



# 5G Observed Service Experience

## QoE-based insights for predictive service experience

### 5G OBSERVED SERVICE EXPERIENCE DELIVERS:

- Machine learning-driven analytics use cases by providing insight into service experience by slice, UE, group of UE, application, and application group
- Frequent (5 min) scoring data (MOS) from a single source for thousands of applications, including enterprise/IoT applications
- A complete solution that isn't dependent on external AFs to provide service experience

### MARKET OVERVIEW

**In this highly competitive market, the best way for operators to differentiate is by delivering and managing the right user experience for applications and services. This focus on user experience is more critical than ever with the introduction of 5G services, as it is no longer about selling the “network capability”, but rather delivering the right application quality of experience (QoE). To effectively unlock the potential of 5G services, operators and their enterprise customers will have to understand what users are experiencing and measure it accurately in real time.**

Observed Service Experience, one of the nine Analytics IDs specified by 3GPP in R15/16, relies on the Network Data Analytics Function (NWDAF) to collect mean opinion score (MOS) from individual Application Functions (AFs) for hundreds of key applications if not thousands.

Unfortunately, 3GPP Rel-16 lacks the definition of a robust DPI engine in the network for application detection. It also relies on individual AFs for providing traffic classification data, and as a result does not offer a solution for obtaining service experience for that application from the network. Due to this limitation, 3GPP Rel-16 only considers the applications that are being served by AFs present in the network, which could be very few.

This is a big limitation for the operators who want to incorporate the application service experience for key OTT applications in their automated decision making.

### SOLUTION OVERVIEW

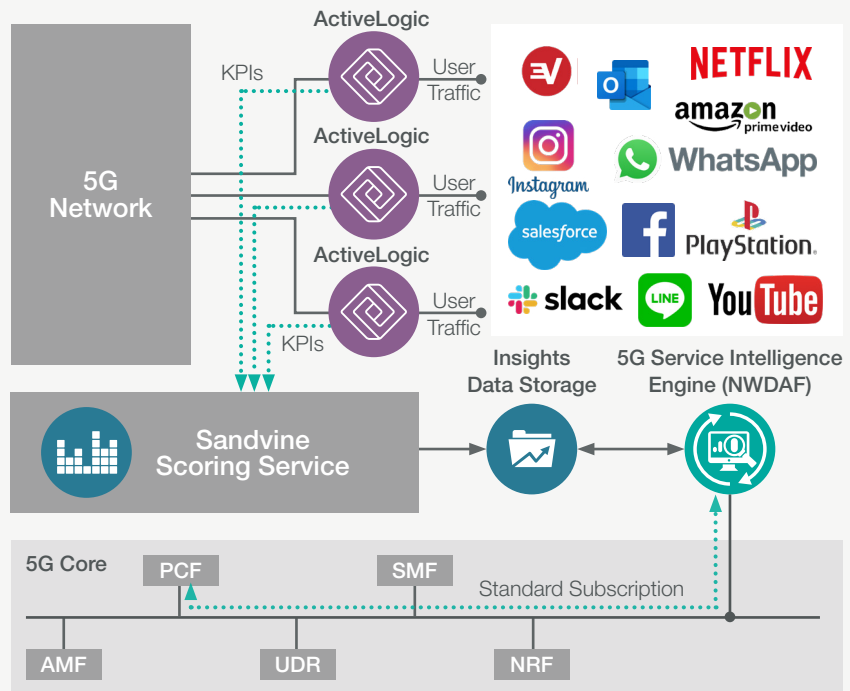
**Sandvine's 5G Service Intelligence Engine, an enriched NWDAF, offers an Observed Service Experience analytics service in the form of statistics and predictions, providing real-time service experience to different 5G Core network consumers: NFs, AFs, and operations, administration, and maintenance (OAM).**

With the existing QoE scoring capabilities within Sandvine Application and Network Intelligence (ANI) solution, Sandvine offers the Observed Service Experience analytics service (**Figure 1**) while acting as the single or additional source of metrics/KPIs needed for the analytics service. As per 3GPP, every AF should provide the application MOS/QoE to the NWDAF by user equipment (UE) or by UE group. When Sandvine ANI solution is deployed, it becomes the trusted AF for all internet applications, providing per service MOS (QoE Score) in a more homogenous manner. Sandvine 5G Service Intelligence Engine consumes this score/MOS for learning service experience with multiple dimensions like UE, group of UE, network slice, etc.



Figure 1

5G Observed Service Experience – Sandvine Solution



Sandvine's 5G Service Intelligence Engine offers current and expected service experience insights, enabling operators to deliver and assure network and next-generation service performance. As stated, the 5G Service Intelligence Engine takes advantage of Sandvine's existing traffic classification and QoE scoring capabilities to provide an enriched outcome when deploying 5G Observed Service Experience (Figure 2 and Table 1).

Figure 2

5G Observed Service Experience – Standard versus Enriched Output

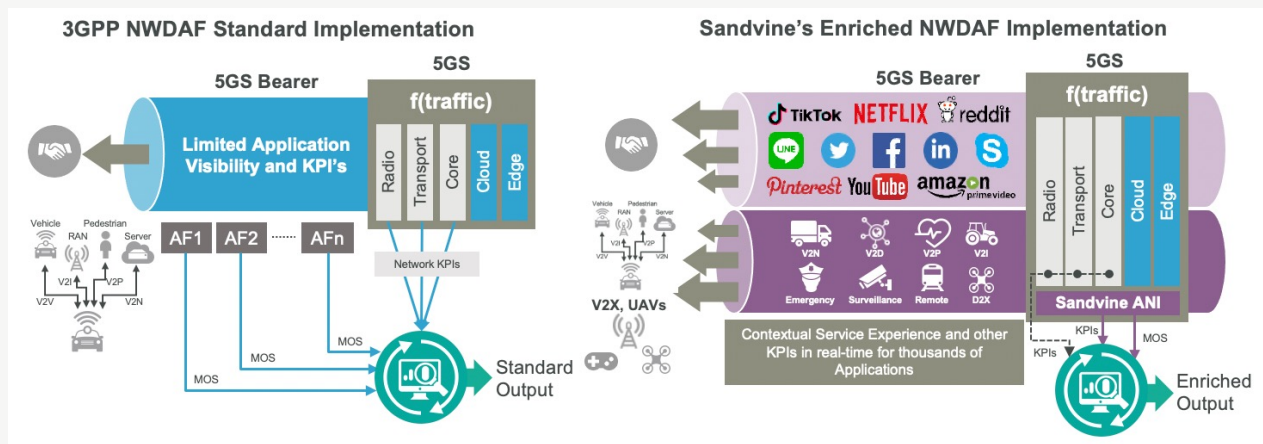




Table 1

### Comparison between standard NWDAF versus Sandvine's Intelligence Engine for 5G Observed Service Experience

3GPP Standard Service Experience	Sandvine's 5G Observed Service Experience
Observed service experience statistics and prediction for an application, UE group, or network slice for limited number of applications	Observed service experience statistics and prediction for an application, UE group, or network slice for thousands of applications including enterprise applications
Depends on individual Application Functions to provide service experience in the form of MOS	No dependency on external AFs to provide service experience
Requires input from multiple sources, including AF, AMF, SMF, UPF, and OAM	ANI solution can be the alternate source for many of the KPIs needed
MOS calculated by individual AFs for their own applications provides inconsistent QoE to the consumers	Consistent scoring algorithm from a single source responsible for measuring QoE for thousands of applications
Consumers like PCF will offer or adjust UE QoS based on the service a slice, UE, group of UE and a location is experiencing	Consumers like PCF will offer or adjust UE QoS based on the service a slice, UE, group of UE and a location is experiencing

### 5G OBSERVED SERVICE EXPERIENCE KEY CAPABILITIES

**3GPP defines Observed Service Experience as the average of observed service MOS (QoE Score) and/or variance of observed service MOS (QoE Score), indicating service MOS distribution for services such as audio-visual streaming and services such as V2X and web browsing. An NWDAF can provide this analytics service in the form of statistics or predictions to a service consumer.**

The Observed Service Experience analytics may provide one or both of the following:

- **Service Experience for an Application:** Service Experience for a UE or a group of UEs or any UE in an application or a set of applications
- **Service Experience for a Network Slice:** Service Experience for a UE or a group of UEs or any UE in a network slice

Observed Service Experience may be provided individually by UE or group of UEs, or network-wide, averaged per application or averaged across a set of applications on a network slice.

As part of this use case, additional value is provided by enabling other 3GPP use cases:

#### Frequency, Slice and Access Type Selection based on Service Experience

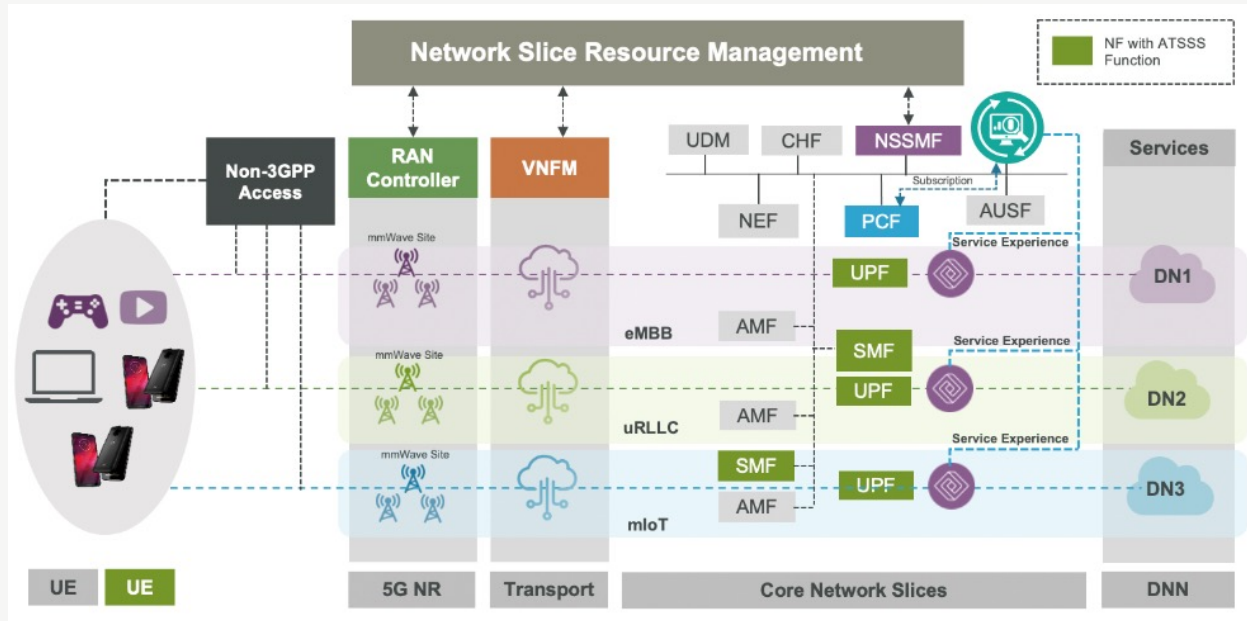
The Policy Control Function (PCF) is one of the key consumers of NWDAF analytics services in a 5G SA network. The NWDAF provides UE-specific, slice-specific, and application-specific analytics services to the PCF for optimizing policies related to UE for new and on-going sessions and IP flows (**Figure 3**). These policies will be based on the type of traffic or application the UE is using and the QoE expected for that traffic. The PCF can consume Service Experience analytics service for performing the following functions:

- Sending UE Route Selection Policies (URSP) to UE for determining the best route including the slice instance or slice type that UE should take
- Sending RFSP index to a UE based on several factors like application in use, subscriber tier, or plan
- Implementing Access Traffic Steering, Switching and Splitting (ATSSS) schemes



Figure 3

PCF influencing UE-related policies using 5G Observed Service Experience



### Service Experience Combined with Other Analytics Services

Predictive QoE or Service Experience is extremely important for many of the 5G use cases, including traffic rerouting, QoS adjustment for V2X applications, multi-access edge computing, etc. Different consumers in a 5G SA network can use the service experience of a particular application, group of applications, a UE, group of UEs, an area of interest, or a network slice, in combination with other NWDAF analytics services to make more subscriber experience-aware decisions.

Sandvine's 5G Observed Service Experience provides operators with a clear understanding of end-to-end application connectivity quality, which is critical for delivering promised SLAs and can be used by other consumers in the network. For example, consumers like PCF can adjust QoS of a UE or group of UEs, based on the quality of the service a slice, UE, group of UEs, and a location, is experiencing. Additionally, this enriched use case, underpinned by Sandvine's 5G Service Intelligence Engine, can be used to provide additional value via other 3GPP use cases.

### 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.



**USA**  
5800 Granite Parkway  
Suite 170  
Plano, TX 75024  
USA

**EUROPE**  
Svärdfiskgatan 4  
432 40 Varberg,  
Halland  
Sweden  
T. +46 340.48 38 00

**CANADA**  
410 Albert Street,  
Suite 201, Waterloo,  
Ontario N2L 3V3,  
Canada  
T. +1 519.880.2600

**ASIA**  
RMZ Ecoworld,  
Building-1, Ground Floor,  
East Wing Devarabeesanahalli,  
Bellandur, Outer Ring Road,  
Bangalore 560103, India  
T. +91 80677.43333

Copyright ©2022 Sandvine Corporation. All rights reserved. Any unauthorized reproduction prohibited. All other trademarks are the property of their respective owners.

This documentation, including all documentation incorporated by reference herein such as documentation provided or made available on the Sandvine website, are provided or made accessible "AS IS" and "AS AVAILABLE" and without condition, endorsement, guarantee, representation, or warranty of any kind by Sandvine Corporation and its affiliated companies ("Sandvine"), and Sandvine assumes no responsibility for any typographical, technical, or other inaccuracies, errors, or omissions in this documentation. In order to protect Sandvine proprietary and confidential information and/or trade secrets, this documentation may describe some aspects of Sandvine technology in generalized terms. Sandvine reserves the right to periodically change information that is contained in this documentation; however, Sandvine makes no commitment to provide any such changes, updates, enhancements, or other additions to this documentation to you in a timely manner or at all.