

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., GOOGLE LLC,
and SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners,

v.

HEADWATER RESEARCH LLC,
Patent Owner.

Case IPR2024-00341
Patent 8,406,733 B2

**DECLARATION OF DR. MICHAEL C. BROGIOLI IN SUPPORT OF
PATENT OWNER'S PRELIMINARY RESPONSE**

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	BACKGROUND AND QUALIFICATIONS	2
III.	LEGAL PRINCIPLES	6
A.	Claim construction	6
B.	Burden of Proof	6
C.	Anticipation	7
D.	Obviousness	7
IV.	PERSON OF ORDINARY SKILL IN THE ART	9
V.	CLAIM CONSTRUCTION.....	10
VI.	OVERVIEW OF THE '733 PATENT	10
VII.	RESPONSE TO DR. TRAYNOR'S ANALYSIS	12

I, Michael C. Brogioli, PhD, hereby declare as follows:

I. INTRODUCTION

1. I am over the age of eighteen (18) years and otherwise competent to make this declaration.

2. I have been retained as an expert witness on behalf of Headwater Research LLC (“Headwater”) for the above-captioned *inter partes* review (“IPR”). I understand that the petition for *inter partes* review involves U.S. Patent No. 8,406,733 (“the ’733 patent”).

3. I make this declaration based on my personal knowledge, educational background and training, consideration of the materials I discuss herein, and my expert opinions.

4. I am being compensated at a rate of \$750 per hour for my time in this matter. My compensation does not depend on the outcome of this proceeding, and I have no financial interest in its outcome.

5. In preparing this Declaration, I have reviewed and considered the ’733 patent, the ’733 patent’s prosecution history, the Petition, Dr. Traynor’s declaration submitted in this proceeding, Dr. Traynor’s deposition transcript, and each document cited in my declaration.

II. BACKGROUND AND QUALIFICATIONS

6. My qualifications for forming the opinions given in this declaration are summarized here and are addressed more fully in my curriculum vitae, which is submitted as Exhibit 2002. That exhibit also includes a list of my publications.

7. I am currently an Adjunct Professor of Electrical and Computer Engineering at Rice University in Houston, TX, teaching Ph.D. candidate level courses in wireless telecommunications, embedded computing software, embedded computing hardware, and software/hardware design. I have held this position since July 2009. I am also currently the Managing Director of Polymathic Consulting in Austin, TX, a company that advises a variety of clients on engineering, research and development, intellectual property, and other technical leadership matters, and I have held this position since October 2011.

8. I am a named inventor on multiple issued and pending patent applications. The subject matter of these applications includes, but is not limited to, embedded processing, edge computing, and various aspects of distributed systems including computation, interconnectivity and hardware/software design and implementation.

9. From November 2009 to October 2011, I was Chief Architect, Senior Member Technical Staff at Freescale Semiconductor in Austin, TX (formerly Motorola), responsible for management of technology, engineering roadmaps,

design lead on compiler infrastructure and optimizations for mobile and embedded computing solutions, including the types of security and encryption technologies involved in this matter. From 2007 to 2009, I was a Senior Engineer working with high performance compiler design and next generation baseband compiler design and next generation baseband microprocessor and microcontroller architecture at Freescale Semiconductor in Austin, Texas, including regarding communications networks and how mobile device architecture and design interacts with network elements.

10. From June 2006 to August 2007, I worked as the Technical Co-Founder of Method Seven LLC, in Boston, MA, working with high performance software and hardware systems architecture. I am currently the co-founder, co-inventor, and Chief Technology Officer of Network Native, an Internet of Things hardware and software company. I have also served on multiple advisory boards for technology companies over the past 10 years.

11. While at Rice University, I developed various computer architecture designs. For example, from 2002 to 2004, I developed Spinach, a simulator design toolset for modeling programmable network interface architectures, which models system components common to all programmable computing environments as well as components specific to embedded. From 2004 to 2009, I developed Spinach DSP-FPGA, a modular and composable simulator design infrastructure for

programmable and reconfigurable embedded SOC architectures specifically targeting mobile, embedded and portable computing devices. From 2005 to 2009, I developed and published a retargetable compiler infrastructure for software and systems related to mobile and embedded computing technologies. Many of these tools have been used at U.S. universities in the area of electrical and computer engineering research.

12. I am recognized as an expert in the field of communications systems, including computer architecture, hardware, and software as they relate to the subject matter at hand. I am a member of the Institute of Electrical and Electronics Engineers (IEEE). I am currently the Program Chair of Design Automation Conference in the areas of Embedded and Wireless Solutions. I have been a Program Committee member for the IEEE and ACM Design Automation Conference from 2011 to the present, as well as other IEEE and ACM conferences. I have published, co-published and contributed to numerous works on wireless and mobile computing, digital networking, Internet of Things technology, software and hardware optimizations, and digital signal processing and related architectures among other topics.

13. I have previously served as an engineering consultant and testifying witness on matters related to, and including Internet and communications technologies such as those at hand in this matter. This experience is encompassed

in my work in academia and as a faculty member, my time in industry as a system designer and architect, as well as my work as an engineering consultant and expert witness over the past 15 years.

14. Over the past 15+ years, I have authored numerous peer reviewed publications in the area of embedded and high performance computing, interconnect technologies, computer networking at the server and mobile handset level, and optimization at the hardware and software design level. I have also been a committee member, and chair of Design Automation Conference in areas of technology related to the '733 Patent, often reviewing and vetting submissions from major industry players often related to technologies at issue in this matter.

15. During my tenure at Freescale Semiconductor, I was in charge of system developer tools for baseband processor design, both in the hardware and software spaces. This work included hardware and software design issues of next generation wireless networking equipment, including system level programming models, interconnect technology, heterogeneous computing, various hardware acceleration technologies and related components.

16. My current curriculum vitae, provided in Exhibit 2002, contains more information on my background and experience, as well as the cases in which I have served as an expert witness the past four years.

17. No part of my compensation is contingent upon the outcome of this litigation. I have no other interests in this litigation or with any of the parties.

III. LEGAL PRINCIPLES

A. Claim construction

18. I understand that the first step in performing a validity analysis of the patent claims is to interpret the meaning and scope of the claims by construing the terms and phrases found in those claims. I understand that the appropriate construction of a claim term is its ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the entire patent.

19. I understand that standard for claim construction in an *inter partes* review is the same standard as is applied in district court proceedings.

20. I understand that a determination of the meaning and scope of the claims is a matter of law. I have been informed that to determine the meaning of the claims, one should consider the intrinsic evidence, which includes the patent's claims, written description, and prosecution history.

B. Burden of Proof

21. I understand that in an *inter partes* review, the petitioner has the burden of proving unpatentability by a preponderance of the evidence. I further understand that for an *inter partes* review to be instituted, the petitioner must show

a reasonable likelihood that the petitioner would prevail with respect to at least one of the claims challenged in the petition.

C. Anticipation

22. I have been instructed by counsel and understand that a reference is anticipated if a single prior art reference discloses each and every claim element, either explicitly or inherently, as arranged in the same way as in the claim. I understand that where even one claim element is not disclosed in a reference, a contention of anticipation fails.

23. I further understand that when a reference fails to explicitly disclose a claim element, that reference inherently discloses that element only if the reference must *necessarily* include the undisclosed claim element.

D. Obviousness

24. I have been instructed by counsel and understand that a combination of prior art references may render a claim obvious if, at the time of the invention, a person of ordinary skill in the art would have selected and combined those prior-art elements in the normal course of research and development to yield the claimed invention.

25. I understand that in an obviousness analysis, one should consider the *Graham* factors: the scope and content of the prior art; the differences between the claimed inventions and the prior art; the level of ordinary skill in the art; and

certain secondary considerations, identified below. I further understand the obviousness analysis is to be performed on a claim-by-claim basis. I understand that a person of ordinary skill in the art is a person of ordinary creativity, not an automaton.

26. I have been instructed by counsel and understand that obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination. I understand obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have been *motivated* to combine those references in a manner that would include all limitations of the challenged claim, and, in making that combination, a person of ordinary skill in the art would have had a *reasonable expectation of success*.

27. I also understand that an obviousness analysis must be conducted with awareness of the distortion caused by hindsight bias and with caution of arguments reliant upon *ex post* reasoning. For instance, I understand that when considering obviousness, I should put myself in the position of a person of ordinary skill in the field at the time of the invention, rather than considering new information that is known today but was not known before the priority date of the challenged patent.

28. In particular, I understand that it is improper to use the challenged patent's disclosure or invention as a roadmap to find its prior-art components,

because such an approach discounts the value of combining various existing features or principles in a new way to achieve a new result.

IV. PERSON OF ORDINARY SKILL IN THE ART

29. Dr. Traynor states that “a POSITA as of the filing date of the effective filing date of the ’733 patent (January 28, 2009) “(1) at least a bachelor’s degree in computer science, electrical engineering, or a related field, and (2) three to five years of experience in services and application implementation in communication networks. Additional graduate education could substitute for professional experience, and *vice versa*.” Ex. 1003, ¶21.

30. For purposes of this declaration, I mostly accept Dr. Traynor’s proposed level of skill in the art, with two caveats. First, as Dr. Traynor acknowledges, a POSITA need only have “three... years of experience in services and application implementation in communications networks,” and that is the understanding I adopt. Persons having three years of experience and five years of experience have *different* levels of skill, so Dr. Traynor’s proposal does not lend itself to application of a single “level of skill in the art.” Second, I do not believe Dr. Traynor’s ambiguous qualification that “[a]dditional graduate education could substitute for professional experience, and *vice versa*” is appropriate, because his proposed level of skill does not require “*professional* experience.” In my view, a POSITA would have had a bachelor’s degree plus the requisite three years of

experience, and that experience could either be either industry experience or research/educational experience.

31. I further note that I am a person of ordinary skill in the art, and was such a person as of January 28, 2009 (regardless of whether three years or five years of experience is applied as the correct standard).

V. CLAIM CONSTRUCTION

32. Dr. Traynor does not propose a construction of any term at issue in this proceeding. For each claim limitation at issue, I apply what I believe would have been the plain and ordinary meaning to a POSITA in light of the specification and file history of the '733 patent.

VI. OVERVIEW OF THE '733 PATENT

33. The '733 patent is generally directed to an end user device (e.g., a mobile phone) that comprises components for communicating with a network system. The device includes, for example, “ a plurality of device agents communicatively coupled to [a] service control device link agent through an agent communication bus” such that the service control device link agent can route message content received from the network system over the agent communication bus using a “device agent identifier.” Ex. 1001, Claim 1; *see also id.* at FIG. 16 (depicting “agent communication bus”).

34. More specifically, representative claim 1 recites:

1. An end-user device comprising:

a modem for enabling communication with a network system over a service control link provided by the network system over a wireless access network, the service control link secured by an encryption protocol and configured to support control-plane communications between the network system and a service control device link agent on the end-user device;

a plurality of device agents communicatively coupled to the service control device link agent through an agent communication bus, each of the plurality of device agents identifiable by an associated device agent identifier; and

memory configured to store an encryption key, the encryption key shared between the service control device link agent and a service control server link element of the network system;

wherein the service control device link agent is configured to:

receive, over the service control link, an encrypted agent message from the service control server link element,

using the encryption key, obtain a decrypted agent message, the decrypted agent message comprising a particular agent identifier and message content for delivery to a particular device agent of the plurality of device agents, the particular agent identifier identifying the particular device agent, the message content from a particular server of a plurality of servers communicatively coupled to the service control server link element, and

based on the particular agent identifier, deliver the message content to the particular device agent over the agent communication bus.

Ex. 1001, Claim 1.

VII. RESPONSE TO DR. TRAYNOR’S ANALYSIS

35. TS-23.140 teaches that “MMS may... be used to transport data specific to applications,” and that “[a]pplications that intend to transport application specific data may either reside on an MMS User Agent or on an MMS VAS Application.” Ex. 1004, 54. TS-23.140 also teaches that “[d]etails of these applications or how an MMS User Agent or how an MMS User Agent or an MMS VAS Application would interface with them are outside the scope of this specification.” *Id.*

36. Despite the TS-23.140 specification making clear that how an MMS User Agent communicates with other applications is “outside the scope of this specification,” Dr. Traynor contends that “[a] POSITA would have understood that the MMS User Agent and other applications would interface ‘through an agent communication bus.’” Ex. 1003, ¶124.

37. I disagree with Dr. Traynor’s opinion in this regard, as a POSITA would know that an agent communication bus (such as, e.g., the D-Bus referenced in Dr. Traynor’s analysis) would be used to transfer data between *separate* applications. This is because buses in computing are typically used to route data *outside* of a given application, not *internal* to an application (e.g., to subparts or subapplications within that application). And each of the examples Dr. Traynor provides of a “bus” is for communications *external* to an application.

38. However, the applications that send and receive MMS data in TS-23.140 in conjunction with the MMS User Agent are **not** external to the MMS User Agent. TS-23.140 makes this explicit, in stating that these applications “**reside on** an MMS User Agent.” Ex. 1003, 54 (“Applications that intend to transport application specific data using MMS may either reside on an MMS User Agent or on an MMS VAS Application.”). In other words, these applications are incorporated into the MMS User Agent as “subparts” or “subapplications” (to use the terms Dr. Traynor used at his deposition) within the MMS User Agent application. A POSITA would have understood that, because the MMS User Agent **includes** each application to which it will deliver application-specific data, no agent communication bus would have been helpful or necessary. Instead, the MMS User Agent would provide data to its subcomponents via standard function calls, such as UpdateAppData(AppID, AppData), which would simply write the AppData to a memory location within the subapplication of the MMS User Agent identified by the AppID. Dr. Traynor presents no evidence that an “agent communication bus” would have been obvious to transport data **within** an application such as the MMS User Agent, as his theory applied to TS-23.140 would require. In my opinion, a POSITA would not have found it obvious to use an “agent communication bus” for transporting data **within** an application such as

the MMS User Agent, because applications are able to effectively manage data and memory issues without the use of any type of “bus.”

39. I note that Dr. Traynor’s theory that an agent communication bus would have been obvious appears to be based on a misreading of the TS-23.140 specification. Specifically, he contends that TS-23.140’s disclosure that “[a]pplications that intend to transport application specific data using MMS... reside on an MMS User Agent” means that the applications would “reside on” the *user device* (or “UE”), rather than “reside on” the MMS User Agent which is defined in TS-23.140 as “application residing on a UE” rather than the MMS User Agent *being* the UE. Ex. 1004, 14 (“**MMS User Agent**: application residing on a UE, an MS or an external device that performs MMS-specific operations on a user’s behalf and/or on another application’s behalf.”).

40. Dr. Traynor is *explicit* that he interprets “MMS User Agent” in this context not to refer to the express definition provided by the TS-23.140 specification (i.e., an application). See Ex. 1003 ¶51 (alleging that the “MMS User Agent” refers to a “device,” and that a POSITA would have “understood [‘MMS User Agent’] to be the same as the UE in the context of this sentence”). I disagree that “MMS User Agent” in that context means anything other than the definition supplied by the TS-23.140 specification, and in my opinion there is no reason for a

POSITA to think that the TS-23.140 specification used its own terminology incorrectly in this sentence.

41. Dr. Traynor’s sole reasoning as to why a POSITA would have viewed “MMS User Agent” to refer to a “UE in the context of this sentence” is that “‘User Agent’ was a term that was used also to refer to a client device.” Ex. 1003, ¶51.

This assertion does not support Dr. Traynor’s opinion for several reasons.

42. First, Dr. Traynor ignores that in the context of TS-23.140, “MMS User Agent” is *defined*, and a POSITA would have understood that definitions in standards specifications are used for precision and accuracy. A POSITA would certainly not ignore a defined term and replace it with some other term, *even assuming* that the term could have multiple meanings outside of the context of the specification.

43. Second, I disagree that “‘MMS User Agent’ was a term that was used also to refer to a client device” as Dr. Traynor contends. Dr. Traynor’s *only* evidence for this assertion is a citation to Ex. 1028, page 731, which states that an “MMS user agent” can refer to “an MMS client.” Ex. 1003 ¶51 (quoting Ex. 1028). But Dr. Traynor presents no evidence that “MMS client” refers to a *device*—a POSITA would have known that “client” does not universally refer to a “device” but instead commonly refers to a “process, such as a program or task.” Ex. 2004 (Microsoft Computer Dictionary’s second definition of “client”). While

“client” *can* refer to a “computer” (*see id.*, third definition), there is no reason to believe that the Mostafa reference, Ex. 1028, was referring to the “computer” meaning of client in that sentence rather than the more common software process meaning. Indeed, Mostafa itself *distinguishes* the “MMS UA” from a “Mobile Terminal,” making clear that these are two distinct concepts. *See* Ex. 1028 at 731 (FIG. 1, reproduced below).

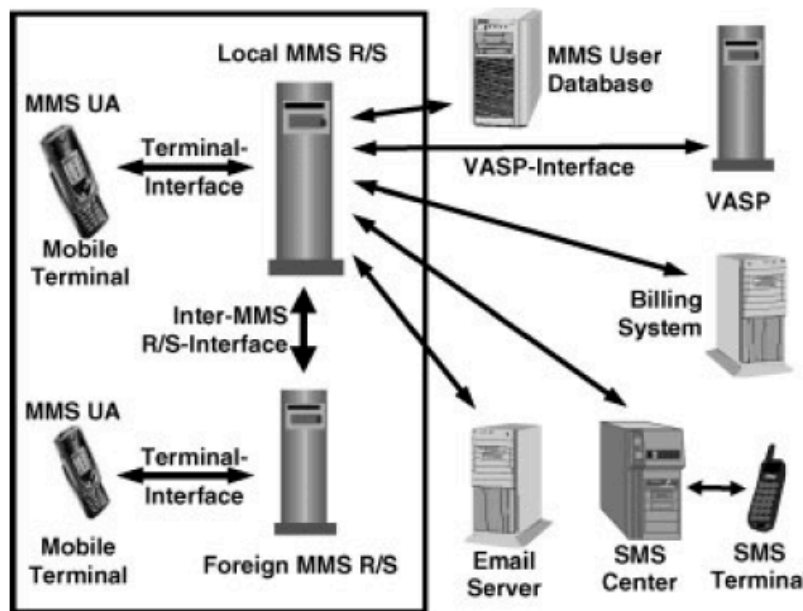


Fig. 1. MMS architecture, depicting different important involved entities and interfaces.

44. I also note that the TS-23.140 specification itself distinguishes between an MMS User Agent and an “MMS capable UE,” thus indicating that these are two distinct concepts. *See, e.g.*, Ex. 1004, 24 (FIG. 4, annotated version reproduced below).

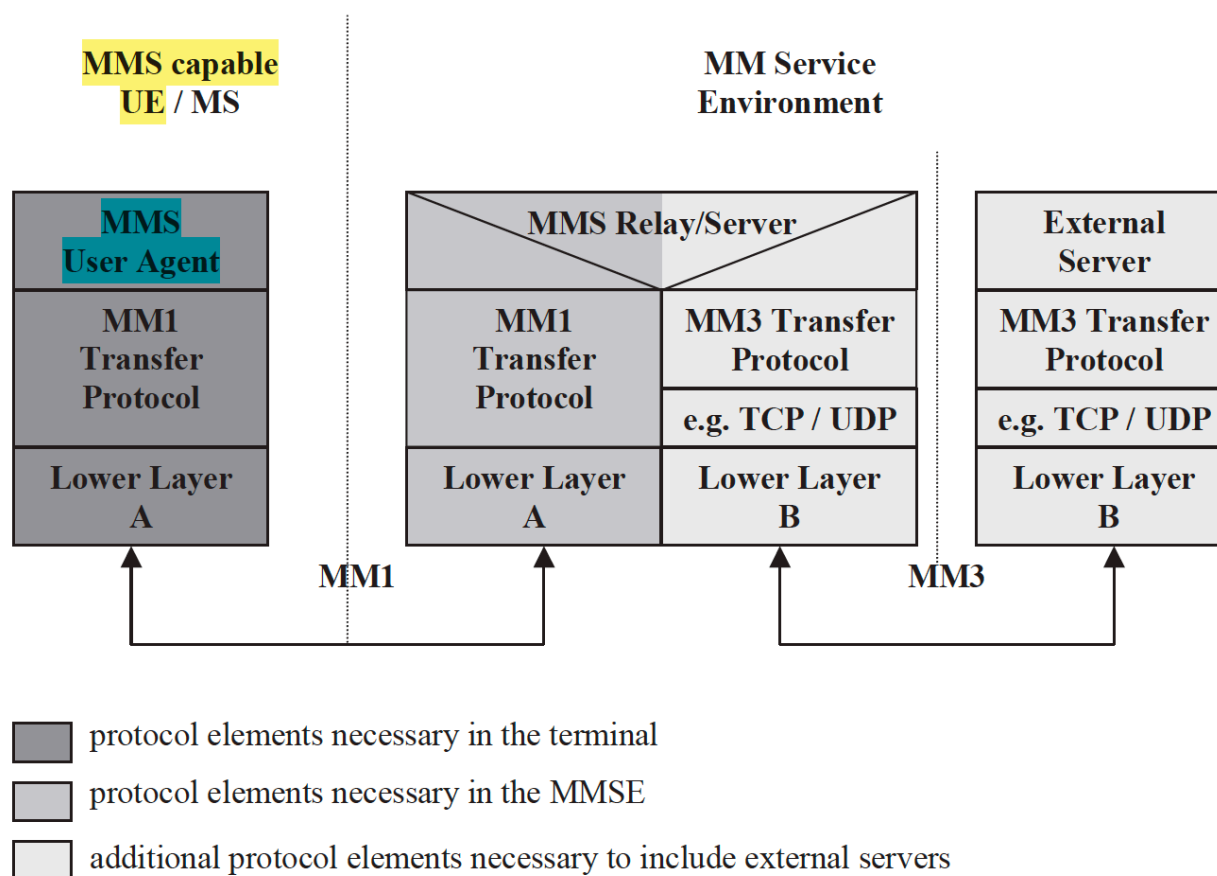


Figure 4: Protocol Framework to provide MMS

45. Third, Dr. Traynor’s conclusion that for an application to “reside on” an MMS User Agent only means that it is installed on a device (instead of being a subpart of the MMS User Agent application) is inconsistent with Dr. Traynor’s own interpretation of other aspects of the relevant TS-23.140 section at issue. For example, Dr. Traynor testified that in the context of “Section 7.1.18” on “page 54 of the TS specification,” “an MMS User agent... is the software that’s running on a UE.” Ex. 2003 at 28:6-19.

46. He also testified that in the context of Section 7.1.18, “what it means for an application to reside on the VAS Application” is that “this larger VAS application could have multiple subapplications.” Ex. 2003 at 29:1-30:11 (referring to the applications as “subparts” of the larger VAS application).

47. However, he took a different view of “reside on” as it applies to the MMS User Agent, when he implied that this means that the application is simply installed on the user’s device (because he incorrectly interpreted “MMS User Agent” to refer to a *device* rather than an *application* as TS-23.140 defines the term). *See* Ex. 2003 at 30:13-31:22. I do not believe that “reside on” could plausibly mean two different things in the exact same sentence. If an application residing on a VAS application means that the application is a “subpart” or “subapplication” of the VAS application software (as Dr. Traynor testified), then clearly an application residing on an MMS User Agent means that the application is a subpart or subapplication of the MMS User Agent software.

48. In view of all of the above, I disagree with Dr. Traynor that when the TS-23.140 specification teaches that applications reside on the MMS User Agent, they merely reside on the MMS-enabled device. Instead, a POSITA would understand those applications to be subparts or subapplications of the MMS User Agent application, such that it would not have been obvious to use an agent communication bus to transfer data within the MMS User Agent (e.g., to the

various subapplications within the MMS User Agent). This is not only consistent with the TS-23.140 specification, but also consistent with how Dr. Traynor applies the term “reside on” as it pertains to an application residing on an MMS VAS Application.

49. Furthermore, because the applications are subapplications of the MMS User Agent, there would be no need or desire to use an agent communication bus to transfer data within the MMS User Agent to the appropriate subapplication, as discussed above. I thus disagree with Dr. Traynor’s conclusion that “a POSITA would have reason to implement communications between the MMS User Agent and the device’s other applications to occur over a bus.” Ex. 1003, ¶125. Dr. Traynor’s citation to Ex. 1031 refers to “send[ing] information *between* applications,” not sending information *within* an application such as the MMS User Agent, which is what an implementation of TS-23.140 would require. *See id.* (quoting Ex. 1031 at 10:56-62). And Dr. Traynor’s citation to the “Lee” reference is similarly inapposite; Lee is not alleged to be compatible with the TS-23.140 specification, and a POSITA would recognize that it is not about MMS (as the TS-23.140 specification is). For example, Lee does not discuss “MMS” at all, even though it does discuss related “SMS” technology. *See, e.g.*, Ex. 1008, ¶10. Lee also includes an “application invoker” (*see, e.g., id.* at FIG. 4), which is a concept not discussed in TS-23.140. And critically, in Lee, each application resides *outside* of

the "integrated push service agent 250" (*see, e.g., id.* ¶¶28-29 & FIG. 4, depicting each "App #N" residing outside of box 250), contrary to TS-23.140's teaching that each application for which data is transported "reside[s] on an MMS User Agent." Ex. 1004, 54.

50. Dr. Traynor's citation to Ex. 1028 ("Mostafa") also does not support his conclusion that an agent communication bus would be used for transporting the data. While FIG. 4 of Mostafa does depict the MMS User Agent transmitting data to an application, this is a logical diagram, and of course, the MMS User Agent must correctly transfer the data to the appropriate subcomponent, and it would use some sort of interface between the higher-level User Agent and the lower level subapplications to do so (i.e., the "Application Interface" discussed in FIG. 4 of Mostafa). A POSITA would not understand Mostafa's logical depiction of the MMS User Agent to be depicting a "bus"; Mostafa does not use that term, and a POSITA would not have found it obvious to use a bus for the intra-application communication contemplated by TS-23.140.

I declare under penalty of perjury 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.

November 1, 2024



Michael C. Brogioli, Ph.D.