



Subscriber Data Management (SDM)

Accelerating 5G Transformation

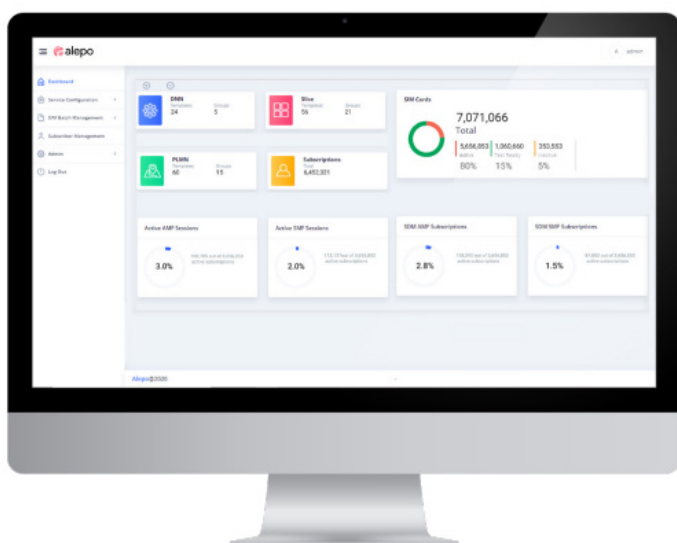
5G's high-value use cases promise to help service providers deliver an unparalleled customer experience, enticing a growing number of CSPs to look towards upgrading their legacy core to include 4G and 5G support, private 5G networks, digital business support systems, and more.

5G relies on cloud-native service-based architectures to deliver core network services that are stateless, with immense potential to manage network services and subscriber data more efficiently. The subscriber data repository segment is expected to expand at a fast pace: its global market size is projected to reach \$22.64 billion by 2023, with experts predicting a compound annual growth rate (CAGR) of 17% from 2023-2032¹.

Subscriber Data Management

Alepo's Subscriber Data Management facilitates a smooth transition to 5G and a cloud-native ecosystem. It offers a converged platform for both 4G and 5G subscriptions, simplifying the network upgrade path. The converged SDM framework enables CSPs to collaborate with third-party service providers and introduce advanced services such as 5G slicing, enterprise IoT, voice, and multimedia telephony services (MMTel) and more. They can easily and swiftly launch new services, and save costs as they enhance their legacy 4G core and extend support to 5G using the centralized and scalable subscriber data repository.

Alepo's SDM is a best-of-breed stack that manages subscriber identities, technical and network-related service configurations, service subscriptions, and is responsible for mobile access authentication to authorize services. It employs microservice-based architecture composed of discreet network functions (NFs) that can operate at web-scale. The cloud-native solution supports public, private, and hybrid deployments. It is vendor-agnostic and employs open standards and documented interfaces.



Casa Systems is excited to partner with Alepo to complement our 5G portfolio and provide innovative solutions that deliver the full benefits of 5G.



Gibson Ang,
Vice President, Technology,
Casa Systems

(1) <https://www.marketresearchfuture.com/reports/subscriber-data-management-market-6362>

What Sets It Apart



Business Elements

- 4G, 5G-NSA, and 5G-SA support
- Rich web-based portals
- Converged subscriber data repository for 4G+5G services
- Support for IMS voice and multimedia services
- Cloud-native microservice-based architecture
- Cloud- and PaaS-agnostic deployment
- Low-footprint offering to support enterprise, private, and public or macro 5G
- Automated release management (CI/CD)
- Open standards and documented interfaces
- Support for geo-redundancy with multi-site deployment
- Interoperability with leading vendors



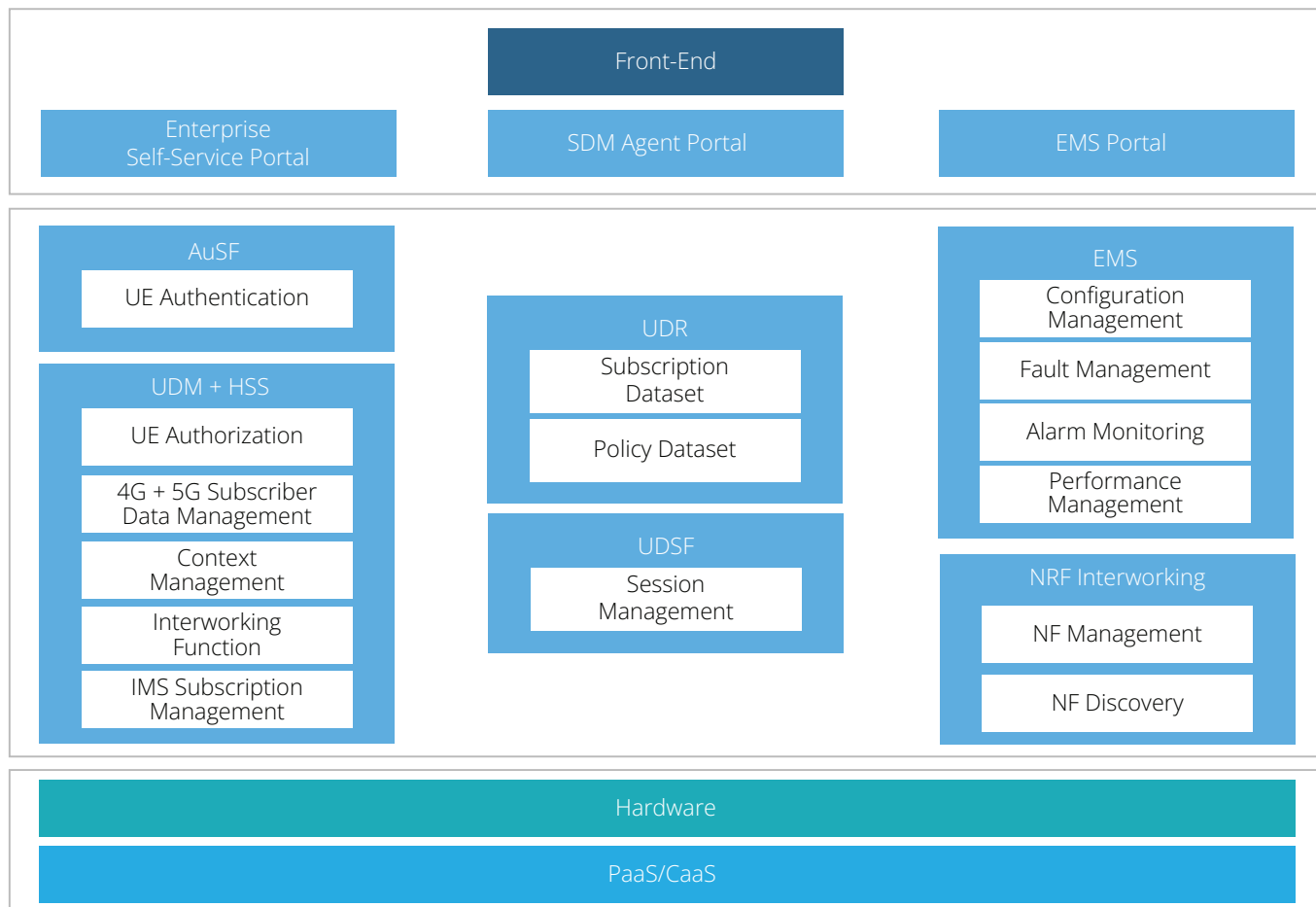
Technical Elements

- 3GPP release 17-compliant
- Based on 5G service-based architecture (SBA)
- HTTP/REST-based APIs complied to open API 3.0 standard
- Highly scalable NoSQL data repository
- KPIs for performance and alarm monitoring
- Provisioning gateway to support API mediation
- Interworking with external EMS over NETCONF/YANG
- Integration with legacy network functions with IWF
- Centralized dashboard to monitor resource health
- Centralized log management and distributed tracing
- Comprehensive role-based access controls (RBAC)

Solution Components

- **Authentication Function (AUSF):** performs authentication in 5G networks.
- **Home Subscriber Server (HSS):** performs authentication in 4G networks, including support for authentication and authorization of IMS subscription profiles to enable voice and multimedia services.
- **Unified (4G+5G) Data Management (UDM):** authenticates and authorizes access services in 4G and 5G networks.
- **Unified Data Repository (UDR):** a highly scalable common subscriber database that holds SIM identities and subscription profiles for 4G and 5G service and policy subscriptions.
- **Unstructured Data Storage Function (UDSF):** manages, stores, and retrieves network function session contexts in an unstructured format.
- **SDM Agent Portal:** a web portal to manage subscriptions, SIM cards, services parameters, and troubleshooting.
- **SDM Element Management System (EMS):** a web portal for operations and maintenance; manages network element configurations and monitors KPIs and system health and performance.
- **Enterprise Self-Service Portal (ESS):** a web portal for enterprise customers can be added in private 5G deployments to manage their SIM/subscription profiles, end-to-end subscription and device lifecycle, real-time connection status, and usage monitoring.

SDM Architecture



Solution Benefits

Ensure hassle-free evolution to 5G

The 4G+5G converged offering makes it easier for operators to seamlessly migrate to next-gen, supporting their existing 4G services as well as advanced 5G services using the same SDM platform.

Leverage new partnership opportunities

The solution opens the door for collaborations with a host of third-party service providers, enabling the launch of advanced services such as enterprise IoT, 5G slicing, and more.

Reduce time-to-market (TTM)

The cloud-native architecture support allows operators to easily scale-up and scale-down to evolve with rapid market changes. New services are easily configured using web portals to ensure swift launch.

Lower costs

With its flexible deployment support, the single converged platform enables operators to leverage cloud benefits for their individual business needs, reducing CAPEX and OPEX.

Unlock new revenue streams

Operators can introduce a host of modern next-gen services (IoT, M2M, eMBB, URLLC, and more) and benefit from new revenue opportunities as they transition to 5G.

Solution Highlights and Features

Alepo's solution can scale from low footprint to high-performance deployment whenever there is demand for more TPS, and offers a host of other features:



Microservice Architecture

Employs microservice-based software architecture in-line with 5G service-based architecture. Every 5G core network function is implemented using one or multiple functionally independent stateless service functions. These service functions integrate with each other, as well as services provided by other vendors, over REST-based APIs in compliance with Open API 3.0 standards.

A high-performing NoSQL database is used for persisting application states. The microservices add, test, and reverse incremental small changes easily, enabling a continuously evolving system.



Cloud Native

The cloud agnostic solution supports containerized deployment. It uses Docker-based containers for deploying an application or service functions under containerized mode with PaaS-agnostic deployment support. The stateless nature of service functions allows scheduling of automatic scaling for individual service functions based on request traffic load.

Alepo's SDM can be deployed on multiple cloud systems such as OpenStack, AWS, VMware, and more as well as on the local data center. It also supports VM and NFV based deployment depending on business requirements.



Convergent SDM

Includes AUSF, UDM+HSS, and UDR along with a centralized subscriber data repository to manage 4G and 5G subscriptions, supporting 4G, 5G NSA as well as standalone 5G deployments. It also offers 4G HSS and a centralized subscriber data repository for the 4G network. The convergent subscriber data management solution offers a robust system to manage multiple varied partnerships with ease and introduce innovative services such as mMTC, massive IoT, URLLC, network slicing, and more using 5G.



4G + 5G Interworking

A converged core offering that includes 4G and 5G NFs, allowing operators to offer services over 4G and 5G, and inter-domain mobility to support session continuity as subscribers switch between 4G and 5G. Can be deployed with 5G core NFs, integrating with the operator's legacy 4G core over the 3GPP standard-based interface. Supports interworking with 4G NFs such as Mobility Management Entity (MME) using inbuilt interworking function (IWF) that facilitates inter-domain mobility and session continuity management.



Voice and Multimedia Services

The IMS HSS component of Alepo's SDM solution supports IMS services. It handles authentication and service authorization for IMS voice (VoNR and VoLTE) and multimedia services like caller identification, call diversion, alert tones, and many more. With the ability to create dynamic services, the IMS HSS enables authorization of any other operator-specific IMS services.



Rich Provisioning APIs

Alepo's 5G Core solution provides a rich API library that is open-API compliant and can be used by external CRM/IT systems for SIM provisioning, subscriber management, subscription management, policy management, and service configurations. Secured by a comprehensive RBAC, the system restricts network access based on roles and their defined permissions.



NRF Interworking

Alepo's SDM network functions integrate with a 5G Network Repository Function (NRF) or network repository service for NF management and discovery of NF instances. This enables the solution to avoid a single point of failure and handles load-balancing of API traffic across NF instances.



Vendor Agnostic

The solution is 3GPP-compliant and supports standard interfaces for interoperability with any best-of-breed network, preventing vendor lock-in and enabling operators to deploy a multi-vendor network for better price and performance. This helps reduce initial and long-term network costs.



Enterprise and Private 5G

The solution can be provided for a micro-environment with a small subscriber base, including enterprise and industry 4.0 use cases, where the core network needs to be deployed on the edge. Supports pre-integrated partnerships to bring the RAN, end devices, and other infrastructure needed to deploy a private 5G network for enterprises.



Public 5G

Alepo's Subscriber Data Management solution can be offered for a macro-environment with a large subscriber base. The scalable data repository offers local and geo-redundancy support for an environment that demands high performance and high flexibility to quickly scale up and scale down based on load, capacity, TPS, and more.



UE Authentication

Supports different authentication methods for 5G-AKA and EPS-AKA, enabling both 4G and 5G authentication. Alepo's SDM also supports resynchronization failure management, as well as non-3GPP access authentication.



Service Authorization

Manages subscriber identities and service subscriptions to perform service authorization of 4G and 5G services using subscription data. Offers support for privacy protection by implementing SUCI de-concealing (SUCI to SUPI conversion).



Enterprise Self-Service

A web-based self-service portal for enterprise customers can be added, enabling end-to-end device lifecycle management, including eSIM capabilities. Supports bulk SIM administration, SIM and service activation, automated provisioning, cost control, subscription management, and real-time usage monitoring.



Web-Based Configurations

Offers a web-based element management system that helps system users configure NF services, profiles, and deployments, and add one or multiple microservices with the same or different functionalities for an NF in an environment. Supports integration with external centralized EMS over NETCONF/YANG.



SDM Agent Portal

An easy-to-use web portal that enables importing and managing SIM batches; carries out service configurations for DNN, slice, APN, and PLMN; manages 4G, 5G, policy subscriptions; stores SIM information in an encrypted format; troubleshoots for subscription-related issues. Enables users to view all subscription-related information in one place and ensures privacy and security of data with role-based access, providing audit logs and operations history.



Centralized Data Repository

Alepo's SDM solution for 5G includes a common and highly scalable subscriber repository that holds SIM identities, subscription profiles, policies, contexts, sessions, and application states for 4G and 5G subscriptions. Offers standard-based API integration for other core network nodes to retrieve subscriber information. Also supports REST (real-time) or batch (bulk) provisioning. The high-performance database supports single- and multi-site deployment.

