

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re *inter partes* review of:

U.S. Patent 8,531,971 to Duan

Filed: Herewith

For: **Method for Controlling Charging
of Packet Data Service**

Atty. Docket: 3674.012IPR0

**Declaration of Dr. Paul Min in Support of
Petition for *Inter Partes* Review of U.S. Patent No. 8,531,971**

Mail Stop Inter Partes Review

Attn: Patent Trial and Appeal Board

Commissioner for Patents

PO Box 1450

Alexandria, VA 22313-1450

Commissioner:

I, Paul Min, declare as follows:

1. I have been retained on behalf of Cisco Systems, Inc. (“Petitioner”) for the above-captioned *inter partes* review proceeding. I understand that this proceeding involves U.S. Patent No. 8,531,971 (“the ’971 patent”) titled “Method for Controlling Charging of Packet Data Service” by Xiaoqin Duan. I also

Cisco 1015
IPR2017-02076
U.S. Pat. 8,531,971

understand that the '971 patent is currently assigned to Huawei Technologies Company, Limited.

2. I have reviewed and am familiar with the specification of the '971 patent. I understand that the '971 patent is a continuation of U.S. Patent Application No. 13/190,817 filed on July 26, 2011, which is a continuation of U.S. Patent Application No. 11/502,921 filed on August 11, 2006 (now Patent No. 8,009,573), which is a continuation of Application No. PCT/CN2005/000388 filed on March 28, 2005.

3. I understand that the '971 patent lists foreign application priority data dating back to April 1, 2004. I also understand that the '971 patent is not necessarily entitled to an April 1, 2004 priority date. However, if the '971 patent is entitled to a priority date before March 28, 2005, the rationale and opinions in this declaration are not substantively impacted.

4. I understand that the '971 patent has been provided as Exhibit 1001. I will cite to the specification using the following format: ('971 patent, 1:1–10). This citation points to the specification of the '971 patent at column 1, lines 1–10.

5. I have reviewed and am familiar with the file histories of the '971 patent, U.S. Patent Application No. 13/190,817, and U.S. Patent Application No. 11/502,921. I understand that the file history of the '971 patent has been provided

as Exhibit 1002. I understand that the file history of U.S. Patent Application No. 13/190,817 has been provided as Exhibit 1008. I understand that the file history of U.S. Patent Application No. 11/502,921 has been provided as Exhibit 1007.

6. The '971 patent describes a “method for controlling charging of packet data service.” ('971 patent, Title.) I am familiar with the technology described in the '971 patent as of its earliest priority date. I am also familiar with the technology described in the '971 patent as of April 1, 2004.

7. I have reviewed and am familiar with the following prior art used in the petition for *inter partes* review of the '971 patent:

3GPP TS 23.125 V6.2.0 (2004-09), titled “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Overall High Level Functionality and Architecture Impacts of Flow Based Charging; Stage 2 (Release 6)” (“3GPP 23.125”). I understand 3GPP 23.125 was publicly available at least before the end of September, 2004—well before the earliest priority date of the '971 patent. I understand 3GPP 23.125 has been provided as Exhibit 1002.

U.S. Patent Pub. No. 2002/0165958 A1 to Duffield *et al.*, titled “Apparatus for Size-Dependent Sampling for Managing a Data Network,” (“Duffield”). Duffield was published on November 7, 2002—well before the earliest possible priority date of the '971 patent. I understand Duffield has been provided as Exhibit 1014.

8. I have been asked to provide my technical review, analysis, insights, and opinions regarding the '971 patent and the above-noted references that form the basis for the grounds of rejection set forth in the petition for *inter partes* review of the '971 patent.

9. When providing my technical review, analysis, insights, and opinions, I have reviewed the following documents:

Exhibit	Description
Ex. 1001	U.S. Patent No. 8,531,971 to Duan
Ex. 1002	U.S. Patent No. 8,531,971 Prosecution History
Ex. 1006	U.S. Patent No. 8,009,573 to Duan
Ex. 1007	U.S. Patent No. 8,009,573 Prosecution History
Ex. 1008	U.S. Patent Application No. 13/190,817 Prosecution History
Ex. 1009	U.S. Patent No. 7,450,591 to Körling <i>et al.</i>
Ex. 1012	U.S. Provisional Application No. 60/418,547 to Körling <i>et al.</i>
Ex. 1013	3GPP TR 23.825 (V1.2.0) (2003-11)
Ex. 1014	U.S. Patent Pub. No. 2002/0165958 to Duffield <i>et al.</i>

Exhibit	Description
Ex. 1017	Dr. Paul Min Curriculum Vitae
Ex. 1023	3GPP TS 23.125 (V6.2.0) (2004-09)
Ex. 1038	Seurre, Emmanuel <i>et al.</i> , GPRS for Mobile Internet (Artech House 2003)
Ex. 1039	Certificate of Translation of CN 2004 1 0030955
Ex. 1040	Certificate of Translation of CN 2004 1 0033721
Ex. 1041	Certificate of Translation of WO 2005/096547 (PCT/CN2005/000388)
Ex. 1052	3GPP TS 29.207 (V5.6.0) (2003-12)

I. Qualifications.

10. I received a B.S. degree in Electrical Engineering in 1982, an M.S. degree in Electrical Engineering in 1984, and a Ph.D. degree in Electrical Engineering in 1987 from the University of Michigan in Ann Arbor. I received several academic honors, including my B.S. degree with honors, a best graduate student award and a best teaching assistant award during my M.S. study, and a best paper award from a major international conference for reporting results from my Ph.D. thesis.

11. After receiving my Ph.D., I worked at Bellcore in New Jersey from August 1987 until August 1990. At Bellcore, I was responsible for evolving the public switched telephone network (POTS) into a multi-services voice and data network that incorporated packet switches, optical technologies, and wireless technologies.

12. In September 1990, I joined the faculty at Washington University in St. Louis. In July 1996, I was promoted to an Associate Professor of Electrical Engineering with tenure. I am currently a Senior Professor at Washington University of the Electrical and Systems Engineering. I have also served as the Chair of the Graduate Curriculum (2000–2002) and the Chair of the Undergraduate Curriculum (2011–2014) for the Electrical and Systems Engineering department.

13. At Washington University, I have conducted research in communication, computing, and related electronic hardware and software. My research group has pioneered a new paradigm for designing electronic circuits that can alleviate the speed and performance mismatch against optical technology. I have received several grants from the U.S. Federal Agencies, including the National Science Foundation and the Defense Advanced Research Project Agency, and numerous contracts from companies and organizations around the world. Specifically related to the technology matters in this litigation, I have researched a

variety of wireless communication technologies, including LTE, LTE-A, CDMA, WCDMA, OFDM, FDD, SC-FDMA, and TDD. I have an extensive background and experience in each of these technologies.

14. As a faculty member at Washington University, I have taught a number of courses in electronics, communication, and computing at both the undergraduate and graduate levels. For example, I have taught communication theory (Washington University ESE 471), transmission and multiplexing (Washington University ESE 571), and signaling and control of communication networks (Washington University ESE 572).

15. I have supervised more than 50 students, 12 of whom received a doctoral degree under my guidance. A number of doctoral theses that I have supervised relate specifically to wireless cellular technology. In particular, my students and I have published a number of peer-reviewed articles on resource allocation, scheduling, modulation, mobility management, and multiplexing. Several of these articles received accolades in the field. For example, in 2011, we received a best paper award in 3G WCDMA-related mobility and resource management at the prestigious Mobility 2011 international conference.

16. In addition to my responsibilities as a university faculty member, I have founded two companies. In May 1997, I founded MinMax Technologies, Inc.,

a fabless semiconductor company that developed switch fabric integrated circuit chips for the Internet. In March 1999, I founded Erlang Technology, Inc., a fabless semiconductor company that focused on the design and development of integrated circuit chips and software for the Internet. One of Erlang's products received a best product of the year award in 2004 from a major trade journal for the electronics industry.

17. Outside my own start-up companies, I have also served in various technology and business advisor roles for other companies and organizations around the world. I was the main technical author for one of two winning proposals to the Korean government for CDMA wireless service licenses (1996). I was responsible for designing a commercial scale IS-95 CDMA cellular network, which I understand to be one of the earliest such networks deployed in the world. I worked with numerous engineers and scientists around the world to implement this commercial-scale cellular network before IS-95 CDMA was widely accepted. This provided me with extensive insight into various components of CDMA technology, which by and large are used in WCDMA network. I have also been involved in a semiconductor company that specializes in semiconductor memories such as flash EEPROMs as a board member and as a technical advisor (2007–2011).

18. I am a member of and have been actively involved in a number of professional organizations. For example, I have served as the Chair of the Saint Louis Section of the IEEE with more than 3,000 members (2014), and a member of the Eta Kappa Nu Honor Society for electrical engineers. I have also been an Ambassador of the McDonnell International Scholars Academy (2007–2013).

19. In my nearly 30 years of experience with telecommunications technology, I have acquired significant knowledge about telecommunications systems industry standards, the 3rd Generation Partnership Project (“3GPP”), standard setting organizations, and the rules and document policies that the standard-setting organizations in 3GPP have in place to develop industry standards.

20. I am a named inventor on nine U.S. patents, many of which are directly related to resource allocation, packet processing, and network designing. I have extensively published technical papers in international conferences and journals, technical memoranda and reports, and given a number of seminars and invited talks. Many of these papers are specifically within the context of standards developed from 3GPP. I have organized several international conferences and served as an international journal editor.

21. My Curriculum Vitae is submitted as Exhibit 1017 and contains further details on my education, experience, publications, and other qualifications

to render an expert opinion. My work on this case is being billed at a rate of \$450.00 per hour, with reimbursement for actual expenses. My compensation is not contingent upon the substance of my testimony or the outcome of this *inter partes* review.

II. My understanding of claim construction.

22. I understand that, during an *inter partes* review, claims are to be given their broadest reasonable construction in light of the specification as would be read by a person of ordinary skill in the relevant art (“POSITA”).

III. My understanding of anticipation.

23. I understand that a patent claim is invalid if the claimed invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent. This means that a claim is unpatentable if all of the requirements of the claim are found in a single prior-art reference as arranged in the claim.

IV. My understanding of obviousness.

24. I understand that a patent claim is invalid if the claimed invention would have been obvious to a POSITA. This means that even if all of the

requirements of the claim cannot be found in a single prior-art reference, the claim can still be unpatentable.

25. As part of this inquiry, I have been asked to consider the level of ordinary skill in the art that someone would have had at the time of the alleged invention. In deciding the level of ordinary skill, I considered the following:

- the levels of education and experience of persons working in the field;
- the types of problems encountered in the field; and
- the sophistication of the technology.

26. To obtain a patent, a claimed invention must have, as of the priority date, been nonobvious in view of the prior art in the field. I understand that an invention is obvious when the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a POSITA.

27. I understand that to prove that prior art or a combination of prior art renders a patent obvious, it is necessary to: (1) identify the particular references that, singly or in combination, make the patent obvious; (2) specifically identify which elements of the patent claim appear in each of the asserted references; and (3) explain how the prior art references could have been combined to create the inventions claimed in patent.

28. I understand that certain objective indicia can be important evidence regarding whether a patent is obvious. Such indicia include: commercial success of products covered by the patent claims; a long-felt need for the invention; failed attempts by others to make the invention; copying of the invention by others in the field; unexpected results achieved by the invention as compared to the closest prior art; praise of the invention by the infringer or others in the field; the taking of licenses under the patent by others; expressions of surprise by experts and those skilled in the art at the making of the invention; and the patentee proceeding contrary to the accepted wisdom of the prior art.

V. Level of ordinary skill in the art.

29. I understand that a POSITA is viewed at the time of invention. Based on the disclosure of the '971 patent, one of ordinary skill in the art would have had a B.S. degree in Computer Science, Electrical Engineering, or an equivalent field, as well as at least 3–5 years of academic or industry experience in the relevant field.

30. By equivalent field, I mean that the required levels of educational and industry experience are on a sliding scale relative to each other. For example, a POSITA could have a more advanced educational degree with less industry experience or vice versa.

VI. Background of the technology.

31. As radio and mobile-network technologies evolved to offer users greater access to a diverse set of services (*e.g.*, voice, data, and multimedia services), service providers needed flexible approaches to charge users for these services. For example, when a user sought access to data services outside a geographical location or when a user exceeded her or his data limit, some service providers wanted to increase the rate at which the user was charged. Conversely, other service providers wanted to decrease the rate at which a user was charged when a pre-defined condition was met. For example, a service provider could charge a user less for incoming messages than outgoing messages. A service provider could charge a user less for a lower quality of service. Or, a service provider could send advertisements to a user without charging the user. Overall, the industry was rapidly moving toward systems that could differentiate services and charge users based on flexible pricing models.

32. Some service providers collected charging records. Based on the services each user consumed, the service providers generated each user's bill. These charging records typically occurred in offline charging systems.

33. Other service providers collected charging records and charged users in real time using online charging systems. Charging in real time was not only

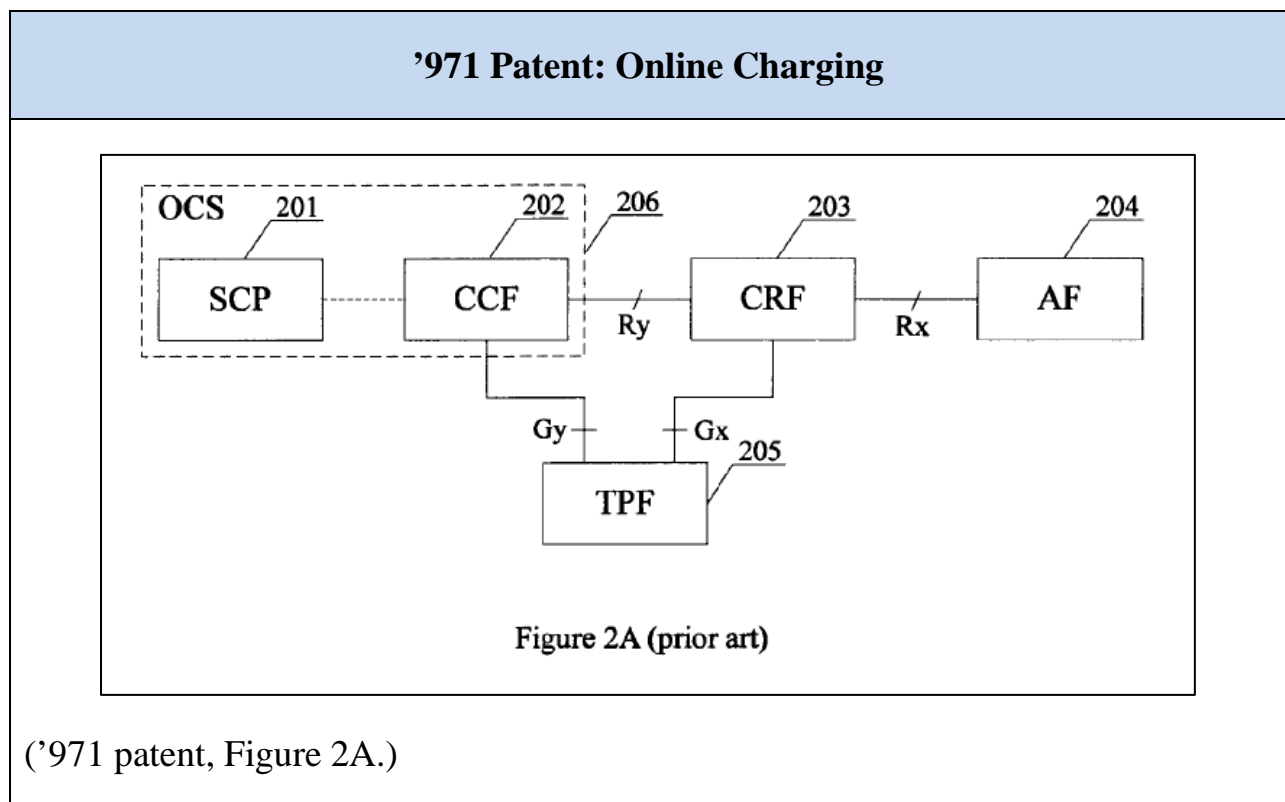
important for providing flexible charging, applying charges in real time was important to ensure users did not exceed a credit limit.

34. To standardize charging systems across the industry, representatives from companies across the globe met, typically quarterly, at conferences for 3GPP. These representatives collectively wrote technical reports and specifications to define industry standards. At the time of the alleged invention, “it [was] being discussed in the 3rd Generation Partnership Project (3GPP) as to how to implement IP Flow Based Charging (FBC).” (Ex. 1001, ’971 patent, 3:12–14; *see also* 3GPP 23.125, p. 9.)

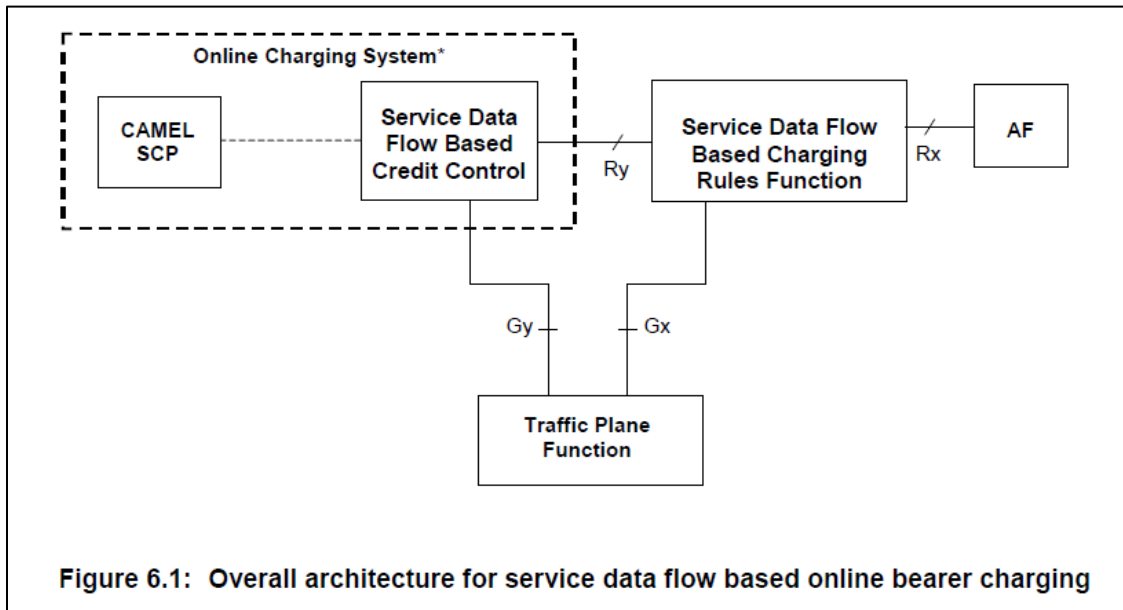
35. The 3GPP specifications for flow-based charging include 3GPP 23.125. A POSITA would have known about the 3GPP specifications (including 3GPP 23.125) and would have understood the importance of these specifications. Also, a POSITA would have understood that the specifications were widely available on the 3GPP website. Using the website and numbering conventions of the specifications, a POSITA would have been able to search for and find the relevant specifications for mobile communications systems. (Ex. 1038, pp. 56–59.)

36. The ’971 patent describes well-known online and offline charging systems. Indeed, the ’971 patent admits that the functionality and configuration of both online and offline charging systems were well known and standardized. (’971

patent, 3:39–50 (for online), 3:51–56 (for offline).) The '971 patent depicts these systems at Figures 2A and 2B—figures that reflect the standardized configurations established during 3GPP. (*Compare* '971 patent, Figures 2A, 2B *with* Ex. 1023, 3GPP 23.125, pp. 17–18.) The system architectures in both the '971 patent and 3GPP 23.125 for online and offline charging systems are shown below.

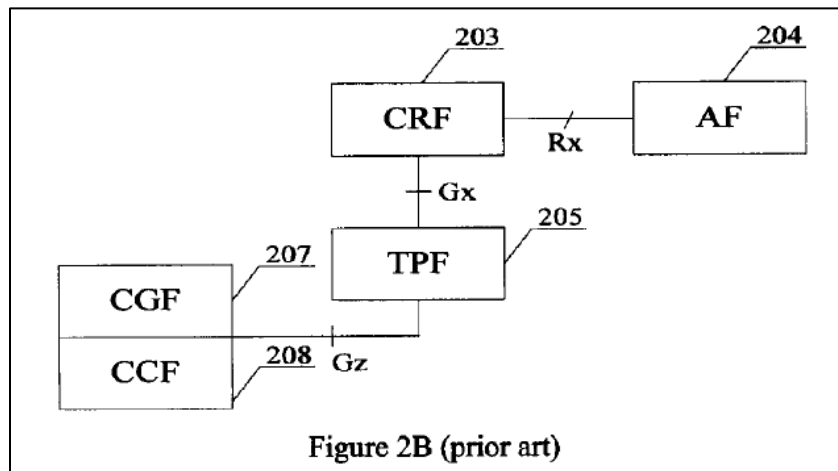


3GPP 23.125: Online Charging



(3GPP 23.125, p. 17.)

'971 Patent: Offline Charging



('971 patent, Figure 2B.)

3GPP 23.125: Offline Charging

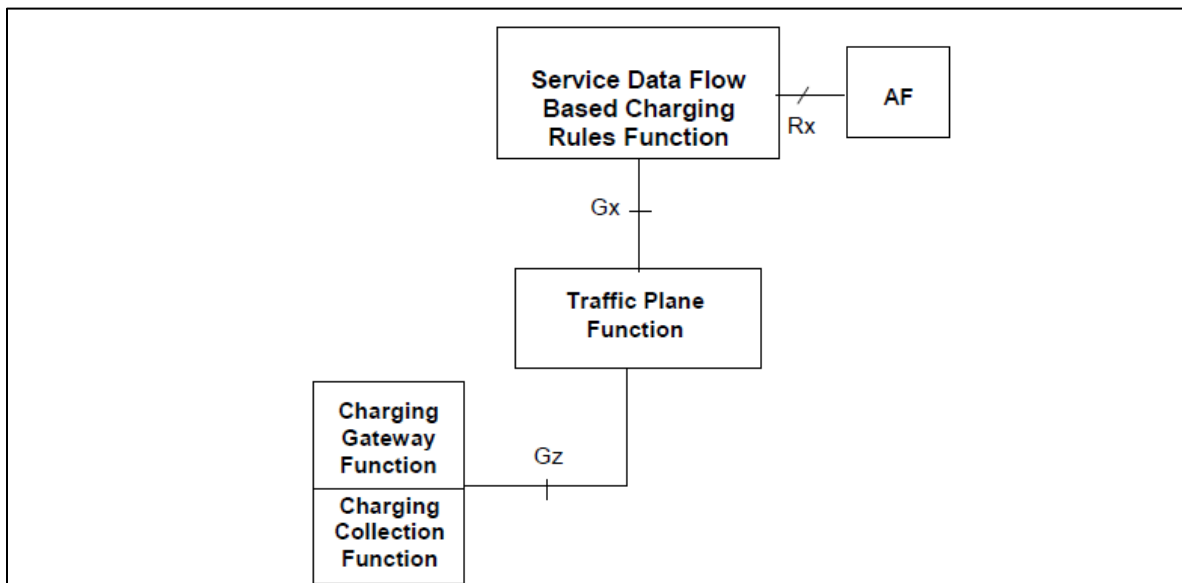


Figure 6.2: Overall architecture for service data flow based offline bearer charging

(3GPP 23.125, p. 18.)

37. For both online and offline charging, a traffic plane function (“TPF”) is coupled to a charging rule function (“CRF”). The TPF bears IP flows and “shall be capable of differentiating user data traffic belonging to different service data flows for the purpose of collecting offline charging data and performing online credit control.” (3GPP 23.125, p. 19; *see also* ’971 patent, 3:19–25, 3:57–58.) As described in the ’971 patent, different services of the IP flows “are screened out by different filters [and] are separately charged so as to reach the object of separately charging different Service Data Flows.” (’971 patent, 3:19–25, 3:57–58.) In other

words, the TPF has a means to identify data packets and charge a user on a service-by-service basis.

38. For both online and offline charging, the CRF provides the TPF with charging rules. (3GPP 23.125, p. 18.) During the establishment of the IP flow bearer, the TPF sends a charging rule request to the CRF through the Gx interface. (3GPP 23.125, pp. 17–18, 24–26; *see also* '971 patent, 3:58–61.) Then, the CRF selects a proper charging rule according to input information provided by the TPF and returns the selected charging rule to the TPF. (3GPP 23.125, pp. 17–18, 24–26; '971 patent, 4:7–9.) Using these charging rules, the TPF then manages the credit/resource for the user. (3GPP 23.125, pp. 19–20, 24–26; *see also* '971 patent, 4:42–44.)

VII. Overview of the '971 patent.

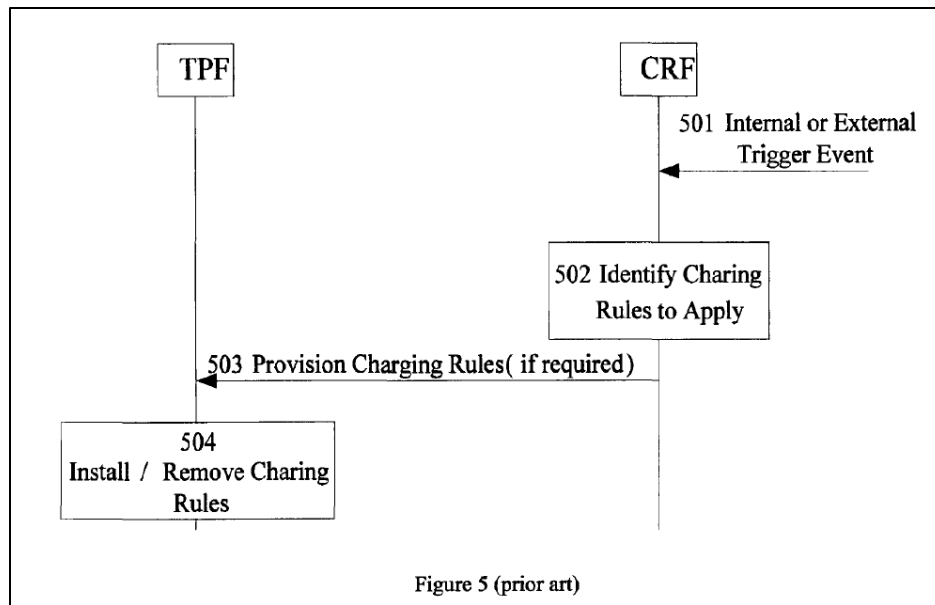
39. The '971 patent applies allegedly novel techniques to the then-existing online and offline charging systems in 3GPP. The '971 patent is specifically directed to “monitoring, by a Traffic Plane Function (TPF), an event trigger provided by a Charging Rule Function (CRF); and sending, by the TPF, a charging rule request to the CRF, if the event trigger is met.” ('971 patent, 6:57–61.) When an event trigger is met, the TPF requests an updated charging rule from the CRF and sends charging-relevant information to the CRF. ('971 patent, 8:18–20.) After the TPF requests an updated charging rule, the CRF selects the proper

charging rule according to the information sent by the TPF and returns the charging rule to the TPF. ('971 patent, 8:20–22.)

40. The system described in the '971 patent sends and receives event triggers to reduce the number of charging-rule requests, which ultimately reduces the amount of traffic between the TPF and CRF. ('971 patent, 6:42–50.) To prevent the sending and receiving of redundant requests, the TPF monitors certain conditions or event triggers and requests updated rules only when one of the event triggers is met: “In the preferred embodiments of the present invention, a plurality of event triggers is set such that a TPF requests corresponding charging rules from a CRF when one of the event triggers are met.” ('971 patent, 8:11–14.)

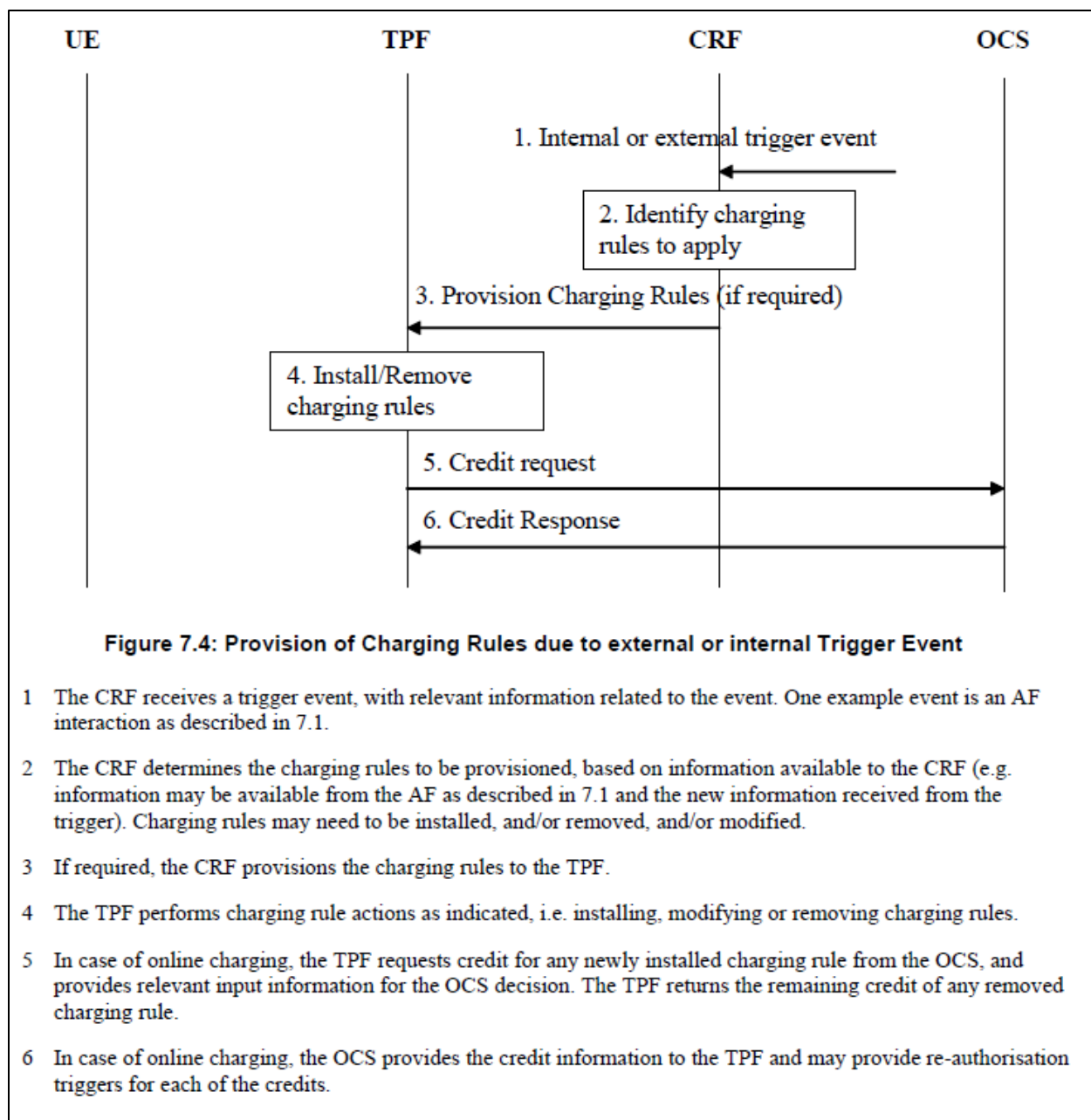
41. These event triggers are included in the claims. For example, independent claim 1 recites “receiving, by a Traffic Plane Function (TPF), event triggers to control the TPF from a Charging Rule Function (CRF), wherein the event triggers are determined by the CRF.” Independent claim 5 also recites the event triggers: “a Traffic Plane Function (TPF) which is in communication with a Charging Rule Function (CRF), wherein the TPF is configured to: receive, from the CRF, event triggers to control the TPF, wherein the event triggers are determined by the CRF.”

42. The '971 patent, however, admits event triggers were already known in the prior art. For example, Figure 5 of the '971 patent (shown below), which is designated as prior art, includes “Internal or External Trigger Event” at step 501. According to the '971 patent, at Step 501, “[t]he CRF receives a certain Internal or External Trigger Event and relevant information about this event, such as the event of the AF sending the input information of charging rule selection to the CRF.” ('971 patent, 6:8–11.) At Step 502, “[t]he CRF selects the corresponding charging rule according to the acquired information,” which may include charging-relevant information provided by the TPF.” ('971 patent, 6:13–21.) At Step 503, “[t]he CRF sends the Provision Charging Rules to the TPF. . . .” ('971 patent, 6:22–24.) The TPF then, at step 504, installs a new charging rule according to the charging rule selected by the CRF, deletes the existing charging rule, or both. ('971 patent, 6:25–28.)



('971 patent, Figure 5.)

43. This admission as prior art mirrors the standardized process in 3GPP 23.125, as shown below.



(3GPP 23.125, p. 31.)

44. Despite the admitted prior art and 3GPP 23.125 already disclosing that a trigger event can be triggered internally to the system, the alleged invention

appears to be a CRF that sends event triggers to a TPF and a TPF that reports trigger events to the CRF for updated charging rules. ('971 patent, 6:29–32.)

45. The prosecution history of the '971 patent also places importance on the event triggers. According to the prosecution history, the applicant made the following argument: “in *APA* ([applicant-admitted prior art]), the event trigger is not determined by the CRF and there is no transmission of the event trigger from the CRF to TPF to control the TPF.” (Ex. 1002, p. 331 (Response, mailed Sept. 24, 2012) (emphasis in original).)

46. This alleged distinguishing feature, as explained in detail later in this declaration, was already well known.

VIII. Priority date of the '971 patent.

47. I understand the patent owner may allege that the '971 patent is entitled to an earlier priority date based on two foreign applications: (1) CN 2004 1 0030955; and (2) CN 2004 1 0033721. I understand that translations for these applications are provided as Exhibits 1039 and 1040. I also understand that a translation for PCT/CN2005/000388 is provided as Exhibit 1041.

48. I understand that a patent claim is only entitled to an earlier filing date if the earlier application has written-description support for the claim. I have

reviewed translations for both of the Chinese applications and have not found written-description support for the full scope of any claim of the '971 patent.

49. Every independent claim in the '971 patent recites “wherein the event triggers comprise at least one of a change of a Serving GPRS Support Node (SGSN), a change of a Public Land Mobile Network (PLMN), a change of a Radio Access Technology (RAT) type, a change of a Traffic Flow Template (TFT), or a change of Quality of Service (QoS).”

50. The '971 patent describes the event triggers at column 8, lines 48–57:

Step **602**: After receiving the Charging Rule Request, the CRF sets dynamic event triggers at which the TPF is required to request charging rules, and then sends a Request Dynamic Event Report to the TPF. The Request Dynamic Event Report carries a list of dynamic event triggers, such as dynamic event trigger A, dynamic event trigger B and dynamic event trigger C. **These events may be a plurality of various Modify Bearer Events, such as the change of the SGSN, of the Public Land Mobile Network (PLMN), of the Radio Access Technology (RAT) type, of the Traffic Flow Template, and of the QoS.**

('971 patent, 8:48–57 (emphasis added).)

51. As this portion of the '971 patent states, the event triggers may comprise a plurality of events, such as a change in SGSN, PLMN RAT type, TFT, and QoS.

52. The published PCT application also lists SGSN, PLMN, RAT, TFT, and QoS. The relevant paragraph of the translated PCT published application is reproduced below.

WO 2005/096547 A1 (PCT/CN2005/000388)

Step 602: After receiving the Request Charging Rules, the CRF sets the dynamic trigger event of the charging rule required by the TPF to request and then sends a Request Dynamic Event Report to the TPF. The Request Dynamic Event Report contains a dynamic events list of dynamic trigger event A, dynamic trigger event B, dynamic trigger event C, etc., which can be different bearer service modification events such as SGSN change, public land mobile network (PLMN) change, radio access technology (RAT) type change, traffic flow template (TFT) change, and QoS change.

(Ex. 1044, p. 16.)

53. In contrast with the '971 patent and the PCT published application, the Chinese applications do **not** include a listing of event triggers. The

corresponding paragraphs of the translations for both CN 2004 1 0030955 and CN 2004 1 0033721 are reproduced below.

CN 2004 1 0030955

Step 602: After receiving the Request Charging Rules, the CRF sets the dynamic trigger event of the charging rule required by the TPF to request and then sends a Request Dynamic Event Report to the TPF. The Request Dynamic Event Report contains a dynamic events list of dynamic trigger event A, dynamic trigger event B, dynamic trigger event C, etc., which can be bearer service modification, modified different levels divided for the QoS parameters, or bearer service deletion.

(Ex. 1039, *17.)

CN 2004 1 0033721

Step 602: After receiving the Request Charging Rules, the CRF sets the dynamic trigger event of the charging rule required by the TPF to request and then sends a Request Dynamic Event Report to the TPF. The Request Dynamic Event Report contains a dynamic events list of dynamic trigger event A, dynamic trigger event B, dynamic trigger event C, etc., which can be bearer service modification, modified different levels divided for the QoS parameters, or bearer service deletion.

(Ex. 1040, p. 17.)

54. The Chinese applications include the statement that the dynamic trigger event points may be “bearer service modification, modified different levels divided for the QoS parameters, or bearer service deletion.” (Ex. 1039, p. 17; Ex. 1040, p. 17.) A POSITA would not have viewed the later-claimed change of the SGSN or the change of the PLMN as a bearer service modification, a QoS modification, or a bearer service deletion. The bearer service modification referenced in both of the Chinese applications changes the QoS, the radio priority level, or the parameters for the traffic flow template negotiated when the bearer is established. (Ex. 1038, p. 347.) The bearer service modification, however, does not refer to bearer modifications, such as a change of the SGSN, the PLMN, the RAT type, or the traffic flow template disclosed in the ’971 patent and described in more detail below. The modification in QoS referenced in both of the Chinese applications is a type of modification that defines the quality of service related to a particular bearer. And the bearer service deletion referenced in both of the Chinese applications, also known as bearer service termination, occurs after a request to remove service. In contrast with these parameters, which are specific to the bearer, the SGSN is the node that serves a mobile station. (Ex. 1038, p. 63.) And the

PLMN is the network established for the purpose of providing telecommunication services. (Ex. 1038, p. 5.)

55. A POSITA would not have viewed a change of a SGSN or a change of a PLMN within the scope of a bearer service modification, QoS modification, or a bearer service deletion. Changing the SGSN or PLMN becomes necessary when a mobile device changes its location as it is roaming. In such situations, the mobile device needs to change the access points to the network and in some cases even need to change the network protocols. Such situations require significantly-different actions to be taken by the mobile device and the network infrastructure, e.g., handover to a different base station, different encoding schemes for the data, adjusting data rates, changing data and control formats, etc. Whereas changing the SGSN or PLMN is a modification of the bearer, these changes are not modifications of the bearer service. Thus, the scope of the claims in the '971 patent is different than the scope of event triggers as disclosed in the Chinese applications.

56. Since the event triggers claimed in the '971 patent were not included in the Chinese applications, and there is no indication that the applicant intended event triggers to have a scope broader than a bearer service modification, a QoS modification, and a bearer service deletion, the Chinese applications do not have

written-description support for the full scope of “wherein the event triggers comprise at least one of a change of a Serving GPRS Support Node (SGSN), a change of a Public Land Mobile Network (PLMN), a change of a Radio Access Technology (RAT) type, a change of a Traffic Flow Template (TFT), or a change of Quality of Service (QoS).” Consequently, the ’971 patent should not be entitled to the filing date of the Chinese applications.

IX. Ground 1: 3GPP 23.125 anticipates claims 1–8 and 11.

57. 3GPP 23.125, which describes the industry standards for flow-based charging, anticipates claims 1–8 and 11.

A. 3GPP 23.125 anticipates claims 1 and 5.

1. 3GPP 23.125 discloses “[a method / communication system] for controlling charging of packet data service,” as recited in claims 1 and 5.

58. 3GPP 23.125 discloses “[a] method for controlling charging of packet data service” and “[a] communication system for controlling charging of packet data service,” as respectively recited in claims 1 and 5.

59. 3GPP 23.125 discloses a communications system: “The flow based charging architecture developed in this Technical Specification shall use generic native IP charging mechanisms to the extent possible in order to enable the reuse of the same charging solution and infrastructure for different type of IP-

Connectivity Networks.” (3GPP 23.125, p. 9, *see also* pp. 17, 18 (disclosing the architecture for both online and offline charging systems).)

60. 3GPP 23.125 discloses a method because the online and offline charging systems disclosed in 3GPP 23.125 are configured to perform a process. (3GPP 23.125, pp. 26–29.) As explained in the following sections, these charging systems perform the steps of the method claimed in the ’971 patent.

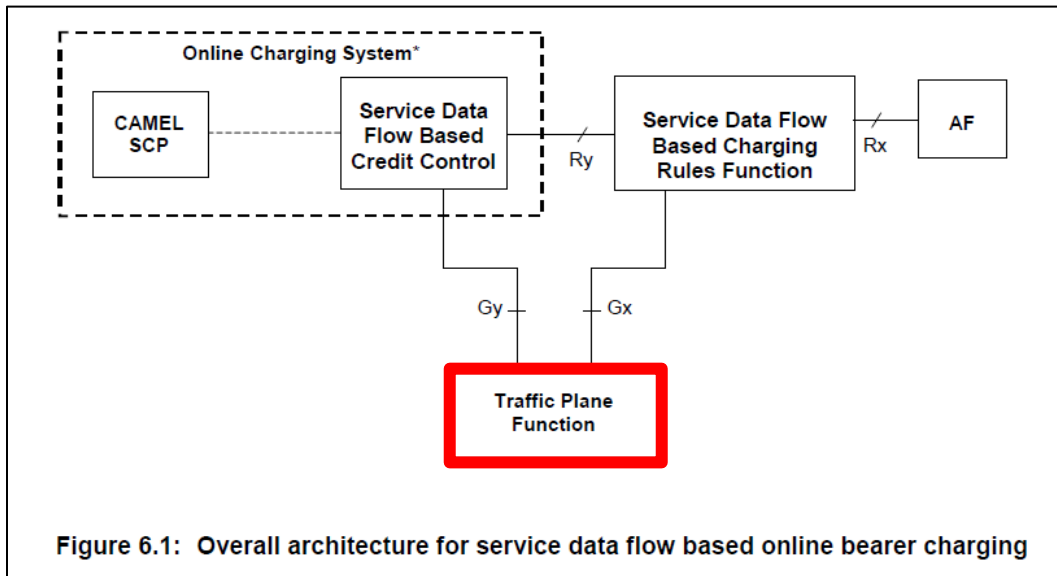
61. The system and method disclosed in 3GPP 23.125 are for controlling charging of packet data service: “It shall be possible to apply differentiated charging for the traffic flows belonging to different services (a.k.a. different service data flows) even if they use the same PDP Context.” (3GPP 23.125, p. 9, *see also* p. 11.)

2. 3GPP 23.125 discloses “a Traffic Plane Function (TPF) and a “Charging Rule Function (CRF),” as recited in claims 1 and 5.

62. Claims 1 and 5 both recite a “Traffic Plane Function (TPF)” and a “Charging Rule Function (CRF).” Claim 5 further recites that the TPF is “in communication with [the CRF].” 3GPP 23.125 discloses these limitations.

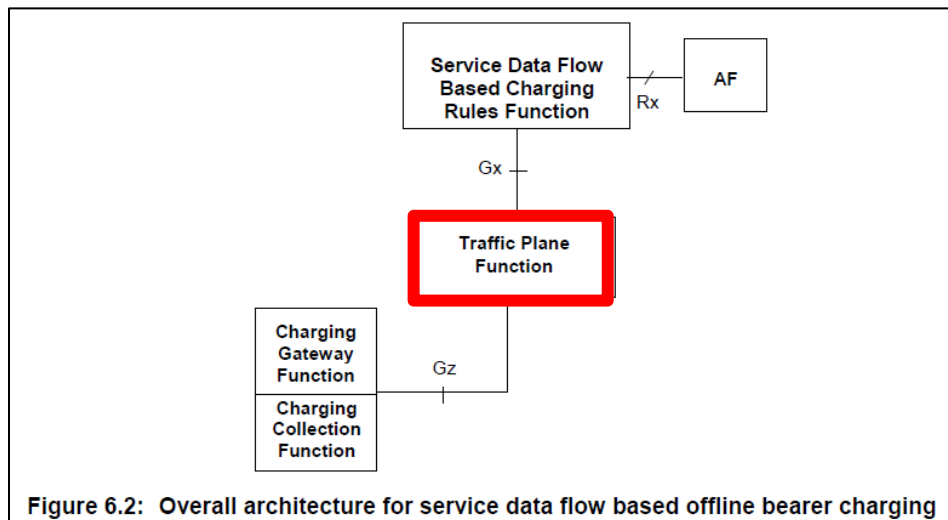
63. 3GPP 23.125 discloses a TPF:

3GPP 23.125: Online Charging



(3GPP 23.125, p. 17 (annotations added).)

3GPP 23.125: Offline Charging

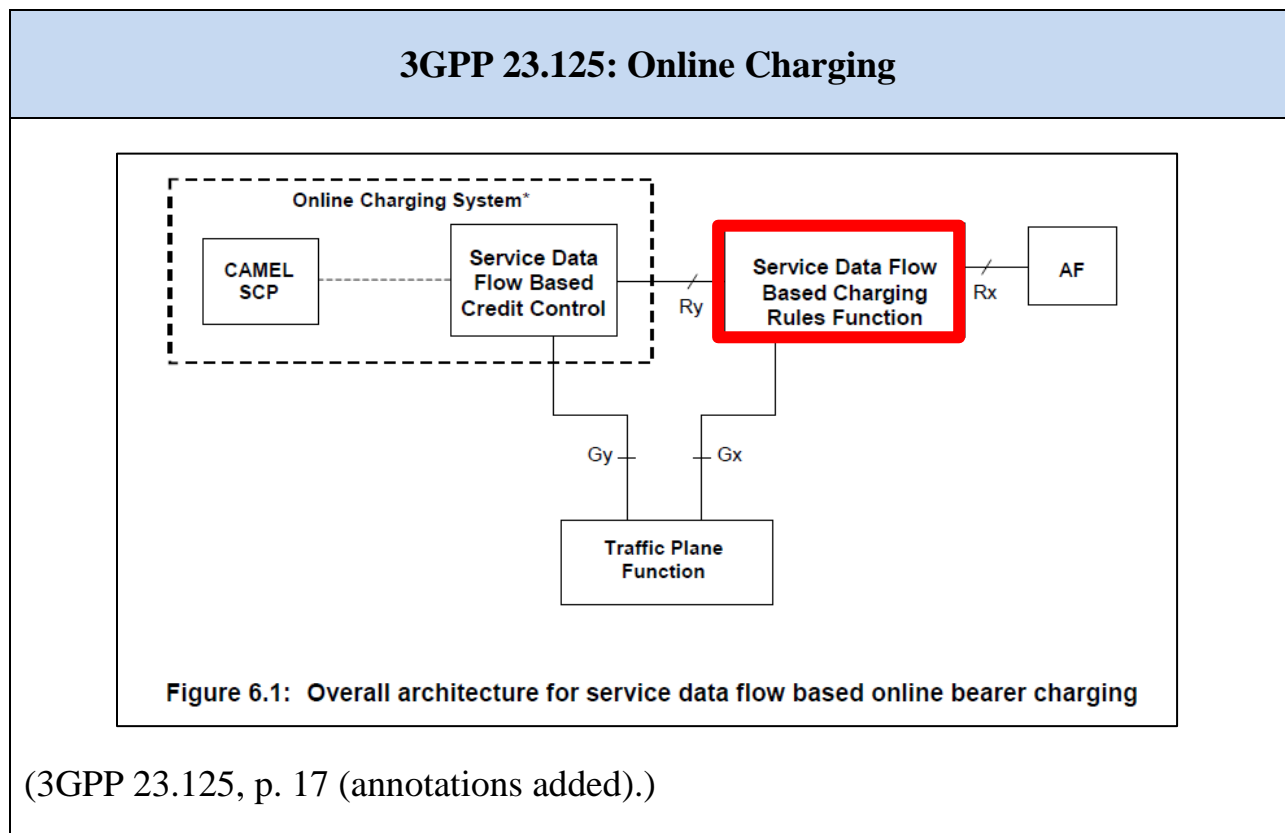


(3GPP 23.125, p. 18 (annotations added).)

64. “The Traffic Plane Function shall be capable of differentiating user data traffic belonging to different service data flows for the purpose of collecting offline charging data and performing online credit control.” (3GPP 23.125, p. 19.)

“In the case of online charging, the Traffic Plane Function shall be capable of managing a pool of credit used for some or all of the service data flows of a user.” (3GPP 23.125, p. 19.)

65. 3GPP 23.125 discloses a CRF:



(3GPP 23.125, p. 17 (annotations added).)

3GPP 23.125: Offline Charging

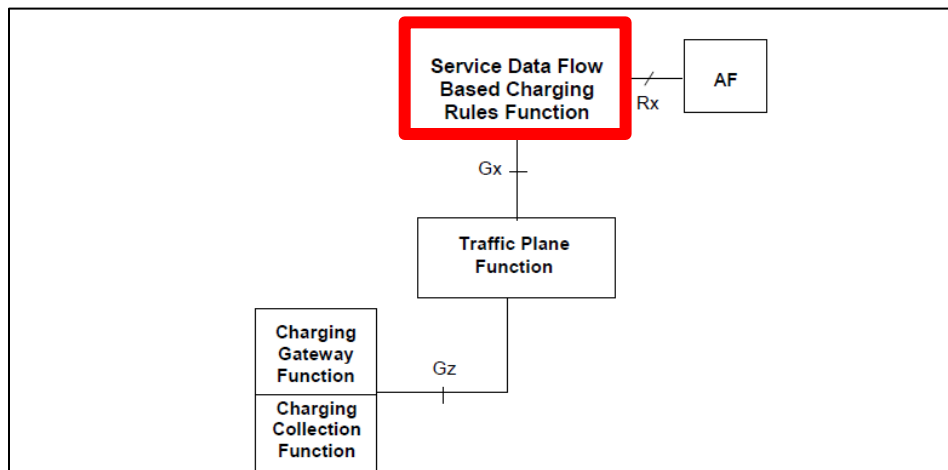


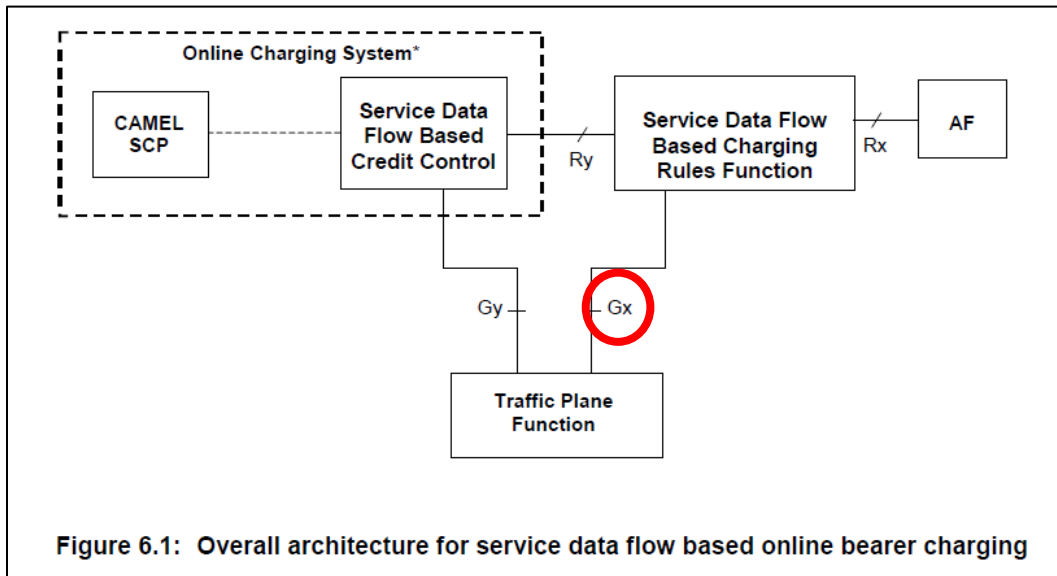
Figure 6.2: Overall architecture for service data flow based offline bearer charging

(3GPP 23.125, p. 18 (annotations added).)

66. “The Service Data Flow Based Charging Rules Function provides service data flow level charging rules.” (3GPP 23.125, p. 18.) “This functionality is required for both offline and online charging.” (3GPP 23.125, p. 18.)

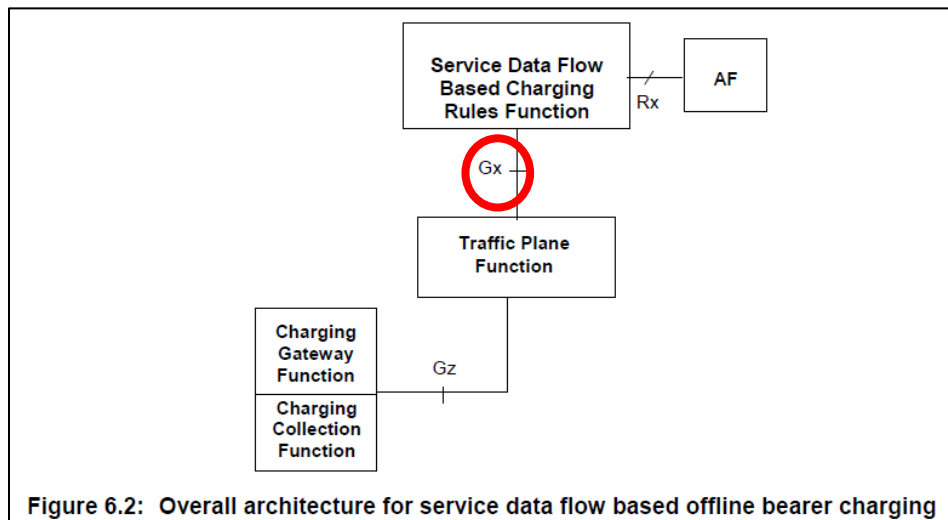
67. The TPF is in communication with the CRF. As shown below, both the online and offline charging architectures have a Gx interface between the TPF and CRF, which it uses for communication. (3GPP 23.125, p. 21.) “The TPF requests the charging rules to be applied.” (3GPP 23.125, p. 21.) “The CRF identifies the charging rules that are applicable to the TPF.” (3GPP 23.125, p. 22.) “The CRF then sends the charging rule information to the TPF.” (3GPP 23.125, p. 22.)

3GPP 23.125: Online Charging



(3GPP 23.125, p. 17 (annotations added).)

3GPP 23.125: Offline Charging



(3GPP 23.125, p. 18 (annotations added).)

3. 3GPP 23.125 discloses the “receiv[ing/e]” limitation, as recited in claims 1 and 5.

68. Claim 1 recites “receiving, by a Traffic Plane Function (TPF), event triggers to control the TPF from a Charging Rule Function (CRF).” Claim 5 recites “receive, from the CRF, event triggers to control the TPF.” 3GPP 23.125 discloses these limitations.

69. 3GPP 23.125 discloses event triggers: “The event triggers are provided by the CRF to the TPF using Provision Charging Rule Procedure.” (3GPP 23.125, p. 15, *see also* pp. 15–16, 31 (disclosing additional details about the event triggers).) “Event triggers apply to both offline and online charging.” (3GPP 23.125, p. 15.)

70. The TPF in 3GPP 23.125 receives event triggers from the CRF: “The event triggers are provided by the CRF to the TPF using Provision Charging Rule procedure.” (3GPP 23.125, p. 15, *see also* p. 25 (“The CRF provides the charging rules and associated event triggers (if available) to the TPF”).)

71. The event triggers in 3GPP 23.125 control the TPF because “[e]vent triggers determine when the TPF **shall** signal to the CRF that a bearer has been modified or a specific event has been detected.” (3GPP 23.125, p. 16 (emphasis added).) Additionally, “the TPF **shall** first use the event triggers to determine whether to request the charging rules for the new bearer characteristics from the

charging rules function.” (3GPP 23.125, p. 20 (emphasis added).) And “[t]he Traffic Plane function **shall** report triggered Events of an existing charging rule for both offline and on-line charging.” (3GPP 23.125, p. 14 (emphasis added).) Since the event triggers dictate how the TPF shall function, the event triggers control the TPF.

4. 3GPP 23.125 discloses “wherein the event triggers are determined by the CRF,” as recited in claims 1 and 5.

72. In 3GPP 23.125, the CRF determines the event triggers: “the CRF also determines which event triggers shall be monitored by the TPF.” (3GPP 23.125, p. 25, *see also* pp. 27, 28 (“The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the TPF).”).

5. 3GPP 23.125 discloses the “determin[ing/e]” limitation, as recited in claims 1 and 5.

73. Claim 1 recites “determining, by the TPF, whether a request for charging rule is required to be sent to the CRF according to the event triggers.” Claim 5 recites “wherein the TPF is configured to: determine whether a request for charging rule is required to be sent to the CRF according to the event triggers.” 3GPP 23.125 discloses these limitations.

74. In 3GPP 23.125, the TPF determines whether a request for charging rule is required to be sent to the CRF because “[t]he TPF requests the charging rules to be applied: [1] At bearer service establishment (PDP context establishment for GPRS) or, [2] At bearer service modification (PDP context modification for GPRS) if the Event trigger is met, or [3] At bearer service termination (PDP context deactivation for GPRS).” (3GPP 23.125, p. 21 *see also* pp. 19-20.)

75. The TPF makes the determination according to the event triggers: “Event triggers determine when the TPF shall signal to the CRF that a bearer has been modified or a specific event has been detected.” (3GPP 23.125, p. 16.) “If the bearer is modified by changing the bearer characteristics, the TPF shall first use the event triggers to determine whether to request the charging rules for the new bearer characteristics from the charging rules function.” (3GPP 23.125, p. 20, *see also* pp. 26–29 (disclosing bearer service modification for online and offline charging, which has the TPF use event triggers to determine whether a request for charging rules is required).)

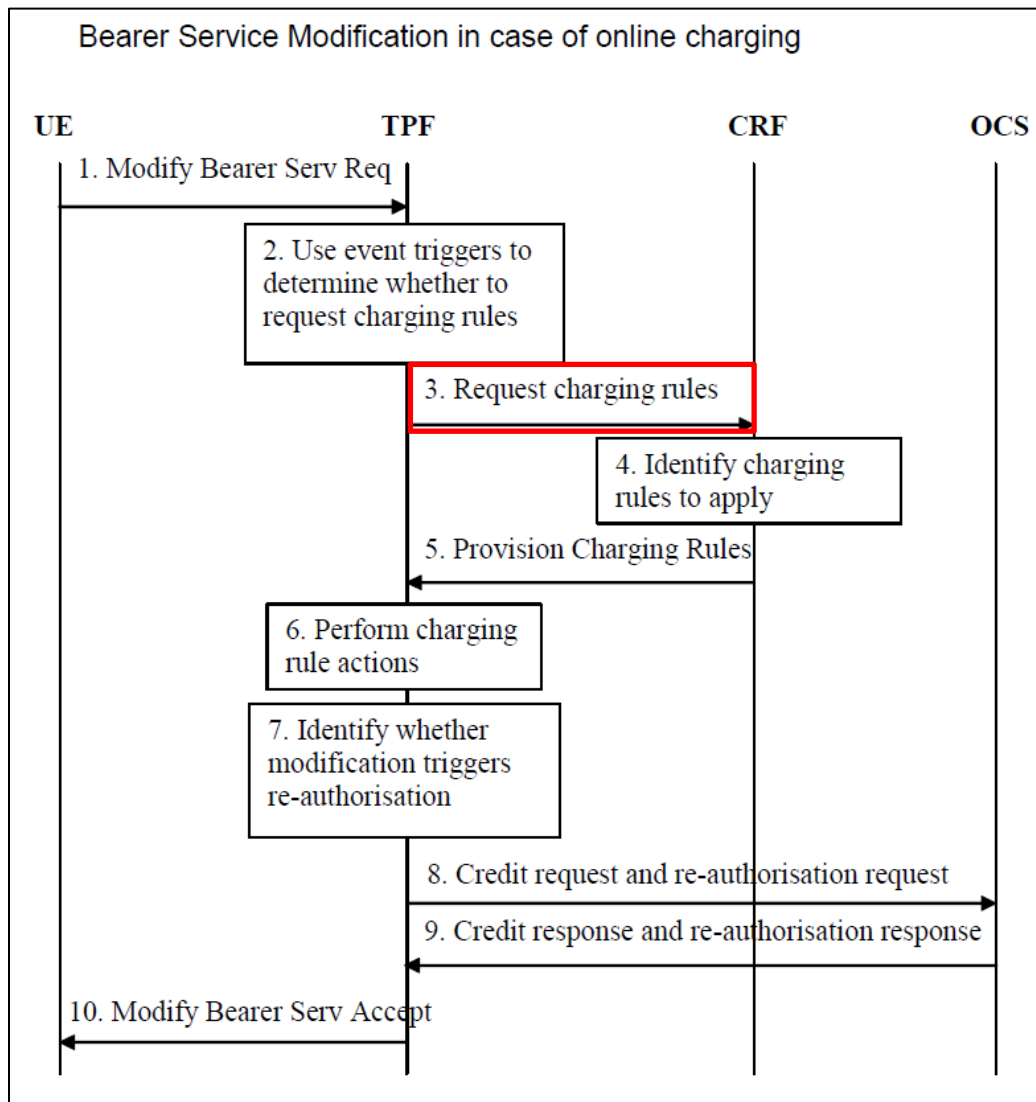
6. 3GPP 23.125 discloses the “send[ing]” limitation, as recited in claims 1 and 5.

76. Claim 1 recites “sending, by the TPF, the request for charging rule to the CRF, if one or more of the event triggers received from the CRF is met.” Claim 5 recites “wherein the TPF is configured to: send the request for charging rule to

the CRF if one or more of the event triggers received from the CRF is met.” 3GPP 23.125 discloses these limitations.

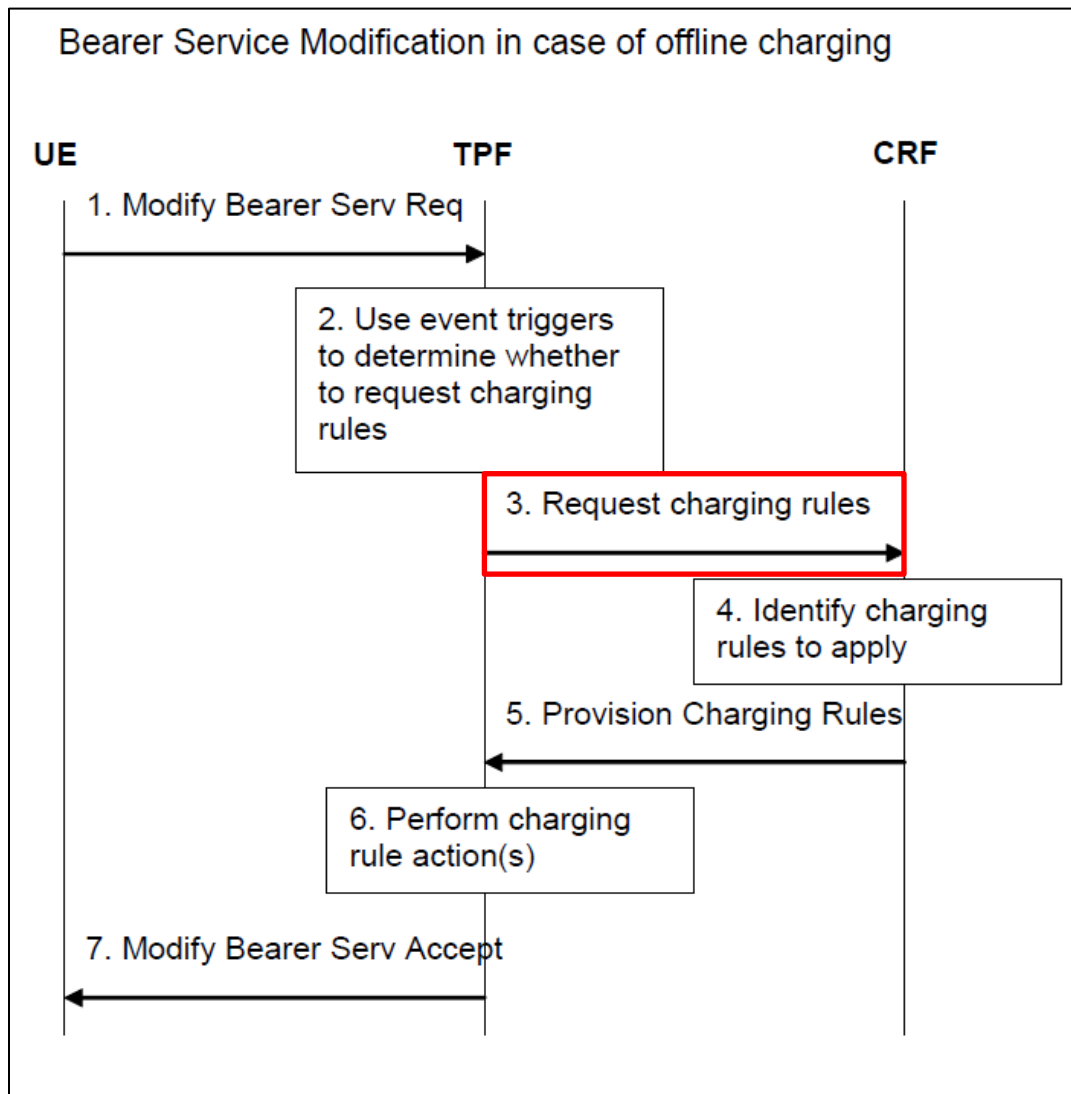
77. The TPF in 3GPP 23.125 sends the request for charging rule to the CRF because “[t]he GX reference point supports the following functions: . . . Request for Charging Rules (from TPF to CRF).” (3GPP 23.125, p. 21.) Further, as shown below, 3GPP 23.125 discloses bearer service modification for online and offline charging, which depicts the TPF sending a request for charging rules to the CRF. (3GPP 23.125, pp. 26–29.)

3GPP 23.125: Online Charging



(3GPP 23.125, p. 28 (annotations added).)

3GPP 23.125: Offline Charging



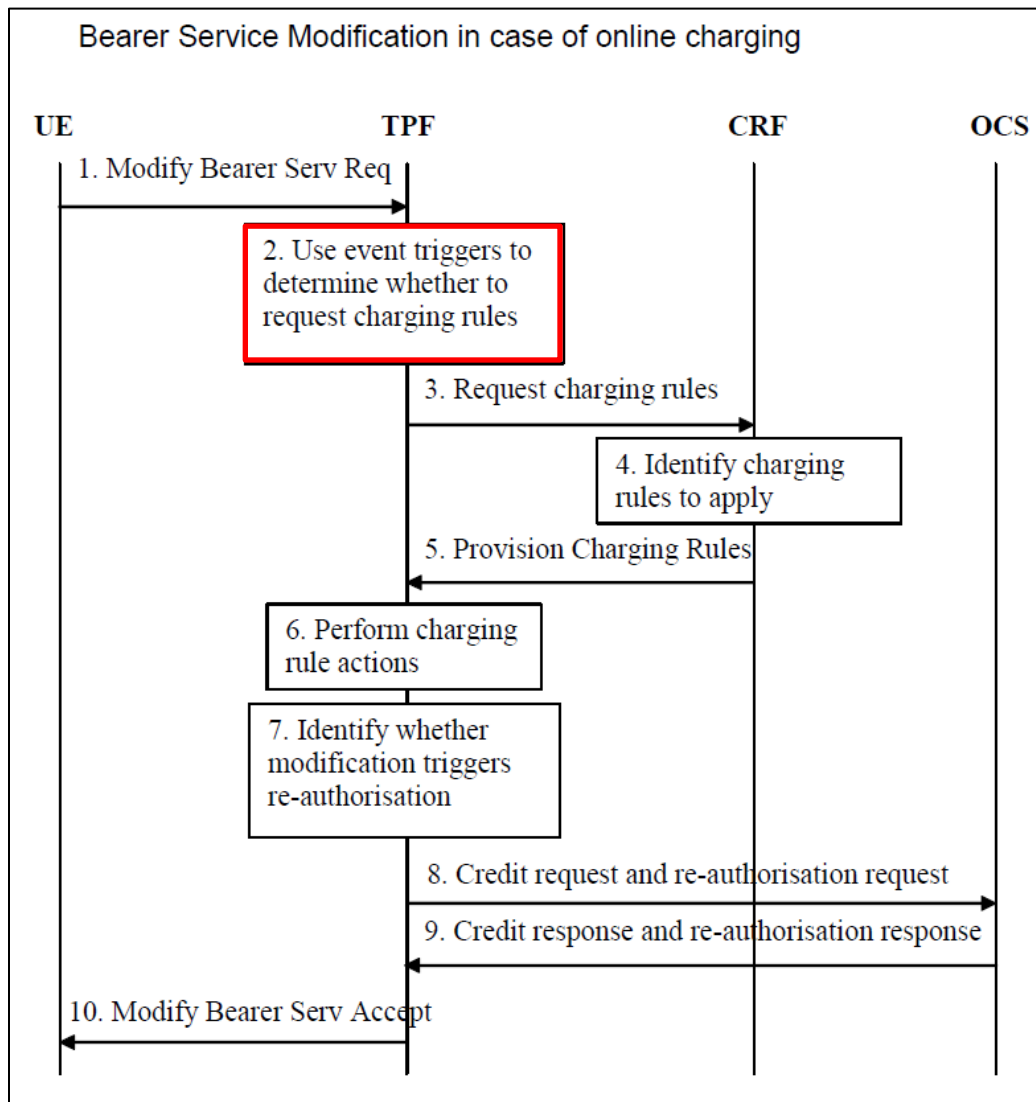
(3GPP 23.125, p. 26 (annotations added).)

78. The TPF sends the request if an event trigger received from the CRF is met: “The TPF requests the charging rules to be applied . . . [a]t bearer service modification (PDP context modification for GPRS) if the Event trigger is met.”

(3GPP 23.125, p. 21, *see also* p. 20 (“If the bearer is modified by changing the

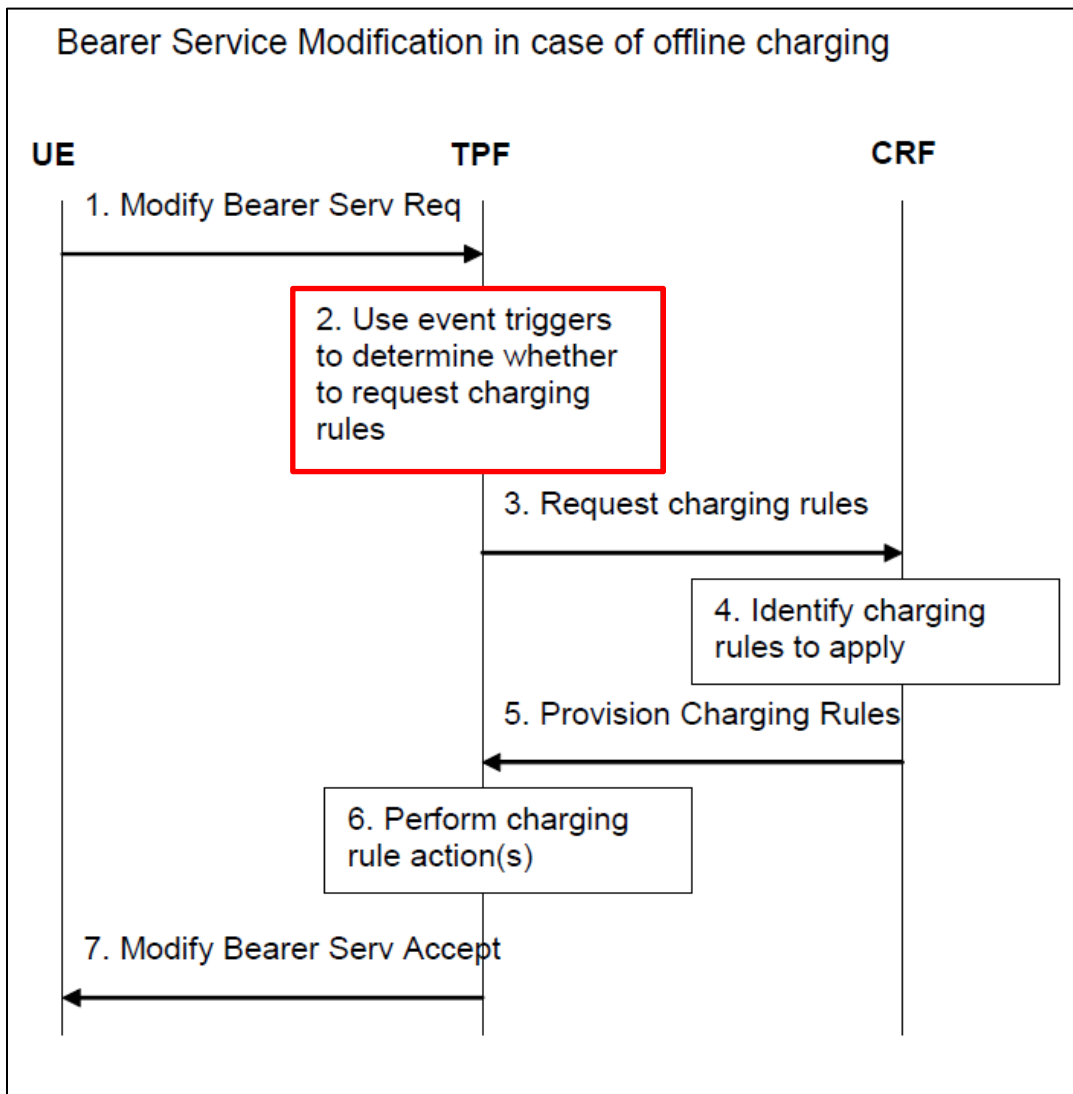
bearer characteristics, the TPF shall first use the event triggers to determine whether to request the charging rules for the new bearer characteristics from the charging rules function.”.) Further, as shown below, 3GPP 23.125 discloses bearer service modification for online and offline charging, which depicts the TPF sending, to the CRF, a request for charging rules after the TPF uses event triggers to determine whether to send the request. (3GPP 23.125, pp. 26–29.)

3GPP 23.125: Online Charging



(3GPP 23.125, p. 28 (annotations added).)

3GPP 23.125: Offline Charging



(3GPP 23.125, p. 26 (annotations added).)

7. 3GPP 23.125 discloses the “event triggers” limitation, as recited in claims 1 and 5.

79. Both claims 1 and 5 recite a list of event triggers. I understand that to meet this limitation, only one of the listed event triggers is required to be shown because the claims recite “wherein the event triggers comprise at least one of.”

80. 3GPP 23.125 discloses event triggers that comprise at least one of a change of a SGSN, a change of a PLMN, a change of a RAT type, a change of a TFT, or a change of QoS: “Event triggers include GPRS events such as SGSN change, QoS change, RAT type change, TFT change.” (3GPP 23.125, p. 16.)

B. 3GPP 23.125 anticipates claims 2 and 6.

81. Dependent claims 2 and 6 recite “wherein the request for charging rule carries an event identifier indicating the met event trigger.” 3GPP 23.125 discloses these limitations.

82. 3GPP 23.125 discloses a request that carries an event identifier. After the TPF determines a request for charging rules is required, “[t]he TPF requests the applicable charging rules indicating a bearer modification, and provides relevant input information for the charging rule selection.” (3GPP 23.125, pp. 26–27.) Accordingly, when a request for charging rules from the TPF arrives at the CRF, “the [CRF] shall be able to identify whether new charging rules need to be transferred to the Traffic Plane Function and respond accordingly.” (3GPP 23.125,

p. 18.) The CRF will also be able to determine the charging rules to be provisioned based on information received from the TPF. (3GPP 23.125, pp. 27, 28.) Thus, during the request for charging rules from the TPF to the CRF, “[a]n identifier is required to allow the specific instance in the TPF/CRF to be identified for subsequent data exchange.” (3GPP 23.125, p. 22.)

83. The event identifier disclosed in 3GPP 23.125 indicates the met event trigger because, for both online and offline charging, the TPF performs the function of “[e]vent indication.” (3GPP 23.125, p. 22.) And the TPF identifies the event in the subsequent charging rules request “to allow the specific instance in the TPF/CRF to be identified for subsequent data exchange.” (3GPP 23.125, pp. 21-22; *see also* pp. 27, 28 (steps 3–4).)

C. 3GPP 23.125 anticipates claims 3 and 7.

84. Dependent claims 3 and 7 recite “wherein the request for charging rule carries charging-relevant input information which is provided to the CRF for charging rule selection.” 3GPP 23.125 discloses these limitations.

85. 3GPP 23.125 discloses a request for charging rule that carries charging-relevant input information: “The TPF requests the applicable charging rules indicating a bearer modification, and provides relevant input information for the charging rule selection.” (3GPP 23.125, pp. 27, 28, *see also* pp. 20, 24, 25, 29,

30 (providing relevant input information during bearer service establishment and bearer termination).) The request for charging rules includes relevant input information along with the request, so the charging rule carries charging relevant input information.

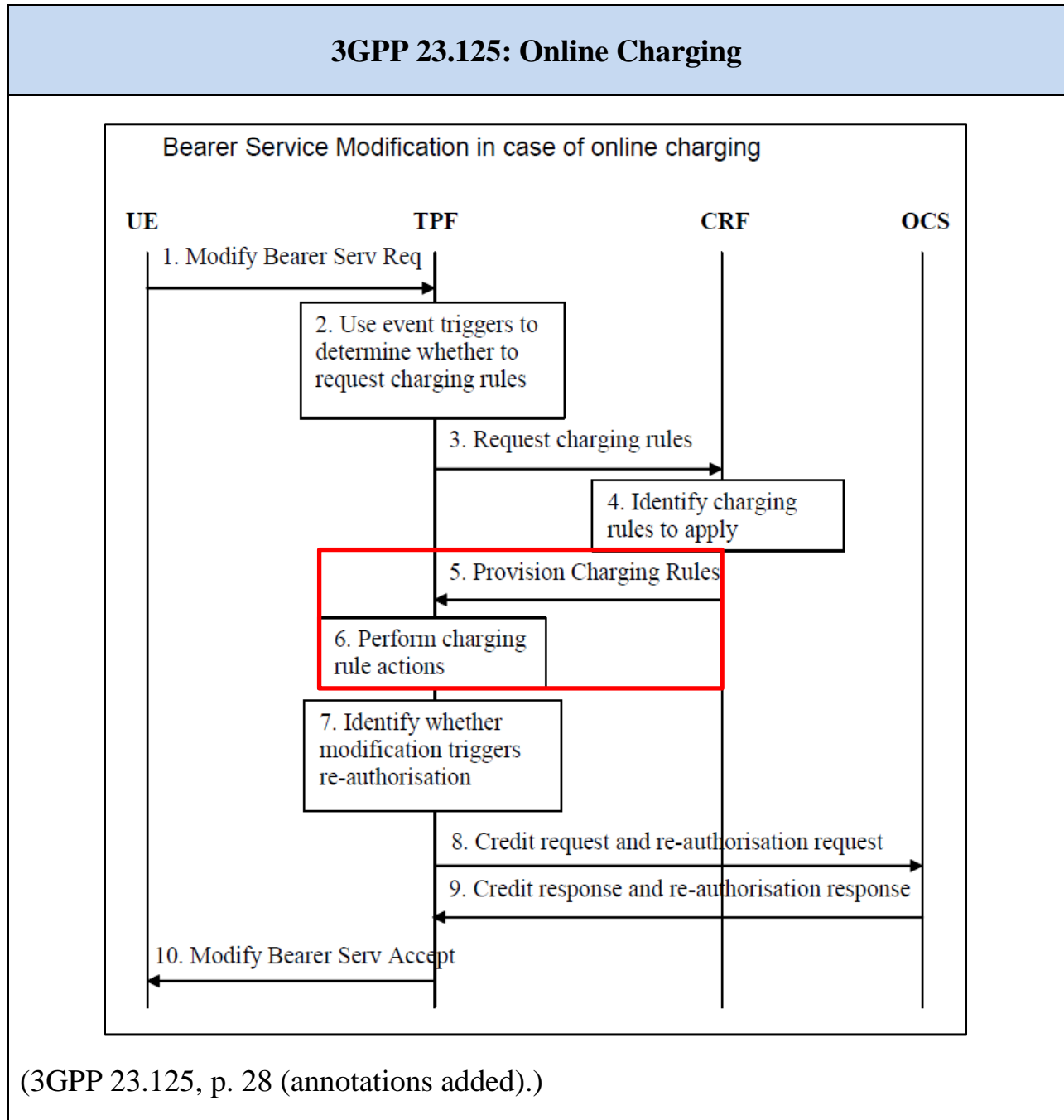
86. The information is provided to the CRF for charging rule selection because 3GPP 23.125 states that the relevant input information is “for the charging rule selection.” (3GPP 23.125, pp. 27, 28.) Additionally, “[t]he CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. . . . the new information received from the TPF).” (3GPP 23.125, pp. 27, 28.)

D. 3GPP 23.125 anticipates claims 4 and 8.

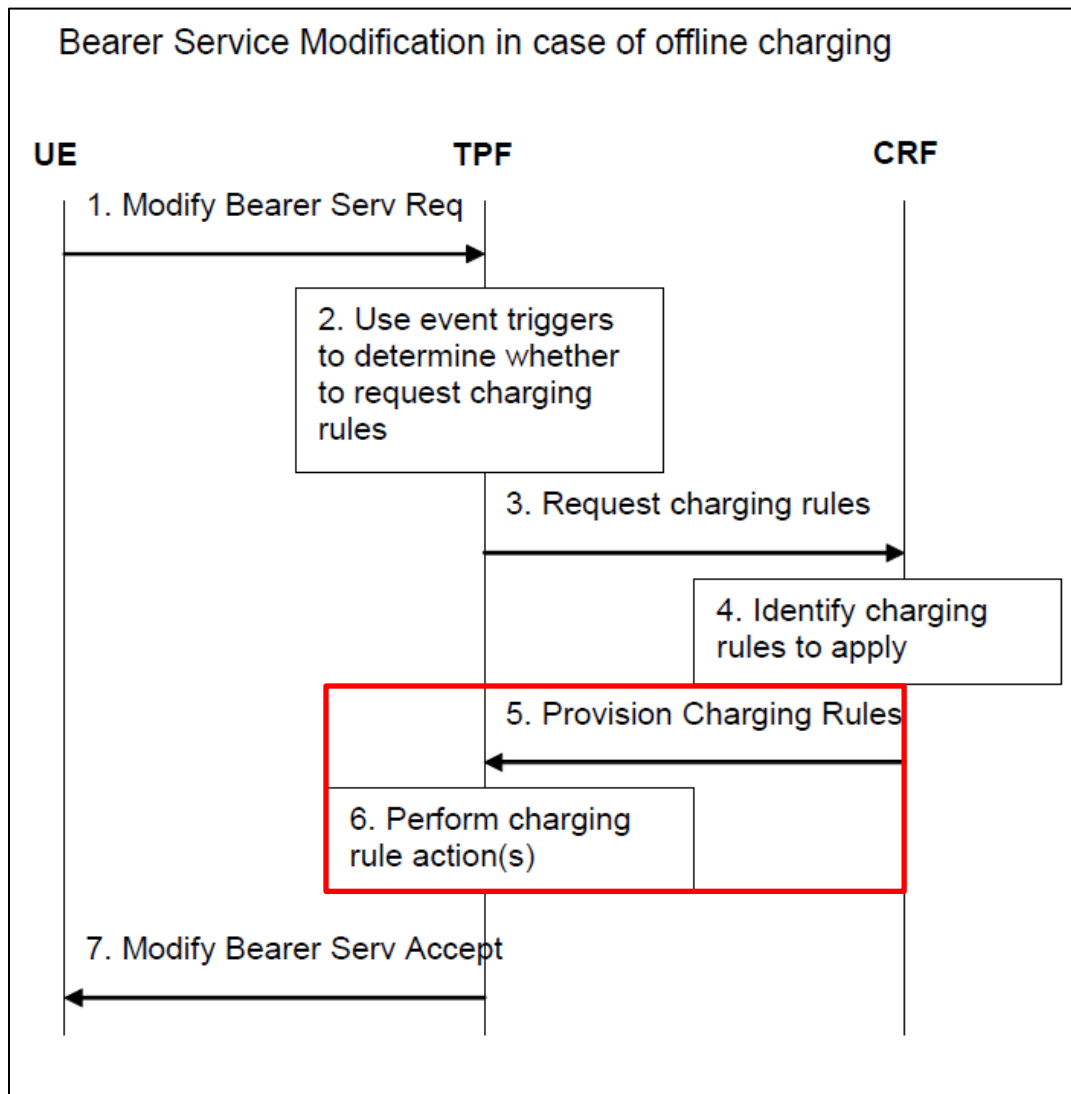
87. Dependent claim 4 recites “receiving, by the TPF, a charging rule from the CRF in a charging rule provision procedure.” Dependent claim 8 recites “the TPF is further configured to receive a charging rule from the CRF in a charging rule provision procedure.” 3GPP 23.125 discloses these limitations.

88. 3GPP 23.125 receives the charging rule from the CRF in a charging rule provision procedure: “The event triggers are provided by the CRF to the TPF using Provision Charging Rule procedure.” (3GPP 23.125, p. 15.) Further, as shown below, 3GPP 23.125 depicts the charging rule provision procedure as steps

5 and 6, which first provisions charging rules and then performs charging rule actions. (3GPP 23.125, pp. 26–29.)



3GPP 23.125: Offline Charging



(3GPP 23.125, p. 26 (annotations added).)

E. 3GPP 23.125 anticipates claim 11.

89. Dependent claim 11 recites “wherein the communication system is a general packet radio service (GPRS) communication system, and the TPF is a GPRS Support Node (GGSN).” 3GPP 23.125 discloses these limitations.

90. The communications system in 3GPP 23.125 is a GPRS communication system. According to 3GPP 23.125, “[t]he current level of traffic differentiation and traffic-type awareness of the GPRS architecture shall be extended beyond APN and PDP Context level.” (3GPP 23.125, p. 9, *see also* p. 8 (stating that GPRS stands for “General Packet Radio Service”).) 3GPP 23.125 also states that both the offline and online architectures are GPRS communication systems. (3GPP 23.125, pp. 9, 21, 24–30. And the “[e]vent triggers include GPRS events. . . .” (3GPP 23.125, p. 16.)

91. 3GPP 23.125 also discloses that the TPF is a GPRS Support Node (GGSN): “For GPRS, the traffic Plane Function is a logical function allocated to the GGSN. . . . For GPRS, the TPF/GGSN shall be able to do separate counts per PDP context for a single service data flow if it is transferred on more than one PDP context.” (3GPP 23.125, p. 19, *see also* pp. 8, 13, 24–26, 28–30 (calling the TPF a GGSN).)

X. Ground 2: 3GPP 23.125 and Duffield renders claims 9 and 10 obvious.

92. As explained in Section IX.D., 3GPP 23.125 discloses every element of claims 4 and 8, which claims 9 and 10 respectively depend. 3GPP 23.125, however, does not explicitly disclose “performing, by the TPF, charging information statistics according to the charging rule,” as recited in claim 9 and “[a] TPF [that] is further configured to perform charging information statistics

according to the charging rule,” as recited in claim 10. However, 3GPP 23.125 in view of Duffield renders claims 9 and 10 obvious.

93. The TPF disclosed in 3GPP 23.125 performs charging information statistics. According to 3GPP 23.125, “[f]low based charging is assumed to provide complete coverage of all traffic, but it shall be possible to collect statistics on data volumes, which were not subject to service data flow based charging.” (3GPP 23.125, p. 9.) These statistics are performed at the TPF, since the TPF bears the IP flows and the TPF is the function that generates reports including information such as “service data flow level byte counts (for volume based charging) and service data flow durations (for time based charging).” (3GPP 23.125, pp. 11, 14 (“The Traffic Plane function shall report bearer charging information for online charging [and] The Traffic Plane function shall report bearer charging information for offline charging”).)

94. In 3GPP 23.125, “[c]harging information is reported based on the application of the bearer charging rules in the TPF.” (3GPP 23.125, p. 14.) But to the extent 3GPP 23.125 does not explicitly disclose performing statistics *according to the charging rule*, Duffield discloses this limitation.

95. 3GPP 23.125 discloses the use of statistics to understand the traffic flows, so a POSITA would have been motivated to find references that describe the

implementation details for methods and systems that perform statistics in a flow-based charging system. This would have led a POSITA to Duffield, which describes an “apparatus for sampling data flows in a data network.” (Ex. 1014, Duffield, ¶ 2.)

96. Duffield states that “[s]ervice providers of data networks [were] increasingly employing usage measurements as a component in customer charges.” (Duffield, ¶ 3.) This teaching is consistent with 3GPP 23.125’s teachings about using statistics and reporting service data flow level byte counts (for volume based charging) and service data flow durations (for time based charging). (3GPP 23.125, pp. 9, 11.) Duffield also explains that “the determinants of a charging scheme may be both numerous and also relatively dynamic.” (Duffield, ¶ 4.) As does 3GPP 23.125, because 3GPP 23.125 states that “[t]here are many different services that may be used within a network . . .” and “[t]he flow based bearer level charging can support dynamic selection of charging to apply.” (3GPP 23.125, p. 10.) Based on Duffield’s recognition that the determinants of a charging scheme may be both numerous and dynamic, Duffield teaches “[a] complementary approach . . . to measure (or at least summarize) all traffic, and then transmit the measurements to a back-office system for interpretation according to the charging policy.” (Duffield, ¶ 5.) According to Duffield, “this could be done by gathering packet headers, **or by forming flow statistics.**” (Duffield, ¶ 5 (emphasis added).)

97. Duffield voices the benefits for incorporating flow statistics into a flow-based charging system. According to Duffield, “[t]he collection of network usage data is **essential** for the engineering and management of communications networks.” (Duffield, ¶ 6 (emphasis added).) Accordingly, “[n]etwork operators need more finely differentiated information on the usage of their network.” (Duffield, ¶ 6.) Duffield then supplies a few examples of such information, which would be “essential” to collect and analyze in a network. (Duffield, ¶ 6.) Duffield then explains why this information is essential to collect and analyze a network. According to Duffield, “[s]uch information can be used to support traffic engineering, network planning, peering policy, customer acquisition, marketing and network security.” (Duffield, ¶ 6.)

98. After reading Duffield, a POSITA would have had a motivation to use flow-based statistics in 3GPP 23.125 to reap the same benefits Duffield describes—support traffic engineering, network planning, peering policy, customer acquisition, marketing, and network security. And since Duffield teaches that the measurements are made “according to the charging policy” (Duffield, ¶ 5) and since 3GPP 23.125 enforces the charging policy / charging rules at the TPF (3GPP 23.125, pp. 19–20), a POSITA would have found it obvious to incorporate Duffield’s teachings such that the TPF in 3GPP 23.125 performs charging information statistics according to the charging rule.

XI. Ground 3: 3GPP 23.125 renders claims 2 and 6 obvious

99. Dependent claims 2 and 6 each recites “*wherein the request for charging rule carries an event identifier indicating the met event trigger.*” For the reasons in Section IX.B, 3GPP 23.125 discloses this element. However, to the extent the Board determines that 3GPP23.125 does not disclose a request that carries an identifier indicating the met event trigger, a POSITA would have found it obvious to include such an event trigger in the request from the TPF to the CRF.

100. Explicitly identifying the met event trigger to the component that must select charging rules based on the occurrence of the event is the most efficient way for the TPF to signal to the remote CRF the occurrence of the event. Indeed, it was well-known and common place to include an identification of an associated event or condition in a message between two network elements. (Min Dec., ¶ 99; 3GPP 29.207, Ex. 1052, pp. 34, 54 (“indicating the detection of specific events”); Körling, Ex. 1009, 2:19–21, 6:65–7:2, 9:17–19, 10:11-1, 12:28–32.)

101. Further, if the Board determines that 3GPP 23.125 does not disclose an event identifier, 3GPP 23.125 motivates the inclusion of an event identifier. As 3GPP 23.125 explains, the TPF needs to send the CRF relevant input information, and “the [CRF] shall be able to identify whether new charging rules need to be transferred to the Traffic Plane Function and respond accordingly.” (3GPP 23.125, p. 18.) The most efficient way to identify whether new charging rules need to be

transferred is to identify the event that triggered the request. A POSITA would have also understood that an identifier is the most expedient way for the CRF to return the proper charging rules and would prevent the CRF from sending unnecessary rules that do not need to be re-provisioned and would otherwise add unnecessary traffic in the network. Thus, in view of 3GPP 23.125's own teachings about the requirement for the CRF to include relevant input information to identify which charging rules need to be provisioned to a TPF during subsequent request, a POSITA would have found it obvious to have the request for charging rule carry an event identifier indicating the met event trigger.

XII. Conclusion.

102. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed this 8th day of September, 2017 at Saint Louis, Missouri.

Respectfully submitted

A handwritten signature in black ink, appearing to read "Paul S. Min", written over a horizontal line.

Paul S. Min, Ph.D.