



HPE Telco Integrated HSS

An optimized, composite, future-proof SDM, at a fraction of the cost

The HPE Telco Integrated Home Subscriber Server (I-HSS) is a cutting-edge Subscriber Data Management (SDM) solution designed to deliver exceptional performance while helping minimize total cost of ownership (TCO). It leverages a composite architecture that minimizes infrastructure footprint and simplifies operations. The composite deployment model of HPE I-HSS enables telecom operators, mobile virtual network operators (MVNO), and managed network providers to significantly reduce operational and capital expenditures, streamline network complexity, and help ensure seamless interoperability across heterogeneous networks while interworking with multiple vendor functions and systems. HPE I-HSS strikes the ideal balance for today's modern, open, and profitable telecom environments without compromising capabilities, scalability, or reliability.

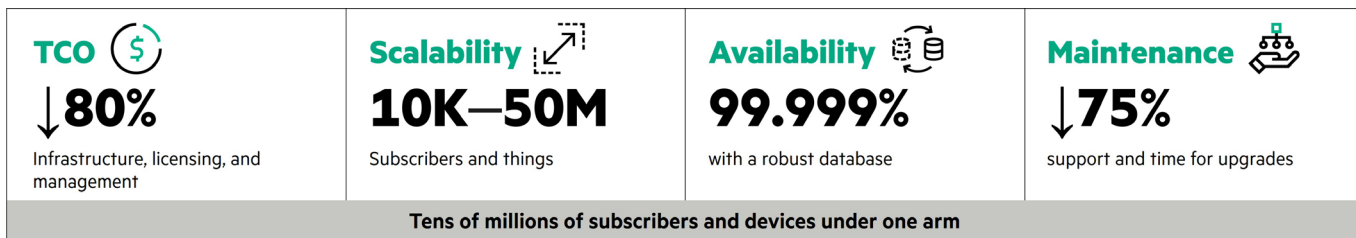


Figure 1. Multidimensional savings¹

¹ Based on certification done using an HPE DL380 platform on customer premises. Results available upon request.



Innovation for simplification

Today's mobile networks have grown increasingly complex, with technological transitions often spanning decades due to longstanding roaming agreements. To address the intricate interrelationships between diverse technologies, Hewlett Packard Enterprise had previously introduced the HPE I-HSS, a groundbreaking solution that simplifies subscriber data management and optimizes messaging—helping ensure seamless operations across networks. This simplification was further enhanced by converging these network functions to a common core of manageability, allowing for unified control and streamlined operations across different access types—all from a single virtual machine (VM).

HPE entered the SDM market in the early 1990s, revolutionizing subscriber management with an off-switch Home Location Register (HLR) that centralized operations. This innovation enabled carriers to support multivendor systems within their networks, as HPE I-HSS adheres to standardized messaging protocols. By eliminating single-vendor dependency and establishing an open network, carriers can benefit from reduced costs and increased flexibility. While network-specific solutions offer rapid deployment advantages, their long-term drawbacks—such as vendor lock-in and higher operational expenses—highlight the critical importance of standardization.

With its standards-based approach and proven interoperability, HPE I-HSS continues to empower carriers to navigate technological transitions efficiently while maintaining flexibility, scalability, and cost-effectiveness.

The virtualization challenge

During the previous decade, the push to standardize virtualization alongside commercial off-the-shelf (COTS) hardware aimed to disaggregate traditional software components into modular functions, enabling carriers to assemble networks from multivendor solutions. While this approach partially succeeded, it introduced significant operational and infrastructure challenges. Validation became increasingly complex as continuous interoperability testing and verification demanded substantial resources, slowing deployment cycles and driving up costs. Infrastructure expenses increased due to the need for layered virtualization architectures, which require significantly more hardware resources to meet performance standards. This added to operational complexity and raised costs. Layered architectures also led to latency degradation, with intra-function hop delays directly impacting hardware efficiency and overall network performance. Furthermore, hardware scalability emerged as a critical issue, as the increased demand for hardware resources also escalated costs.

Optimized composite approach

Recognizing these challenges, HPE streamlined hardware utilization and simplified operations by re-architecting virtualized components to maintain carrier-grade performance while reducing hardware dependencies. Consolidated functions minimized layered overhead, easing maintenance and reducing the need for continuous interoperability validation to enhance operational efficiency. This approach also significantly improved signaling efficiency and reduced latency, increasing network capacity and performance. In fact, the Transactions Per Second (TPS) rate on the composite model is double that of the decomposed model, meaning the same workload can be handled with just one-third of the hardware, resulting in up to 6x greater efficiency. By optimizing these critical factors, our solution gained rapid global adoption among carriers, offering a pragmatic balance between the flexibility of virtualization and operational practicality.

What's in the box?

HPE I-HSS is a standards-based solution consolidating multiple critical network functions into a single platform, helping ensure seamless operation across diverse network technologies. These functions include:

- **Home Subscriber Server (HSS):** Provides consistent support for 4G EPS, IP Multimedia Subsystem (IMS), VoLTE, and 5G non-standalone (NSA) networks. It is the central repository for subscriber data, authentication, and service profiles.
- **Home Location Register (HLR):** Designed for 2G/3G GSM and GPRS networks, it manages subscriber profiles, authentication, and location data, ensuring secure and efficient network access.



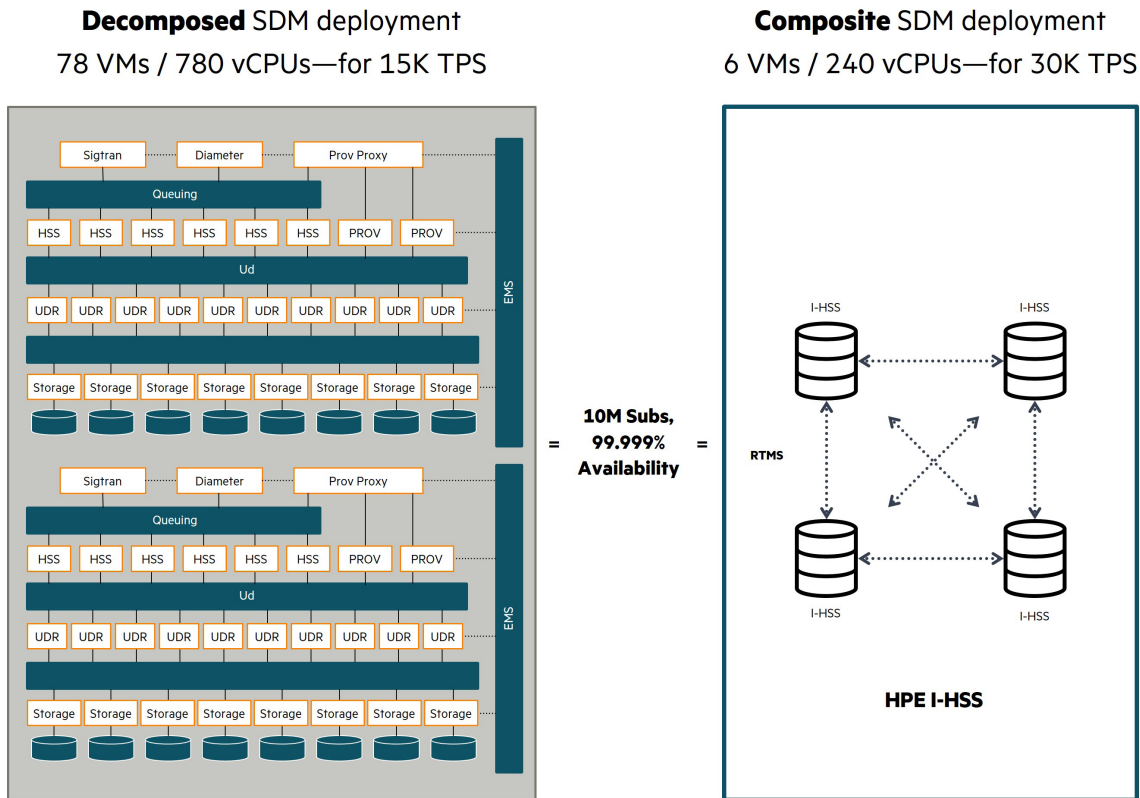


Figure 2. Decomposed versus Composite SDM architectures compared—Double throughput at 1/3 of footprint

- **Authentication, authorization, and accounting (AAA):** Provides robust authentication and accounting services for Wi-Fi networks, enabling secure and reliable Diameter connectivity across diverse technologies.
- **Equipment Identity Register (EIR):** Supports 3G and 4G networks by managing device identity and preventing unauthorized equipment from accessing the network.

HPE I-HSS includes several key components that enhance its functionality and operational efficiency. These components are designed to optimize network performance and simplify management tasks. The key elements include:

- **High performance database:** Purpose-built for telco networks, optimized to handle high TPS rates while prioritizing data integrity and flexibility for real-time updates.
- **Real-time management system (RTMS):** A proactive monitoring early warning system that utilizes advanced event detection and statistical analysis to identify and resolve potential issues before they impact operations. RTMS comes preconfigured with customizable events and threshold rules, enabling effortless adaptation to each customer’s unique network requirements.
- **User interface:** Features an intuitive graphical user interface (GUI) and a powerful command-line interface (CLI), providing comprehensive tools for efficient database management and ensuring optimal performance and reliability.

These integrated components work together to deliver a high-performing, reliable, and easily manageable solution that meets the demanding needs of modern telecom environments.



Guiding principles

Designed with flexibility and interoperability, HPE I-HSS addresses the critical requirements of modern carrier networks by enabling seamless integration, efficient management, and future-oriented evolution. It is designed around several principles:

- **Multivendor compatibility:** Offers a standards-compliant interface that supports the integration of components from multiple vendors, giving carriers the freedom to select the most suitable vendor and solution to fit their needs. In cases where proprietary implementations of standards-based features are encountered, these challenges have been consistently resolved, enabling carriers to open their networks and foster a competitive vendor landscape.
- **Extended functionality:** HPE I-HSS is the core subscriber data storage and management function, which enhances traditional HSS with support for IMS, AAA, 5G-NSA capabilities, and beyond, in a controlled fashion.
- **Usage flexibility:** Serves a wide range of use cases, from Tier 1 multiaccess operators to MVNOs, MVNEs, and enterprise networks. Supports traffic separation between Internet of Things (IoT) devices and consumer subscribers, enabling a single composite server to handle up to 50 million IoT connections through more predictable modeling and growth.
- **Hardware-agnostic:** Runs on standard Commercial-Off-The-Shelf (COTS) hardware, supports multiple Linux® distributions, and operates in virtualized cloud environments—helping ensure seamless deployment across diverse infrastructures.

Functional highlights

HPE I-HSS offers robust features to enhance network capabilities, support diverse technologies, and help ensure seamless operations across various access networks. The following are some of the key functional highlights:

- **IMS and AAA integration:** Supports IMS and AAA for seamless delivery of legacy voice services with VoLTE/VoWi-Fi. As global IMS adoption accelerates due to the shutdown of legacy voice networks, HPE I-HSS helps ensure critical compatibility for international roaming, where visited networks mandate IMS.
- **IoT scalability:** Supports up to 50 million IoT subscribers on a single server for efficient traffic modeling and predictive growth. As carriers increasingly segregate IoT-specific SDM from consumer SDM to address divergent service patterns, HPE I-HSS offers seamless integration into existing networks. This enables operators to deploy dedicated IoT SDM instances or unified platforms, balancing specialized IoT requirements, such as machine-to-machine (M2M) traffic patterns, with legacy consumer services while helping ensure robust scalability.
- **Multi—tenancy support:** Enables international roaming with local numbering, roaming controls, and Multi-IMSI, Multi-MSISDN (MIMM) capabilities, making it ideal for mobile virtual network operators/enablers (MVNO/MVNE) seeking scalable and isolated tenant environments.
- **Hardware agnosticism:** Deployable on standard COTS hardware, running multiple Linux flavors or hyperscaler cloud environments, helping ensure seamless flexibility and abstraction from hardware platforms.
- **Extended authentication:** Supports primary IMS authentication procedures using AKA-based security architecture as specified in 3GPP TS 33.102. It includes EAP-AKA, EAP-AKA-prime, and TUAK authentication algorithms shared across access technologies for easy provisioning. Additionally, it supports HTTP digest authentication and Network Access Subsystem (NASS) bundled authentication for next-generation network terminal support and can operate as a stand-alone network authentication center (NAC).
- **Data change notification:** HPE's real-time data-handling technology enhances HPE I-HSS capabilities by automatically notifying external applications or services when data changes occur, reducing the need for subscriber data update requests. This helps ensure efficient synchronization and helps minimize operational overhead.

Heterogeneous networking

HPE I-HSS provides the required SDM functions for each network generation and domain, working as a real heterogeneous networking (HetNet) framework:

- **HLR:** Provides full support for 2G/3G networks and areas without LTE coverage by using C, D, Lh, and Gr interfaces to manage user data and connectivity through standard signaling.
- **HSS:** Supports LTE/EPC networks by using S6a, SLh, S6d, and S6t interfaces to handle authentication, mobility, and user profile management through standard signaling between core systems.
- **IMS:** Enables IMS-based services such as VoLTE and secure access by using Cx, Sh, and Zh interfaces to handle user profiles and service authentication.
- **AAA:** Extends mobile service over Wi-Fi by using S6b, SWx, Wa, SWm, STa, and SWd interfaces, allowing features like VoWi-Fi while using the same profile info as in mobile networks.



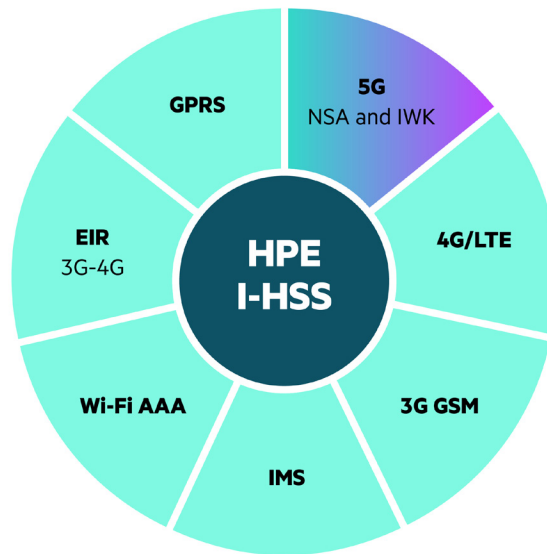


Figure 3. One SDM for all your networks

- **EIR:** Helps prevent phone fraud and unauthorized device use across 2G, 3G, and LTE networks by checking if a handset can connect.
- **IoT:** Allowing low-power NB-IoT RAT (Radio Access Technology) connections and non-internet-based messaging through standard network interfaces (S6a/S6d).
- **5Gt Communication Patterns:** Optimized for efficient IoT communication within the 3GPP Machine-Type Communication (MTC) framework.
- **SMS:** Enables SMS sending and receiving in 4G networks using the MME for message delivery without relying on older 2G/3G systems, making it ideal for IoT and M2M devices needing simple, efficient communication.
- **All IP interfaces:** Diameter, MAP, and HTTP2-based applications to bridge gaps between different generation functions.
- **5G NSA:** Operators can start using 5G radio networks without fully switching to a new 5G core, offering a smoother and faster upgrade path.
- **5G SA:** Enables full 5G standalone core deployment using standard UDICOM (Unified Data Interoperability for Core Operations and Management) features, while protecting existing networks and users from early-stage tech risks.

Extended capabilities

HPE I-HSS offers over 1000 features designed to enhance network performance, scalability, and flexibility. The following are some of its most unique and popular capabilities:

- **Traffic surge control:** This unique feature detects traffic surges in their early stages and automatically adjusts the network to return to normal, helping ensure stability while remaining transparent to network entities.
- **Subscriber routing:** Allows carriers to locally reroute network traffic based on subscriber criteria and ranges. Initially introduced for subscriber migrations, this feature has evolved to offer multipurpose capabilities like DRA functionality.
- **Multiple IMSI/IMPU support:** Enables operators to utilize other operators' IMSIs for roaming services, allowing subscribers to connect using local MSISDNs. This helps ensure they can receive calls at local rates and have a local caller ID when making or receiving calls in a roaming area.
- **Roaming controls:** Provides operators with a flexible framework for controlling subscriber access when roaming, helping ensure seamless and secure connectivity.
- **Multitenancy:** Enables operators to share their network with multiple tenants (for example, MVNxs) by presenting different identities for the HPE I-HSS, allowing for efficient resource utilization and management.
- **Closed user group:** Facilitates businesses in supplying cellular phones to employees designated for work purposes only, helping ensure controlled usage within specific user groups.
- **Mobile number portability:** Fully supports mobile number portability, allowing subscribers to retain their numbers while switching networks.



Migration made simple

As a trusted leader in a space dominated by network equipment providers (NEP), HPE has earned its reputation as a reliable partner for telecom operators seeking to modernize and consolidate their subscriber management infrastructure. With over 250 million subscribers successfully migrated from systems by Huawei, Ericsson, Nokia, Blue Slice, Siemens, and others, HPE offers unmatched expertise in seamless migrations to its advanced SDM platform.

Recognizing the complexity and risk sensitivity of subscriber migration in telecom operations, HPE has developed a robust, step-by-step framework supported by specialized tools to help ensure smooth transitions with minimal disruption. This process addresses operator challenges while delivering operational efficiency and continuity.

Migration framework principles

- **Zero downtime:** Our migration framework facilitates a live migration of subscribers without impacting service availability. Whether transitioning thousands or millions of subscribers, the process is engineered for continuity and speed—typically completed within hours without downtime or user disruption.
- **Adoptable provisioning:** With native integration into existing provisioning interfaces and workflows, we can help ensure **plug-and-play** compatibility. This eliminates the need for extensive customization, allowing operators to retain their current provisioning streams while reducing deployment time and complexity.
- **Risk-free implementation:** The migration process follows customer-approved steps for risk-free transitions. Expertise is also transferred to customer staff to empower them for subsequent migration tasks.
- **Customizable tools for flexibility:** We use tools tailored for data format conversions and automation with BSS/IT integration. These tools streamline processes like data extraction from legacy SDM systems and provisioning to new platforms.
- **Deployment automation toolset:** Leveraging automation helps ensure consistency and efficiency throughout the migration process, minimizing manual intervention while maintaining accuracy.

Step-by-step migration

HPE has developed a structured, no-risk migration process to help telecom operators seamlessly transition their SDM system with precision, efficiency, and reliability.

- **Survey:** The process begins with thoroughly analyzing existing capabilities and evaluating use cases, features, and migration strategies based on constraint satisfaction problem (CSP) constraints.
- **Design:** Next, we define a migration approach with precise 1:1 feature mapping. Migration can be performed by number ranges, BSS-defined groups, or individual subscribers while leveraging a catalog of historical custom swaps for guidance.
- **Develop and test:** We adapt our migration tools by customizing data format conversions and automating processes with BSS/IT integration. Rigorous testing ensures optimal data extraction speed from legacy SDM systems and provisioning into the new platform.
- **Implement:** We implement a low-risk migration flow following customer-approved steps for risk-free transitions. Expertise is transferred to customer staff to empower them for future migration tasks.

This blueprint underpins the entire migration process, ensuring consistency and efficiency while minimizing manual intervention.

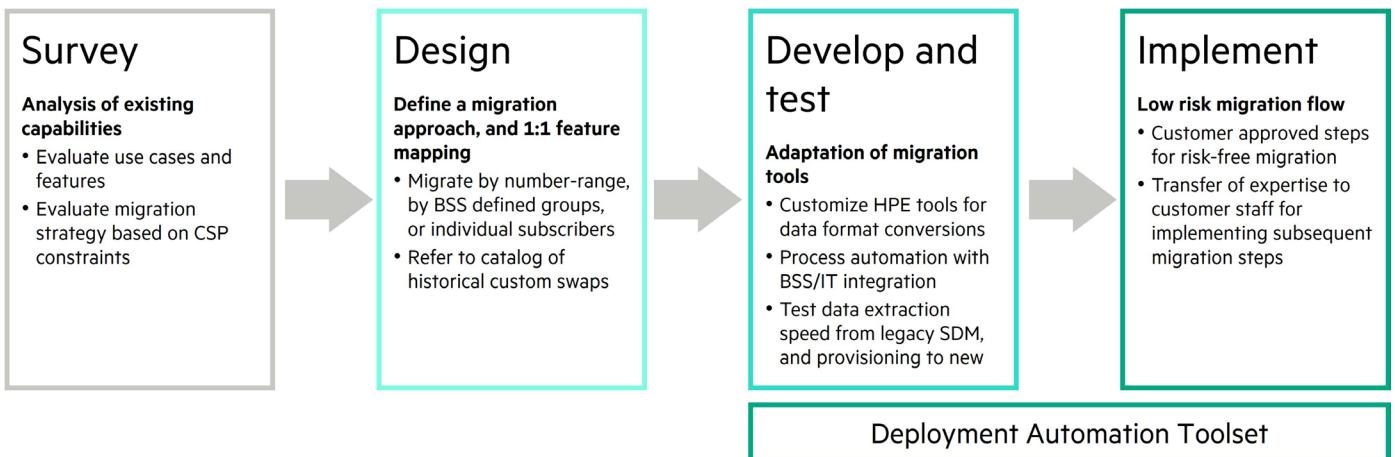


Figure 4. No-risk subscriber data migration



Proven results

HPE has successfully migrated up to 10 million subscribers in a single evening using this structured approach. Backed by decades of telecommunications experience and a deep understanding of real-world operator challenges, HPE delivers cost-effective, high performance migration practices supporting legacy systems and future network environments.

Unleash your network potential

HPE Telco Integrated Home Subscriber Server offers comprehensive benefits and features that enhance network efficiency, scalability, and future readiness. Here are some key highlights:

Optimized for growth

In today’s fast-paced telecommunications landscape, operational efficiency is the foundation for agility, enabling carriers to adapt swiftly to emerging technologies and dynamic market demands. HPE I-HSS provides multiple optimization strategies to streamline operations, reduce costs, and enhance performance:

- **80% reduction in TCO:** This has been verified through analyses with Tier 1 to Tier 3 customers.² The optimization of hardware results in decreased spending on infrastructure, licensing, management, and maintenance costs. Given your call model and subscriber counts, HPE can provide a custom analysis tailored to your specific needs.
- **Solution simplification:** A single VM that supports all network protocols simplifies the management of subscribers. HPE has internalized the complexities of carrier networks into a single consolidated subscriber management control point.
- **Protect your existing investments:** Leverage your current investments to seamlessly transition to LTE, Wi-Fi, and IMS services, paving the way for 5G adoption. HPE I-HSS SS7-based connectivity helps ensure interoperability with existing network elements, providing a cost-effective and proven solution.
- **Functional containment:** The composite HPE I-HSS not only converges multiple protocols but also simplifies management by creating a self-contained virtual network function (VNF). This eliminates the need to manage dozens of independent VMs, their interrelationships, and associated infrastructure.

Diverse network demands

Our composite deployment HPE I-HSS delivers unparalleled scalability, high-quality service, and flexibility tailored to various use cases, helping ensure adaptability for operators of all sizes and globally distributed systems. The following are its key capabilities:

- **Massive subscriber support**
Scaling to accommodate millions of subscribers and up to 50 million IoT subscribers within a single VM on a single server. This level of optimization ensures efficient resource utilization for large-scale deployments.

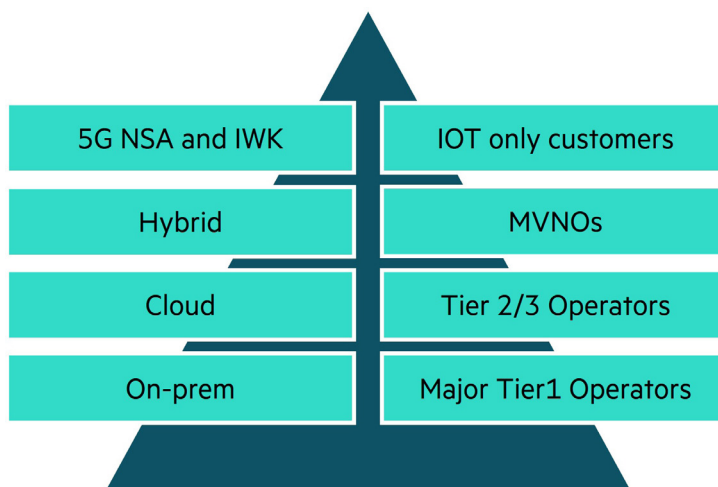


Figure 5. Variety of carrier use cases served by HPE I-HSS

² Based on certification done using an HPE DL380 platform on customer premises. Results available upon request.





- **Adaptability for smaller carriers**

For smaller carriers, the solution can scale down to operate with just a handful of vCPUs while still supporting high subscriber counts and diverse traffic patterns, making it ideal for operators with varying needs.

- **Proven success across industries**

HPE I-HSS delivers scalable, high-quality service across diverse use cases, including MVNx, IoT, Tier 1 Telcos, and social media companies. It effectively supports both consumer and IoT deployments, helping ensure seamless operations for a wide range of applications. With over 1 billion active profiles today, it has demonstrated its ability to handle deployments for IoT vendors, manufacturers, and operators of all sizes, helping ensure reliability and performance across various industries.

- **Global solutions for distributed systems**

Empowering carriers to manage globally distributed systems across continents with ease. For instance, a carrier operating one system in Europe and another in the U.S. can achieve seamless synchronization, helping ensure consistent performance and helping maximize operational efficiency across regions.

- **Flexible solutions for diverse network needs**

Whether consumer or IoT-focused, cloud-based or on-premises, large-scale deployments or private networks, our composite HPE I-HSS has consistently delivered flexibility and reliability over decades. Its versatility helps ensure that carriers can adapt to evolving network demands while maintaining control over their infrastructure.

Over 1 billion subscribers rely on HPE I-HSS technology across diverse network environments, including 3G and 4G/LTE networks. Its extensive customer base ranges from Tier 3 deployments with 100,000 subscribers to Tier 1 operators managing up to 130 million subscribers, showcasing its versatility and reliability.

Future-ready SDM

Built on 3GPP standards and deployed alongside major network equipment providers for decades, HPE I-HSS empowers carriers to introduce multiple vendors into their network environments. This fosters competition, reduces dependency on single-vendor solutions, and creates negotiation advantages for future expansions—offering a cost-effective and flexible alternative to proprietary systems.

HPE I-HSS supports service providers as they evolve their networks, helping ensure a transparent, gradual, and seamless transition to new technologies. The following are some of its key capabilities:

- **Seamless integration of new elements:** Built on 3GPP standards, the HPE I-HSS helps ensure seamless integration of new network elements. It utilizes standard-compliant Diameter-based interfaces, 5G service-based interfaces, and MAP interfaces to help ensure interoperability and seamless operations in heterogeneous environments.
- **Voice and roaming continuity:** With the adoption of IMS for international roaming, our HPE I-HSS supports per-subscriber configurations. Carriers can offer seamless roaming without modifying the core network, overcoming legacy voice restrictions and enabling smooth handoffs of VoLTE and VoWi-Fi.
- **5G evolution:** HPE I-HSS delivers a phased evolution to 5G standalone (SA). Through native support for NSA and UDICOM and optional integration with HPE Telco UDM, operators achieve a streamlined 4G/5G SDM, helping ensure compatibility and advancement.
- **Path to a unified core:** HPE I-HSS is a natural precursor, facilitating a smooth evolution into HPE I-SDM, our cloud-native, multi-technology SDM solution that enables a common core networking architecture for multi-technology access networks.

With HPE I-HSS, carriers gain the efficiency, flexibility, and interoperability needed to thrive in a multivendor ecosystem. By embracing standards-based solutions and future-ready capabilities, operators can reduce costs, enhance agility, and seamlessly transition to advanced technologies while maintaining competitive advantages in a dynamic telecommunications landscape.



About us

Decades of expertise

The HPE I-HSS has evolved through three decades of experience collaborating with carriers of all sizes globally. This evolution has been driven by staying ahead of industry trends with software enhancements and feature-rich functionality—key for an independent vendor to win over NEPs. While other NEPs, such as Nortel and Lucent, have left the telco market, HPE has maintained its leadership position by continuously innovating.

In addition to our leadership in SDM, HPE supports carriers' ambitions to transition safely to 5G and containerized networks. With a gradual, methodical approach starting with 5G NSA, carriers can proceed cautiously as new technologies mature—critical for minimizing risks during the early adoption phases.

HPE Aruba Networking Telco Solutions

At HPE Aruba Networking Telco Solutions, we are passionately dedicated to forging groundbreaking vertical solutions specifically for the communications industry. Our innovative software and services are not just tools but catalysts for your digital transformation, empowering you to automate operations seamlessly and elevate your business growth. Join us in embracing the future with cutting-edge network solutions and dynamic digital services that inspire success and drive progress.

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