity has scaled to approximately 60 billion records per day, enabling near-real-time fraud detection throughout the entire network. Fraud patterns that previously required hours or days to identify can now be detected and acted upon almost immediately.

The system has substantially lowered revenue leakage by identifying and blocking SIM Box operations, bypass fraud, subscription fraud, recharge fraud and other revenue-impacting activities before they can scale. At the same time, subscriber complaints about spam calls, harassment and fraud have declined significantly, increasing customer trust and the overall service experience.

Operationally, the platform maintains 99.9 percent uptime while supporting pan-India deployment across all 22 telecom circles. Its horisontal scaling architecture permits seamless expansion as subscriber volumes and data traffic continue to grow.

The initiative has also established Jio as a point of reference for telecom fraud prevention, regulatory compliance and AI-based security innovation. By combining machine learning, automation, real-time analytics and scalable infrastructure, Jio FraudX has demonstrated how advanced technologies can be leveraged to secure one of the world's largest digital communications ecosystems.

Conclusion

Jio FraudX represents a major progress in telecom fraud management, transforming fraud detection from a reactive operational function into an intelligent, predictive and continuously advancing security capability. Through the combination of Apache Kafka streaming, Isolation Forest anomaly detection, XGBoost classification models, behavioural profiling, automated workflows and AI-driven analytics, the platform protects more than 450 million subscribers.

Its achievements like 95 percent-plus recognition precision, less than 3 percent false positives, 99.9 percent uptime, pan-India deployment and the ability to combat multiple categories of telecom fraud in near real time demonstrate the effectiveness of combining artificial intelligence with large-scale telecom operations.

As fraud techniques continue to evolve, Jio FraudX provides a scalable foundation for future innovations in predictive fraud prevention, AI-powered security and digital trust across India's communications infrastructure.

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