Customer Case Study:
i2i Systems Delivers Real-Time Online Charging for Mobile Operators

Executive Overview

i2i Systems is a Turkish systems integrator and software development company with approximately 250 staff, maintaining long-standing relationships with major operators including Turkcell, Türk Telekom, and Vodafone Turkey. Its Frontiers-CBS Online Charging System (OCS) sits at the revenue heart of mobile operator infrastructure, making real-time credit decisions on all voice calls, data sessions, and SMS messages its customers' subscribers generate.

Modern mobile operators demand an OCS that can authenticate subscriber credit, charge usage, and enforce shared bundle quotas; all within milliseconds, across millions of concurrent sessions, without ever losing a transaction. For i2i, the legacy Oracle/Times Ten stack could no longer meet this bar. It was expensive to scale, difficult to virtualise, and brittle under peak load.

i2i Systems selected Volt Active Data as the decisioning layer for Frontiers-CBS, replacing Oracle/Times Ten as the high-velocity charging backend. The outcome:

- Charging decision latency reduced from seconds to sub-10 milliseconds
- 99.999% system availability through Active-Active clustering
- Zero revenue leakage from delayed or failed charging decisions
- Linear horizontal scaling replacing costly Oracle/Times Ten scale-up
- Full virtualisation support enabling cloud-native operator deployments
- Real-time concurrent deduction across shared household and MVNO bundles

> We needed a high throughput, easy to scale and available in-memory database. VoltDB was selected because of its references in the Telecom sector, and the way it solves high availability and horizontal scalability." — Head Engineer, i2i Systems

Key Performance Results

Deployed in production serving major Turkish operators, Frontiers-CBS with Volt Active Data delivers:

Metric	Legacy System	With Volt Active Data
Charging Decision Latency	Seconds (batch / near-real-time)	**Sub-10 milliseconds**
SLA Compliance	At risk under peak load	**Consistently met**
System Availability	Single-point failure risk	**99.999% (Active-Active)**
Horizontal Scalability	Costly Oracle/TimesTen scale-up	**Linear node expansion**
Revenue Leakage Risk	High (delayed deduction)	**Eliminated**
Virtualisation Support	Poor	**Full virtualisation ready**
Shared Bundle Management	Manual/delayed	**Real-time, concurrent deduction**

Technical Architecture

Real-time Online Charging for Mobile Operators

i2i Systems
innovation to integration

Challenges

- Online *real-time* charging for mobile operators
  - Integrate with network nodes responsible for handling voice, data, and SMS traffics
  - Check if the subscriber has credit to make the call
  - Charge the subscriber
  - Deduct usage from subscriber balance
- Scalability, high throughput and avaiablity
- Virtualization

Solution

VoltDB stores and provides instant access to:

- All subscribers data (phone number, sim number, products purchased etc.)
- Subscriber balance and credit data

Results

- Accurate, real-time online charging at scale, high throughput and availability
- Access all subscriber data quickly and reliably
  - Enable multiple people to access the same shared data in real-time
- Run seamlessly in a virtualized environment

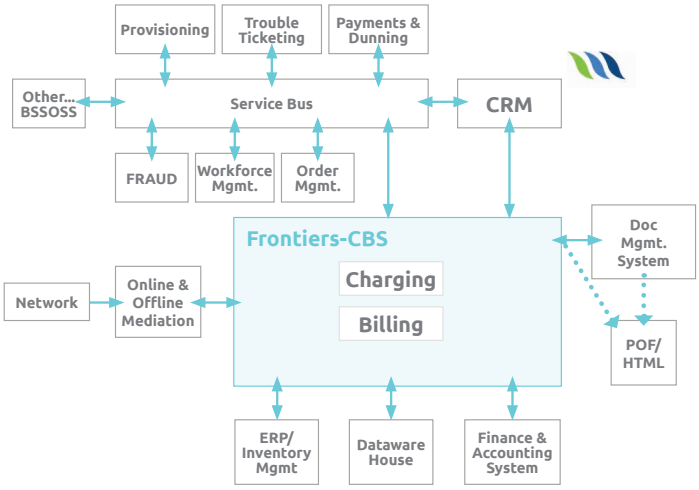

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Figure 1: i2i Systems Frontiers-CBS — Real-Time Online Charging Architecture powered by Volt Active Data

Business Challenge: Charging Decisions That Cannot Wait

In mobile telecoms, a charging decision delayed is revenue lost. When a subscriber makes a call, initiates a data session, or sends an SMS, the network node reaches out to the OCS in real time to check credit availability before allowing the action to proceed. Any latency beyond a few milliseconds' risks SLA breach. Any failure in that path risks fraudulent usage, double-spend, or network node timeout each with direct financial and reputational consequences.

i2i Systems built Frontiers-CBS to serve this exact function. But as operator requirements scaled, more subscribers, more concurrent sessions, more complex shared bundle products, the limitations of the Oracle/TimesTen stack became critical:

> **Scale cost**: Oracle/TimesTen scale-up was commercially unsustainable in competitive telecom markets

> **Virtualisation gap:** Legacy stack offered poor virtualisation support, blocking modern cloud-native deployments

> **Peak load brittleness:** Under high-concurrency conditions, charging decision latency degraded and SLAs were at risk

> **Revenue leakage:** Delayed or failed deductions opened windows for subscriber credit abuse and billing errors

> **Shared bundle complexity:** Managing concurrent deductions across household or MVNO-shared bundles required consistent atomic state that the legacy stack could not maintain

Technical Challenges

Four structural issues drove i2i's decision to replace the legacy backend:

1. **Fragmented Concurrent State**
   Multiple subscribers sharing the same bundle — voice minutes, data quota, WiFi time — were simultaneously deducting from a shared finite resource. The legacy system could not guarantee atomic, consistent deduction across concurrent sessions, creating race conditions and potential over-spend.
2. **Latency Under Load**
   At peak, network nodes require credit decisions within milliseconds. The disk-bound Oracle/TimesTen architecture could not sustain sub-10ms response times under high concurrency, threatening SLA compliance with major operators.
3. **Scale Economics**
   Oracle/TimesTen's scale-up model required expensive hardware expansion to handle volume growth. Horizontal scalability — adding nodes to distribute load linearly — was not viable on the legacy stack.
4. **Virtualisation Readiness**
   Operator infrastructure is moving to virtualised and cloud-native environments. The legacy stack's poor virtualisation story was a strategic blocker for i2i's competitive positioning with modern operator customers.

The Volt Solution: Real-Time Charging Decisioning Layer

i2i Systems integrated Volt Active Data as the in-memory state and decisioning core of Frontiers-CBS. The architectural principle aligns directly with Volt's decisioning layer narrative: move the charging logic to the data, not the data to the logic.

All subscriber state phone number, SIM identity, product entitlements, real-time balances, and quota positions across voice, data, SMS, WiFi, and IPTV lives in Volt's in-memory partitioned tables. Every charging decision is made atomically, at the point of data, in a single stored procedure execution:

- Single in-memory engine ingests charging requests, validates credit, and deducts in one ACID transaction
- 100% of subscriber balance and entitlement state held in Volt, sub-10ms read/write access guaranteed
- Concurrent deductions from shared household or MVNO bundles serialised per partition zero race conditions
- Policy enforcement (throttle, block, notify) applied deterministically within the charging transaction boundary
- Active-Active clustering provides k-safety redundancy with sub-millisecond failover

Why Volt Active Data?

i2i evaluated alternatives before selecting Volt. The decision aligned with five non-negotiable requirements of real-time online charging:

1. **ACID Consistency at Speed**
   Charging decisions must be both fast and correct. 'Eventually consistent' is not a valid state in a live revenue system. Volt uniquely combines sub-10ms execution with full ACID transactional guarantees ensuring that every deduction is atomic, isolated, and durable, even at peak concurrency. Unlike NoSQL or eventually consistent databases, Volt ensures no race conditions and no over-spend.

2. **Horizontal Scalability**
   Unlike Oracle/TimesTen's scale-up model, Volt scales linearly by adding nodes. As operator subscriber volumes grow, i2i can expand capacity without architectural changes or commercial step-costs. Each added node participates immediately in live production traffic.

3. **High Availability by Design**
   Volt's Active-Active clustering provides k-safety redundancy with sub-millisecond failover. No single node failure can interrupt charging decisions directly supporting the 99.999% availability demanded by tier-one operator SLAs. Combined with ISSU, platform upgrades proceed without maintenance windows.

4. **Proven Telecom References**
   Volt's established track record in telecoms including 5G mediation, policy enforcement, and real-time charging deployments globally gave i2i confidence in production readiness for mission-critical operator environments.

5. **Virtualisation Ready**
   Volt runs on standard commodity hardware and virtualised infrastructure, resolving the strategic gap that Oracle/TimesTen created for i2i's cloud-native operator customers.

Architecture and Implementation Highlights

Three core pillars define the Volt deployment within Frontiers-CBS:

> **In-Memory Subscriber State Store:** All subscriber data identity, purchased products, and real-time balance positions across voice, data, SMS, WiFi, and IPTV maintained in Volt's in-memory partitioned tables. Sub-10ms read/write access guaranteed under sustained load

> **Real-Time Charging Engine:** Network nodes (3GPP Diameter / REST) submit charging requests directly to Volt stored procedures. The stored procedure executes the full credit check → authorise → deduct workflow in a single atomic transaction. Multiple concurrent sessions deducting from shared quotas serialised per partition zero double-spend risk

> **Policy and Threshold Control:** Volt enforces limit and threshold policies as part of the charging transaction not as a downstream process. When a subscriber reaches their quota, the decision to throttle, block, or notify is made deterministically within the same execution path as the deduction

The application stack combines Volt Active Data with Apache Kafka and Akka for event bus infrastructure, with PostgreSQL or Oracle used for long-term persistence beyond Volt's active intra-day state window.

The system had to sit in the middle and manage customers that are using three or four different systems to use their quotas; technically challenging, and exactly Volt's sweet spot.

Business Outcomes and Benefits

The results of the Volt Active Data deployment were immediate, measurable, and material to i2i's operator customers:

SLA Compliance Guaranteed
Sub-10ms charging decisions sustained under peak operator load. Tier-one operator SLAs consistently met not aspirationally, but architecturally.

Revenue Protection
Real-time, atomic deduction eliminates the delayed-charging window that drives subscriber credit abuse and billing errors. Revenue leakage eliminated, not reconciled.

Elastic Scale Economics
Linear horizontal scaling replaces costly Oracle/TimesTen scale-up. Capacity grows with subscriber volumes at predictable cost, with no architectural changes required.

Cloud-Native Readiness
Full virtualisation support enables i2i to serve operator customers modernising to cloud-native and virtualised infrastructure a direct competitive differentiator.

Conclusion: Charging Decisions as a System Property

Real-time online charging is not a billing exercise. It is a test of decisioning architecture. Operators processing millions of concurrent sessions across voice, data, SMS, WiFi, and shared household bundles cannot tolerate charging systems that batch, delay, or approximate. A charging decision that arrives late is indistinguishable from a wrong decision.

With Volt Active Data as the decisioning core of Frontiers-CBS, i2i Systems has built a charging system where correctness, speed, and availability are architectural guarantees not operational aspirations. For its operator customers, this means:

- Zero revenue leakage from delayed or failed charging decisions
- Consistent SLA compliance under peak concurrency
- Deterministic shared bundle management across household and MVNO structures
- A platform ready for 5G, cloud-native, and next-generation service architectures

Volt's unique combination of in-memory speed, ACID transactional integrity, and linear horizontal scalability makes it the engine of choice for mission-critical online charging where every millisecond of decision latency has a direct revenue consequence.

Charging compliance is no longer a function of reconciliation. It is a function of architecture.

Ready to make real-time revenue decisions?

Volt Active Data is purpose-built for the latency, throughput, and consistency demands of real-time charging and monetisation. Whether you are modernising an Online Charging System, enforcing entitlements at scale, or building next-generation usage-based services, Volt gives you the platform to be correct; provably, at scale, in real time.

Talk to a Volt Solutions Architect today.

Visit www.voltactivedata.com, email info@voltactivedata.com or contact your Volt account team to arrange a briefing and proof-of-concept scoping session.