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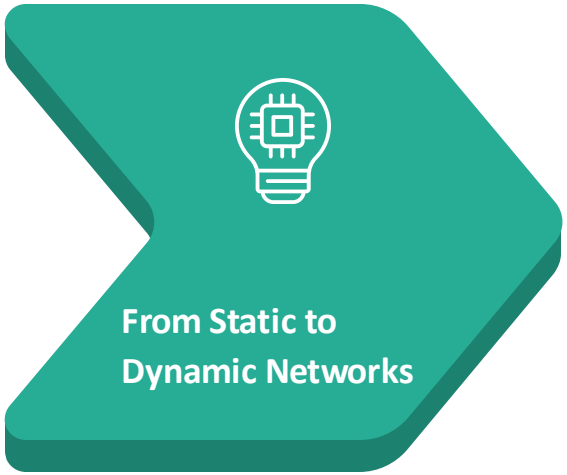
SUBEX

Wholesale Billing in the 5G Era: Preparing for New Traffic Patterns & Settlement Models

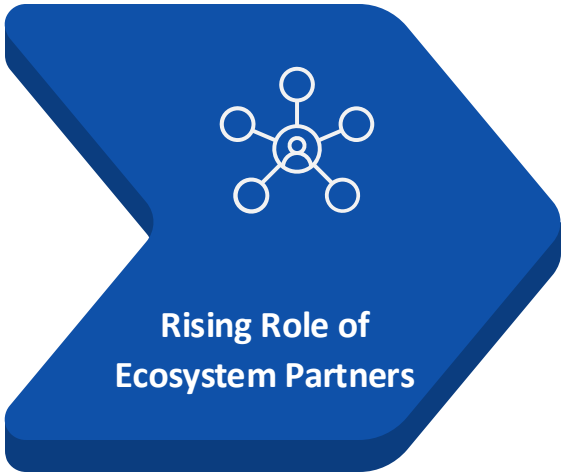
Why 5G Demands a **New Billing Paradigm**



5G introduces variable, real-time traffic **(URLLC, mMTC, eMBB)**, unlike the predictable, session-based flows of 4G.

Legacy models like volume-based (minutes/MB/SMS) can't handle **micro-events, dynamic QoS needs, or slice-based charging.**

5G creates commercial complexity with low-ARPU, high-volume use cases and demands **flexible, SLA-based billing models.**



Cloud providers, MEC nodes, and enterprise customers become new interconnect partners — **requiring flexible, SLA-driven agreements**

"At the high end, data-intensive IoT applications, such as smart cities apps and autonomous vehicles, can be hugely unprofitable, unless carriers find a way to monetize on a use-case-by-use-case scenario rather than one based simply on connectivity plans".

- ***PWC***, *The challenge of monetizing 5G*

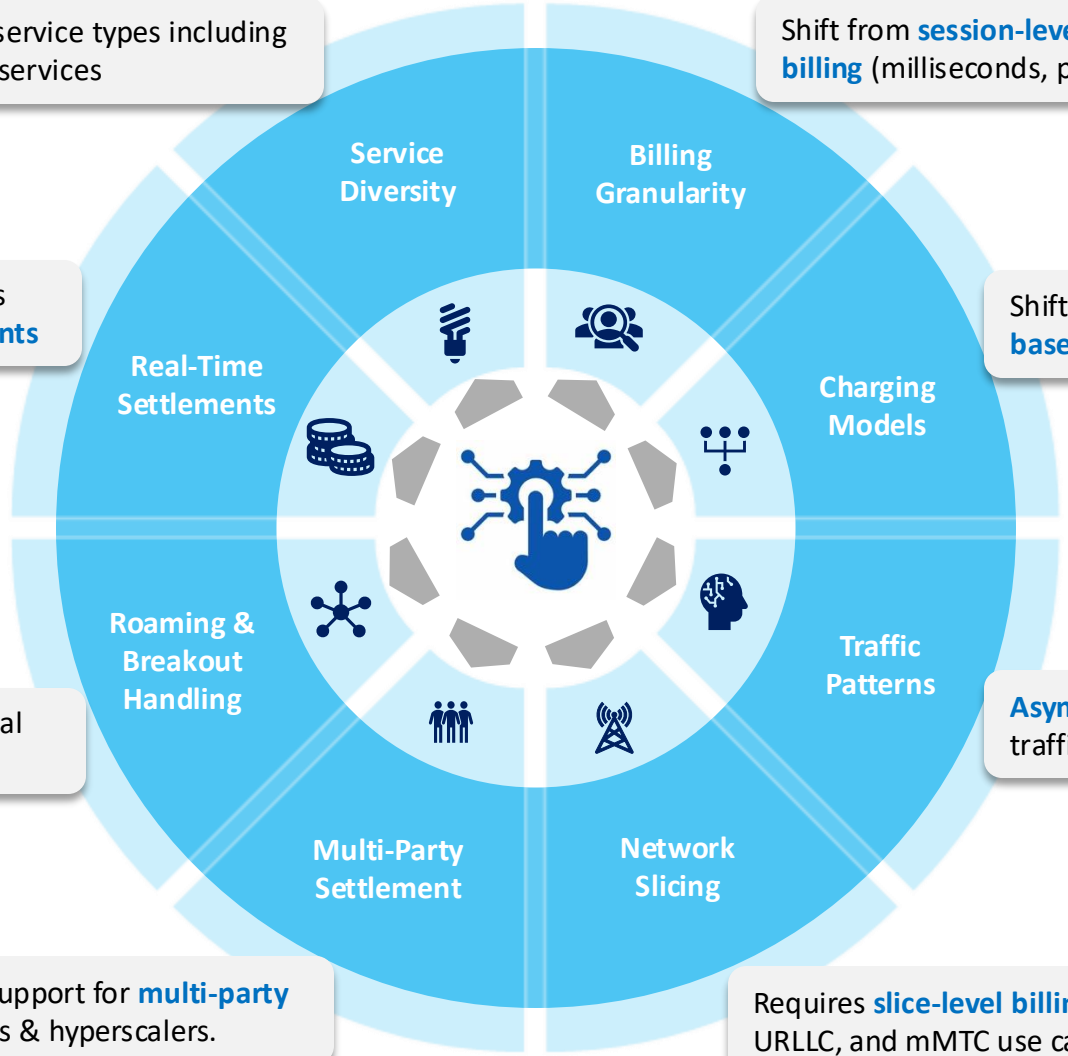
How 5G Transforms **Wholesale & Interconnect** Billing

Billing must support a broad range of new service types including **IoT, private 5G, MEC**, **and vertical-specific** services

Shift from **session-level billing** to **micro-event level billing** (milliseconds, packet-based, real-time usage)

High-value, time-sensitive services (e.g., autonomous driving) require near **real-time interconnect settlements**

Shift from **flat-rate** or **per-unit charging** to **QoS/SLA-based charging** (latency, jitter, throughput)



Local breakout in standalone 5G disrupts traditional TAP-based roaming billing models

Asymmetric & **edge-based routing** complicates traffic tracing and directional billing b/w operators

Emergence of **B2B2X models** demands support for **multi-party revenue sharing** among CSPs, enterprises & hyperscalers.

Requires **slice-level billing** with **differentiated pricing** for eMBB, URLLC, and mMTC use cases

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IoT (Massive M2M)	Millions of low-bandwidth connections, often always-on	Shift from per-minute/data billing to **per-device/month, usage thresholds, or event-based** models.
Private 5G Networks	Localized, high-priority traffic within enterprise campuses	Need for **enterprise-level SLAs, customized pricing models, and internal settlement** mechanisms.
Edge Computing	Ultra-low latency traffic with regional breakout	Requires new models for **local breakout charging**, potentially bypassing traditional interconnect paths.
Network Slicing	Virtual networks per service/app with specific QoS	Introduction of **SLA-based billing per slice, dynamic settlement** based on performance KPIs.
Fixed Wireless Access (FWA)	High data volumes with broadband-like usage	Settlement models similar to fixed-line interconnects, but with **mobility aspects considered**.

Cross-Network **5G IoT Roaming**

Scenario: *A logistics company deploys smart 5G-enabled IoT trackers in shipping containers. These trackers are provisioned by CSP A but frequently roam into CSP B's network during cross-border transit.*

4G/Legacy based Interconnect Billing

What it looked like?

- Devices sent **periodic data bursts** (e.g., every 15–30 minutes).
- **Billing was simple** — based on MB consumed during roaming.
- **Interconnect agreements** between CSP A and CSP B were **flat-rated**, e.g., $0.01 per MB.

Settlement Process

- CSP B generated TAP files (standard GSMA roaming billing files).
- CSP A reconciled usage and paid CSP B for MB consumed monthly.
- There were **rare disputes**, as the data flow was predictable and the service quality wasn't mission-critical.

There was no concern for how quickly data arrived or network reliability.

5G based Interconnect Billing

What changes with 5G?

- Devices now send **real-time telemetry every 1–5 seconds** (e.g., temperature, humidity, shock, vibration, and GPS).
- Data is used to **trigger immediate alerts** (e.g., if temperature exceeds threshold for sensitive cargo like vaccines).
- CSP A needs **guaranteed delivery within a certain latency window (e.g., <50ms)** to ensure timely responses.

This transforms billing in three keyways:

Volume to Event-Based Charging	SLA and QoS-Driven Settlements	Complex Multi-Party Reconciliation

• **4G:** CSP B charges CSP A for 500 MB of data.
• **5G:** CSP B may now charge for **every event/telemetry transmission** (e.g., $0.00005 per message).
 	
Why? Because **each micro-event has commercial value** — e.g., triggering an automated warning system or a cargo rerouting.
	• **CSP B is contractually bound** to maintain **latency, packet delivery success**, and **network uptime** — all measurable.
	• Billing depends not just on whether data was sent — but **how well it was delivered**.
	• If **CSP B fails to meet SLA targets**, CSP A:
	  ◦ May pay reduced rates.
	  ◦ Could receive **service credits or penalties**.
		In 5G, roaming may involve **more than two players**:
		• **CSP A:** Owns subscriber
		• **CSP B:** Visited network
		• **Edge/MEC Provider (optional):** Hosting local AI processing for immediate responses
		• **IoT Platform:** Aggregates data and forwards to CSP A's logistics partner
		
		This increases **settlement volume**, **dispute complexity**, and the need for **automated reconciliation tools**.

Reference*: Roambee launched a disposable 5G smart label for shipments that tracks location, temperature, and handling conditions in real time. It uses 5G connectivity to provide live updates during transit, making it ideal for cross-border logistics and sensitive goods.*

5G Billing Flow for Connected Car – Collision Warning Use Case

Scenario: *A connected car, while roaming on a 5G network (CSP B), detects an obstacle and triggers a* ***V2X hazard alert*** *using the* ***URLLC slice****. The alert is processed in real time via a* ***MEC node****, broadcast to nearby vehicles, and shared with the OEM cloud. CSP A (home operator) is billed for the service through* ***BCE-based real-time interconnect billing****.*

1 Event Identification

- Connected car detects a crash hazard or debris.
- A **low-latency V2X alert** is generated and sent over the **URLLC slice**.

2 Edge (MEC) Processing

- The alert is routed to a **MEC node** for local processing.
- MEC instantly broadcasts the alert to nearby vehicles and logs the event.

3 Usage Record Generation

CSP B logs:

- **Slice ID**: URLLC
- **QoS metrics**: latency, jitter, reliability
- **Edge compute usage**
- **Event metadata** (e.g., alert type, timestamp)

4 Real Time Rating

CSP B's billing system rates:

- **Event type** (V2X hazard)
- **SLA compliance** (e.g., <10ms latency met)
- **MEC resource usage**

5 Billing Settlement

BCE APIs send usage details to CSP A (home operator).

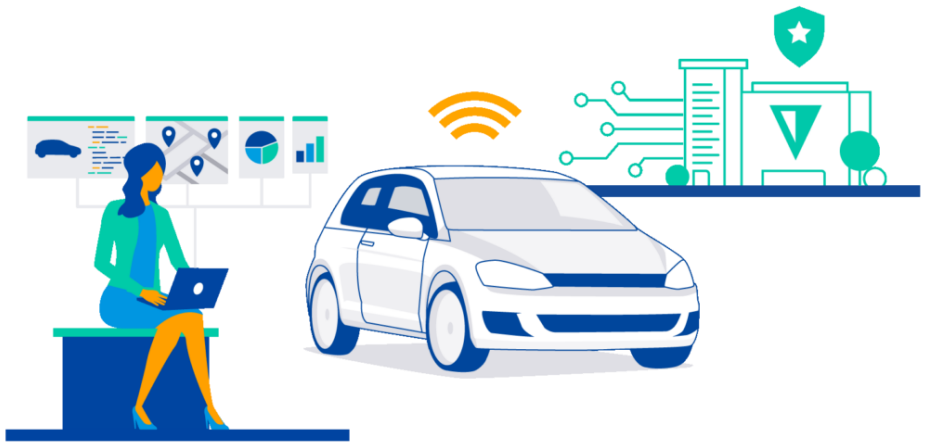
CSP A is billed based on:

- **Event importance**
- **SLA fulfillment**
- **Slice class** (URLLC = premium)

6 Revenue Distribution

CSP B may:

- Pay MEC provider for **compute usage**
- Share revenue with **OEM cloud platform if integrated**



What 5G Billing Enables (vs. 4G/Legacy)?

Legacy /4G Based Billing	5G-Based Billing Capability
Flat-rate per MB	Event-specific, SLA-rated billing
No QoS awareness	Latency/jitter tracked and monetized
No slice differentiation	Slice-aware pricing (URLLC/eMBB/mMTC)
Delayed, file-based TAP	Real-time BCE-driven interconnect settlement
Only CSP-to-CSP	Multi-party revenue sharing (CSP + MEC + OEM)

Reference*: Verizon, TELUS, Capgemini, and Stellantis, showcased a connected car detecting road hazards and transmitting alerts via URLLC over 5G. The data was processed in real-time using MEC and broadcasted to nearby vehicles, demonstrating seamless V2X communication across different network operators.*

Adapting Agreements & Systems for 5G Billing

Smart Contracts & Adaptive Interconnect Terms

- Move from static, flat-rate contracts to dynamic, service-aware agreements.
- Contracts must now account for – QoS Tiers, SLA Compliance Tracking & Real time triggers for price adjustments or penalties
- Enables on-the-fly pricing changes and billing alignment with actual performance.

Need for Flexible, Configurable Billing Platforms

- 5G billing platforms must go beyond volume-based rating to support - Event-based billing, Slice-based charging, Directionally split flows & Multi-party billing logic
- System should support real-time rating engines, API integration, and modular configurations for emerging 5G services.

Multi-Stakeholder Agreement Readiness

- 5G services are delivered across multiple entities, not just CSPs - Edge compute providers, Cloud platforms, Application owners
- Interconnect agreements must - Define roles, revenue share, and settlement logic, Provide transparent usage tracking and include cross-party SLA enforcement clauses

Real-Time Compliance, Auditability & Security

- Cross-border services introduce regulatory & security obligations: GDPR, data localization, telecom regulatory audits
- Billing systems must support: Real-time data visibility, Audit trails for every charge, Policy-based access control across domains

Thank You

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