

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOYOTA MOTOR CORP. AND KIA CORP.,
Petitioners,

v.

EMERGING AUTOMOTIVE LLC,
Patent Owner.

Case No. IPR2024-00785
U.S. Patent No. 10,407,026

**DECLARATION OF KEVIN C. ALMEROOTH, PH.D.
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 10,407,026**

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I. Introduction

1. I, Kevin C. Almeroth, Ph.D., submit this declaration to state my opinions on the matter described below.

2. I have been retained by Petitioner Toyota Motor Corp. (“Petitioner”), as an independent expert in this proceeding before the United States Patent and Trademark Office. Although I am being compensated at my usual and customary rate of \$800 per hour, no part of my compensation depends on the outcome of this proceeding, and I have no other interest in this proceeding.

3. I understand that this proceeding involves U.S. Patent No. 10,407,026 (the “’026 patent”), and I have been asked to provide my opinions as to the patentability of the claims of the ’026 patent. I understand that the application for the ’026 patent was filed on May 26, 2017, and claims priority to a U.S. application having a filing date of October 25, 2013. I understand the ’026 patent also purports to be a continuation-in-part of U.S. applications filed March 15, 2013, and April 22, 2012, respectively, and claims priority to two U.S. provisional applications, one filed December 24, 2012, and one filed April 22, 2011. I was also asked to evaluate Patent Owner’s priority claims for the ’026 patent. As discussed herein, it is my opinion that claims 1-20 are entitled to a priority date of no earlier than October 25, 2013.

4. I have been asked to consider the validity of certain claims of the '026 patent based on certain prior art references. I have also been asked to consider the state of the art and prior art available as of October 25, 2013. Based on the prior art discussed in this declaration, it is my opinion that claims 1-7, 10-15, and 18-20 of the '026 patent are unpatentable for the reasons provided below.

II. Qualifications and Background

5. I believe that I am well qualified to serve as a technical expert in this matter based upon my educational and work experience, and specifically, in the field of vehicle electronics and computing devices. My curriculum vitae ("CV") is submitted as Exhibit 1003.

6. I am currently a Professor Emeritus in the Department of Computer Science at the University of California, Santa Barbara (UCSB). While active at UCSB, I held faculty appointments and was a founding member of the Computer Engineering (CE) Program, Media Arts and Technology (MAT) Program, and the Technology Management Program (TMP). I also served as the Associate Director of the Center for Information Technology and Society (CITS) from 1999 to 2012. I have been a faculty member at UCSB since July 1997.

7. I hold three degrees from the Georgia Institute of Technology: (1) a Bachelor of Science degree in Information and Computer Science (with minors in Economics, Technical Communication, and American Literature) earned in June

1992; (2) a Master of Science degree in Computer Science (with specialization in Networking and Systems) earned in June 1994; and (3) a Doctor of Philosophy (Ph.D.) degree in Computer Science (Dissertation Title: Networking and System Support for the Efficient, Scalable Delivery of Services in Interactive Multimedia System, minor in Telecommunications Public Policy) earned in June 1997. During my education, I have taken a wide variety of courses as demonstrated by my minor. My undergraduate degree also included a number of courses more typical of a degree in electrical engineering including digital logic, signal processing, and telecommunications theory.

8. One of the major concentrations of my research over the past 30+ years has been the delivery of multimedia content and data between computing devices, including various network architectures. In my research, I have studied large-scale content delivery systems, and the use of servers located in a variety of geographic locations to provide scalable delivery to hundreds or thousands of users simultaneously. I have also studied smaller-scale content delivery systems in which content is exchanged between individual computers and portable devices. My work has emphasized the exchange of content more efficiently across computer networks, including the scalable delivery of content to many users, mobile computing, satellite networking, delivering content to mobile devices, and network support for data delivery in wireless networks.

9. In 1992, the initial focus of my research was on the provision of interactive functions (e.g., VCR-style functions like pause, rewind, and fastforward) for near video-on-demand systems in cable systems; in particular, how to aggregate requests for movies at a cable head-end and then how to satisfy a multitude of requests using one audio/video stream broadcast to multiple receivers simultaneously. This research has continually evolved and resulted in the development of techniques to scalably deliver on-demand content, including audio, video, web documents, and other types of data, through the Internet and over other types of networks, including over cable systems, broadband telephone lines, and satellite links.

10. An important component of my research has been investigating the challenges of communicating multimedia content, including video, between computers and across networks including the Internet. Although the early Internet was used mostly for text-based, non-real time applications, the interest in sharing multimedia content, such as video, quickly developed. Multimedia-based applications ranged from downloading content to a device to streaming multimedia content to be instantly used. One of the challenges was that multimedia content is typically larger than text-only content, but there are also opportunities to use different delivery techniques since multimedia content is more resilient to errors. I have worked on a variety of research problems and used a number of systems that

were developed to deliver multimedia content to users. One content-delivery method I have researched is the one-to-many communication facility called “multicast,” first deployed as the Multicast Backbone, a virtual overlay network supporting one-to-many communication. Multicast is one technique that can be used on the Internet to provide streaming media support for complex applications like video-on-demand, distance learning, distributed collaboration, distributed games, and large-scale wireless communication. The delivery of media through multicast often involves using Internet infrastructure, devices and protocols, including protocols for routing and TCP/IP.

11. Starting in 1997, I worked on a project to integrate the streaming media capabilities of the Internet together with the interactivity of the web. I developed a project called the Interactive Multimedia Jukebox (IMJ). Users would visit a web page and select content to view. The content would then be scheduled on one of a number of channels, including delivery to students in Georgia Tech dorms delivered via the campus cable plant. The content of each channel was delivered using multicast communication.

12. In the IMJ, the number of channels varied depending on the capabilities of the server including the available bandwidth of its connection to the Internet. If one of the channels was idle, the requesting user would be able to watch their selection immediately. If all channels were streaming previously selected

content, the user's selection would be queued on the channel with the shortest wait time. In the meantime, the user would see what content was currently playing on other channels, and because of the use of multicast, would be able to join one of the existing channels and watch the content at the point it was currently being transmitted.

13. The IMJ service combined the interactivity of the web with the streaming capabilities of the Internet to create a jukebox-like service. It supported true Video-on-Demand when capacity allowed, but scaled to any number of users based on queuing requested programs. As part of the project, we obtained permission from Turner Broadcasting to transmit cartoons and other short-subject content. We also connected the IMJ into the Georgia Tech campus cable television network so that students in their dorms could use the web to request content and then view that content on one of the campus's public access channels.

14. More recently, I have also studied issues concerning how users choose content, especially when considering the price of that content. My research has examined how dynamic content pricing can be used to control system load. By raising prices when systems start to become overloaded (i.e., when all available resources are fully utilized) and reducing prices when system capacity is readily available, users' capacity to pay as well as their willingness can be used as factors in stabilizing the response time of a system. This capability is particularly useful in

systems where content is downloaded or streamed on-demand to users.

15. As a parallel research theme, starting in 1997, I began researching issues related to wireless devices and sensors. In particular, I was interested in showing how to provide greater communication capability to “lightweight devices,” i.e., small form-factor, resource-constrained (e.g., CPU, memory, networking, and power) devices. Starting in 1998, I published several papers on my work to develop a flexible, lightweight, battery-aware network protocol stack.

16. The lightweight protocols we envisioned were similar in nature to protocols like Bluetooth, Universal Plug and Play (UPnP) and Digital Living Network Alliance (DLNA). From this initial work, I have made wireless networking-including ad hoc, mesh networks and wireless devices-one of the major themes of my research. My work in wireless network spans the protocol stack from applications through to the encoding and exchange of data at the data link and physical layers.

17. At the application layer, even before the large-scale “app stores” were available, my research looked at building, installing, and using apps for a variety of purposes, from network monitoring to support for traditional computer-based applications (e.g., content retrieval) to new applications enabled by ubiquitous, mobile devices. For example, my research has looked at developing applications for virally exchanging and tracking “coupons” through “opportunistic contact”

(i.e., communication with other devices coming into communication range with a user). In many of the courses I have taught there is a project component. Through these projects I have supervised numerous efforts to develop new “apps” for download and use across a variety of mobile platforms.

18. Toward the middle of the protocol stack, my research also looked to build wireless infrastructure support to enable communication among a set of mobile devices unaided by any other kind of network infrastructure. These kinds of networks are useful either in challenged network environments (e.g., when a natural disaster has destroyed existing infrastructure) or when suitable support for network communication never existed. The deployment of such networks (or even the use of traditional network support) are critical to support services like disaster relief, catastrophic event coordination, and emergency services deployment.

19. Yet another theme is monitoring wireless networks, in particular different variants of IEEE 802.11 compliant networks, to (1) understand the operation of the various protocols used in real-world deployments, (2) use these measurements to characterize use of the networks and identify protocol limitations and weaknesses, and (3) propose and evaluate solutions to these problems. I have successfully used monitoring techniques to study wireless data link layer protocol operation and to improve performance by enhancing the operation of such protocols. For wireless protocols, this research includes functions like network

acquisition and channel bonding.

20. Protecting networks, including their operation and content, has been an underlying theme of my research almost since the beginning of my research career. Starting in 2000, I have been involved in several projects that specifically address security, network protection, and firewalls. After significant background work, a team on which I was a member successfully submitted a \$4.3M grant proposal to the Army Research Office (ARO) at the Department of Defense to propose and develop a high-speed intrusion detection system. Key aspects of the system included associating streams of packets and analyzing them for viruses and other malware. Once the grant was awarded, we spent several years developing and meeting the milestones of the project. A number of my students worked on related projects and published papers on topics ranging from intrusion detection to developing advanced techniques to be incorporated into firewalls. I have also used firewalls, including their associated malware detection features, in developing techniques for the classroom to ensure that students are not distracted by online content.

21. Recent work ties some of the various threads of my past research together. I have investigated content delivery in online social networks and proposed reputation management systems in large-scale social networks and marketplaces. On the content delivery side, I have looked at issues of caching and

cache placement, especially when content being shared and the cache has geographical relevance. We were able to show that effective caching strategies can greatly improve performance and reduce deployment costs. Our work on reputation systems showed that reputations have economic value, and as such, creates a motivation to manipulate reputations. In response, we developed a variety of solutions to protect the integrity of reputations in online social networks. The techniques we developed for content delivery and reputation management were particularly relevant in peer-to-peer communication and recommendations for downloadable “apps.”

22. As an important component of my research program, I have been involved in the development of academic research into available technology in the market place. One aspect of this work is my involvement in the Internet Engineering Task Force (IETF). The IETF is a large and open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. I have been involved in various IETF groups including many content delivery-related working groups like the Audio Video Transport (AVT) group, the MBone Deployment (MBONED) group, Source Specific Multicast (SSM) group, the Inter-Domain Multicast Routing (IDMR) group, the Reliable Multicast Transport (RMT) group, the Protocol Independent Multicast (PIM) group, etc. I

have also served as a member of the Multicast Directorate (MADDOGS), which oversaw the standardization of all things related to multicast in the IETF. Finally, I was the Chair of the Internet2 Multicast Working Group for seven years.

23. As another important component of my research, I have been involved in the development of academic research into available technology in mobile connections, networks, and protocols in dynamic environments, including moving vehicles. See, e.g.:

- K. Almeroth, K. Obraczka and D. De Lucia, “*A Lightweight Protocol for Interconnecting Heterogeneous Devices in Dynamic Environments*,” IEEE International Conference on Multimedia Computing and Systems (ICMCS), Florence, ITALY, June 1999.
- K. Harras, K. Almeroth and E. Belding, *Delay Tolerant Mobile Networks (DTMNs): Controlled Flooding in Sparse Mobile Networks*,” IFIP Networking Conference, Waterloo, Ontario, CANADA, May 2005.
- C. Holman, K. Harras, and K. Almeroth, “*A Proactive Data Bundling System for Intermittent Mobile Connections*,” IEEE International Conference on Sensor and Ad Hoc Communications and Networks (SECON), Reston, Virginia, USA, September 2006.

- R. Chertov, D. Havey and K. Almeroth, “*MSET: A Mobility Satellite Emulation Testbed*,” IEEE Infocom, San Diego, California, USA, March 2010.

24. My involvement in the research community extends to leadership positions for several academic journals and conferences. I am the co-chair of the Steering Committee for the ACM Network and System Support for Digital Audio and Video (NOSSDAV) workshop and on the Steering Committees for the International Conference on Network Protocols (ICNP), ACM Sigcomm Workshop on Challenged Networks (CHANTS), and IEEE Global Internet (GI) Symposium. I have served or am serving on the Editorial Boards of IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, IEEE Network, ACM Computers in Entertainment, AACE Journal of Interactive Learning Research (JILR), and ACM Computer Communications Review. I have co-chaired a number of conferences and workshops, including the IEEE International Conference on Network Protocols (ICNP), IEEE Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON), International Conference on Communication Systems and Networks (COMSNETS), IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS), the International Workshop On Wireless Network Measurement (WiNMee), ACM Sigcomm Workshop on Challenged Networks (CHANTS), the

Network Group Communication (NGC) workshop, and the Global Internet

Symposium, and I have served on the program committees for numerous conferences.

25. Furthermore, in the courses I taught at UCSB, a significant portion of my curriculum covered aspects of the Internet and network communication, including the physical and data link layers of the Open System Interconnect (OSI) protocol stack, and standardized protocols for communicating across a variety of physical media such as cable systems, telephone lines, wireless, and high-speed Local Area Networks (LANs). The courses I have taught also cover most major topics in Internet communication, including data communication, multimedia encoding, and mobile application design. My research and courses have covered a range of physical infrastructures for delivering content over networks, including cable, Integrated Services Digital Network (ISDN), Ethernet, Asynchronous Transfer Mode (ATM), fiber, and Digital Subscriber Line (DSL). For a complete list of courses I have taught, see my curriculum vitae (CV) (Ex. 1008).

26. In addition, I co-founded a technology company called Santa Barbara Labs that was working under a sub-contract from the U.S. Air Force to develop very accurate emulation systems for the military's next generation internetwork. Santa Barbara Labs' focus was in developing an emulation platform to test the performance characteristics of the network architecture in the variety of

environments in which it was expected to operate, and, in particular, for network services including IPv6, multicast, Quality of Service (QoS), satellite-based communication, and security. Applications for this emulation program included communication of a variety of multimedia-based services, including video conferencing and video-on-demand.

27. In addition to having co-founded a technology company myself, I have worked for, consulted with, and collaborated with companies for nearly 30 years. These companies range from well-established companies to start-ups and include IBM, Hitachi Telecom, Turner Broadcasting System (TBS), Bell South, Digital Fountain, RealNetworks, Intel Research, Cisco Systems, and Lockheed Martin.

28. Through my graduate education, leadership with CITS, involvement in TMP, role in the development of the Internet infrastructure, and consulting with ISPs, I have gained a strong understanding in the role of the Internet in our society and the challenges of deploying large-scale production networking infrastructure. CITS, since its inception, has looked at the role of the Internet in society, including how the evolution of technology have created communication opportunities and challenges, including, for example through disruptive technologies like P2P. TMP looks to focus on non-purely technical issues, including, for example, state-of-the-art business methods, strategies for successful technology commercialization, new

venture creation, and best practices for fostering innovation. Through my industry collaborations and Internet work, I have developed significant experience in the challenges of deploying, monitoring, managing, and scaling communication infrastructure to support evolving Internet services like streaming media, conferencing, content exchange, social networking, and e-commerce.

29. I am a Member of the Association of Computing Machinery (ACM) and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE).

III. Materials Considered

30. In forming my opinions, I have reviewed the following documents:

Exhibit	Description
Ex. 1001	U.S. Patent No. 10,407,026 to <i>Penilla</i> et al.
Ex. 1002	Prosecution File History for U.S. Patent No. 10,407,026.
Ex. 1005	U.S. Patent Pub. No. 2011/0112969 to Sam Zaid et al.
Ex. 1006	U.S. Patent Pub. No. 2014/0129053 to Robert Bruce Kleve et al.
Ex. 1007	U.S. Patent Application Pub. No. 2006/0136106 A1 by Russell A. Patenaude et al.
Ex. 1008	U.S. Patent Pub. No. 2013/0113602 to Matthew R. Gilbertson et al.
Ex. 1009	Prosecution File History for U.S. Patent No. 11,738,659.
Ex. 1010	U.S. Patent Application No. 61/478,436.
Ex. 1011	U.S. Patent Application No. 61/745,729.
Ex. 1012	U.S. Patent Application No. 13/452,882.

Exhibit	Description
Ex. 1013	U.S. Patent Application No. 13/842,158.
Ex. 1014	U.S. Patent Application No. 14/063,638.
Ex. 1015	District of Columbia Department of Motor Vehicles, <i>Medical Restrictions</i> , Retrieved from: https://web.archive.org/web/20101110064942/http://dmv.dc.gov/serv/medical/medicalRestrictions.shtm (Nov. 10, 2010).
Ex. 1016	Florida Department of Highway Safety and Motor Vehicles, <i>Licensing Requirements for Teens – Graduated Driver Licensing</i> , Retrieved from: https://web.archive.org/web/20101216053738/http://flhsmv.gov/ddl/teendriv.html#learner (Dec. 16, 2010).
Ex. 1017	D. Alfred Owens and Michael Sivak, <i>The Role of Reduced Visibility in Nighttime Road Fatalities</i> , Retrieved from: https://deepblue.lib.umich.edu/bitstream/handle/2027.42/49541/UMTRI-93-33.pdf?sequence= (Nov. 1993).
Ex. 1018	Bob D’Avello and Jim Van Bosch, <i>Portable and Embedded Wireless Devices as Conduits for Telematics Applications</i> (Oct. 2002).
Ex. 1019	Mike Spencer et al., <i>Network Security: Private Communications in a Public World</i> (2002).
Ex. 1020	Jacqui Cheng, <i>OpenTable’s iPhone app makes reservations a breeze</i> (Nov. 17, 2008).
Ex. 1021	Order Granting Request For Ex Parte Reexamination, Reexamination Control No. 90/019,456, Patent No. 11,738,659 (April 15, 2024).
Ex. 1022	<i>Login</i> , Facebook Developers (May 4, 2013).
Ex. 1023	<i>Using the signed_request Parameter</i> , Facebook Developers (April 15, 2013).
Ex. 1024	<i>Email Permissions</i> , Facebook Developers (March 17, 2013).
Ex. 1025	<i>Mercedes-Benz mbraceBy Hughes Telematics, Inc.</i> , iTunes App Store,

Exhibit	Description
	last updated Aug. 24, 2010, retrieved from: https://web.archive.org/web/20110265054805/http://itunes.apple.com/us/app/mercedes-benz-mbrace/id335276900?mt=8b .
Ex. 1026	<i>Mercedes-Benz mbrace</i> By Hughes Telematics, Inc., iTunes App Store, last updated Aug. 24, 2010 retrieved from: https://web.archive.org/web/20110265054805/http://itunes.apple.com/us/app/mercedes-benz-mbrace/id335276900?mt=8b .
Ex. 1027	Reserved.
Ex. 1028	Reserved.
Ex. 1029	Text Comparison of U.S. Patent Application No. 13/452,882 to U.S. Patent Application No. 14/063,638.
Ex. 1030	U.S. Patent No. 11,738,659.
Ex. 1031	U.S. Patent Publication 2014/0156111 to Ehrman (“Ehrman”).
Ex. 1032	U.S. Patent Application No. 15/344,566.
Ex. 1033	U.S. Patent Application No. 15/180,306.
Ex. 1034	U.S. Patent Application No. 14/303,442.
Ex. 1035	Budget Rent-a-Car Common Questions (Dec. 2, 2010).
Ex. 1038	Text Comparison of U.S. Patent Application No. 13/842,158 to U.S. Patent Application No. 14/063,638.
Ex. 1039	9/3/2015 Response to Office Action, App. No. 14/063,638.

IV. Legal Standards

31. In forming my opinions and considering the subject matter of the ’268 patent and its claims in light of the prior art, I am relying on certain legal principles that counsel in this case explained to me. My understanding of these concepts is

summarized below.

32. I understand that the claims define the invention. I also understand that an unpatentability analysis is a two-step process. First, the claims of the patent are construed to determine their meaning and scope. Second, after the claims are construed, the content of the prior art is compared to the construed claims.

33. I understand that a claimed invention is only patentable when it is new, useful, and non-obvious in light of the “prior art.” That is, the invention, as defined by the claims of the patent, must not be anticipated or rendered obvious by the prior art.

A. Claim Construction

34. I understand that the United States Patent and Trademark Office interprets claim terms in an *inter-partes* review proceeding under the same claim construction standard that is used in a United States federal court. I understand that under this standard, the meaning of claim terms is considered from the viewpoint of one of ordinary skill in the art at the time of the alleged invention.

35. I understand that claim terms are generally given their ordinary and customary meaning as understood by one of ordinary skill in the art in light of the specification and the prosecution history pertaining to the patent. I understand, however, that claim terms are generally not limited by the embodiments described in the specification.

36. I understand that in addition to the claims, specification, and prosecution history, other evidence may be considered to ascertain the meaning of claim terms, including textbooks, encyclopedias, articles, and dictionaries. I have been informed that this other evidence is often less significant and less reliable than the claims, specification, and prosecution history.

B. Anticipation Under 35 U.S.C. § 102

37. I understand that under 35 U.S.C. § 102, a patent claim is invalid if its subject matter was patented or described in a printed publication before the effective filing date of the claimed invention. I have been told that this is referred to as invalidity by anticipation. I have been told that a patent claim is anticipated under § 102 if a single prior art reference discloses all limitations of the claimed invention.

C. Obviousness Under 35 U.S.C. § 103

38. I understand that a patent claim is invalid as obvious if the claimed invention would have been obvious to a person of ordinary skill in the art (“POSA”) at the time the claimed invention was made. This means that even if all of the elements of the claim cannot be found in a single prior art reference that would anticipate the claim, a person of ordinary skill in the field who knew about all the prior art would have come up with the claimed invention. I understand that in an obviousness determination, the person of ordinary skill in the art is presumed

to have knowledge of all material prior art. I understand that whether a claim is obvious is based upon the determination of several factual issues.

39. I understand that obviousness is a determination of law based on underlying determinations of fact. I understand that these factual determinations include the scope and content of the prior art, the level of ordinary skill in the art, the differences between the claimed invention and the prior art, and secondary considerations of non-obviousness.

40. In considering obviousness, I understand that one must determine the scope and content of the prior art. I understand that, in order to be considered as prior art to a patent being considered, a prior art reference must be reasonably related to the claimed invention of that patent. A reference is reasonably related if it is in the same field as the claimed invention or is from another field to which a person of ordinary skill in the art would look to solve a known problem.

41. I understand that one must determine what differences, if any, existed between the claimed invention and the prior art.

42. I understand that a patent claim composed of several elements is not proved obvious merely by demonstrating that each of its elements was independently known in the prior art. In evaluating whether such a claim would have been obvious, one may consider whether a reason has been identified that would have prompted a person of ordinary skill in the art to combine the elements

or concepts from the prior art in the same way as in the claimed invention. There is no single way to define the line between true inventiveness on the one hand (which is patentable) and the application of common sense and ordinary skill to solve a problem on the other hand (which is not patentable). For example, market forces or other design incentives may be what precipitated a change, rather than true inventiveness.

43. I understand that whether a prior art reference renders a patent claim unpatentable as obvious is determined from the perspective of a person of ordinary skill in the art at the time of the alleged invention. I have been told that there is no requirement that the prior art contain an express suggestion to combine known elements to achieve the claimed invention, but a suggestion to combine known elements to achieve the claimed invention may come from the prior art, as filtered through the knowledge of one skilled in the art. In addition, I have been told that the inferences and creative steps a person of ordinary skill in the art would employ are also relevant to the determination of obviousness.

44. I understand that there is no rigid rule that a reference or combination of references must contain a “teaching, suggestion, or motivation” to combine references. But I also understand that the “teaching, suggestion, or motivation” test can be a useful guide in establishing a rationale for combining elements of the prior art. I have been told that this test poses the question as to whether there is an

express or implied teaching, suggestion, or motivation to combine prior art

elements in a way that realizes the claimed invention, and that it seeks to counter impermissible hindsight analysis.

45. I understand that one may consider, e.g., whether (1) the change was merely the predictable result of using prior art elements according to their known functions, or whether it was the result of true inventiveness; (2) there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; (3) the claimed innovation applies a known technique that had been used to improve a similar device or method in a similar way; (4) the claimed invention would have been obvious to try, meaning that the claimed innovation was one of a relatively small number of possible approaches to the problem with a reasonable expectation of success by those skilled in the art; (5) the invention merely substituted one known element for another known element in order to obtain predictable results; (6) the invention merely applies a known technique to a known device, method, or product to yield predictable results; or (7) known work in the field may have prompted variations of use of the same inventions in the same or different fields due to market forces or design incentives that would have been predictable to a person of ordinary skill in the art.

46. I understand that any assertion of secondary considerations of non-obviousness must be accompanied by a nexus between the merits of the invention

and the evidence offered.

D. Priority Under 35 U.S.C. § 120

47. I understand that the “priority date” or “effective filing date” of a patent is the date on which it is filed, or the date on which an earlier-filed U.S. or international patent application was filed if the patentee claims the benefit of priority to that earlier-filed application.

48. I understand that in the patent application process, the applicant may keep the originally filed claims, or change the claims between the time the patent application is first filed and the time a patent is issued. An applicant may amend the claims or add new claims. These changes may narrow or broaden the scope of the claims. I understand that a patent application is entitled to the benefit of the filing date of an earlier-filed application only if the disclosure of the earlier application provides support for the claims of the later application as required by the “written description” requirement of 35 U.S.C. § 112. I further understand that for a patent application to have an adequate written description of the invention, it must show the inventor was in possession of the invention at the time the patent application was filed.

49. When determining whether a specification of a patent application contains adequate written description of the claimed invention, I understand that one must make an objective inquiry into the four corners of the specification from

the perspective of a POSA. Further, I understand that the standard for written description is stricter than the standard for determining whether or not a patent claim would have been obvious based on the prior art.

50. In particular, the question for purposes of written description is not merely whether the claimed invention is an obvious variant of what the specification discloses. Instead, the application itself must describe the invention, and do so in sufficient detail that a POSA can clearly conclude that the inventor invented the claimed invention as of the date when the application was filed.

51. Similarly, I understand the issue of written description is separate from the question of “enablement” (i.e., whether a specification allows a POSA to practice the claimed invention without undue experimentation). A specification may adequately enable a claimed invention, yet fail to provide written description support.

52. Finally, I understand that the standard for whether or not a disclosure is sufficient to provide written description support for a claim is different from the standard for whether a disclosure anticipates a claim. To support a claim, the description must be sufficient to convey to a POSA that the inventors were in possession of the full scope of the claimed subject matter. By contrast, a description anticipates a claim if it discloses even a single species within the scope of the claim. Thus, in the case of “genus” claims covering two or more different

species, I understand that there can be situations in which a given disclosure is sufficient to anticipate the claim even though that same disclosure is not adequate to support the claim and entitle the inventors to an earlier priority date.

53. I understand that in order to claim priority to an application through a chain of applications, every single application in the chain (going back to the particular application on which the inventors want to rely) needs to support the claim as a matter of written description. In other words, each application in the chain must allow a person of ordinary skill in the art to discern that the inventors were in possession of the claimed invention at the time of the application. It is not sufficient under this standard for the disclosure in the specification to render the claimed invention obvious.

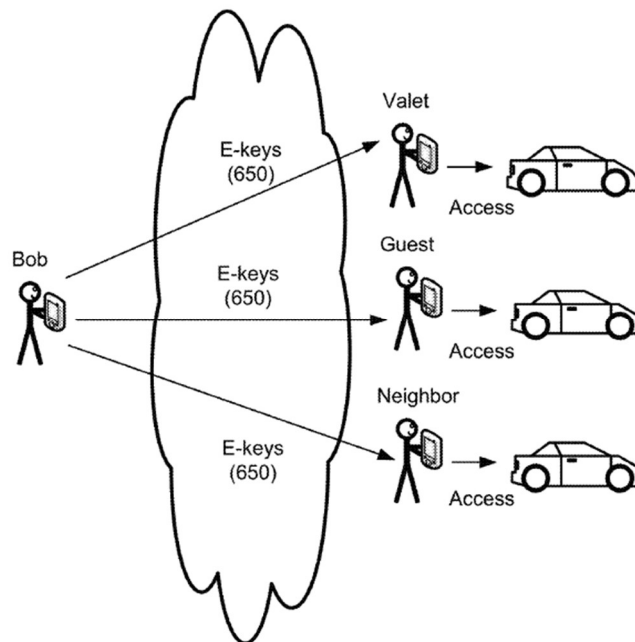
V. The '026 Patent

A. Overview of the '026 Patent

54. The application that led to the '026 patent was filed on May 26, 2017. It is my opinion that the earliest date to which the challenged claims of the '026 patent can claim priority, as explained in further detail in section V.B, is October 25, 2013. The '026 patent, on its face, references four earlier applications: a provisional application filed April 22, 2011, a provisional application filed December 24, 2012, a non-provisional application filed April 22, 2012, and a non-provisional application filed March 15, 2013. Even if the '026 patent could claim priority back to any of

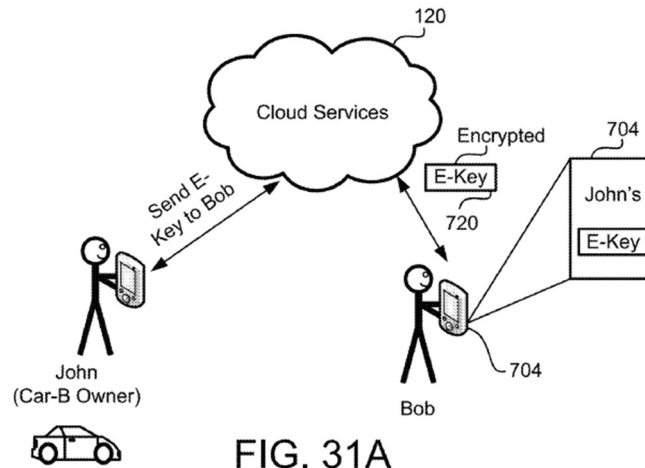
these dates (which it cannot), my ultimate conclusions as to the invalidity of the '026 patent would not change.

55. **The '026 Patent** is directed to a system in which a vehicle owner assigns an electronic key to a user for enabling access and use of a shared vehicle by the user. '026 Patent, 43:23-37. For example, in Figure 29, vehicle owner Bob shares electronic keys 650 with users “valet,” “guest,” and “neighbor” for vehicle access. *Id.*, 43:23-25. The specification explains that “[e]ach e-key, in one embodiment, will include a unique access code or substantially unique access code.” '026 Patent, 43:38-39. Further, “[t]he unique generation of access codes enables each electronic keyed [sic] to be different for each user and each e-key can expire at any time set by a requesting user.” *Id.*, 43:46-50.



'026 Patent, Fig. 29.

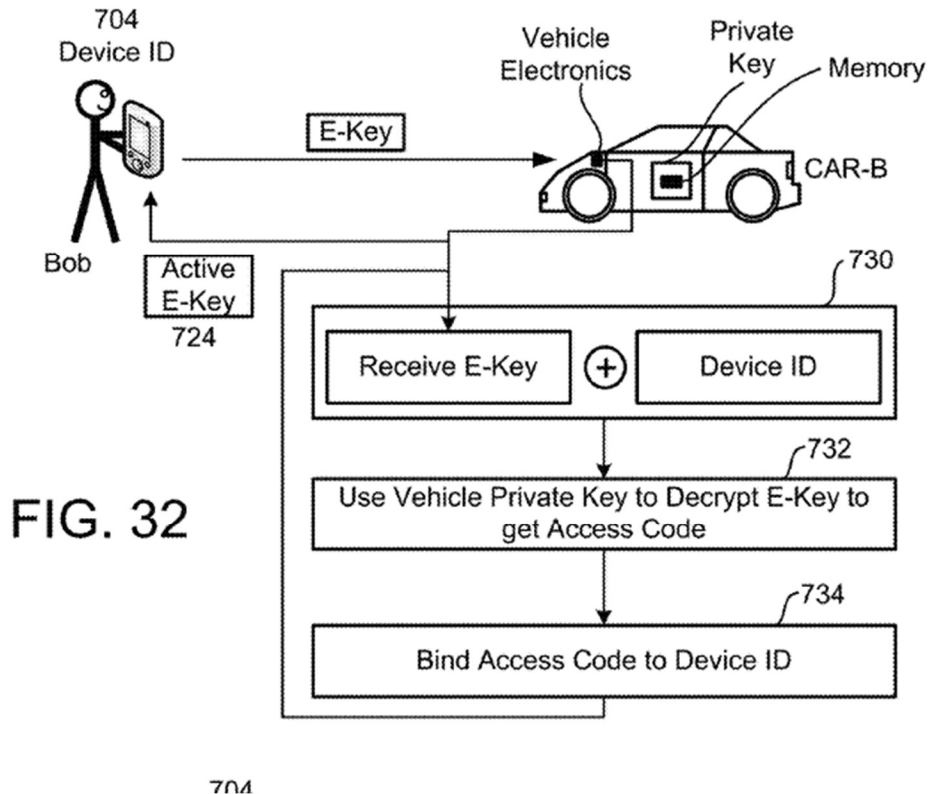
56. In Figure 31A, vehicle owner John utilizes a cloud server 120 to send an encrypted ekey to guest user Bob. In this embodiment, “the server will generate an access code for the vehicle” (*id.*, 44:40-41), which “will then be encrypted by the server and then sent as encrypted e-keys 722¹ to Bob’s device 704.” *Id.*, 44:41-43.



'026 Patent, Fig. 31A.

57. Next, in Figure 32, user Bob “will transfer the encrypted e-keys 720 to the vehicle that belongs to John (car-B). . . At the vehicle, the vehicle will receive the encrypted e-keys and the device ID of Bob’s device 704. The vehicle will hold a private key to unlock and un-encrypt the encrypted e-keys 720.” *Id.*, 44:49-58.

¹ The specification’s reference to “encrypted e-keys 722” is likely a typo and should instead refer to encrypted e-keys 720.



58. Figure 32 further describes a process by which the e-key is associated with the device of the user seeking to utilize the e-key. In step 730, the encrypted ekey is “associated” with the mobile device. *Id.*, 44:63-65. In step 732, “the vehicle private key is used to decrypt the e-keys to get access to an access code.” *Id.*, 45:7-8. And in step 734, “[t]he access code is then sent as activated e-keys 724 back to Bob’s device 704,” allowing Bob’s device to access the vehicle. *Id.*, 45:11-15. The ’026 patent discloses that the unique access code “can be generated by a number generator, and [sic] alphanumeric random generator, in [sic] incremental number generator, or any other generation device that can generate codes that are unique or substantially unique.” *Id.*, 45:52-55.

59. Finally, the specification discloses that the “keys can be assigned to users with various privilege settings” corresponding to the use of a vehicle function for an associated time period. *Id.*, 43:25-26. For example, “electronic keys for each user can be associated with a different expiration time.” *Id.*, 43:36-37; *see also* 38:50-51 (privileges for “use[] during specific periods of time”), 50:37-39 (“the privileges can be assigned by selecting . . . time durations[.]”). In the example above, once Bob receives the ekey from the server as John requested, “Bob’s device 704 can now access the vehicle in accordance with the privileges set by John, the owner of the vehicle.” *Id.*, 45:13-15.

B. Prosecution History of the ’026 Patent

60. I have reviewed the prosecution history of the application that led to the ’026 patent. Ex. 1002. I am not aware of anything in the prosecution history changes my opinions expressed in this declaration. To the extent Patent Owner relies on the prosecution history for some point relevant to my opinions, I reserve the right to respond in a future declaration.

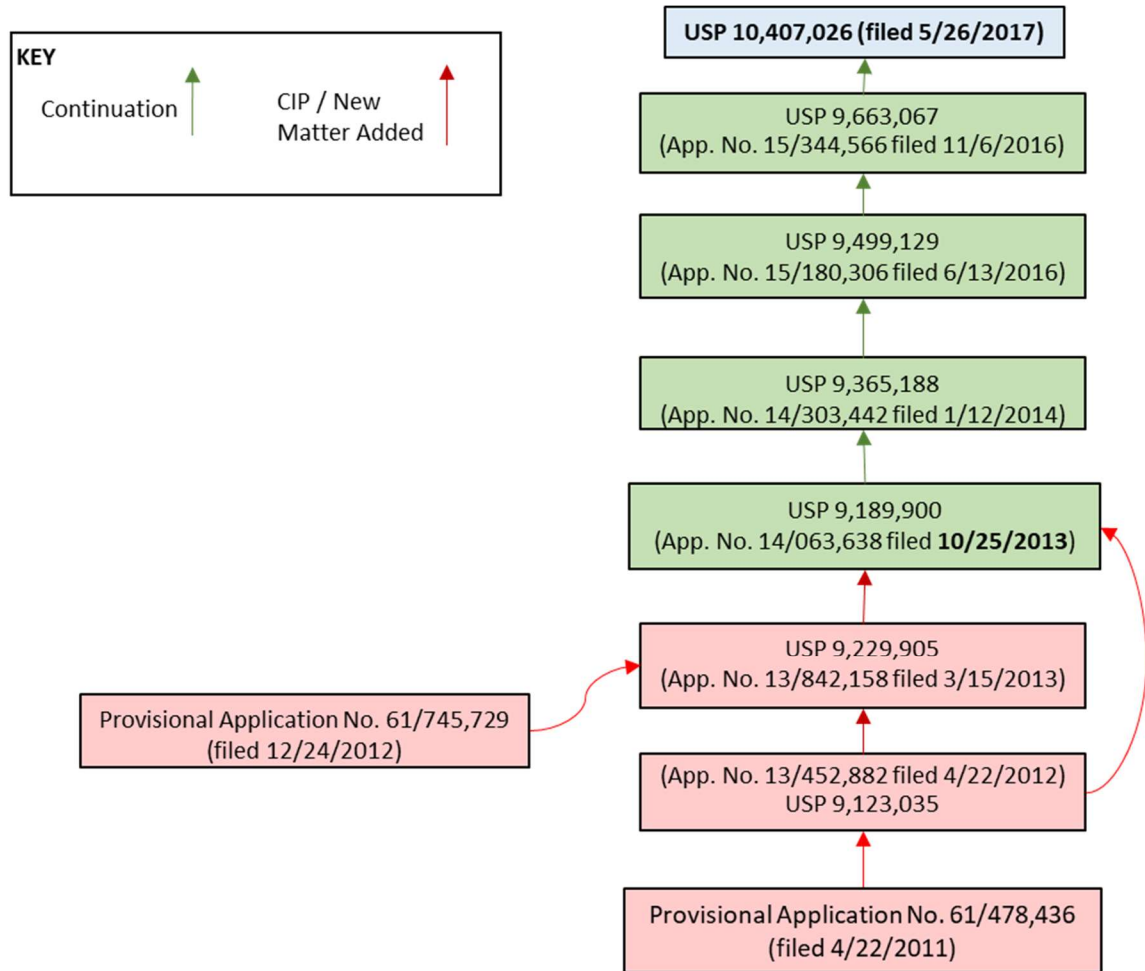
C. The ’026 patent’s claims are entitled to an effective filing date of no earlier than October 25, 2013

61. The application leading to the ’026 Patent claims priority to U.S. Application Nos. 15/344,566 (now U.S. Pat. No. 9,663,067), 15/180,306 (now U.S. Pat. No. 9,499,129), 14/303,442 (now U.S. Pat. No. 9,365,188), 13/452,882 (now

U.S. Pat. No. 9,123,035), 14/063,638 (now U.S. Pat. No. 9,189,900), 13/824,158

(now U.S. Pat. No. 9,229,905), 61/478,436, and 61/745,729. *See* Exs. 1010-1014,

1032-34.



62. I observe that Application No. 14/063,638 (Ex. 1014) describes itself as a “continuation-in-part” of Application No. 13/842,158 (Ex. 1013) and Application No. 13/452,882 (Ex. 1012). I understand that a continuation-in-part application repeats all or a substantial part of a prior application’s disclosure and adds new subject matter not disclosed in the parent application. Only claims that are

adequately disclosed in the parent application receive the benefit of the parent application's filing date, while any claim that recites a feature first introduced in the continuation-in-part application and was not adequately disclosed in the parent application is not entitled to the filing date of the parent application. As illustrated above, the application leading to the '026 Patent is related to Application No. 14/063,638 via multiple continuation applications.

63. There are numerous differences between the Application No. 14/063,638 and Application No. 14/063,638, which are evident from a computerized comparison of the two. *See* Ex. 1029. Numerous differences also appear between Application No. 13/842,158 and Application No. 13/452,882. *See* Ex. 1038. For example, I observe several new paragraphs and figures describing “e-keys” in Application No. 14/063,638 that do not appear in either of Application Nos. 13/452,882 or 14/063,638. *Id.* In my opinion, the claim limitation “enabling access to use the vehicle via one or more electronic keys,” as required by every claim of the '026 patent, is directed to the previously unrecited “e-key” issue.

64. The new matter introduced in the '026 Patent, via Application No. 14/063,638 (Ex. 1014), is not present in any of the filings predating Application No. 14/063,638. *See* Exs. 1010-1013. This new matter is the only basis on which the specification for the '026 patent even arguably conveys to a person of ordinary skill

in the art that the inventors had developed a system for “enabling access to use the vehicle via one or more electronic keys.”

65. I understand that Patent Owner relied on new matter introduced by the ’638 application, including Figure 31B, throughout prosecution of the ’638 application to support claims concerning the “access code.” *See, e.g.*, Ex. 1039, 1.

66. Accordingly, in my opinion, the ’026 patent’s claims are not entitled to a filing date before October 25, 2013. None of the applications prior to this date describe the subject matter of the Challenged Claims including “enabling access to use the vehicle via one or more electronic keys.” The earliest priority date to which the asserted claims could be entitled is October 25, 2013.

67. I also understand that the Patent Office considered the effective priority date of descendent Patent No. 11,738,659 (the “’659 Patent) in granting Ex-Parte re-examination of the ’659 Patent. *See* Ex. 1021 at 4, fn.1 (“The disclosure of [U.S. Provisional App. No. 61/478,436] however *appears to lack support* for several limitations claimed in US Patent 11,738,659 requested for reexamination. These include for example an ‘eKey’, ‘coded data’, ‘unlocking’ or ‘starting’ of the vehicle and ‘privilege settings’.”). My conclusion is consistent with this finding.

68. To the extent Patent Owner argues an earlier priority date, I reserve the right to respond to those opinions.

D. Person of Ordinary Skill in the Art

69. I am informed that patentability must be analyzed from the perspective of “one of ordinary skill in the art” in the same field as the ’026 patent at the time of the invention. As previously discussed, the relevant time of invention is the patent’s priority date, which is no earlier than October 25, 2013. Moreover, I understand that whether or not a patent application provides “written description” support for patent claims must also be assessed from the perspective of a person of ordinary skill in the art.

70. I am also informed that several factors are considered in assessing the level of ordinary skill in the art, including (1) the types of problems encountered in the art; (2) the prior art solutions to those problems; (3) the rapidity with which innovations are made; (4) the sophistication of the technology; and (5) the education level of active workers in the field.

71. The ’026 patent claims the benefit of U.S. Provisional Application No. 61/478,436 (Ex. 1010) filed April 22, 2011, U.S. Provisional Application No. 61/745,729 (Ex. 1011) filed December 24, 2012, U.S. Application No. 13/452,882 (Ex. 1012) filed April 22, 2012, and U.S. Application No. 13/842,158 (Ex. 1013) filed March 15, 2013. However, as discussed herein, in my opinion, the challenged claims of the ’026 patent are not entitled to a priority date any earlier than October 25, 2013.

72. Regardless of whether the priority date(s) for the challenged claims is

October 25, 2013 or April 22, 2011 (or any date in between), a person of ordinary skill in the art pertinent to the '026 patent would have had at least a four-year undergraduate degree in electrical engineering, automotive engineering, or a closely related field and at least two years of experience in the fields of access control systems, vehicle electronics, and/or cryptography. Additional education could substitute for professional experience and vice versa. A person of ordinary skill in the art would also be able to understand and apply the prior art discussed herein.

73. Although I surpass this definition of one of ordinary skill in the art now and at the priority date of the '026 patent, my analysis regarding the '026 patent has been based on the perspective of one ordinary skill in the art as of the priority date of the '026 patent.

74. I am also familiar with the knowledge of the person of ordinary skill in the art as of the priority date of the '026 patent. I am able to opine on how the person of ordinary skill in the art would have understood the disclosure and claims of the '026 patent, the disclosures of the prior art, the motivation to combine the prior art, and what combinations would have been obvious to one of ordinary skill in the art.

75. My conclusions as to the profile of a person of ordinary skill in the art would be the same regardless of the priority date. Moreover, I had or surpassed the level of skill of a person of ordinary skill in the art at all potentially relevant times, including as far back as April 22, 2011.

VI. Claim Construction of Terms of the '026 Patent

76. As I discussed above, I have been informed that for purposes of *inter-partes* reviews, the standard for claim construction of terms within the claims of the patent is the same as that applied in federal district court litigation. I have been asked to assume that the claim terms otherwise have their plain and ordinary meaning to a person skilled in the art in light of the specification and the prosecution history.

77. As of this time, I am not aware of any term that requires specific construction for my opinions. To the extent Patent Owner suggests a narrow construction for a term, I reserve the right to respond to those opinions.

VII. Overview of Prior Art

78. *Zaid* discloses a car sharing system where renters use their mobile devices to find available vehicles, rent them for specified periods of time, and use their mobile devices to unlock and start the shared vehicles. Ex. 1005 (*Zaid*), ¶¶ [0067-69]. During the rental period, a user's mobile device receives an electronic key from a server and sends an encrypted vehicle reservation to the vehicle for access and use during the rental period. *Id.*, ¶ [0070].

79. *Zaid* discloses a “vehicle access kit” 102 within **vehicle 100**. The vehicle access component can be added to a commercially available vehicle to permit electronic unlocking and starting of a vehicle from a mobile device and without a physical key. *Zaid*, ¶ [0075]. The vehicle access component receives a

vehicle reservation from a user's **wireless communication device 106**, which can be a smartphone. *Zaid*, ¶¶ [0082, 0135]. The wireless communication device 106 communicates via a **cloud network 114** with a remote central server 110 (**yellow**).

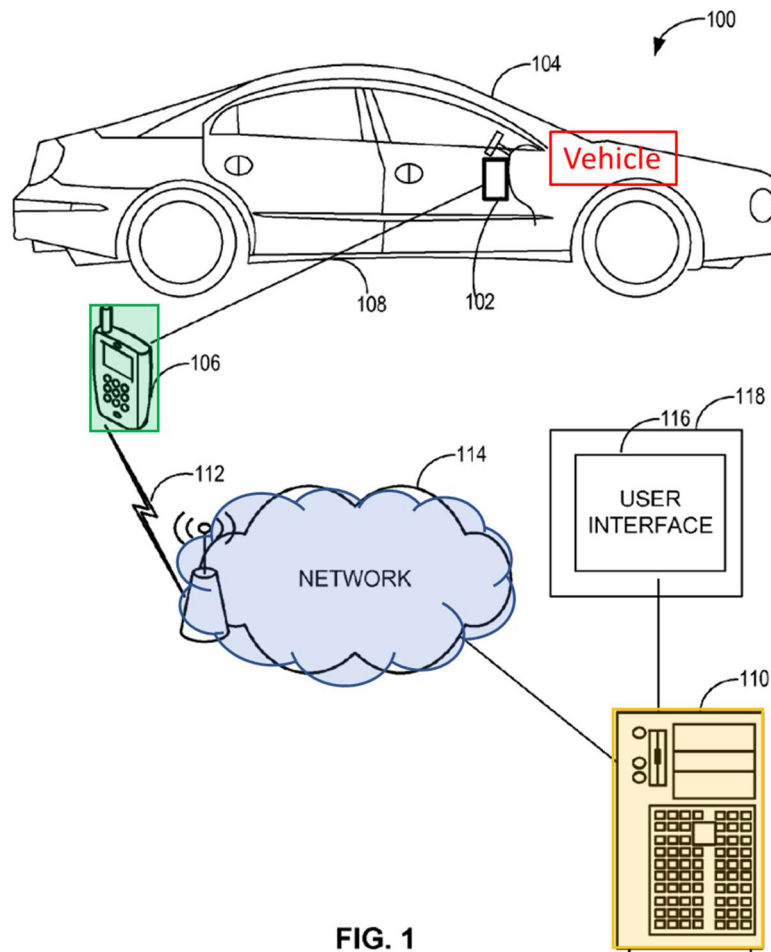


FIG. 1

Zaid, Figure 1 (annotated).

80. *Zaid*'s central server interacts with vehicle access control systems on many vehicles to provide rental options for users across a town or city. *Zaid*, ¶ [0080]. In a typical use case, a customer uses their wireless communication device 106 to search for available vehicles. *Id.*, ¶ [0077]. They make a reservation for a

certain vehicle, which is communicated to the central server 110. *Id.*, ¶ [0076]. The central server 110 sends an encrypted vehicle reservation to a vehicle via the wireless communication device 106. *Id.* The vehicle access component 102 then decrypts the request and, if authentic, permits the user to unlock and start the vehicle, but only for the specific time-period that the user requested and paid for. When the time-period elapses, access is withdrawn and the renter can no longer unlock or start the vehicle. *Id.*, ¶ [0131].

81. *Zaid* discloses that “communications, including vehicle reservation communications, received from the wireless communication device by the vehicle access control system for vehicle access control includes [sic] a unique increment for each message to avoid repeat message attack. In various embodiments, the unique increment is in the form of a counter and/or time stamp that indicate the uniqueness of the message to avoid a repeat message attack.” *Zaid*, ¶ [0081]. Thus, each vehicle reservation is unique.

82. *Zaid*’s vehicle access component can be integrated into a “vehicle access kit,” illustrated in Fig. 2 and shown containing electronic components such as a microprocessor, memory, and a communication interface which can be WiFi or Bluetooth for communicating to a remote server via the user’s mobile device. *Id.*, Fig. 2, ¶ [0087]. A long-range communication function can be added to the

communication interface to “act as a backup” in case communication via the user’s mobile phone is unavailable. *Id.*, ¶ [0106].

83. The remaining cited references, *Patenaude* (Ex. 1007), *Gilbertson* (Ex. 1008), and *Kleve* (Ex. 1006) demonstrate other well-known elements of vehicle communication systems present in the art, namely, determining learned settings (claim 10), cancelling a reservation and deactivating access (claim 13), and sending notifications to vehicles in the event of a privilege violation (claim 15), respectively.

VIII. Summary of Opinions on Unpatentability

84. In the analysis that follows, I identify the following combinations of prior art that, in my opinion, anticipate and/or render obvious the ’026 patent claims:

Grounds of Unpatentability	
1a	<i>Zaid</i> anticipates claims 1-7, 11-12, 14, and 18-20 under Section 102.
1b	<i>Zaid</i> renders obvious claims 1-7, 11-12, 14, and 18-20 under Section 103.
2	<i>Zaid</i> and <i>Patenaude</i> render obvious claim 10 under Section 103.
3	<i>Zaid</i> and <i>Gilbertson</i> render obvious claim 13 under Section 103.
4	<i>Zaid</i> and <i>Kleve</i> render obvious claim 15 under Section 103.

A. Ground 1a: *Zaid* anticipates claims 1-7, 11-12, 14, and 18-20 under Section 102

Ground 1b: *Zaid* renders obvious claims 1-7, 11-12, 14, and 18-20 under Section 103

1. Independent Claim 1

1[preamble]: “A vehicle configured to communicate with a server of a cloud system to enable access to use the vehicle via one or more electronic keys, comprising,”

85. As shown below in annotated Figure 1, *Zaid* discloses a **vehicle 104** in communication with a server 110 (**yellow**) belonging to a cloud system or **network 114** for enabling access to use the vehicle via an electronic key from a **wireless communication device 106**. *Zaid*, Fig. 1.

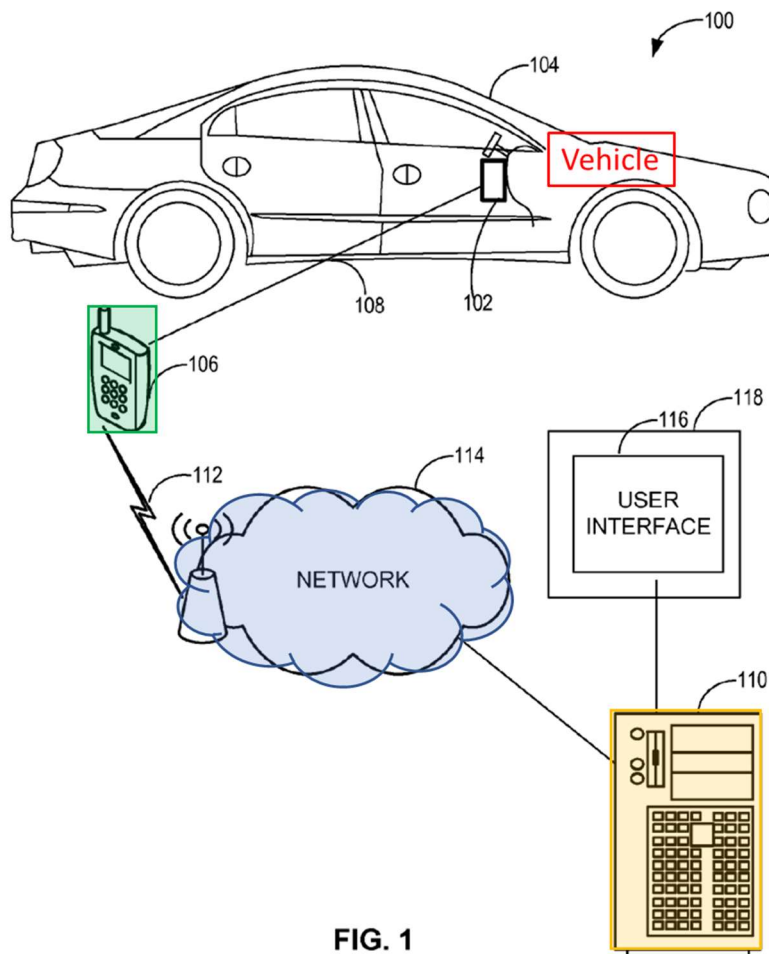


FIG. 1

Zaid, Figure 1 (annotated).

86. *Zaid*'s electronic key is part of a "vehicle access control service[]" for "provid[ing] access to a vehicle . . . when a vehicle reservation is received from [a] wireless communication device." *Zaid*, Abstract, ¶ [0067]. The server generates and transmits a vehicle reservation (i.e. an electronic key) to the wireless communication device 106, e.g., a "smart phone," which passes the request to a "vehicle access component" in the vehicle to enable access. *Zaid*, ¶ [0075]-[0076]. The vehicle reservation therefore provides electronic access to use the vehicle via an electronic key.

87. To enable access, *Zaid*'s vehicle communicates with the wireless communication device and also with the server of the network 114, which Figure 1 shows is a cloud system. Vehicle-server communication in *Zaid* is used for encryption/decryption purposes. *Id.*, ¶¶ [0070], [0099], [0125]-[0128], [0133], claims 10-13. For example, to allow for decryption of the vehicle reservation as part of enabling access, *Zaid*'s server sends an update containing a private key to the vehicle. *Id.*, ¶ [0130] ("the server update includes a new private key for vehicle access control"). Vehicle-to-server communication is transmitted via the user's wireless communication device, but the vehicle may also include a mobile communication radio (e.g., GSM radio) to act as a backup when the user's wireless communication device is not available. *Id.*, ¶ [0106] (vehicle can include "long-

range mobile communication radio/interface . . . for wireless communication to a vehicle reservation or sharing system”); *see also id.* claims 7-8. The mobile communication radio provides a route for direct vehicle-to-server communications. *Id.*

88. *Zaid*’s disclosure of a vehicle in communication with a cloud server to enable access and use of the vehicle via an electronic key is functionally identical to that disclosed in the ’026 patent specification. Both describe sending a request to a server (’026 Patent, 44:37-39; *compare Zaid*, ¶ [0080]), sending an “access code” from the server to the user device (’026 Patent, 44:41-44; *compare Zaid*, ¶ [0126]), transmitting the access code from the user device to the vehicle (’026 Patent, 44:49-51; *compare Zaid*, ¶ [0128]), decrypting the access code using a private key provided by the server (’026 Patent, 44:55-58, 47:52-54; *compare Zaid*, ¶ [0128]), and sending the decrypted access code back to the user device from the vehicle for enabling access to the vehicle (’026 Patent, 45:11-15; *compare Zaid*, ¶ [0129]).

89. Further, during prosecution of the continuation application which became the ’659 patent, the Examiner found that *Zaid* “teaches a sub-system of a vehicle (Fig. 1-Fig. 3, access kit 102, 200, 302 of a vehicle 104), the vehicle having an on-board computer interfaced with the sub-system for processing instructions *to enable use of an electronic key* (eKey)” and “communications circuitry of the vehicle interfaced with the on-board computer of the vehicle and the subsystem, the

communications circuitry is configured to process program instructions to enable communication with a server and to enable communication with a mobile device.”

Ex. 1009, 178-79. The Applicant did not dispute these findings, but rather distinguished the claims of the ’659 patent on other grounds. *Id.*, 511-12.

90. Accordingly, in my opinion, *Zaid* discloses the preamble of claim 1.

1[a]: “electronics of the vehicle;”

91. *Zaid*’s vehicle includes electronics, e.g., a microprocessor 224 and memory 226, in the vehicle access kit 200. *Zaid*, ¶¶ [0100]-[0101], Fig. 2; *see also id.*, ¶ [0083]. The microprocessor 206 utilizes memory 226 to “store various computer instructions to be executed by the microprocessor[.]” *Id.*, ¶ [0101]. The vehicle access kit, containing the microprocessor and memory, is “coupled to the vehicle[.]” *Id.*, [0083]. Therefore, the microprocessor and memory are “electronics of the vehicle.” *Id.*, ¶ [0083].

92. Accordingly, in my opinion, *Zaid* discloses this limitation of claim 1.

1[b]: “a subsystem of the vehicle for enabling unlocking of the vehicle, the subsystem being interfaced with the electronics;”

93. *Zaid*’s vehicle includes part of an electronic control unit 308, which enables the vehicle actuators 310 that unlock the vehicle. *Zaid*, ¶ [0123], Fig. 3. *Zaid* provides a definition of ECU “Electronic Control Unit” as “any embedded system that controls one or more subsystems in a motor vehicle. Modern motor vehicles

have up to 80 ECU's and often the [sic] collectively referred to as the ECU.” *Id.*, ¶ [0035]. The component of the ECU 308 which enables unlocking is the claimed unlocking “subsystem” in limitation 1[b].

94. ECU 308 interfaces with the vehicle access kit 302, including the microprocessor 224 and memory 226, via a vehicle bus 306 and adapter 304. *Id.*, Fig. 3. *Zaid* discloses that microprocessor 224 “accepts commands (e.g., unlock doors, start engine, and/or other commands) . . . and instructs the vehicle bus to actuate the corresponding car function.” *Id.*, ¶ [0100]. *Zaid* discloses that the vehicle bus used to interface between the microprocessor and other vehicle components is typically a CAN-bus or LIN-bus. *Id.*, ¶¶ [0037]-[0038], [0046] (describing “central ECU” and “door lock[s]” as being controlled via the LIN bus interface).

95. *Zaid* also discloses that “[h]ardware components commonly installed in a vehicle, generally includ[e] . . . [a] hardware interface to the vehicle control bus and primary ECU for . . . trigger[ing] vehicle actuators (e.g., Door locks). This typically leverages SAE standards such as CAN-bus and/or LIN-bus.” *Id.*, ¶¶ [0058], [0062].

96. Accordingly, in my opinion, *Zaid* discloses this limitation of claim 1.

1[c]: “a subsystem of the vehicle for enabling starting of the vehicle for use of the vehicle; and”

97. *Zaid*'s vehicle includes a vehicle access control component 206 for enabling starting the vehicle for use. The vehicle access control component 206 "includes a physical adaptor connected to the vehicle bus of a vehicle so that it is capable of actuating car functions (e.g., unlock doors, *start engine*).” *Zaid*, ¶ [0091], Fig. 2.

98. Accordingly, in my opinion, *Zaid* discloses this limitation of claim 1.

1[d]: “communications circuitry of the vehicle interfaced with electronics of the vehicle, the communications circuitry being programmable to communicate with the server of the cloud system and communicate with a mobile device;”

99. *Zaid* discloses communications circuitry including a wireless device communication interface 202 in the vehicle access kit, which is interfaced with the microprocessor 224 and memory 226.

100. *Zaid* discloses that the “microprocessor 224 unit (MPU) [is] connected to [interfaced with] the vehicle bus adapter and the short-range wireless link [the communications interface 202].” *Zaid*, ¶ [0100].

101. The communication interface 202 is programmable to (1) communicate with the server of the cloud system and (2) communicate with a mobile device. The communication interface 202 communicates with the “central server [] sitting on [the] data network” (the server of the cloud system) and a “wireless communication device” (a mobile device). *Zaid*, ¶¶ [0076], [0099], [0125]-[0126], [0130]. The

communications interface 202 receives a vehicle reservation from a central server.

Id., ¶¶ [0126]-[0128] (“a central server . . . communicates the vehicle reservation to a wireless communication device. . . . [then] the reservation is forwarded from the wireless communication device to the vehicle access kit.”). The communications interface 202 also “includes a short-range wireless interface (e.g., Bluetooth and/or WiFi) for two-way communication” with the wireless communication device. *Zaid*, ¶ [0087]. The communications interface 202 is programmed with the pairing (Bluetooth) or network details (Wi-Fi) to connect, illustrating that it is *programmable*.

102. *Zaid*’s central server communicates the reservation over a “network” illustrated as a cloud system in Fig. 1. *Id.*, ¶ [0126]. Further, *Zaid* explains that the invention can be implemented as a “computer program product embodied on a computer readable storage medium.” *Id.*, ¶ [0013]. Therefore, communication interface 202 contains communications circuitry programmable to communicate with the server of a cloud system (e.g., the “network”) and communicate with a mobile device (e.g., wireless communication device 106).

103. As additional examples of communication between the vehicle and the mobile device, the communication device 202 receives commands communicated from a mobile device to the vehicle (*Id.*, ¶ [0124]) and sends symmetric keys from the vehicle to the mobile device (*Id.*, ¶ [0129]).

104. Although not required by the claim, the communication interface 202 also can communicate *directly* between the vehicle and the cloud server, without an intermediary mobile device. *See, e.g., id.*, ¶ [0106] (“the vehicle access kit additionally includes a long-range mobile communication radio . . . for wireless communication to a vehicle reservation or sharing system [the server].”). A person of ordinary skill in the art would have understood that the vehicle access kit’s long-range cellular radio can enable communications with the server for communicating vehicle reservations, vehicle usage data, or security keys through server updates, as described throughout *Zaid*. *See Zaid*, [0081] (“new private key” via server update), [0095], [0099] (“vehicle usage data” sent to central server), [0130] (“access control information” sent to and from server), claim 20. Incorporating cellular radios into vehicles for communication with cloud services was well known in the art by at least October 2002, as evidenced by Ex. 1018. *See Ex. 1018* at 4 (“an embedded transceiver is used to communicate wirelessly with the service center delivery gateway” (cloud services)), 4 (“The telematics unit is the central component of the telematics systems and . . . consists of a microcontroller, **wireless cellular transceiver(s)**. . . .”), 4 (“The embedded transceivers can be used for . . . **unlocking doors**”). A person of ordinary skill in the art would have interpreted *Zaid*’s disclosures of an in-vehicle cellular radio and server-vehicle communication in view of this knowledge.

105. To the extent Patent Owner argues that the claim requires direct communication between the vehicle and the server and that *Zaid's* disclosures of vehicle-mobile device and vehicle-server communications are provided in different embodiments, it would have been obvious to a person of ordinary skill in the art to combine these embodiments to arrive at the claimed limitation. Specifically, in my opinion, it would have been obvious to a person of ordinary skill in the art in 2013 to combine *Zaid's* method of communicating the vehicle reservation to the vehicle via the wireless communication device with *Zaid's* method of updating the private key at the vehicle via an update transmitted from the server directly to the vehicle, in which case the short-range wireless link and the long-range mobile communication radio would together constitute the claimed communications circuitry. In such a combination, the server would maintain control over the reservation authentication process and has added flexibility to use the wireless communication device to route data to the vehicle. As *Zaid* notes, “cellular and satellite communication service fees can be expensive,” *Zaid*, ¶ [0016], so by including both direct-to-server communications alongside communications that rely on the user’s separately-paid-for mobile device, the vehicle designer optimizes connectivity while minimizing cost. *See also* Ex. 1018, 11 (“On vehicles equipped with both WAN and WLAN technologies, portable devices with complementary technology could be configured to choose how to interact with the vehicle in the

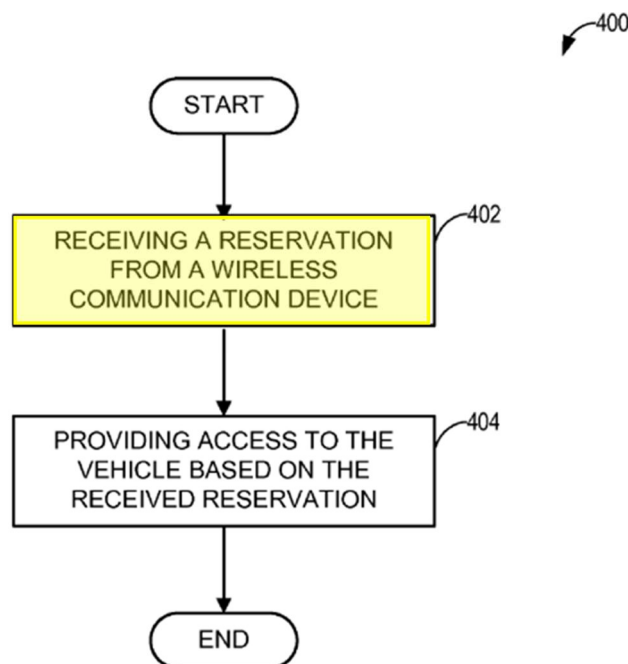
most efficient manner.”). Reliability and redundancy would have been important considerations in the design of a vehicle-based system since vehicles have access to different levels of connectivity based on their changing location. Reliability is improved since direct-to-server communication does not rely on the user’s mobile device to connect, avoiding the possibility of power or service interruptions from the mobile device.

106. This combination would have been nothing more than an obvious design choice, since providing multiple pathways for communication with the vehicle would have provided added reliability and redundancy, improving the user experience. A person of ordinary skill in the art would have had a reasonable expectation of success in the combination given that, as the ’026 patent acknowledges, communications between a vehicle and a server, whether or not using an intervening mobile device were well established and common place by 2013. *See* ’026 Patent, 2:2-4, *Zaid* [0106]. A person of ordinary skill at the relevant time would have easily combined *Zaid*’s server update method with *Zaid*’s method of conveying a reservation to the vehicle via the wireless communication device. Accordingly, a person of ordinary skill in the art at the relevant time would have been motivated to make this combination to improve communication reliability with the vehicle rental system. *See Zaid*, ¶ [0130]).

107. Accordingly, in my opinion, *Zaid* discloses or renders obvious this limitation of claim 1.

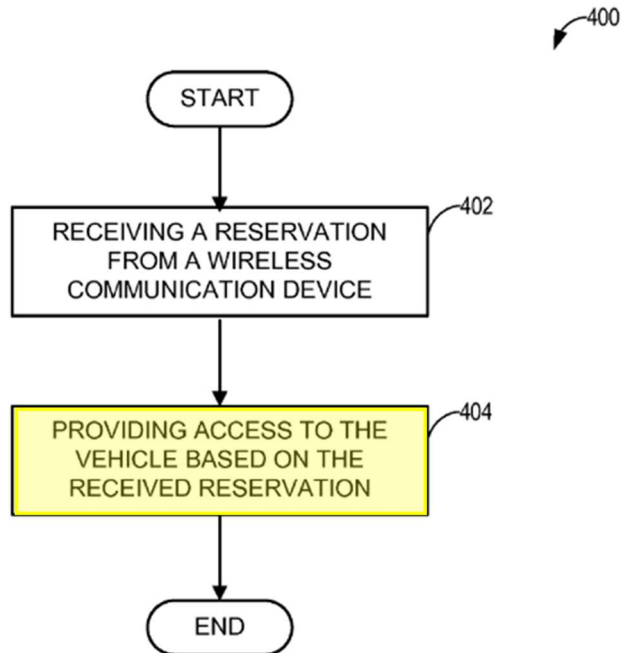
1[e]: “wherein the communications circuitry of the vehicle is configured to receive a request from the mobile device for unlocking of the vehicle,

108. *Zaid*’s vehicle access kit receives requests for unlocking of the vehicle. These are referred to as “vehicle reservations,” which are sent from the user’s “wireless communication device,” the claimed “mobile device,” and provide access to the vehicle via unlocking. *Zaid*, ¶¶ [0067] (“access to the vehicle is provided when a vehicle reservation is received from the wireless communication device”), [0124], Fig. 4 (reproduced below), Fig. 6.



Zaid, Fig. 4 (annotated).

109. *Zaid*'s vehicle reservation includes a time period during which a user is authorized to unlock a vehicle. During this predetermined time period, the user is granted access to the vehicle by unlocking the vehicle doors. *See id.*, ¶ [0069] (“the vehicle reservation includes a reservation for a specified time period.”); *see also id.*, ¶¶ [0124], [0129] (“granting access includes opening the vehicle door”), *see also id.*, [0090] (“a vehicle access control component 206 [] provides access to the vehicle by for example unlocking the vehicle door”), Fig. 4 (reproduced below), Fig. 6.



Zaid, Fig. 4 (annotated).

110. Therefore, *Zaid*'s communications circuitry receives requests from the mobile device for unlocking of the vehicle.

111. Accordingly, in my opinion, *Zaid* discloses this limitation of claim 1.

1[f]: the request from the mobile device including a unique access code obtained by the mobile device from the server to enable sending the request to the vehicle,”

112. *Zaid*’s “vehicle reservation” is a request from the mobile device. *Id.* The vehicle reservation can include “a unique increment.” *Zaid*, ¶¶ [0081], [0130], claims 21-22. Like the “unique access code” in the ’026 patent specification, which is disclosed in one embodiment as including an “incremental number” generated by a “incremental number generator” at the server, ’026 Patent, 45:53-54, the unique increment in *Zaid* is a unique access code obtained by the mobile device from the server to enable sending the request to the vehicle. *Id.*

113. As described in limitations 1[d] and 1[e] above, the vehicle reservation and its associated unique increment is sent from the server to the wireless communication device and onwards to the vehicle. *Zaid*, ¶¶ [0080] (“The vehicle reservation is booked at the server[.]”), [0126] (“a central server . . . communicates the vehicle reservation to a wireless communication device”), [0128] (“the reservation is forwarded from the wireless communication device to the vehicle access kit”). Upon receipt and decryption, vehicle access is granted. *See id.*, ¶ [0129]. Thus, the request from the mobile device includes a unique access code obtained from the server to enable sending the access request to the vehicle.

114. *Zaid*'s encrypted vehicle reservation also meets this limitation.

Specifically, *Zaid* discloses an encrypted vehicle reservation having a unique increment, which is sent to the wireless communication device to enable access to the vehicle. *Zaid*, ¶¶ [0125] (“At 504, the vehicle reservation is encrypted.”), [0126] (“At 506, the vehicle reservation is communicated to a wireless communication device of the user.”), [0130] (“each message for exchanging information such as a vehicle reservation and updates includes a unique increment.”). A person of ordinary skill in the art at the relevant time would have recognized that encryption of the vehicle reservation would result in the creation of a unique code representing the vehicle reservation data. *See Zaid*, [0065-66].

115. It would have been well known to a person of ordinary skill in the art that commonplace encryption methods involve converting a plain message, via an encryption algorithm, into a ‘secret code’ that can be decrypted and read by a recipient. *See Ex. 1019*, 5 (“We use the terms *secret code* and *cipher* interchangeably to mean any method of encrypting data.”) (emphasis original). A POSITA would understand that the “secret code” is “unique” to the reservation request because the corresponding decryption algorithm must be able to decrypt the secret code to its original form. *Id.*

116. With this understanding, a person of ordinary skill in the art would have viewed encryption as a process for generating a unique access code. *Id. Zaid's*

encrypted vehicle reservation further provides access to the vehicle. *Zaid*, ¶ [0129]

(“At 602, vehicle reservation is received from a wireless communication device. In various embodiments, the vehicle reservation is decrypted and authenticated at the vehicle access control system. At 604, vehicle access is granted.”).

117. *Zaid*’s encrypted vehicle reservation also falls squarely within the ’026 Patent’s description. *See* ’026 Patent, 45:51-55 (“The unique access code can be generated by . . . any other generation device that can generate codes that are unique or substantially unique.”), 45:56 (“the access code is encrypted”), 46:26-29 (“Cloud services 120 can generate the unique access code which is then encrypted in a message and sent as encrypted e-keys 720 to the recipient, Bob, who receives it via device 704.”).

118. Accordingly, in my opinion, *Zaid* discloses this limitation of claim 1.

1[g]: “wherein the unique access code is associated with privileges for use of the vehicle, the privileges are defined for the unique access code,”

119. The unique access code in *Zaid* is associated with privileges to (1) access the vehicle for a period of time (unlock the vehicle doors) and (2) use the vehicle for a period of time (start the vehicle). *Zaid*, ¶¶ [0069] (“the vehicle reservation includes a reservation for a specified time period.”), [0131] (“the vehicle reservation becomes invalid at the end of the vehicle reservation period”), Fig. 6, claims 2, 3, 18, 42. *Zaid* explains that access to the vehicle and use of the vehicle

may be provided for the specified time period by allowing for “unlocking [of] the vehicle door and/or allowing for starting of the vehicle engine.” *Id.*, ¶ [0090]. Reserving a different vehicle for a different time would cause a vehicle reservation with a different unique access code (unique increment or encrypted vehicle reservation), corresponding to different privileges to (1) access the vehicle for a period of time and (2) use the vehicle for a period of time, to be transmitted to the vehicle. *Id.*, ¶ [0069] (“In various embodiments, ***the vehicle reservation includes a reservation time slot and vehicle identifier*** identifying the vehicle.”); *see also id.*, ¶ [0130] (emphasizing the importance of “the ***uniqueness*** of [each vehicle reservation] message to avoid a repeat message attack”). Each encrypted vehicle reservation in *Zaid* has a unique access code associated with it, defining privileges to (1) access the vehicle for a specified time period and (2) use the vehicle for a specified time period. *Id.* (“each message for exchanging information ***such as vehicle reservation*** [comprising time-limited access and use privileges] and updates ***include a unique increment*** for each message to avoid repeat message attack. . . . the unique increment may . . . ***indicate the uniqueness of the message***”). Therefore, the unique access code is associated with privileges of use for the vehicle, and the privileges are defined for the unique access code.

120. *Zaid*’s privileges of (1) “access” (unlocking doors) during the specified time period and (2) “use” (starting) during the specified time period are synonymous

to the “privileges” described in the ’026 Patent. Specifically, the ’026 Patent specifies that “the privilege settings defin[e] *types of functional access* of the vehicle, *expiration data for the access code*” (’026 Patent, 7:15-17) and “the privilege settings include a time code *defining a length of during which the e-keys will remain active*” (’026 Patent, 7:32-34). *See also* ’026 Patent, 5:56-67 (“privileges (e.g., what type of access . . . amount of time the e-keys will be valid (or else expire)”), 10:31-33, 36:49-50, 48:37-40, claim 7.

121. Accordingly, in my opinion, *Zaid* discloses this limitation of claim 1.

1[h]: the vehicle is configured to receive information from the server to authenticate the request by the mobile device,

122. *Zaid*’s vehicle receives encryption/decryption information, namely a security key, from the server to authenticate requests from the mobile device. Specifically, the vehicle access kit receives a private key from the server, which is used by the vehicle access kit to decrypt and thereby authenticate the vehicle reservation. *Zaid*, ¶ [0081] (“the vehicle access control system (e.g., vehicle access control component) is configured to receive a server update . . . [which] includes a new private key to the vehicle access control system.”). *Zaid* utilizes these private keys from the server explicitly to “authenticate” the reservation. *Id.*, ¶ [0126] (“decryption is used to ensure and *authenticate* that the intended wireless communication device is receiving the vehicle reservation rather than one that

intercepts the vehicle reservation”). Therefore, *Zaid* receives information from the server, an updated private key, to authenticate requests from a mobile device.

123. To the extent Patent Owner argues that the information must be received *directly* from the server, and not via an intervening wireless communication device, I note that such a limitation is not required by the plain language of the claim. Moreover, even if *direct* receipt were required, it would have been obvious to a person of ordinary skill in the art to implement *Zaid* in a manner such that the private key is transmitted directly from server to vehicle. *Zaid* already discloses that “as a backup” the vehicle may “additionally include[] a long-range mobile communication radio/interface, such as GSM radio, which can be used for wireless communication to a vehicle reservation or sharing system.” *Id.*, ¶ [0106]. In such an implementation, *Zaid*’s communication circuitry would be the combination of the wireless device communication interface and the long-range mobile communication radio. A person of ordinary skill in the art would recognize that “wireless communication” would have included transmitting the private key used for authentication directly from the server when data tethering was unavailable.

124. Utilizing the mobile communication radio for direct receipt of authentication information would have had the benefit of improving security by, for example, eliminating the risk of decryption key theft from the intervening wireless communication device. *See* Ex. 1018, 5 (“An embedded phone system is a

requirement for OEMs heavily focused on safety and security applications”), 6 (describing that, as compared to an embedded cellular radio, “portable phone [tethering] is [] a poor conduit for safety and security applications.”). A person of ordinary skill in the art would understand that the number of devices with access to a symmetric or private decryption key should be kept to a minimum. This combination would allow the server to routinely update the vehicle’s private key and prevent bad actors from exploiting a key routed through mobile device.

125. This implementation would further provide flexibility in how the vehicle receives information. Incorporating the long-range mobile communication radio disclosed in *Zaid* within *Zaid*’s communications circuitry would have increased robustness of the system by providing an alternate path for vehicle-server communications. For example, a person of ordinary skill in the art would have recognized that data tethering via a user’s wireless communication device could be interrupted by, e.g., data caps and roaming, or intentionally disconnected by a bad actor, e.g., a car thief, to disable vehicle location tracking.

126. A person of ordinary skill in the art would have understood the benefits and tradeoffs of the design choice and the implementation of the additional feature would have predictable. This is evident from *Zaid*’s disclosure itself, which, acknowledging the tradeoffs of incorporating a long-range mobile communications radio, still opted to include the long-range mobile communications radio as an

additional feature in view of the benefits, e.g., for vehicle-server communication “in the event tethered long-range wireless communication through a tethered device is not possible (e.g., software/hardware incompatibility) or currently unavailable.” *Zaid*, [0106].

127. To the extent this is considered an alternative embodiment, in my opinion, a person of ordinary skill in the art would have had a reasonable expectation of success in utilizing the mobile communication radio for direct receipt of authentication information from the server, since the vehicle is already provided with a long-range communication device, so it already has all necessary hardware to communicate directly with the server—and as explained above, it does in fact communicate directly with the server. *Zaid*, [0106]. Additional programming is all that would have been required to directly receive the server update. A person of ordinary skill in the art at the relevant time would have easily configured *Zaid*’s server update to communicate directly with the vehicle. Accordingly, a person of ordinary skill in the art at the relevant time would have been motivated to make this combination to improve security of the vehicle rental system.” *See Zaid*, ¶ [0130]).

128. Accordingly, in my opinion, *Zaid* discloses or renders obvious this limitation of claim 1.

1[i]: and if the request is authentic, and² the mobile device is provided with data to enable an electronic key to use the vehicle and the electronics of the vehicle instructs the subsystem of the vehicle to enable unlocking of the vehicle and enable starting of the vehicle for use of the vehicle via the electronic key consistent with the privileges of the unique access code.”

129. *Zaid* discloses that, if the vehicle reservation is authentic, the wireless communication device is provided with a symmetric key for unlocking and starting the vehicle, consistent with the time period of the reservation.

130. First, *Zaid* discloses that the authenticity of the vehicle reservation is confirmed by decrypting the vehicle reservation using the private key of the vehicle, as described in limitation 1[h]. *Zaid*, ¶¶ [0065-66], [0070], [0099], [0125-26], [0128], [0133], Fig. 5, claims 10-13.

131. Second, if the request is authentic, the mobile device receives a symmetric key. *Id.*, ¶ [0129] (“the vehicle access control system grants vehicle access by sending a symmetric key back to the wireless communication device”).

² Applicant amended this claim limitation on July 19, 2019, by removing the “and” immediately preceding “the mobile device.” This amendment is not reflected in the issued claims, however. Regardless, *Zaid* discloses this limitation with or without the “and”.

The symmetric key is data provided to the mobile device to enable the mobile device with the vehicle reservation (an electronic key) to use the vehicle. *Id.* (“granting access includes opening the vehicle door, and/or allowing engine to be turned on by user”).

132. Third, use of the vehicle includes the microprocessor instructing the locking component of the ECU to enable unlocking, via the unlocking actuator, and instructing the engine starting component, via the starting actuator, of the vehicle access kit 200 to enable starting of the vehicle. *Id.*, ¶ [0100] (“If authenticated, [the microprocessor 224] accepts commands (e.g., unlock doors, start engine, and/or other commands) from wireless communication device . . . and instructs the vehicle bus to actuate the corresponding car function.”). These commands from the mobile device illustrate the enabled electronic key being used to unlock the vehicle and start the vehicle.

133. And fourth, use of the electronic key in *Zaid* is limited by the time period of the unique access code. When the time period expires, the privileges for access to and use of the vehicle are withdrawn, and the user will be unable to unlock or start the vehicle. *See Zaid*, ¶ [0131]. Thus, use of the vehicle via the electronic key is consistent with the privileges of the unique access code.

134. Accordingly, in my opinion, *Zaid* discloses this limitation of claim 1.

2. Claim 2

2[a]: “The vehicle of claim 1, wherein the communications circuitry of the vehicle is configured to receive one or more additional requests from other mobile devices to use the vehicle,”

135. *Zaid* discloses that the communications interface 202 in the vehicle may receive additional vehicle reservations from other wireless communication devices. Specifically, *Zaid* discloses a vehicle *sharing* service where anyone can send requests from their mobile device to reserve a vehicle. *See, e.g., Zaid*, ¶¶ [0077] (system permits “retrieving a list of nearby vehicles available for sharing”), [0016], [0095] (vehicle monitored “during *one or more reservations*”), [0134] (“*all the drivers* of a particular vehicle”), claim 34 (“one *or more* vehicle users”).

136. One or more users of the car sharing service would, using their respective wireless communication devices, book one or more vehicle reservations at the central server, which would be transmitted to the communication interface 202 as discussed above in limitation 1[e]. The would be clear to a person of ordinary skill in the art from the context of *Zaid*’s vehicle sharing service.

137. Accordingly, in my opinion, *Zaid* discloses this additional limitation of claim 2.

2[b]: “each request is associated with a unique access code generated by the server, such that each unique access code is associated with a user account having respective privileges assigned by an administrator of the vehicle that enables assigning of electronic keys to use the vehicle.”

138. As discussed above for limitations 1[f] and 1[g], each vehicle reservation in *Zaid* is associated with a unique access code generated by the server and in turn is associated with privileges for vehicle access and use during a specific time period.

139. *Zaid* also discloses that each vehicle reservation is associated with a user account, which can have privileges assigned to it by a vehicle administrator to enable assigning electronic keys to the vehicle. Specifically, *Zaid* teaches that reservations can be “booked through one or more social networking websites, such as FourSquare® and Facebook®.” *Zaid*, ¶ [0072]. On the social media sites, the user “***must first log into the social networking website***,” which connects the user to a user account and then requests a vehicle reservation. *Id.* *Zaid* tracks the “driving history” and “reputation” of the user, illustrating that the vehicle reservation and unique access code are associated with a user account. *Id.* The user tracking allows for the vehicle owner to “have better control over the type of user the owner is lending/sharing/renting vehicle to.” *Id.* A person of ordinary skill in the art would have understood that, to enable tracking of renter usage via the vehicle reservation, the vehicle reservation must be associated with the renter’s account. By providing a method for making reservations through a social media account, *Zaid* discloses a simple technique for associating the vehicle reservation and unique access code with a renter account. *Id.*

140. Finally, *Zaid* teaches that the vehicle owner or administrator assigns the privileges by defining the times that the system can assign electronic keys for the vehicle. *Zaid*, ¶ [0077] (owner can “advertise or announce when the vehicle will be available for sharing. . .”). *Zaid*’s reservation system also “allows a vehicle user and owner to dynamically send out a vehicle request and/or update the server(s) (e.g., online vehicle reservation system) of various vehicle related information such as vehicle availability and vehicle location.” *Id.*, ¶ [0079]. The request sent by the owner would enable the requested duration for vehicle access and use.

141. Accordingly, in my opinion, *Zaid* discloses this additional limitation of claim 2.

3. Claim 3

“The vehicle of claim 2, wherein said vehicle is a shared vehicle.”

142. *Zaid* discloses that the vehicle can be a shared vehicle. *See, e.g., Zaid*, ¶¶ [0016] (“Therefore, an improved way for providing *car sharing services* is needed.”), [0095] (“one *or more* reservations”), claim 34 (“one *or more* vehicle users”), [0069] (“the vehicle reservation includes a vehicle rental reservation.”), [0077] (system permits owner to “advertise or announce when the vehicle will be available for sharing”).

143. Accordingly, in my opinion, *Zaid* discloses the additional limitations of claim 3.

4. Claim 4

“The vehicle of claim 1, wherein said vehicle is identified as available for sharing and said vehicle is capable of being located based on a geographic location of the vehicle.”

144. *Zaid*’s vehicle can be advertised as available for sharing and is capable of being located based on its geographic location. Specifically, *Zaid* discloses an application on a mobile device for viewing which vehicles are available and where they are located. *Zaid*, ¶ [0077] (“[T]he wireless communication device includes a vehicle reservation application or other software function (e.g., an iPhone or Droid application) that enables a vehicle user (e.g., renter and owner) to communicate with backend server(s) (e.g., an online vehicle reservation system) to (a) ***advertise or announce the location of the vehicle***, . . . (c) ***advertise or announce when the vehicle will be available for sharing***, . . . and/or (d) retrieving a list of nearby vehicles ***available for sharing*** . . .” As such, *Zaid* discloses that a user may “retriev[e] a list of nearby vehicles available for sharing,” including the location of the vehicle. *Id.*

145. Accordingly, in my opinion, *Zaid* discloses the additional limitations of claim 4.

5. Claim 5

“The vehicle of claim 1, wherein an application accessed by said mobile device is configured to enable finding a geo-location of said vehicle and enables requesting use of said vehicle.”

146. *Zaid* discloses a vehicle reservation application on the mobile device can be used to locate and request use of a shared vehicle.

147. First, the vehicle reservation application “enables a vehicle user . . . [to] advertise or announce the location of the vehicle.” *Zaid*, ¶ [0077]. Using this information, the prospective renter may “retriev[e] a list of nearby vehicles available for sharing.” *Id.*; *see also* claim 31 (“a central server configured to advertise a vehicle reservation using a social network site, wherein the advertised vehicle reservation includes geolocation information”).

148. Second, the user can request use of the vehicle via their wireless communication device. *Zaid*, ¶ [0125] (“At 502, a vehicle reservation is booked. In various embodiments, ***the vehicle reservation is booked by a user at a central server via a user interface*** displayed on a computing device. . . . In various embodiments, the computing device is ***the same wireless communication device the reservation is sent to.***”).

149. It would have been obvious to a person of ordinary skill in the art at the relevant time to implement *Zaid*’s vehicle reservation application in a manner that

enables both geolocation (*Id.*, ¶ [0077]) and requesting use of the vehicle (*Id.*, ¶ [0125]) such that users only need to install one application. A person of ordinary skill in the art at the relevant time would have been motivated to make this combination to simplify access to the shared vehicles via simplification of the user experience. *See Zaid*, ¶¶ [0077], [0125]). This straightforward implementation would simplify the user experience and would have been desirable to minimize user downloads and user confusion and maximize ease of use by providing the ability to locate and reserve a vehicle in a single application.

150. Integrating these functions into a single application would have been nothing more than a simple design choice with predictable results. For example, similar iOS applications already existed years before the effective filing date of the '026 Patent. *See, e.g.*, Ex. 10X25 (illustrating a geo-location feature within the Mercedes-Benz mbrace e-key application)

iPhone Screenshots



Ex. 1025 at 2.

151. A person of ordinary skill in the art at the relevant time would have easily implemented *Zaid*'s application for "advertis[ing] or announc[ing] the location of the vehicle" such that the prospective renter may "retriev[e] a list of nearby vehicles available for sharing" with the functionality of *Zaid*'s application for requesting use of a vehicle. A person of ordinary skill in the art would have further had a reasonable expectation of success in doing so since the ability to locate and the ability to reserve are already provided for in *Zaid* as functionalities available

via the mobile device; combining such functionalities into one application would not have changed how they are programmed or operated.

152. Accordingly, in my opinion, *Zaid* discloses or renders obvious the additional limitations of claim 5.

6. Claim 6

6[a]: “The vehicle of claim 1, wherein an application accessed by said mobile device is configured to enable sending instructions to said server to share the vehicle with a user to enable use of the electronic key on said vehicle,”

153. *Zaid*’s vehicle reservation application is configured to enable sending instructions to the central server to share the vehicle with a user to enable use of the electronic key on said vehicle. Specifically, the vehicle reservation application enables “communicat[ion] with backend server(s)” to permit vehicle “sharing.” *Zaid*, ¶ [0077]. The vehicle reservation is “booked at the server 110 via a user interface” and then the vehicle reservation is sent to the vehicle, via the mobile device, for providing access and usage of the vehicle via an electronic key. *Id.*, ¶ [0080].

154. Accordingly, in my opinion, *Zaid* discloses this limitation of claim 6.

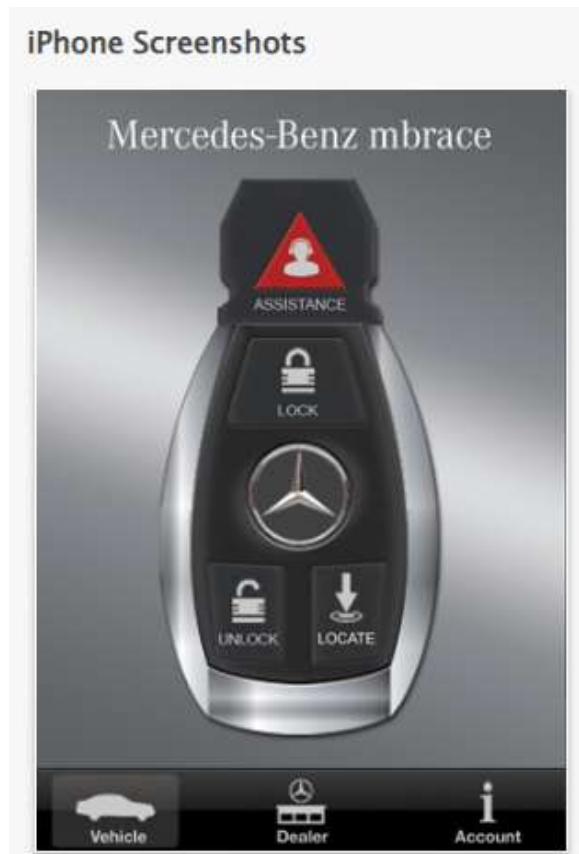
6[b]: “wherein the electronic key has functions enabled via graphical user interfaces of the application of the mobile device.”

155. *Zaid*'s vehicle reservation application includes "user interfaces" for booking a vehicle reservation. *Zaid*, ¶¶ [0072], [0080], [0125]. *Zaid* discloses that the reservation is booked "at the server 110 via a user interface 116 displayed on a computing device 118," and *Zaid* also discloses that "[i]n various embodiments, the computing device 118 is the same wireless computing device 108 used by a user to access the vehicle [the user's mobile device]." *Id.*, ¶ [0080]. *Zaid* discloses that the mobile device generally includes "a rich visual interface" (*id.*, ¶ [0026]), which provides the graphical user interfaces for booking vehicle reservations via "social networking websites, such as FourSquare® and Facebook®" (*id.*, ¶ [0072]), each comprising a graphical user interface. Thus, *Zaid* discloses user interfaces on the mobile device that enable the electronic key functionality.

156. *Zaid* further discloses that the electronic key can unlock the vehicle via commands sent from the mobile device. *Id.*, ¶ [0124] ("[O]nce vehicle access is provided, the user can send commands from the wireless communication device to . . . open the vehicle door, turn on the engine, and/or otherwise allow the user to use the vehicle."). A person of ordinary skill in the art would have understood that, by providing the user with the ability to reserve the vehicle using the mobile application and send commands from the wireless communication device, *Zaid* teaches enabling functionality in the vehicle reservation application to use the electronic key once vehicle access is granted. Therefore, *Zaid* discloses that graphical user interfaces of

an application on the mobile device are used to enable functions of the electronic key.

157. To the extent Patent Owner argues that *Zaid* does not explicitly disclose that user interfaces displayed on the user's mobile device via the vehicle reservation application are "graphical," a person of ordinary skill in the art at the relevant time would have interpreted *Zaid*'s vehicle reservation application such that the application incorporates graphical windows for controlling functions of the vehicle, rather than using a command line interface or otherwise. Specifically, a person of ordinary skill in the art at the relevant time would have been well aware of graphical mobile application design and development propagated by Apple and Google as early as 2007. *Id.* Indeed, with the introduction of smart phones from Apple and Google, which became ubiquitous quickly, the predominate interface type by far was graphical in nature. Some of the earliest mobile device applications concerned graphical user interfaces for making reservations, as evidenced by Ex. 1020. Further, applications for graphically enabling electronic key functions on mobile devices were well established, such as the Mercedes mbrace app, as evidenced by Ex. 1026, which shows a graphical user interface on an iPhone for unlocking a vehicle via an electronic key.



Ex. 1026 at 2.

158. *See also* Ex. 1018, 11 at Figure 7 (illustrating an early graphical user interface, circa 2002, for enabling electronic key functions via a mobile device, including “unlock doors.”). It would have been obvious to a person of ordinary skill in the art at the relevant time to implement *Zaid*’s user interfaces graphically, and it would have been necessary to for *Zaid*’s application to operate in the mobile application environment at the time. *See Zaid*, [0077] (“e.g., an iPhone or Droid application”). In my opinion, a person of ordinary skill in the art would have had a reasonable expectation of success in doing so since mobile device applications with

graphical user interfaces, and keyless entry systems, were well known by 2013. *See Zaid*, ¶¶ [0026], [0051]. Providing access to the electronic key via a *graphical* user interface, as opposed to any other interface, would require no more than a typical smart phone application coupled to existing keyless entry technologies.

159. Accordingly, in my opinion, *Zaid* discloses or renders obvious this additional limitation of claim 6.

7. Claim 7

“The vehicle of claim 1, wherein said privileges associated with the unique access code define a period of time for use of said vehicle.”

160. *Zaid* discloses privileges to (1) access the vehicle during a “specified time period” and (2) use the vehicle during a “specified time period.” These privileges are defined by the vehicle reservation and thus associated with *Zaid*’s unique increment in the encrypted vehicle reservation. *Zaid*, ¶¶ [0069] (“the vehicle reservation includes *a reservation for a specified time period. . .*”), [0129], [0131], Fig. 6, claims 2, 3, 18, 42.

161. Accordingly, in my opinion, *Zaid* discloses the additional limitations of claim 7.

8. Claim 11

“The vehicle of claim 1, wherein said privileges associated with the unique access code define constraints for use of the vehicle, and said constraints

include one or more of geographic restrictions, age restrictions, time of day restrictions, speed restrictions, or combinations thereof.”

162. *Zaid* discloses privileges to (1) access the vehicle during a specified time period and (2) use the vehicle during a specified time period. These privileges define constraints for use of the vehicle in the form of the “specified time period” of *Zaid*’s vehicle reservation, which is associated with the unique increment in the encrypted vehicle reservation. *Zaid*, ¶ [0069].

163. To the extent it is argued that the specified time period is not a time of day restriction, it would have been obvious to a person of ordinary skill in the art at the relevant time to configure *Zaid*’s vehicle reservation time period such that the privileges to access and use the vehicle during a specified time period are only available during daylight hours, a “time of day,” or to only particular ages of drivers. A person of ordinary skill in the art at the relevant time would have been motivated to implement these typical rental restrictions in the reservation/rental application to provide rental restrictions typical in the industry.

164. For example, a person of ordinary skill in the art would be familiar with age restrictions in the vehicle rental business, so only drivers over the age of, for example, 21 or 25 may reserve vehicles. These are common rental car requirements and would have been obvious to anyone implementing a vehicle reservation system. *See* Ex. 1035. Further, time of day restrictions were common licensure requirements

for inexperienced drivers and drivers with medical conditions. *See* Ex. 1015 (explaining that drivers with medical conditions affecting vision are restricted to “[d]aylight driving only”), Ex. 1016 (“With your Learner's License, you may: [o]nly drive during daylight hours during the first three months and until 10 p.m. thereafter. . . .”). A person of ordinary skill in the art would also have known that the rate of serious accidents, and thus corresponding insurance costs, could be reduced by limiting driving at night. Ex. 1017 (“fatality rates have averaged 3.5 times higher at night than in daylight”). It therefore would have been obvious to anyone implementing a vehicle reservation system to optionally include these restrictions.

165. A person of ordinary skill in the art implementing such a system would have had a reasonable expectation of success in doing so since limitations to time-of-day or the age of the user are simply a subset or added layer on the existing time period limitations. Specifically, a person of ordinary skill in the art at the relevant time could have easily implemented *Zaid*'s vehicle reservation system such that a user may reserve the vehicle only from, for example, sunrise to sunset, a “time of day restriction.

166. Accordingly, in my opinion, *Zaid* discloses or renders obvious the additional limitations of claim 11.

9. Claim 12

“The vehicle of claim 1, wherein an application of the mobile device provides graphical user interfaces for use of the electronic key, and the application includes a reservation function for said vehicle.”

167. Claim 12 is very similar to claim 6, but further requires the application to include a reservation function. *Zaid*’s vehicle reservation application includes user interfaces for reserving a vehicle. *Zaid*, ¶¶ [0077] (“the wireless communication device includes ***a vehicle reservation application***”), *Id.*, [0125] (“*vehicle reservation* is booked by a user at a central server *via a user interface displayed on a computing device*. . . . the computing device [can be] the same wireless communication device the reservation is sent to.”).

168. As described for limitation 6[b], *Zaid* discloses that a user may also send commands with the electronic key (to “unlock [the vehicle] doors, start [the vehicle] engine”) via the wireless communication device and its reservation application. *Id.*, ¶¶ [0100], [0124], [0129].

169. To the extent that Patent Owner argues that *Zaid* does not explicitly disclose that the method for sending commands for use of the electronic key is implemented using “graphical user interfaces, it would have been obvious to a person of ordinary skill in the art at the relevant time to implement graphical user interfaces for the reasons discussed above in limitation 6[b].

170. Accordingly, in my opinion, *Zaid* discloses or renders obvious the additional limitations of claim 12.

10. Claim 14

“The vehicle of claim 1, wherein the electronics include decryption logic for decrypting data associated with the unique access code.”

171. *Zaid*’s microprocessor decrypts the received vehicle reservation “to verify [its] authenticity.” *Zaid*, ¶ [0128]. *Zaid* discloses that the microprocessor “includes proprietary firmware code [logic] that enables the system to authenticate nearby mobile handsets. . . [and i]f authenticated, it accepts commands, (e.g., unlock doors, start engine and/or other commands) from the wireless communication link . . . and instructs the vehicle bus to actuate the corresponding car function.” *Id.*, [0100]. Memory 226 stores “various instructions, codes, and data information” including “a locally stored private key” which is used in decryption. *Id.*, ¶ [0101]. The proprietary firmware code stored in memory 226 that enables authentication is decryption logic for decrypting data associated with the unique access code such as commands to unlock or start the vehicle in the limited time period. The electronics may also be considered to include the reservation authentication unit 216 which is also provided with the vehicle access kit 200 and may provide cryptography functionality. *See Zaid*, Fig. 2, ¶ [0096].

172. The vehicle reservation is decrypted with the data such as the vehicle identifier, time of use, and mobile device identification that is associated with the unique access code. *Id.*, ¶ [0069].

173. Accordingly, in my opinion, *Zaid* discloses the additional limitations of claim 14.

11. Claim 18

“The vehicle of claim 1, wherein the mobile device is one of a smartphone, or a smartwatch, or smart glasses, or a computer, or a digital assistant.”

174. *Zaid* discloses that the wireless communication device can be “any suitable wireless communication device that supports long-range wireless connectivity. . . . Examples of which include a *smart phone*, mobile handset, PDA, smartbook, netbook, and laptop.” *Zaid*, ¶ [0073].

175. Accordingly, in my opinion, *Zaid* discloses this additional limitation of claim 18.

12. Claim 19

“The vehicle of claim 1, wherein the access code for use of the vehicle is generated in response to a request to generate the electronic key for the mobile device, the mobile device being identified using information that includes one or more of an email address, a phone number, a text number, a message address, a notification, a link, a web address, a social network address, or a combination of two or more thereof.”

176. *Zaid* discloses that the access code for using the vehicle is generated in response to a request to generate the electronic key for the mobile device. Specifically, *Zaid*'s user utilizes the vehicle reservation application to request issuance of an encrypted vehicle reservation and associated unique increment, which are provided to the mobile device to enable the ability to access and use the vehicle. *Zaid*, ¶¶ [0077], [0081].

177. *Zaid* also discloses users logging in to social networking websites before making a reservation, and using this log in as a tracking mechanism to determine which users are using the shared vehicle. *Zaid*, ¶ [0072]. As such, the mobile device making the request is identified to the server using the user's social network address or an email address. In my opinion, a person of ordinary skill in the art at the relevant time would have been familiar with Facebook Login. It was well known that Facebook Login provides connected applications with identification of the Facebook user, including the user ID (i.e., a social network address) and, in some cases, the user's email address." *See* Exs. 1022, 1023, 1024.

178. As another example, *Zaid* discloses that the "identity of the wireless communication device is used to identify the driver . . ." *Zaid*, ¶ [0134]. A person of ordinary skill in the art would have appreciated that the identity of the wireless communication device would include information such as a phone number or email

address, so that the wireless communication device can be associated with a particular user. *See id.* at [0026].

179. Accordingly, in my opinion, *Zaid* discloses the additional limitations of claim 19.

13. Claim 20

“The vehicle of claim 1, wherein the privileges defines [sic] one of a geographic restriction for where the vehicle is allowed to be used, or a speed restriction, or an occupancy restriction, or a time frame of use restriction, or a time of day use restriction, or a time expiration of use restriction, or a combination of two or more thereof.”

180. *Zaid* discloses privileges to (1) access the vehicle during a specific time period and (2) use the vehicle during a specified time period. *Zaid*, ¶ [0069]. These are “time frame of use” and “time expiration of use” restrictions.

181. Accordingly, in my opinion, *Zaid* discloses the additional limitations of claim 20.

B. Ground 2: *Zaid* in view of *Patenaude* renders obvious claim 10

182. In my opinion, it would have been obvious to a person of ordinary skill in the art to combine *Zaid* with *Patenaude* (US Pat. Pub. No. 2006/0136106, Ex. 1007) to reach the limitations of claim 10.

183. *Patenaude* discloses a method for monitoring entertainment selections at a telematics unit, determining a user entertainment selection profile based on that

monitoring, and automatically activating entertainment units based on that monitoring. Ex. 1007 (*Patenaude*) at Abstract. *Patenaude* endeavors to “determine and predict entertainment selections,” in particular, by learning a user’s preferences and developing an “entertainment selection profile” for that user which can be stored remotely via a telematics unit in the vehicle. *Id.*, ¶¶ [0001], [0024].

184. As described below, it would have been obvious to combine *Zaid* with *Patenaude*, which discloses the limitations of claim 10.

1. Claim 10

10[preamble]: “The vehicle of claim 1, further comprising,”

10[a]: “the electronics receiving interface input data during use of the vehicle by a user via the electronic key,”

185. *Zaid* discloses that the microprocessor and memory receive data from various vehicle sensors during the use of the vehicle. *Zaid*, ¶¶ [0101] (memory for storing “data information”), [0123] (vehicle access kit, including processor and memory, receives vehicle sensor data from ECU and actuators). A person of ordinary skill in the art at the relevant time would have understood that the microprocessor and memory (the “electronics”) receive this data whenever the vehicle is operating, including during use of the vehicle by a user via the electronic key, as described in Ground 1. See Ground 1.

186. A person of ordinary skill in the art would have looked to analogous references for implementing the functionality of *Zaid*'s vehicle sharing service with a method for providing suggestions.

187. *Patenaude*'s disclosures are pertinent to the problem faced by the '026 patent inventor (i.e., utilizing remote connectivity to provide added functionality and improve user experience). For example, *Patenaude* describes efforts to overcome limitations in prior systems that could not utilize the telematics services to provide enhanced experiences via predicted entertainment selections. *Patenaude*, ¶¶ [0002]-[0005]. Similar efforts are described throughout the '026 Patent. See, e.g., '026 Patent at 2:2-5, 5:56-67, 9:56-60.

188. Further, the '026 Patent describes a system for sharing access to a vehicle via remote communication and for managing profiles of information related to vehicle users. See, e.g., '026 Patent (Ex. 1001) at 16:57-17:2. *Patenaude* describes a system for utilizing the same remote communication functionality and related user profiles for providing entertainment recommendations. See, e.g., *Patenaude*, ¶¶ [0005]-[0006].

189. *Patenaude* describes a “telematics unit 120” that communicates with “entertainment units 135, 136 and 137” such that “data is transmitted . . . to the telematics unit 120” “upon power-up of the entertainment units 135, 136 and 137.” *Patenaude*, ¶¶ [0038], [0042]-[0043]. *Patenaude*'s “data” includes “an

entertainment unit factor” which is interface input data. *Id.* Specifically, the “entertainment unit factor” includes radio inputs. *Id.*, ¶ [0052]. *Patenaude* further discloses a processor 122 and memory 128 within telematics unit 120, which are analogous to *Zaid*’s microprocessor 224 and memory 226 electronics. The memory 128 receives “entertainment unit factors and selection time factors[.]” *Id.*, ¶ [0055].

190. It would have been obvious to a person of ordinary skill in the art at the relevant time to combine the features of *Patenaude*, including receiving interface input data by the electronics, with the vehicle of *Zaid*, such that *Zaid*’s electronics and communications circuitry perform the functions of *Patenaude*’s telematics unit. In such a combination, *Zaid*’s microprocessor 224 and memory 226 would receive “entertainment unit factor[s]” (interface input data) from entertainment units 135, 136 and 137 installed within the shared vehicle. A person of ordinary skill in the art at the relevant time would have been motivated to make this combination to provide an additional functionality to *Zaid*’s vehicle sharing service, as is described in further detail below.

191. Accordingly, in my opinion, *Zaid* and *Patenaude* render obvious this limitation of claim 10.

10[b]: “the interface input data being examined to determine learned patterns, the learned patterns used to identify recommendations for settings of the vehicle during the use or future uses of the vehicle or other vehicles.”

192. *Patenaude* discloses examining a user's entertainment inputs (interface input data) and identifying patterns based on the history of use. *Patenaude* also discloses generating recommendations for settings during use of the vehicle.

193. Based on the “entertainment unit factors” and “selection time factors,” *Patenaude*'s telematics unit “determines patterns in the entertainment selections” of a user. *Patenaude*, ¶ [0055]. “After a minimum number of entertainment unit factors and selection time factors are stored in the in-vehicle memory 128, the processor 122 applies an algorithm on the stored entertainment unit factors and selection time factors.” *Id.* This algorithm automatically configures the user's desired entertainment settings for when they are using the vehicle. *Id.*, ¶ [0073]. Specifically, “[d]uring stage S612, the telematics unit 120 powers-up at least one entertainment unit 135, 136, or 137 based on the retrieved user-specific entertainment selection profile.” *Id.*, ¶ [0074].

194. It would have been obvious to a person of ordinary skill in the art at the relevant time to combine the features of *Patenaude* with the vehicle of *Zaid*, such that *Zaid*'s electronics and communications circuitry perform *Patenaude*'s method of pattern learning and setting recommendations. Incorporating a pattern learning system to make recommendations based on inputs would have been an obvious functionality to incorporate into a system for sharing vehicles since users may not know how to utilize the interface of a vehicle they are renting or sharing for the first

time and/or their favorites may not be stored in it. A system that learns user's preferred settings such as disclosed in *Patenaude* can recommend those settings automatically to a user who accesses one of *Zaid*'s shared vehicles for the first time.

195. A person of ordinary skill in the art at the relevant time would have been motivated to make this combination to provide an additional functionality to *Zaid*'s vehicle sharing service. *Id.* For example, *Zaid* already recognizes the benefit of “allow[ing] media providers to stream music to the car via the vehicle access kit.” *Zaid*, ¶ [0118]. Implementing *Patenaude*'s method for learning and suggesting entertainment selections with *Zaid*'s vehicle would be a natural design choice since users of *Zaid*'s shared vehicles may be unfamiliar with the interface and/or not have their favorites stored in it, and could benefit from automatic suggestions based on past vehicle use stored with their user profile. *See also* Ex. 1018, 13 (“OEMs can extend the in-vehicle communications technologies to allow increased functionality and consumer value with applications that improve the vehicle ownership experience. Enabling the vehicle for m-commerce, remote door lock/unlock, heater on/off, diagnostics, horn sounding and vehicle alarm notification are examples of applications that OEMs can use to differentiate themselves in the marketplace.”), 13 (“Figure 7 lists other data applications that can be provided to the user such as door unlock, sounding the horn, vehicle alarm notification, and web browsing. Other examples include the ability to lock the vehicles doors, flash the lights, turn on the

heated seats, start the car (regulations permitting), ***configure user settings (e.g., seat position, radio channel settings, mirror position, etc.)***, transfer data, transfer vehicle information (e.g., mileage, location, error codes, fuel levels, tire pressure, etc.), traffic information and server based navigation.”).

196. In my opinion, a person of ordinary skill in the art would have had a reasonable expectation of success in the combination since *Zaid*’s shared vehicle already includes all necessary hardware for *Patenaude*’s entertainment suggestion system, e.g., wireless communication, local processor and memory, centralized server, music streaming functionality, and typical vehicle audio components. *See Zaid*, ¶ [0085]. The functions of *Patenaude*’s telematics unit could easily be performed on *Zaid*’s electronics and communications circuitry. The only modification would need to be done in software such that *Zaid*’s a user is provided suggestions based on past vehicle use stored in their profile.

197. Accordingly, in my opinion, the combination of *Zaid* and *Patenaude* renders obvious this additional limitation of claim 10.

C. Ground 3: *Zaid* in view of Gilbertson renders obvious claim 13

198. *Zaid* discloses sending data to a server during use of a vehicle including, for example, acceleration data, as described below regarding limitation 13[a]. *Zaid* also discloses time-limited reservations expiring.

199. *Gilbertson* discloses “electronically controlling access” to a locked receptacle using an “electronic key” comprising an “internal code needed to open the lock.” *Gilbertson*, claim 1. Relevant to element 13[b], *Gilbertson* explains that “administrators designated by the supplier can add and *deactivate* keys from the software of the invention.” *Id.*, ¶ [0064].

200. As described below, it would have been obvious to combine *Zaid* with U.S. Patent Pub. No. 2013/0113602 to *Gilbertson* (“*Gilbertson*”) (Ex. 1008) to provide a system for receiving requests from a server to *cancel* the electronic key, teaching all the limitations of claim 13 and rendering the claim obvious.

1. Claim 13

13[a]: “The vehicle of claim 1, wherein the vehicle sends data to the server during the use of the electronic key on the vehicle, the data including at least use metrics of the vehicle, the use metrics being stored by the server as history of use for the electronic key;”

201. *Zaid* discloses that the “vehicle access kit” sends “usage data” to the “central server” during the “vehicle reservation.” *Zaid*, ¶¶ [0099] (“the vehicle access kit includes vehicle usage data reporting unit 222 configured to report and communicate back to a central server. . . .”); [0095] (“the vehicle access kit 200 further includes an accelerometer 214 for monitoring acceleration of the vehicle during one or more reservations to provide vehicle usage data.”).

202. Zaid further discloses that the “usage data” is stored to establish “member driving history and reputation” to allow the vehicle owner to “have better control over the type of user the owner is lending/sharing/renting vehicle to.” *Id.*, ¶ [0072]. A person of ordinary skill in the art would have understood that Zaid’s “member driving history” is compiled at the server by storing “use metrics” (e.g., acceleration data) during specific “reservations” (uses of the claimed “electronic key”). *Zaid*, ¶ [0099]; *see also Zaid*, Fig. 7, [0132].

203. Accordingly, in my opinion, *Zaid* discloses this additional limitation of claim 13.

13[b]: “wherein vehicle, after receiving from the server a request to cancel the electronic key, the vehicle receives deactivation instructions to one or both of the mobile device and the vehicle.”

204. *Zaid* discloses an application executed on a wireless communication device and in communication with the central server. *Zaid*, ¶ [0077]. *Zaid*’s application provides functions including “advertis[ing] or announc[ing] when the vehicle will be available for sharing.” *Id.*

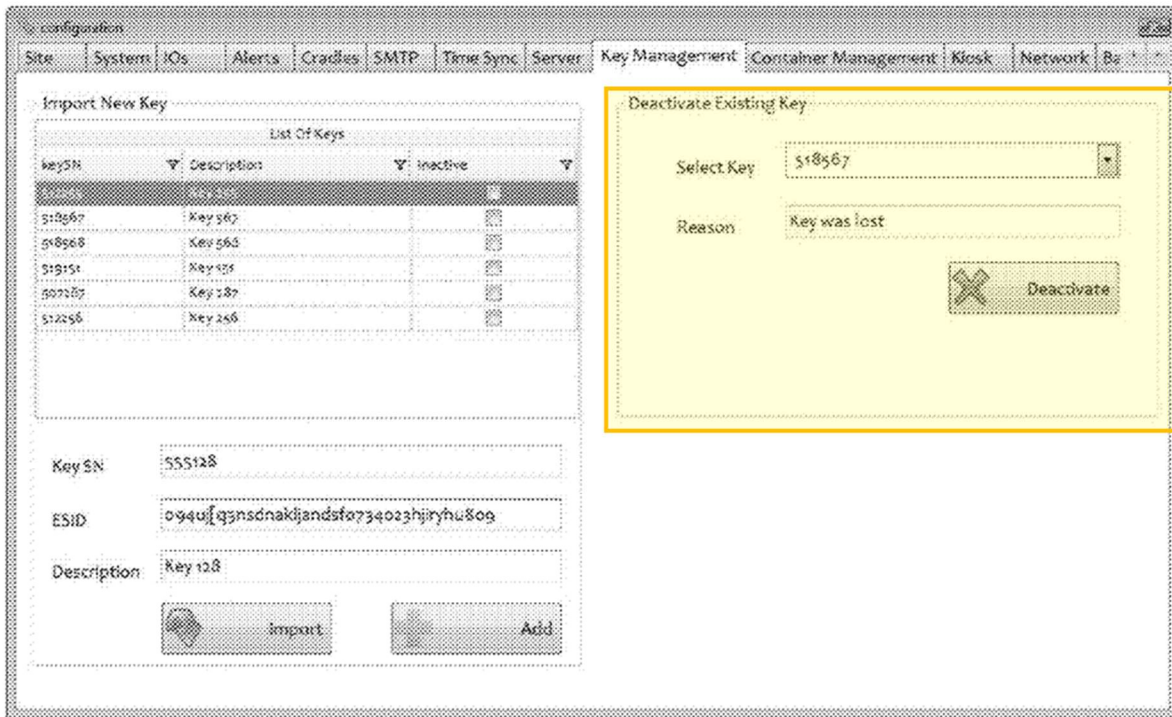
205. *Zaid* discloses that its vehicle reservations expire after the specified period of time, at which point the reservation “becomes invalid” and access is “withdrawn.” *See Zaid*, ¶ [0131], Fig. 6.

206. A person of ordinary skill in the art at the relevant time would have understood that requests from a server to cancel the electronic key would be a trivial addition to the system disclosed in *Zaid*. A request to cancel the vehicle reservation would cause the central server to send deactivate instructions to the user's wireless communication device and the reserved vehicle to invalidate the vehicle reservation.

207. A person of ordinary skill in the art would have looked to analogous references for implementing the functionality of *Zaid*'s vehicle sharing service with a method for e-key deactivation for increased security. *Zaid* and *Gilbertson* are both analogous art to the '026 patent at least because each is from the same field of endeavor, namely, electronic key systems. *Gilbertson* also discloses time-limited electronic keys for access control which are functionally similar to the electronic key disclosed in *Zaid*, at least to the extent there would have been a need to deactivate access remotely. *Gilbertson*, ¶ [0033]; *Zaid*, ¶ [0131].

208. By 2013, systems for *deactivation* of electronic keys were well known and found naturally alongside systems for remote *activation* of electronic keys. For example, *Gilbertson* teaches “electronically controlling access” to a locked receptacle using an “electronic key” comprising an “internal code needed to open the lock.” *Gilbertson*, claim 1. *Gilbertson* further explains that “administrators designated by the supplier can add and *deactivate* keys from the software of the invention.” *Id.*, ¶ [0064].

209. Deactivation of *Gilbertson's* “electronic keys” is accomplished via input of a deactivation request at a user interface executed on a computing device. See, e.g., *id.*, Figs. Screen Shot AD, Screen Shot AE (reproduced below).



Gilbertson, Screen Shot AE (annotated).

210. In my opinion, it would have been obvious to combine *Gilbertson's* deactivation function with *Zaid's* application such that the owner/administrator of the vehicle is provided the ability to deactivate e-keys. *Zaid*, [0077]. Such a deactivation function would operate in the same manner as *Zaid's* vehicle reservation function: “[t]he [deactivation request] is booked at the server 110 via a user interface 116 displayed on a computing device 118. The server may

be configured to interact with a plurality of vehicle access control systems for [deactivating] access control to a plurality of vehicles.” *Zaid*, ¶ [0080]. Using the deactivation request received at the vehicle via the *Zaid*’s “tethering” or “GSM radio,” the vehicle would invalidate the vehicle reservation. *Id.*, ¶ [0106]. In such a configuration, “[a]t 506, the [deactivation request] is communicated to a wireless communication device of the user.” *Id.*, ¶ [0126]. Using the deactivation request received at the wireless communication device, the wireless communication device would also invalidate the vehicle reservation.

211. A person of ordinary skill in the art at the relevant time would have been motivated to make this combination to provide the vehicle owner with additional control over the vehicle. As *Zaid* explains, the vehicle owner should be provided with “an increased level of vehicle security.” *Zaid*, ¶ [0114]. *Gilbertson* explains that electronic keys can be deactivated, for example, if the “[k]ey was lost.” *Gilbertson*, Screen Shot AE. A person of ordinary skill in the art would have understood that lost electronic keys (that is, lost devices comprising eKeys), provide an opportunity for malicious actors to access and control the vehicle without authorization by passing the electronic key off as their own. A method of deactivating lost keys, however, would prevent such unauthorized access by a malicious actor. Accordingly, a person of ordinary skill in the art would have

recognized that *Gilbertson*'s method of deactivating keys provides an increased level of vehicle security, which Zaid notes is preferred. Zaid, ¶ [0114].

212. To account for safety concerns, a person of ordinary skill in the art would have understood that when combining *Gilbertson*'s deactivation feature of with *Zaid*'s vehicle, such deactivation should not occur while the vehicle is in motion or without appropriate warning to vehicle occupants. However, cancellation of the privileges would be a desirable and obvious feature to include, for example, to immobilize a vehicle that had been stolen or was being used in an impermissible or illegal manner.

213. Since Zaid provides circuitry for activating the electronic key, no additional hardware would have been required to implement deactivating the same system. Accordingly, in my opinion, it would have been obvious to modify the system disclosed in *Zaid* to accommodate a request to cancel the electronic key, at least as disclosed in *Gilbertson*.

214. In my opinion, a person of ordinary skill in the art would have had a reasonable expectation of success in combining the deactivation feature of *Gilbertson* with the shared vehicle of *Zaid* since the feature is a straightforward addition, provided in software, to the hardware already provided in *Zaid*. A deactivation request would be analogous to a reservation request, except it would indicate that the privileges provided in the unique access code of the reservation

should be terminated (e.g., by adjusting the specified time period of the reservation to none.

215. Accordingly, in my opinion, *Zaid* and *Gilbertson* renders obvious this additional limitation of claim 13.

D. Ground 4: *Zaid* in view of *Kleve* renders obvious claim 15

216. In my opinion, it would have been obvious to a person of ordinary skill in the art to combine *Zaid* with *Kleve* to reach the limitations of claim 15, rendering the claim obvious.

217. The use of in-vehicle displays for notifying a vehicle user to vehicle status and condition was well known in the art, as evidenced by, e.g., *Kleve*. Indeed, *Kleve* discloses a vehicle comprising a “touchscreen visual display 4” which may display messages to “notify the Temporary User if a restriction limit has been exceeded.” *Kleve*, ¶¶ [0023]-[0024], [0040], [0043], [0047], [0049], [0053].

218. Like *Zaid*, *Kleve* (Ex. 1006) also discloses in-vehicle wireless communication circuitry for bidirectional communications with a server. As illustrated in Figure 4, annotated below, *Kleve* discloses a “remote vehicle 421” in communication with a “server(s) 401” via “network 414” or “cellular network 415.” *Kleve*, ¶¶ [0057], [0060].



Kleve, Fig. 4 (annotated).

219. *Kleve* describes an “authorization solution for personal vehicle rental.” *Id.*, title; *compare Zaid*, title. Like *Zaid*, *Kleve* teaches that the communications illustrated above enable a rental system for “keyless drive-away” of a rented vehicle via a “virtual key.” *Kleve*, ¶¶ [0036], [0039], [0064], [0065].

220. As described below, in my opinion, it would have been obvious to combine *Zaid* with *Kleve*, which discloses the limitations of claim 15.

1. Claim 15

“The vehicle of claim 1, wherein the vehicle sends data regarding use of the vehicle to the server, and the vehicle receives instructions from the server regarding a violation of the privileges associated with the electronic key, the vehicle is configured to receive

**at least one notification for displaying or outputting
an indication regarding the violation.”**

221. As described in limitation 13[a], above, *Zaid* discloses sending data to a server during use of a vehicle including, for example, GPS and acceleration data. *See, e.g., Zaid*, ¶¶ [0098], [0099], [0133]. *Zaid* explains that “vehicle usage data reporting unit 222 [is] configured to report and communicate back [usage data] to a central server” (*Id.*, ¶ [0099]) for “analy[sis] to generate driver driving profile and/or car driving profile” (*Id.*, ¶ [0134]).

222. A person of ordinary skill would have looked to analogous references for implementing the functionality of *Zaid*’s vehicle sharing service with a method for notification of violations. *Zaid* and *Kleve* are both analogous art to the claimed invention of the ’026 patent because the references are from the same field of endeavor as the claimed invention (electronic key systems); and/or (2) the references are reasonably pertinent to the problem faced by the inventor (utilizing remote connectivity to provide added functionality and improve user experience). For example, *Zaid* describes “an improved way for providing car sharing services” utilizing a “wireless communication device” as an e-key for accessing a shared vehicle during a reservation period. *Zaid*, ¶¶ [0016], [0067]. *Kleve* discloses a “vehicle rental micro-business” utilizing “a “virtual key” for “enabl[ing] the keyless drive system for the appropriate Temporary User during a given rental period.”

Kleve, ¶¶ [0036], [0039]. Both *Zaid* and *Kleve* recognize the benefit of implementing an e-key via a mobile device for conveying vehicle access to shared and rented vehicles.

223. Like *Zaid*, *Kleve* also discloses sending usage data to a server during use of a vehicle. Specifically, *Kleve* explains that “during the rental term the [vehicle computing system] may **monitor** the Temporary User's utilization of the vehicle including, but not limited to, renter verification, **driving behavior, vehicle location, speed, fuel level**, and other vehicle information requested by the vehicle owner.” *Kleve*, ¶ [0073]. “The continuous monitoring of the Temporary Users behavior during the rental period may be **transmitted to the server**.” *Id.*, ¶ [0076]; *see also id.* (“The GPS data may be transmitted to the server and monitored using the vehicle owner's nomadic device.”). *Kleve* further discloses privileges of vehicle speed, location, and weight. *See, e.g., id.*, ¶ [0040]. *Kleve* teaches that the usage data is “monitor[ed]” to identify potential “violation[s]” of these privileges. *Id.*, ¶ [0053]. Specifically, *Kleve* describes generating and distributing “virtual keys” for accessing a shared vehicle, wherein the “virtual keys” enable the shared vehicle to differentiate between drivers (“Owner” or “Temporary User”). *Id.*, ¶ [0045]. *Kleve* explains that “Temporary Users” use of the shared vehicle may be subject to “restriction limits [privileges] initially set by the Owner at the beginning of the rental term.” *Id.*, ¶ [0043]; *see also id.*, ¶ [0040] (“The restrictions may be based on, but not limited to,

the owner's selection of parameters including, but not limited to, *speed*, *global position coordinates*, or load weight restrictions.”). During the rental term, the “control parameters” of the shared vehicle are “monitor[ed]” to determine whether a “restriction” has been exceeded. *Id.*, ¶¶ [0040], [0053]. *Kleve* discloses that a server may perform this determination. *Id.*, [0035] (“the exemplary processes may be executed by a computing system in communication with a vehicle computing system. . . (e.g., and without limitation, *a server*)”).

224. When a restriction is exceeded, *Kleve* teaches that “the Temporary User and Owner may be notified.” *Id.*, ¶ [0040]. Specifically, “an in-vehicle display message may be sent [from the server] to notify the Temporary User if a restriction limit has been exceeded.” *Id.*; *see also id.*, ¶ [0053] (“The display message to alert the Temporary User of a restriction violation may be sent to the vehicle display information console.”).

225. In my opinion, it would have been obvious to a person of ordinary skill in the art at the relevant time to implement *Kleve*’s privileges and violation notification method with *Zaid*’s existing usage data monitoring system such that if a user exceeds the time period for access, including unlocking and starting the vehicle, the vehicle receives a notification regarding the violation. A person of ordinary skill at the relevant time would have been motivated to make this combination to

encourage the user of *Zaid's* shared vehicle to promptly return or check-in the vehicle if the period for use has expired.

226. A person of ordinary skill in the art at the relevant time would have been motivated to make this combination to encourage the user of *Zaid's* shared vehicle to promptly return or check-in the vehicle if the period for use has expired. For example, a late return notification would encourage a user to return the vehicle promptly, reducing the likelihood of delaying a subsequent rental of the shared vehicle.

227. In my opinion, a person of ordinary skill would have had a reasonable expectation of success in the combination since all necessary hardware for providing in-vehicle notifications regarding violations was already present in *Zaid's* shared vehicle. The only modification would need to be done in software such that the notification was sent to the vehicle upon observing the violation. Specifically, *Zaid's* system already monitors vehicle location and vehicle sensor outputs, and sends this information to the central server. *Zaid's* system already includes time constraints for accessing and using the vehicle, which are generated by the central server. And *Zaid's* system already includes an in-vehicle display, which interfaces with the vehicle electronics (microprocess and memory) that are in communication with the central server. *Id.*, [0110]. A person of ordinary skill in the art at the relevant time could have easily implemented *Kleve's* privileges and violation notification method

within *Zaid*'s existing usage data monitoring system such that *Zaid*'s server sends a notification to the vehicle for display when the privileges for use of the vehicle have been exceeded, e.g., the time period for use has elapsed.

228. Accordingly, in my opinion, *Zaid* and *Kleve* render obvious claim 15.

IX. Secondary Considerations of Non-obviousness

229. I am not aware of any secondary considerations, or so-called "objective indicia of non-obviousness" for the challenged claims.

230. Secondary considerations could include things like commercial success of a product due to the merits of the claimed invention; a long felt need for the solution provided by the claimed invention; unsuccessful attempts by others to find the solution provided by the claimed invention; copying of the claimed invention by others; unexpected and superior results from the claimed invention; acceptance by others of the claimed invention as shown by praise from others in the field or from the licensing of the claimed invention; teaching away from the conventional wisdom in the art at the time of the invention; independent invention of the claimed invention by others before or at about the same time as the named inventor thought of it; and other evidence tending to show obviousness.

231. Patent Owner has not identified any such secondary considerations, and I am not independently aware of any. For example, Patent Owner has no commercial products embodying the '026 patent that I am aware of. Additionally,

as discussed throughout, the claimed features reflect predictable results of combining known elements according to their known functions, and thus, there are no unexpected and superior results from the claimed invention. Also, there are no licenses of the '026 patent of which I am aware.]

232. Further, even if Patent Owner were to assert that secondary considerations exist, given the strong reasons that the challenged claims are obvious in light, including the motivations to combine the references set forth above, I do not believe any such secondary considerations would rise to the level of overcoming the invalidity opinions I have expressed.

233. I understand that Patent Owner may address the issue of secondary considerations more fully in the future. I reserve the right to respond to any specific bases for such secondary considerations that Patent Owner may identify.

X. Conclusion

234. For the reasons set forth above, I believe claims 1-7, 10-15, and 18-20 of the '026 patent are unpatentable in view of the prior art. In signing this declaration, I understand 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 acknowledge that I may be subject to cross-examination in this 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.

235. I declare that all statements made herein of my knowledge are true, that all statements made on information and belief are believed to be true, and 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.

Dated: April 22, 2024

By: Kevin C Almeroth
Kevin C. Almeroth, Ph.D.