

5G Steering of Roaming: why advanced OTA services matter

A path to enhance roaming orchestration for consumer and IoT devices

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With international travel rebounding and IoT devices, such as smart vehicles, logistics trackers, and wearables, demanding seamless **cross-border connectivity**, 5G roaming is set for rapid growth¹. To stay ahead of these trends and deliver the enhanced customer experience promised by 5G, mobile operators must master **5G Steering of Roaming (SoR)**, the key to smart network selection abroad. But 5G SoR isn't plug-and-play. It requires a strategic shift in network management. That's where **advanced Over-The-Air (OTA)** services come in. Want to future-proof your network and revenue? Read on.

The importance of Steering of Roaming in the 5G era

5G technology is powering innovations from high-speed streaming and real-time gaming to autonomous vehicles, smart factories, connected healthcare, and AI-driven applications. In cross-border scenarios, efficient 5G Steering of Roaming is essential to make the full promise of 5G a reality. By prioritizing the **best available networks**, it reduces rejections and connection failures, boosts data speeds, and ensures stable, high-quality connectivity. In short, it helps deliver a **seamless user experience**.

Implementing 5G SoR: not an easy feat

In 5G Non-Standalone (NSA) configurations, the impact on Steering of Roaming (SoR) remains relatively limited. However, in a 5G Standalone (SA) environment, the landscape changes dramatically. **New technical challenges** arise due to significant shifts in network services, standards, protocols, and steering mechanisms. The implementation of 5G SA fundamentally reshapes the SoR process, introducing the need to address new complexities such as:

- ➔ **Dynamic network selection:** Implementing real-time, dynamic network selection that adapts to changing conditions—such as signal strength, latency, and speed—as well as evolving user demands.
- ➔ **Scalability:** Ensuring the SoR system can scale to support the growing number of 5G devices and the massive data traffic they generate.
- ➔ **Consistent Quality of Service (QoS):** Maintaining consistent QoS across different networks, particularly as users move between networks with varying capabilities.
- ➔ **Real-time analytics:** Enabling the SoR system to make informed network selection decisions using real-time data.

- ➔ **Confidentiality and integrity:** Integrating enhanced 5G security protocols into SoR procedures to protect user data and privacy during roaming.
- ➔ **New standards and protocols:** Adapting to new, centralized approaches for managing user data—such as Unified Data Management (UDM)—which are reshaping how roaming is handled.

Benefits of efficient 5G Steering of Roaming

Efficient Steering of Roaming in 5G networks demands a far more dynamic and responsive approach to mobile network management than previous network generations—especially when addressing the unique challenges introduced by 5G Standalone (SA) architectures. Optimized Over-The-Air (OTA) services play a critical role in enabling effective 5G SoR across SA and Non-Standalone (NSA) deployments, supporting both mobile devices and IoT use cases.

Modernizing OTA services is a strategic imperative for optimizing 5G Steering of Roaming, ensuring reliable connectivity, robust data protection, and operational efficiency across consumer and IoT deployments.

Jose Canizares, Product Manager OTA Services, IST Connectivity Services



With advanced Over-The-Air (OTA) services, Mobile Network Operators (MNOs) and Mobile Virtual Network Operators (MVNOs) can dynamically update network preferences in real time. This flexibility allows them to optimize roaming agreements and adapt quickly to changing conditions. Instead of relying on pre-configured roaming partners, a 5G device can receive an updated list of preferred networks from its home operator at the moment of connection.

Intelligent traffic steering not only helps prevent network congestion but also ensures a more balanced distribution of network loads. The benefits are substantial: significantly lower roaming costs, noticeably reduced latency, and a consistently higher quality of service—outcomes that directly enhance both user satisfaction and operational efficiency.

Key considerations for selecting an OTA service provider

When choosing an Over-the-Air service provider, MNOs and MVNOs should assess the following essential criteria to ensure reliable and future-ready support for 5G and IoT deployments:

1. IoT and 5G implementation roadmap

- ➔ The provider should offer a clear plan for supporting IoT and 5G, with a strong focus on enabling 5G Steering of Roaming (SoR).
- ➔ A cloud-based implementation will help deliver the high availability and flexibility needed for both technologies.

2. Availability of 5G SoR APIs and core network integration

- ➔ The OTA platform should provide 5G SoR APIs that integrate directly with core network components such as Unified Data Management (UDM).
- ➔ Tight integration with network data will improve the efficiency of roaming management—even for operators without SMSC capabilities.

3. Support for advanced SIM applets

- ➔ The provider should support a range of SIM applets to enable flexible and future-proof service activation.
- ➔ These applets should in particular include 5G SoR and Multi-IMSI to seamlessly deliver advanced 5G features like network slicing and private network access.

4. Readiness for Over-the-Air 5G activation

- ➔ The provider should enable immediate OTA activation of 5G services as soon as coverage is available in a specific area.
- ➔ The OTA platform should provide a smooth and timely transition to 5G when it becomes available, preserving service continuity for users.

5. Commitment to data sovereignty and regional compliance

- ➔ The OTA provider must ensure that subscriber data is processed and stored in compliance with local data sovereignty regulations (e.g. GDPR, CCPA).
- ➔ Where applicable, data centers and cloud infrastructure should be geographically aligned with the operator's regulatory environment to avoid legal and operational risks

6. Post-Quantum cryptography readiness

- ➔ The provider should demonstrate awareness and preparedness for upcoming post-quantum cryptographic standards.
- ➔ OTA security mechanisms—including those protecting SIM communication and provisioning—should be future-proofed against quantum computing threats to maintain long-term data confidentiality.

By focusing on these key capabilities, mobile operators can choose an OTA provider that supports scalable, secure, and future-proof connectivity in the 5G and IoT era.

Optimizing mobile network management for next-gen connectivity services

When executed effectively, 5G Steering of Roaming unlocks smart, optimized network selection that ensures seamless connectivity for users and devices. It drives reliable roaming, elevates customer satisfaction, and opens new revenue opportunities for mobile operators. As 5G adoption accelerates, advanced OTA services become indispensable, not only to tackle evolving roaming challenges but also to empower MNOs and MVNOs with dynamic, responsive network management for the future. At IDEMIA Secure Transactions we continuously upgrade our OTA platform capabilities to make it possible.

¹ <https://kaleidointelligence.com/5g-roaming-revenues-to-reach-30-billion-by-2028/>
