Standards-Compliant Online Charging

A Sandvine Technology Showcase

Contents

Executive Summary

Performing accurate, real-time metering of data traffic for prepaid charging use cases is a requirement in today's telecommunications market. These capabilities form the foundation of many subscriber services, and are necessary both to protect subscribers from bill-shock and to protect network operators from revenue leakage.

According to the 3GPP standards, a direct, real-time interaction between the PCEF and the OCS is required to ensure accurate reporting and timeliness of the online charging mechanism.

Many systems claim to be 3GPP Gy-compliant, but lack one or both of the functional requirements (i.e., direct and real-time). These non-compliant solutions typically introduce a processing intermediary that breaks the direct connection, leading to a host of accuracy and reliability challenges that in turn cause revenue leakage and unreliable billing for all online charging use cases.

Sandvine's online charging architecture is completely compliant with 3GPP standards.

In our architecture, the Policy Traffic Switch (PTS) – our PCEF/TDF – is connected directly, in real-time, to the online charging system (OCS). Critically, the PTS performs the on-the-wire measurement of usage, and usage is passed directly to the OCS (i.e., it does not pass through an external intermediary or internal intermediary process). As a result, Sandvine's online charging solution is both accurate (i.e., measures usage correctly), and reliable (i.e., keeps working).

Introduction to Online Charging

Performing real-time metering of data traffic is a pivotal requirement in today's telecommunications markets. Accurate metering protects the revenue streams generated by data services and ensures no bill shock for subscribers due to under- or over-counting.

The 3GPP has defined a set of standards for policy and charging control systems. Of particular relevance to real-time metering is the requirement that the measurement component in the data path be connected directly and in real-time to the online charging system (OCS) via Diameter Gy – only in this manner can a communications service provider (CSP) avoid revenue leakage.

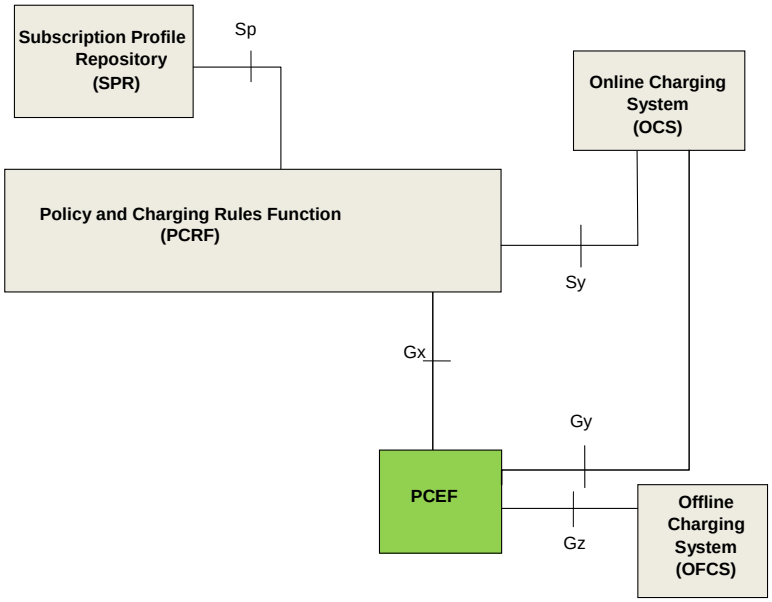

Figure 1 - 3GPP PCC Architecture (adapted from 3GPP TS 23.203 Release 11)

According to 3GPP TS 23.203, the PCEF is one logical entity and encompasses service data flow detection, policy enforcement, and online and offline charging interactions. To ensure accuracy and timeliness, 3GPP standards describe online charging mechanisms as real-time processes requiring a direct interaction of the charging mechanism with data sessions and services. The charging mechanism encompasses both the OCS and the PCEF.

Many systems claim to be 3GPP Gy-compliant, but lack one or both of the functional requirements. These non-compliant solutions have typically introduced a processing intermediary that breaks the direct connection and adds many minutes of delay. At the surface (and marketing) level, it is often very difficult for an evaluator to distinguish between compliant and non-compliant solutions.[1]

Non-compliance with the 3GPP online charging standards leads to a host of accuracy and reliability challenges. In a non-compliant architecture, attempts to address one shortcoming (e.g., lack of accuracy) will make the other one worse (e.g., lower reliability). The ultimate impacts on the operator include increased cost and complexity, lower subscriber satisfaction, and revenue leakage.

[1] A detailed explanation of online charging standards and considerations, and an overview of how vendors try to claim compliance for non-compliant solutions is available in the Sandvine whitepaper *Online Charging with Diameter Gy: Considerations for Accuracy and Reliability*

Sandvine's Online Charging Architecture

Sandvine's online charging architecture is completely compliant with 3GPP standards. In our architecture (Figure 2), the Policy Traffic Switch (PTS) – our PCEF/TDF – is connected directly, in real-time, to the online charging system (OCS).

Critically, the PTS performs the on-the-wire measurement of usage, and usage is passed directly to the OCS (i.e., it does not pass through an external intermediary or internal intermediary process).

Also, note the complete absence of our other deployment elements, the Service Delivery Engine (SDE) and the Subscriber Policy Broker (SPB).

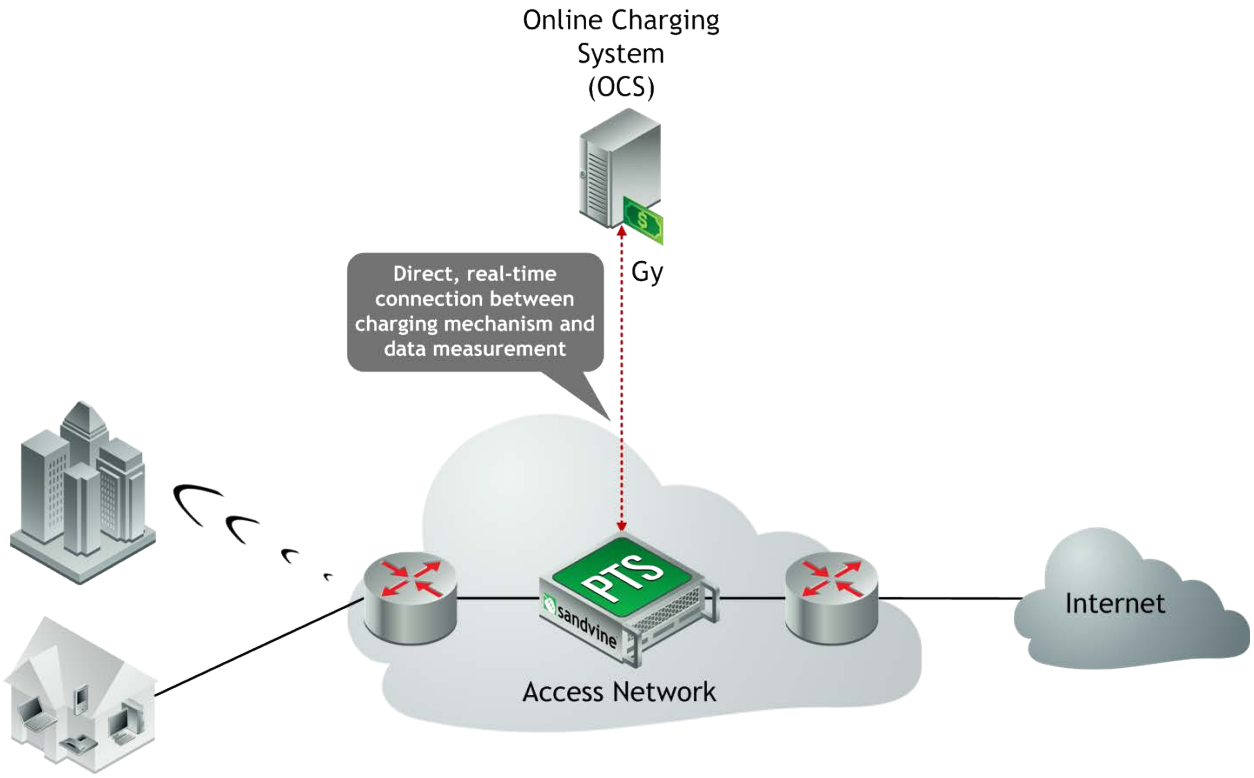

Figure 2 - Sandvine's online charging deployment architecture

As a result, Sandvine's online charging solution is both accurate (i.e., measures usage correctly), and reliable (i.e., keeps working).

Market Alternatives

Many systems claim to be 3GPP Gy-compliant but fail in real-world deployments because the claims are false. Figure 3 shows three diagrams that represent two charging architectures:

- The left-most architecture, the one implemented by Sandvine, is compliant with 3GPP online charging standards: the connection between the measurement component in the data path and the OCS is direct and is real-time
- The middle figure is not compliant: the introduction of an intermediate processing node breaks the direct connection and breaks the real-time nature of the usage reports

- The right-most figure has an identical architecture to the middle figure, but the diagram has a superficial box misrepresenting two separate components as one: this box does not rectify the indirect, none real-time nature of the architecture

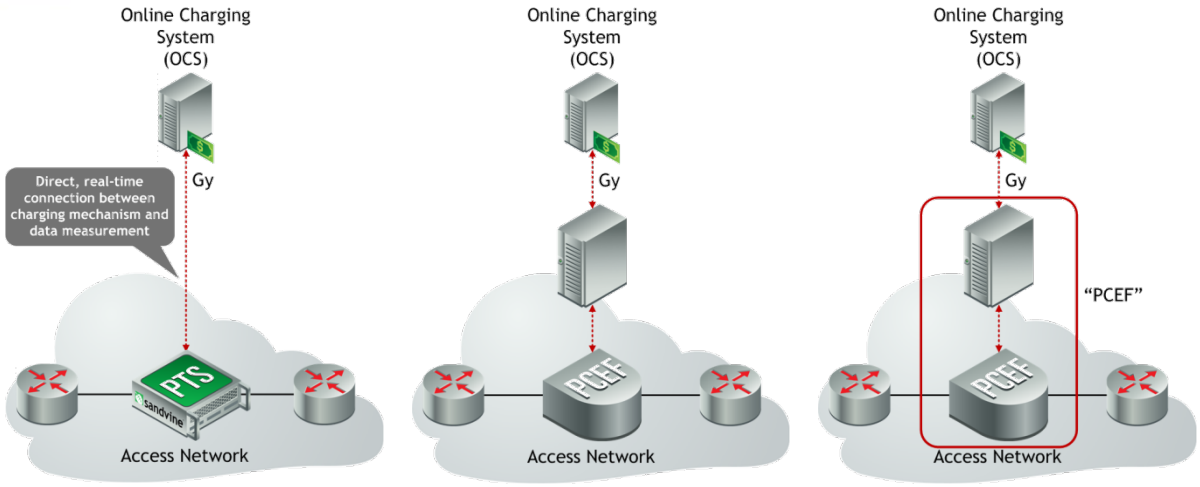

Figure 3 - Three diagrams representing two charging architectures: only the left-most diagram is compliant with 3GPP standards for online charging

From the communication service provider's perspective, failure to adhere to the strict 3GPP standards for online charging results in revenue leakage and unreliable billing for all online charging use cases. The degree of revenue leakage varies by use case based upon a handful of factors, so each must be considered separately.[2]

If there was no difference in charging accuracy and reliability between these deployments, then non-compliance would not be of significant importance – but that is not the case. The only way for a CSP to achieve minimum revenue leakage and maximum reliability is by adhering to the 3GPP requirements.

[2] The Sandvine whitepaper *Online Charging with Diameter Gy: Considerations for Accuracy and Reliability* includes an examination of the risk of revenue leakage for a range of use cases when using the two deployment architectures discussed in Figure 3.

Conclusion

To enable real-time metering for a range of powerful subscriber service use cases, Sandvine has built an online charging architecture that is completely compliant with the 3GPP standards. Critically, in the Sandvine architecture our Policy Traffic Switch (PTS) – our PCEF/TDF – is connected directly, in real-time, to the online charging system (OCS).

Characteristics of Sandvine's Online Charging Architecture

The table below provides additional explanation of the characteristics of Sandvine's online charging architecture.

Consideration	Characteristic of the Sandvine Solution	Explanation
Usage Measurement	The measurement component, our Policy Traffic Switch (PTS), measures data usage in real-time	To decrement from prepaid quota in real-time, the data usage must be measured in real-time (as opposed to later via a records system)
Connection between Measurement Component and Online Charging System	The connection between the PTS and the OCS is direct; there is no intermediate processing node	This is the only way to ensure accuracy and reliability in real-world networks
	The connection between the PTS and the OCS is real-time; there is no interruption for aggregation or processing	This is the only way to ensure accuracy and reliability in real-world networks

Additional Resources

In addition to the 3GPP resources cited in this document, please consider reading the Sandvine whitepaper *Online Charging with Diameter Gy: Considerations for Accuracy and Reliability*.

Headquarters
Sandvine Incorporated ULC
Waterloo, Ontario Canada
Phone: +1 519 880 2600
Email: sales@sandvine.com

European Offices
Sandvine Limited
Basingstoke, UK
Phone: +44 0 1256 698021
Email: sales@sandvine.co.uk

sandvine
Intelligent Broadband Networks