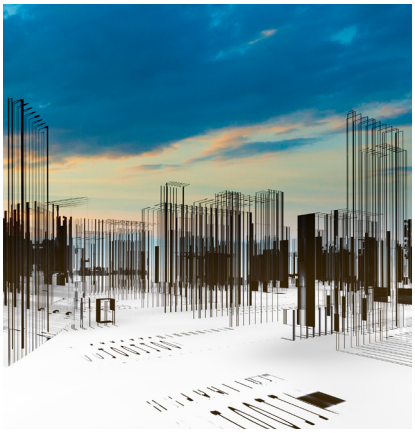


5G Service Intelligence Engine

Machine learning-powered, 3GPP compliant, enriched cloud-native NWDAF

Virtualized networks in cloud computing environments are becoming the norm. The complex and dynamic nature of their lifecycle management is driving the need for analytics-driven closed-loop automation, ultimately with a view to zero-touch operations.

The main driving force behind the unprecedented uptake in the adoption of 5G technology is the performance characteristics it offers, which unlock use cases previously not possible. 5G technology offers peak data rates of up to 20Gbps with latencies in the range of a millisecond, while serving one million devices per square kilometre. Additionally, 5G allows operators to deploy diverse services through network slicing, while each slice is optimized to meet SLAs based on the application, customer segment, or business.

With the introduction and adoption of 5G, it is imperative for operators to implement new business models and address the requirements of next generation use cases. SLA assurance becomes essential in these business models to address the significant investments 5G brings. Cutting-edge technologies like machine learning and artificial intelligence provides the level of prediction and automation needed to guarantee the SLAs. Specifically, these technologies offer new incredible capacities of throughput, latency, and connection density.

KEY BENEFITS

- Complies with 3GPP R15 and R16 and offers an enrichment option
- Deploys in public or on-prem cloud-native environments
- Leverages a microservices-based design for highly scalable containerized deployments
- Collects data from various 5G NFs including AFs and OAM
- Gathers and delivers user QoE-aware enriched outputs
- Relies on a common datastore for NWDAF and ANI datasets, offering better TCO
- Provides centralized license, configuration and operational KPI management
- Offers all 3GPP-defined analytics services and a broad range of Automation use case support
- Supports a range of analytics techniques from basic threshold-driven notifications to deep learning-based modeling for predictive analytics
- Displays rich and intuitive analytics within the Sandvine ANI Portal

5G SERVICE INTELLIGENCE ENGINE

Sandvine's 5G Service Intelligence Engine is a 3GPP-compliant NWDAF. It is also an enriched solution, incorporating proven machine learning capabilities with the industry's most advanced traffic classification technology – Sandvine's ActiveLogic. The inclusion of high-fidelity application performance data and subscriber quality of experience (QoE) metrics within NWDAF enhances its outputs, resulting in a whole new level of use case value and accuracy.

Architecture

Sandvine's 5G Service Intelligence Engine is developed as part of the architecture specified in 3GPP TS 23.501 Release 15/16. This cloud native, 5G product is designed for scalability with its modular and microservice-based design architecture, allowing for large or small deployments with optimized TCO. Aside from tremendous scale and performance benefits, it also allows for accelerating the development and operation of new business models needed for tight SLA assurance.

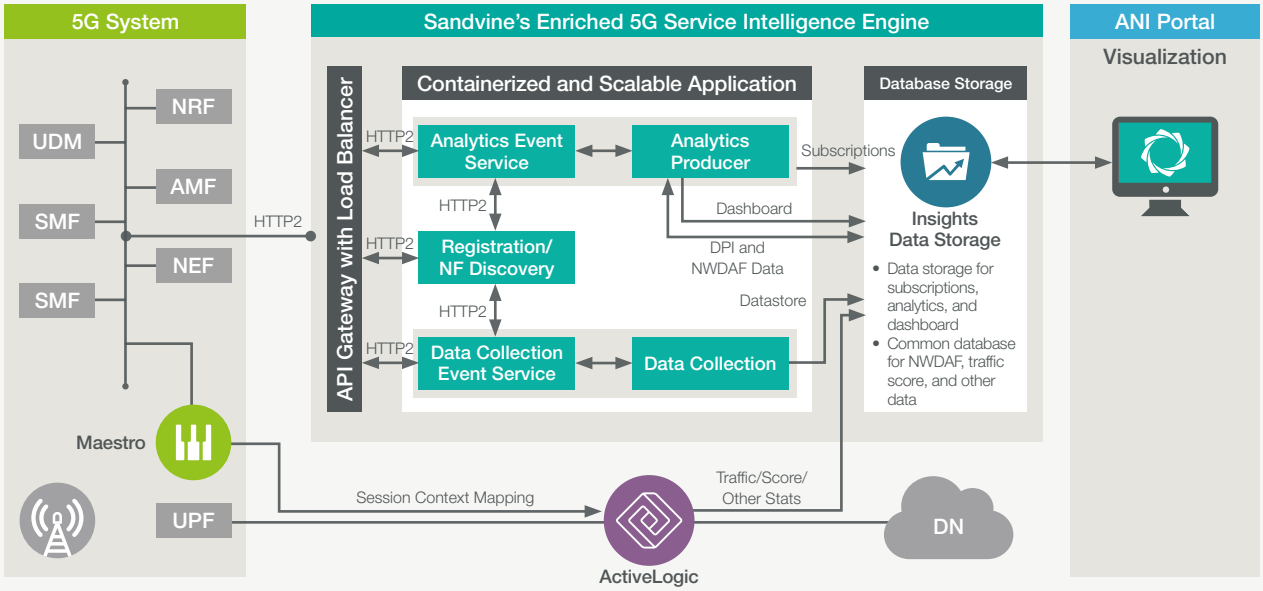
The 5G Service Intelligence Engine architecture (**Figure 1**) includes the following:

- **API Gateway with Load Balancer:** This feature exposes the 5G Service Intelligence Engine services to other 5G systems. It also participates in 5G core service-based architecture (SBA) and the load balancer supports horizontal scaling for high availability.
- **Registration and NF Discovery Service:** Registers with the Network Registration Function (NRF) as an NWDAF in the 5G core. Consumer network functions (NFs) will use NRF to discover Sandvine's NWDAF instances, serving one or more analytics services for the entire network or a specific service area. It also requests details of other registered NFs in the network.

- **Data Collection Service:** Collects input data virtually from all the network functions used for offering different analytics services in the form of statistics and predictions, and then writes the data collected to the common storage layer.
- **Analytics Engine Service:** This microservice performs in-depth, machine learning-driven analytics and produces analytics service outcomes in the form of Analytics IDs. When Sandvine's ActiveLogic is deployed, it will use the user plane KPIs as input for calculating the outputs.
- **Analytics Event Service:** This Analytics Engine Service front-end is designed to handle subscriptions and requests from Consumer NFs interested in analytics and predictions from the 5G Service Intelligence Engine – subscription data is also stored in Insights Data Storage.
- **Database Storage:** Insights Data Storage is designed for large-scale deployments, where it can be used in conjunction with big data systems, or where it fulfils the role of a data lake. It uses a columnar database designed for exploratory analytics, which depend on the storage and retrieval of granular information with segmentation and complex data structures. Insights Data Storage scales elastically while acting as one virtual cluster, and it boasts several features specifically designed to natively enable big data functions and interoperability. The data is organized in a simple, fixed schema, supplying easy-to-use data for a network operator's analytics requirements.

Figure 1

5G Service Intelligence Engine Architecture



5G SERVICE INTELLIGENCE ENGINE FEATURES

Sandvine's 5G Service Intelligence Engine offers following features and capabilities in Standalone 5G networks:

- **3GPP Compliant Cloud-Native Platform** – Fully compliant with 3GPP release 15 and 16 with solid foundation for R17 architecture. Designed on next generation cloud-native principles, it offers tremendous scale, resiliency, and performance benefits, including microservices architecture, managed by various Kubernetes solutions, dimensioned for different deployment scenarios, CI/CD, etc.
- **Access to the Best Data** – Provides access to the highly granular and rich real-time network and service data to deliver 5G SLA and service innovation

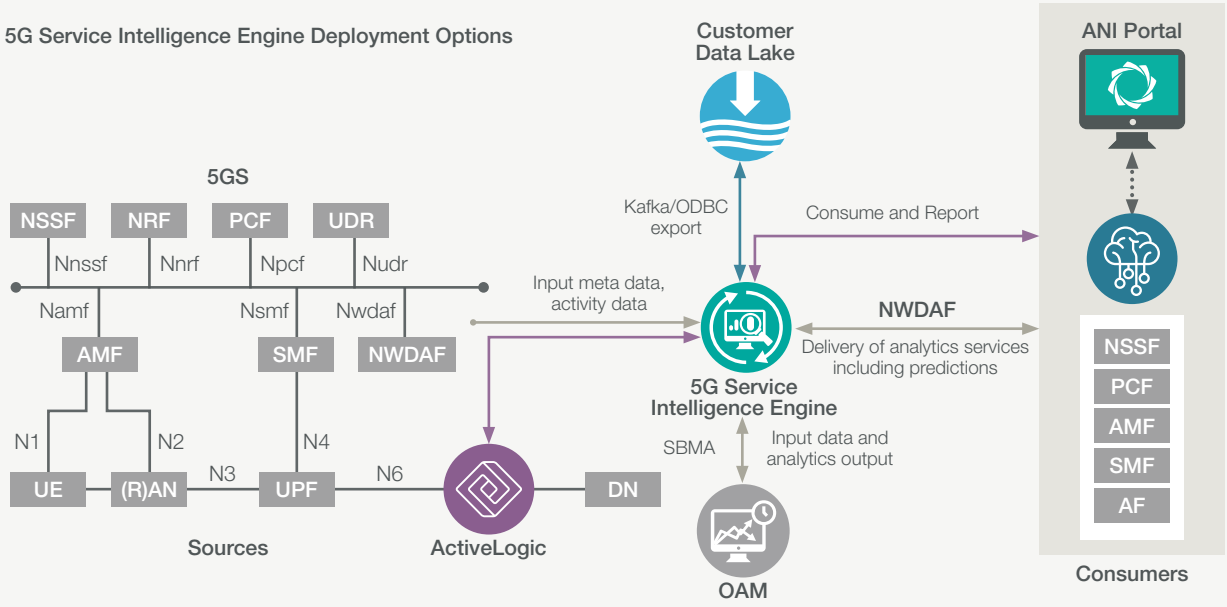
- **Enablement of Variety of Use Cases** – The 5G Service Intelligence Engine offers all nine analytics services as specified in R15 and R16. These analytics services will enable hundreds of use cases in different domains, including NF/Slice life-cycle management, network operations, SLA assurance, cyber threat management, etc.
- **Granular Application Visibility and Scoring** – When deployed with Sandvine's ActiveLogic, the 5G Service Intelligence Engine directly leverages machine learning-based traffic classification, ensuring enriched analytics outcomes
- **Simplified Multi-Vendor Support** – When the 5G Service intelligence Engine is deployed with ActiveLogic in a multi-vendor environment, contextual data can be collected by ActiveLogic and be used instead of relying on multiple, less accurate data sources (e.g., OAM)
- **ANI Portal Integration** – Sandvine's ANI Portal can consume 5G Service Intelligence Engine data and visualize each analytics service. This integration allows operations and planning teams to look at the stats associated with these analytics services in a very intuitive way for forensics and planning purposes.
- **Data Export** – The 5G Service Intelligence Engine can export NWDAF analytics services data to third-party big data systems by providing ODBC access to the Insights Data Storage and/or via Kafka data export. This data export option will give operators more control over data and reporting for more advanced data correlation and experimentation purposes.

Deployment Options

Due to its unique capability of ingesting highly granular application performance data, the Sandvine 5G Service Intelligence Engine offers three deployment options (**Figure 2**):

1. Standalone NWDAF
2. Standalone NWDAF with ANI Portal
3. Enriched and Sandvine integrated NWDAF

Figure 2



Each deployment option requires a specific set of components (**Figure 3**).

Figure 3

Components per Deployment Option

	Standard NWDAF	Standard NWDAF with ANI Portal	Enriched NWDAF
Compliance	Release 15 and 16	Release 15 and 16	Release 15 and 16
Components Required			
Benefits	Fully compliant with 3GPP Release 15 and 16 specifications using latest machine learning techniques for producing outcomes	Fully compliant with 3GPP Release 15 and 16 specifications integrated with Sandvine Deep Insights for visualizing Analytics Services in the ANI Portal	Fully compliant with 3GPP Release 15 and 16, and enriched with contextual data by leveraging user plane analytics directly from ActiveLogic

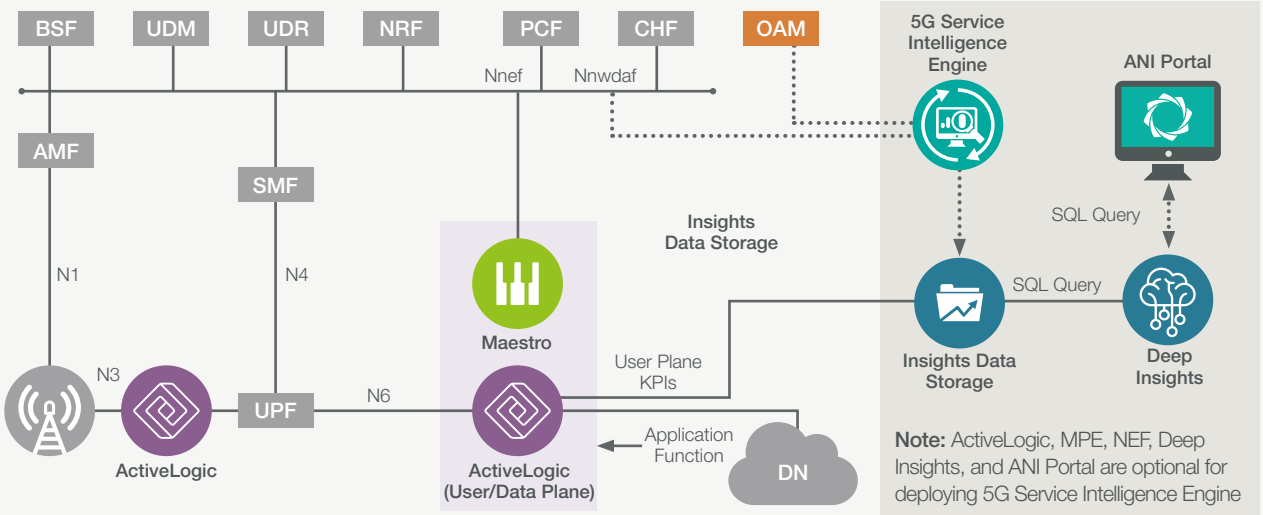
Key

5G Service Intelligence Engine | Maestro Policy Engine | Insights Data Storage | ActiveLogic | Deep Insights

Figure 4 shows the connectivity of Sandvine's 5G Service Intelligence Engine in a 5G network. The Engine can be optionally integrated with ActiveLogic.

Figure 4

5G SA Deployment



ABOUT SANDVINE

Sandvine's cloud-based Application and Network Intelligence portfolio helps customers deliver high quality, optimized experiences to consumers and enterprises. Customers use our solutions to analyze, optimize, and monetize application experiences using contextual machine learning-based insights and real-time actions. Market-leading classification of more than 95% of traffic across mobile and fixed networks by user, application, device, and location creates uniquely rich, real-time data that significantly enhances interactions between users and applications and drives revenues. For more information visit **http://www.sandvine.com** or follow Sandvine on Twitter **@Sandvine**.

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