

Oracle Cloud Scale Charging

Engineered for hyperscale operations

ORACLE®



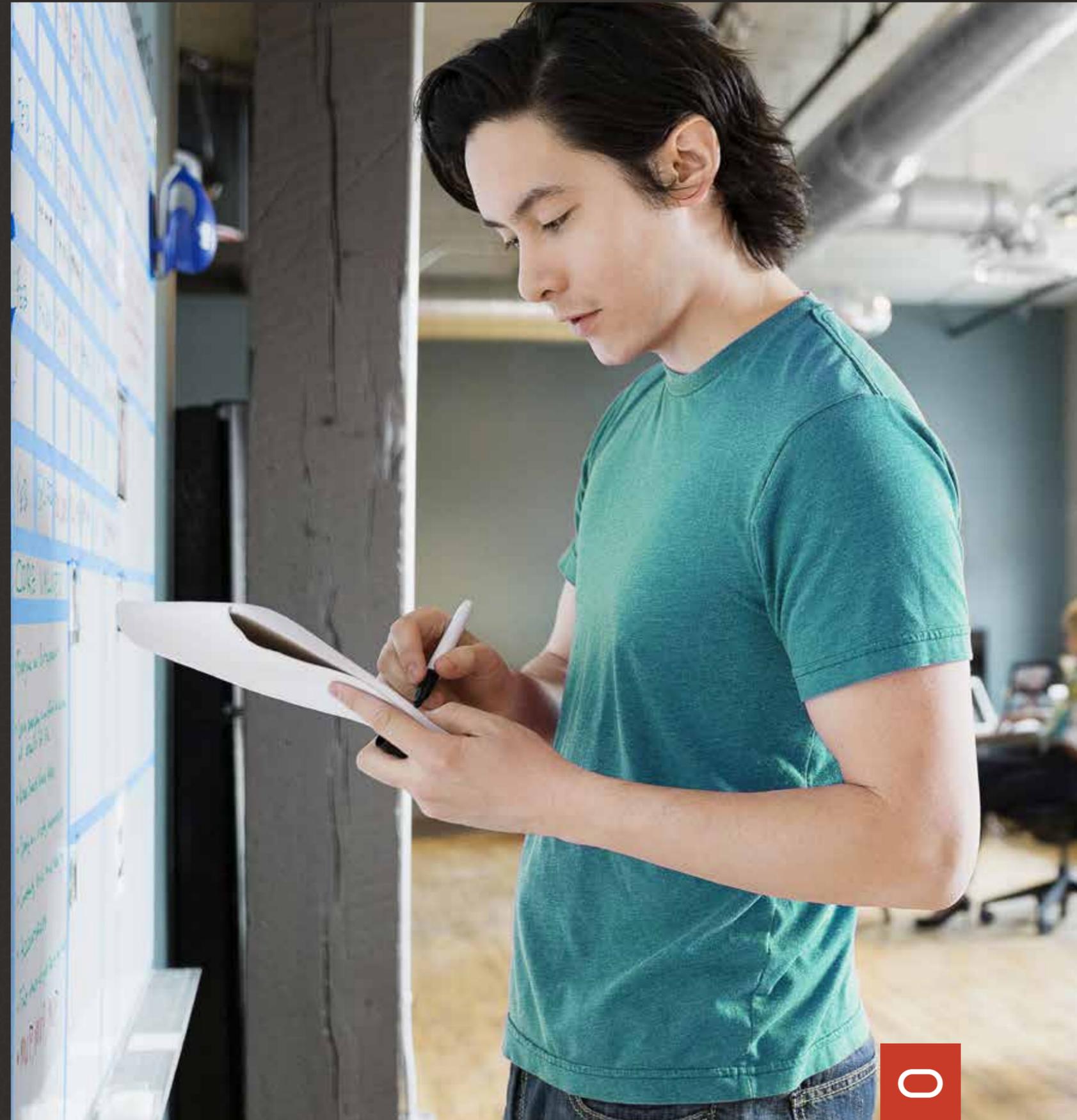
You've invested in 5G. Now it's time to monetize.

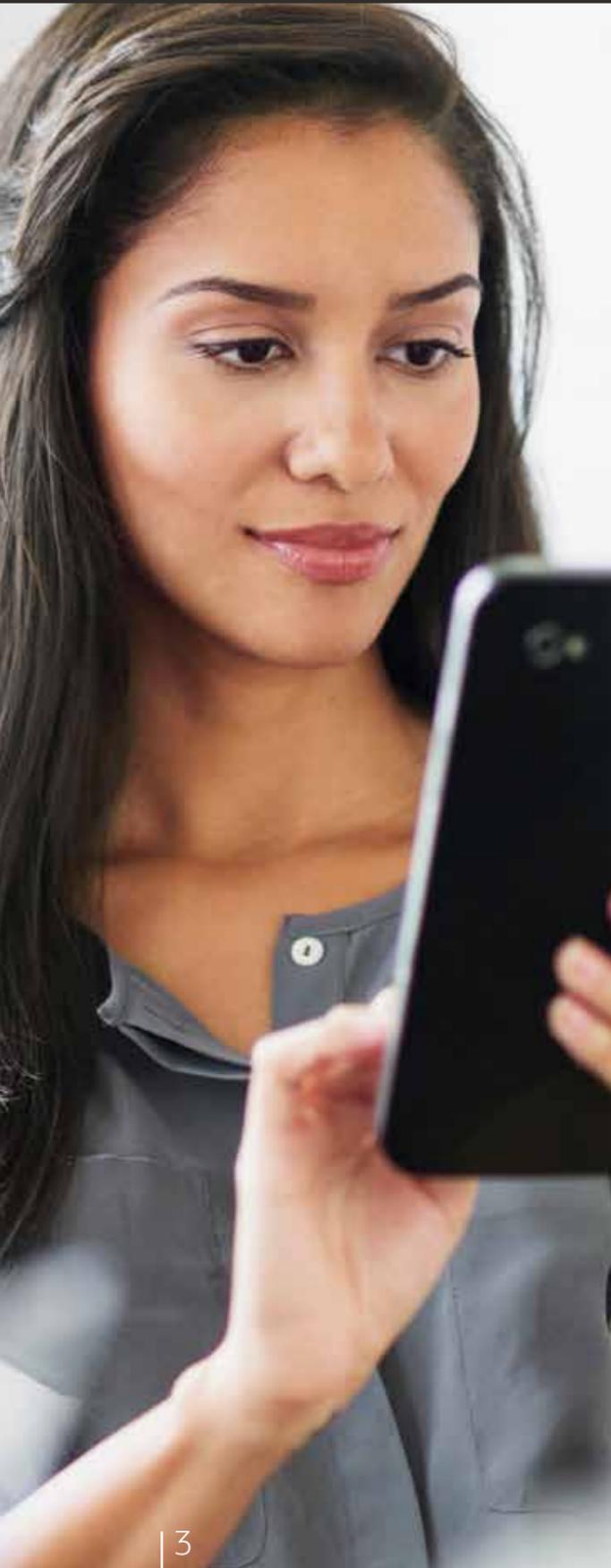
5G's faster speed and lower latency will enable the "everything connected" experience for lifestyle and commerce. Industries will increasingly be powered by network slice based offers using standalone 5G core networks which are cloud native from the very beginning.

But there's no point building low latency into the 5G network if the end user experience is hampered by a charging architecture that struggles to keep up with the scale, complexity, and accuracy required.

Market leading service providers will monetize 5G with value-based offers to both consumers and enterprises. But they can't let innovation be limited by real-time charging restraints within increasingly complex models and B2B2X use cases.

Tomorrow's converged charging system needs to be different. It must be cloud native and support rapid business flexibility across the entire revenue lifecycle. And it needs low latency performance, gold-standard availability, and linear scalability.





Unleash cloud native charging efficiency

Cloud native is mandatory. 5G converged charging systems need to take optimal advantage of compute, network, and storage infrastructure to operate and scale efficiently as the business demands. They need to support a cloud native deployment with a containerized, orchestrated, and multi-service architecture designed for business-critical applications.

DevOps driven operational agility

It's also essential for converged charging systems to work well with today's DevOps aligned CI/CD (Continuous Integration/Continuous Delivery) tool chains. This will help to minimize time-to-value, scale efficiently, and improve the overall operational quality of deployments.

While cloud native applications are not new, they're still relatively unproven at scale for business-critical communications applications such as converged charging systems.

Converged charging system performance needs to be validated using realistic, large scale traffic tests on cloud native infrastructure.

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Low latency performance



Performance is a measure of transaction processing efficiency.

Service providers will monetize 5G with personalized offers, plans, bundles, and subscriptions for any mobile or IoT-enabled device. Many monetization strategies are focused on enterprise with B2B2X use cases—these increasingly require very large and complex hierarchies.



All these strategies need to take place with real-time charging and spend control. And it needs to be 5G fast—that's why performance is extremely important.

To preserve the low latency use cases that 5G enables, real-time charging transactions must be processed with single digit millisecond latency alongside always accurate rating, balance, and threshold management. Converged charging systems must support complex charging structures while maintaining extreme performance with high throughput and parallel transaction processing.

Network-grade availability



Availability is a measure of a system's ability to be operational.

With so many 5G use cases dependent on services never failing, converged charging is a business-critical application which can never go down. It's also the real-time engine of digital BSS.



It's more important than ever for converged charging to be delivered with network-grade availability while minimizing the risk of revenue leakage at any level.

Converged charging must provide availability at the software level with fault tolerant state and data management. And it must also provide availability at the hardware level with geographic redundancy where the “gold standard” ensures business continuity with active-active multi-site deployment.





Linear scalability

Scalability is a measure of the system's ability to maintain performance and expand efficiently as the traffic requirements grow.

Engineering an application to support complex transaction processing is far from straightforward. It's even harder to maintain this feature richness while efficiently processing charging transactions generated by many millions of provisioned accounts. And simultaneous connections are set to go through the roof with the everything connected era.

Converged charging systems must be able to monetize existing 2G-4G offerings as well as 5G with linear scalability and efficient resource utilization.



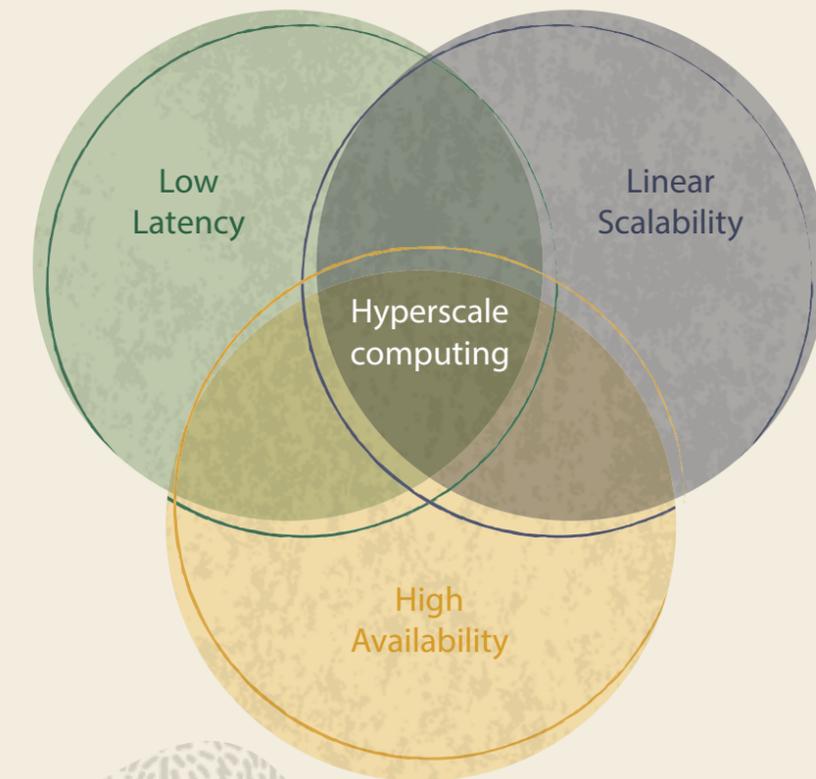
The Need for Hyperscale

Converged charging systems need to be 5G fast and remain fast even under heavy load, staying up and running even through failure of any underlying hardware or software components.

While it's relatively easy to satisfy any one of these three requirements individually, and not too difficult to comply with any two of them, it is considerably more difficult to fulfill all three at the same time.

How should converged charging systems be engineered for hyperscale demands?

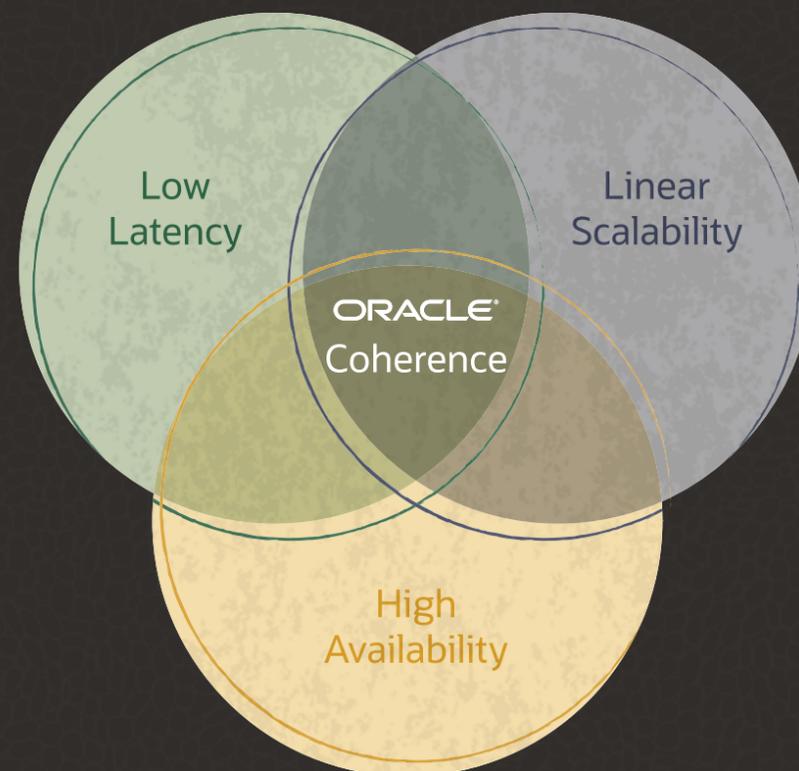
Cloud native microservices architecture



Oracle Coherence gets the in-memory data architecture right

Oracle Coherence is the industry-leading in-memory data grid solution to fulfill high availability, high scalability, and low latency—all at the same time.

It has a dynamic mesh-based architecture to power mission-critical applications with fast data access, while enabling predictable scalability. It also provides support for a cloud native microservices architecture.



Why Oracle Coherence is a perfect foundation for 5G converged charging demands:

- Fault-tolerant in-memory distributed data caching and processing
- True linear scalability and capacity on demand
- Persistence for fast recovery from planned or unplanned outage
- Proven in other very demanding environments such as financial services
- Deep investment in R&D technology and proven ability to scale critical enterprise applications over two decades
- Constant improvements to resiliency and performance through the combined test/feature requirements of hundreds of other uses

To learn more about in-memory data grids (IMDG), view our eBook “In-Memory Data Grids for Dummies”

Introducing Oracle Cloud Scale Charging

From the outset we built Cloud Scale Charging using Oracle Coherence. This forms the basis of our converged charging system where the real-time rating and balance management functions are underpinned by a high performance in-memory charging grid.

The charging grid provides a unique approach to real-time transaction processing since it co-locates data and processing to deliver extremely fast rating and balance management, with complete transactional consistency.

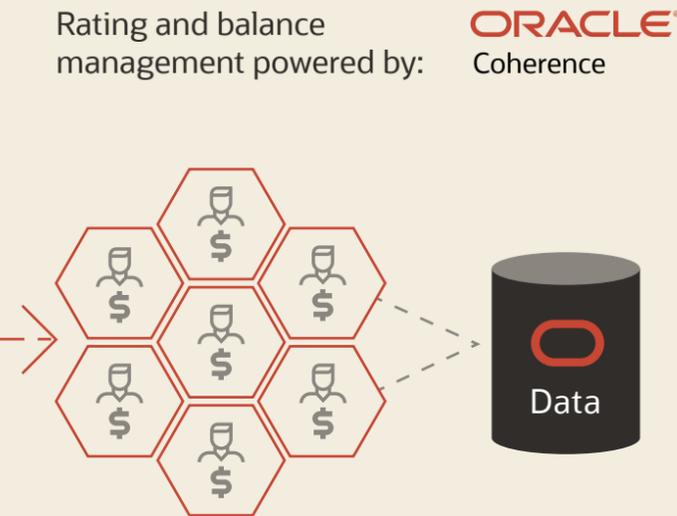
Billions of connected people



Many billions of connected sensors



5G network and service usage events



“Converged charging systems designed for the 5G era must exhibit a wide array of critical attributes never before needed at such a hyperscale level of effectiveness. This includes extreme business flexibility, superior operational efficiency, high-level availability, and multi-dimensional business model addressability while delivering real-time attention to changing business needs. Accomplishing such requires cloud native deployment within an automated operations environment.”

Karl Whitelock,
Research Vice President,
Communications Service Provider
Operations & Monetization, IDC

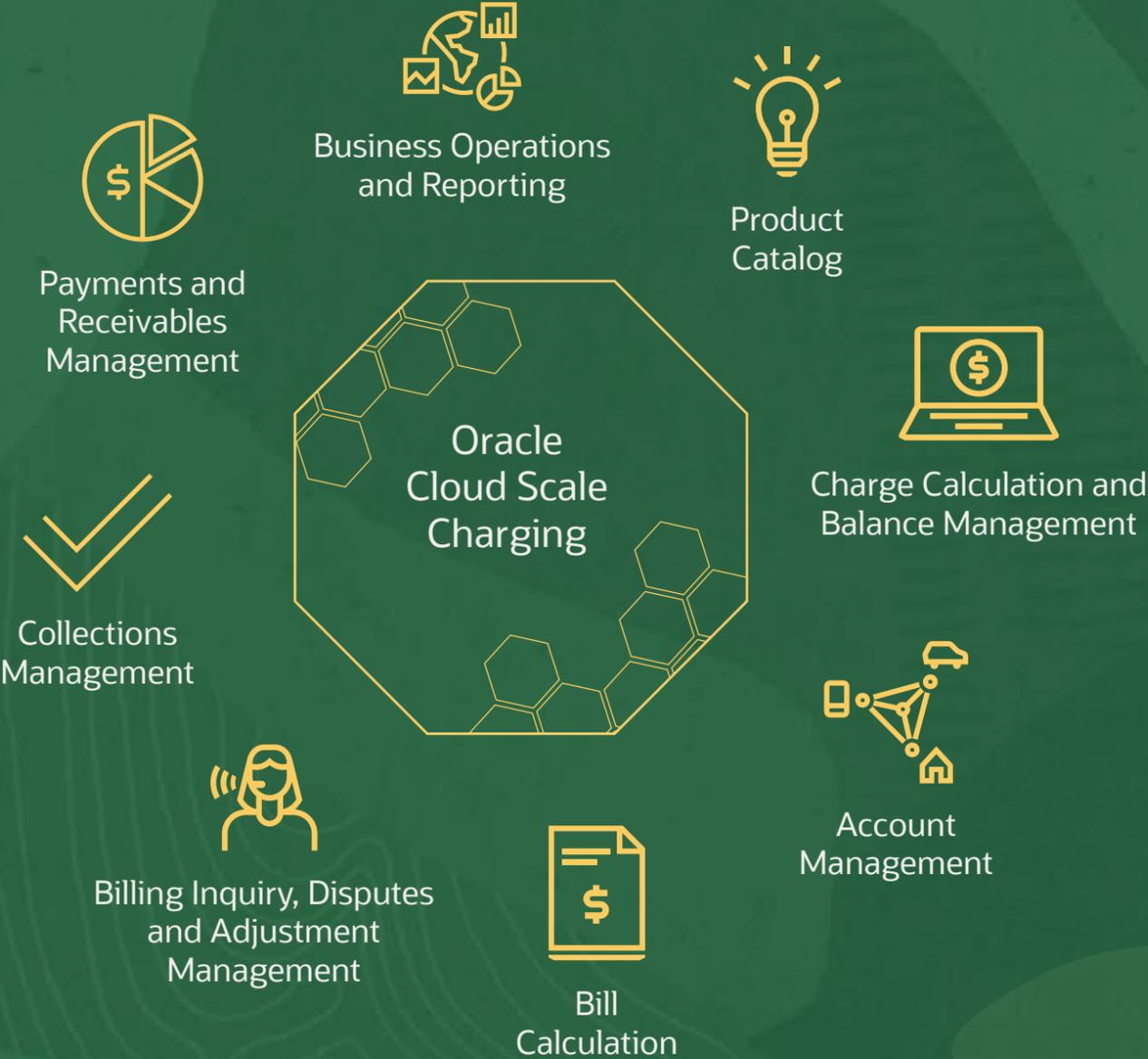


Oracle's Cloud Scale Charging

Designed to bridge network and IT domains

Integrates with any generation of mobile network.

Designed to monetize any commercial offer with any structure using hyperscale real-time charging.



Aligned with TM Forum open APIs and includes industry-leading billing, invoicing, and revenue management.

Enables DevOps driven operational agility as part of cloud native deployment.

Oracle Cloud Credentials

- Platinum member of the Cloud Native Computing Foundation (CNCF)
- Cloud is part of Oracle's DNA



Performance to support any commercial offer or model

Oracle's Cloud Scale Charging provides an Oracle Coherence-powered in-memory charging grid that co-locates processing and data for massive parallel processing.

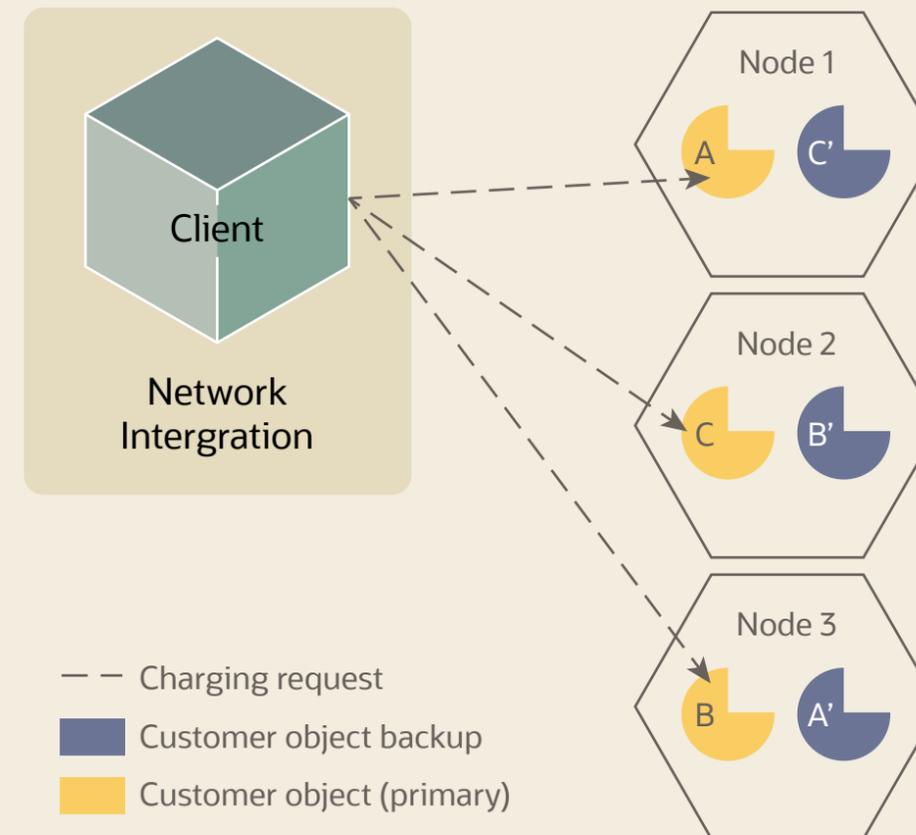
It can easily support the high-volume, parallel transaction processing needed for multi-dimensional pricing structures. This means you don't need to limit innovation based upon performance restraints. This is key for monetizing 5G revenue streams that require real-time charging within complex B2B2X business models.

No revenue leakage

Full transactional consistency is provided thanks to extreme transaction processing with almost zero cost locking. This prevents the introduction of revenue leakage in the charging layer.

Fault tolerant availability

The charging grid supports business continuity using fault tolerant state and data management. This is achieved using the Oracle Coherence-distributed cache mechanism, so that changes to customer data are automatically replicated in real time to one or more backup nodes to ensure high availability with almost zero impact on node failure.



Performance test for 50 million subscribers*



Proves hyperscale scalability and performance using cloud native deployment.

In a recent test, Oracle's Cloud Scale Charging was proven to scale to fifty million subscribers with single digit latency, using industry realistic charging scenarios, as part of a cloud native deployment on Oracle Cloud Infrastructure.

The study further demonstrated high transaction throughput, efficient resource utilization and linear scalability.

Low latency charging

Data



6.96 ms
76,800 TPS

Voice



6 ms
21,200 TPS

SMS



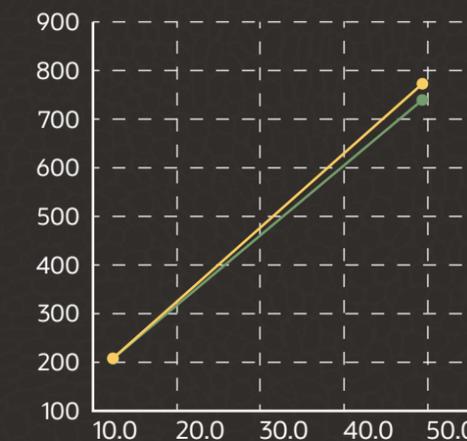
5.75 ms
2,884 TPS

Balance Queries



2 ms
5,592 TPS

Linear scalability



vCPUs consumed by app
(on or below the reference line is good)

Reference (x4 linearity)

vCPUs (App)

Linear characteristics observed scaling from 12.5M to 50M

View the [full report](#): Oracle's Performance Test March 2021

Efficient resource utilization

Average App CPU Utilization

46%

Average App Memory Utilization

46%

Max App IOPS

300

Average DB CPU Utilization

12%

Average DB Memory Utilization

54%

Max DB IOPS

7,360



Based upon the performance test metrics shown, Oracle's CCS provides a foundation for future 5G mobile edge charging scenarios".

*The test used industry realistic price plans. Mixed traffic types and mixed charging operation types (initiate, update, terminate). 90% prepaid, 10% postpaid.

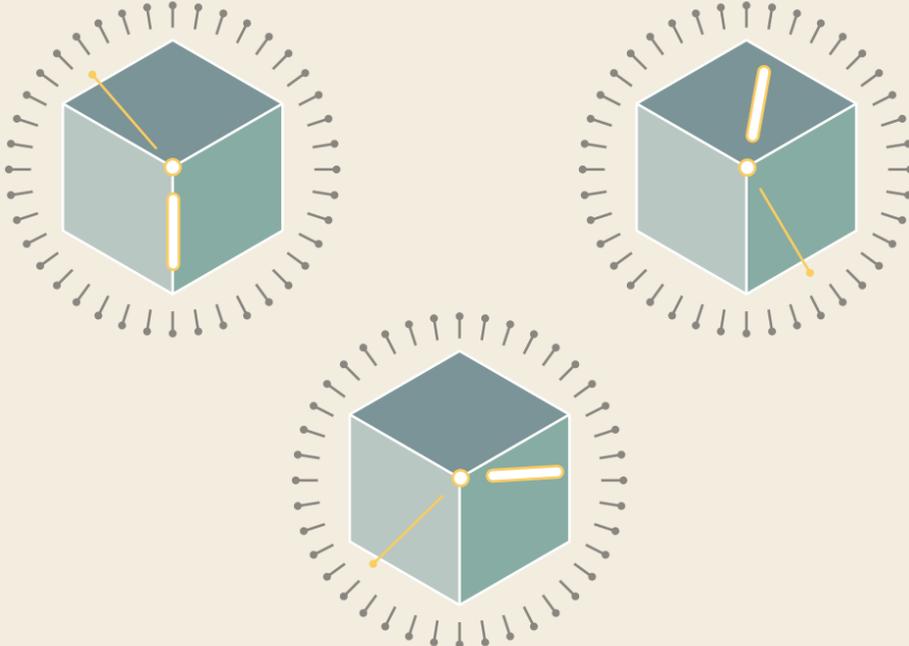
Average latency measured as a roundtrip between the network gateway internal charging requests and the core charging server instances in terms of an initiate, update, or terminate operation.



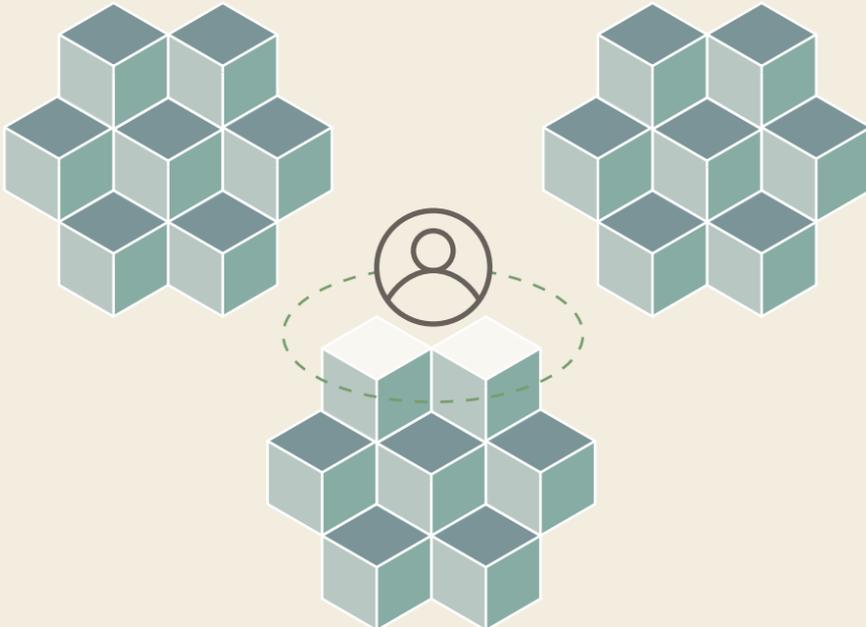
Active-active multi-site deployment

Innovative use of Oracle Coherence federated caching allows Oracle's Cloud Scale Charging to offer the highest levels of availability with flexible geographic redundancy models including active-active multi-site deployment.

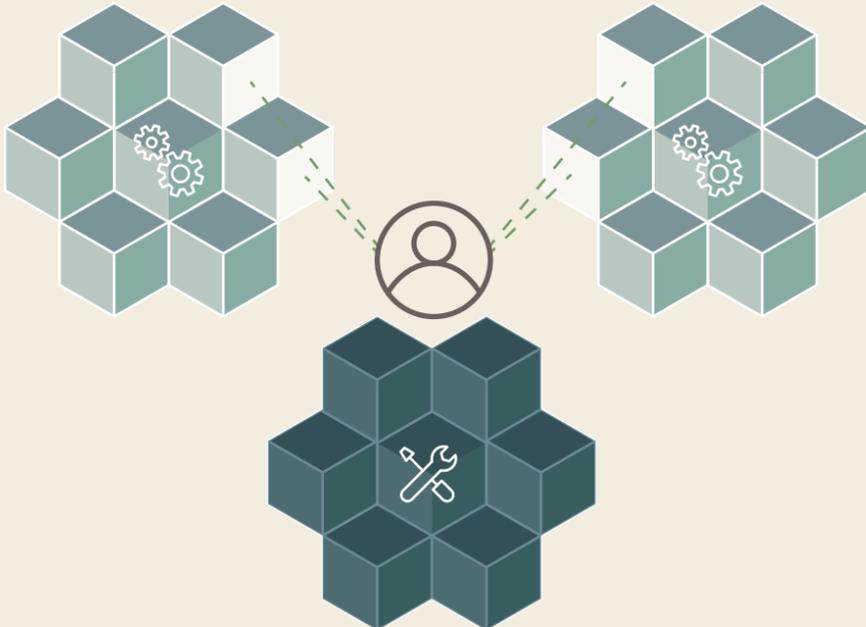
With active-active multi-site deployment, you can run all sites, all of the time.



Intelligence within Oracle's Cloud Scale Charging routes charging traffic based on the subscriber's preferred site.



And if there's an outage or planned maintenance, any of the sites can process charging—ensuring business continuity, a seamless customer experience, and no lost revenue.





Complete

Fully integrated with industry-leading revenue management

Fully integrated with industry-leading revenue management.

- TM Forum certified pricing design
- Aligned with TM Forum Open APIs
- Collections
- Accounts receivables
- Taxation
- Support for revenue recognition
- General ledger integration
- Billing and invoicing
- Support for management of MVNOs and 2nd brands
- Partner settlement

Reduce costs and enable faster time to cash across the entire revenue lifecycle

Having a single converged charging system with integrated billing and revenue management means:

1. Orders or price plans are created once

Alleviates integration across otherwise decoupled charging and billing which could require dual provisioning and associated complexity in having to create identical hierarchical structures.

2. Accounts are provisioned once

Prevents duplicated data and complex provisioning across decoupled systems, reducing the risk of issues that could impact the customer experience. Provisioning once also translates to faster time to market and lower cost.

More than just a standalone solution

Integrated with Oracle Digital Experience for Communications.

With Oracle, converged charging is not just a CCS. It's part of Oracle Digital Experience for Communications - an integrated and broader offering with Oracle's CX (Customer Experience) portfolio. Oracle Digital Experience for Communications provides:

- Added intelligent experiences to offer design and launch, personalized marketing, omni-channel buying, and care
- A broader end-to-end play that's architected in alignment with TM Forum Open Digital Architecture (ODA) and integrated using TM Forum certified Open APIs

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TM Forum Open APIs

Oracle's Cloud Scale Charging exposes a REST API for balance and consumption counters (based on TM Forum Open API 677) supporting various external services such as device-based self-care integration.

Additional TM Forum Open API-aligned REST end points are supported covering areas across product launch, buying, and care.

Why Oracle Communications is endorsing TM Forum's Open Digital Architecture



“By adopting the TM Forum Open Digital Architecture and Open APIs across our Oracle Communications applications portfolio, Oracle is providing operators with the business and IT agility to compete in fast-changing markets.”

“Oracle is pleased to be a signatory to the Open API and Open Digital Architecture Manifesto and to continue collaborating on defining these standards.”

Jason Rutherford,
Senior Vice President and General Manager,
Oracle Communications, Applications
TM Forum press release, June 18, 2020

Get ready to hyperscale your charging operations

Monetize 5G Now with operational excellence across network and IT domains.

Prepare to profit from future slice-based 5G experiences, mobile edge services, and digital business ecosystems.

- **Realize hyperscale performance, availability and scalability.**
In-memory charging grid delivering ultra-low latency, gold-standard availability, and linear scalability. Foundation for decentralized edge charging.
- **Unleash innovation with flexibility and performance for any model.**
Combine 5G charging models with any pricing or account structure powered by a real-time experience engine for digital BSS.
- **Be agile with cloud native deployment for business-critical operations.**
Kubernetes orchestrated multi-service architecture takes advantage of modern compute and infrastructure environments. Oracle is a Cloud DNA and platinum CNCF member.
- **Achieve rapid time to cash across the entire revenue lifecycle.**
Efficiently monetize the 5G ecosystems of tomorrow with industry-leading billing, invoicing, and revenue management, aligned with TM Forum Open APIs.



[Technical Brief: Converged Charging for Hyperscale Service Providers](#)

Learn more at
oracle.com/converged-charging

Ready to start a conversation

Contact us

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