

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Edward H Nortrup	
U.S. Patent No.:	10,444,028	Attorney Docket No.: 45343-0072IP1
Issue Date:	October 15, 2019	
Appl. Serial No.:	14/971,658	
Filing Date:	December 16, 2015	
Title:	METHOD AND SYSTEM FOR PROVIDING TRAVEL TIME INFORMATION	

Mail Stop Patent Board

Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 10,444,028 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

TABLE OF CONTENTS

I.	REQUIREMENTS FOR IPR.....	1
A.	Grounds for Standing.....	1
B.	Challenge and Relief Requested.....	1
II.	SUMMARY OF THE '028 PATENT	3
A.	Brief Description.....	3
B.	Summary of the Prosecution History.....	4
C.	Level of Ordinary Skill in the Art.....	5
D.	Claim Construction	5
III.	THE CHALLENGED CLAIMS ARE UNPATENTABLE.....	6
A.	[GROUND 1] – Obviousness based on Knockart-Feldman (Claims 1-7, 9-10, 12-21, 25-26, 29, 31)	6
1.	Knockart	6
2.	Feldman	8
3.	Knockart-Feldman Combination	9
4.	Application of Knockart-Feldman.....	15
B.	[GROUND 2] – Obviousness based on Knockart-Feldman-Simske (Claims 7-8)	47
1.	Simske	47
2.	Application of Knockart-Feldman-Simske	48
C.	[GROUND 3] – Obviousness based on Knockart-Feldman-Whitsell (Claims 10-11, 30)	50
1.	Whitsell.....	50
2.	Application of Knockart-Feldman-Whitsell.....	50
D.	[GROUND 4] – Obviousness based on Knockart-Feldman-Boies (Claims 14, 22-24)	53
1.	Boies	53
2.	Knockart-Feldman-Boies Combination	54
3.	Application of Knockart-Feldman-Boies	56
E.	[GROUND 5] – Obviousness based on Knockart-Feldman-Boies-Peterson (Claim 14)	59
1.	Peterson	59
2.	Application of Knockart-Feldman-Boies-Peterson	60
F.	[GROUND 6] – Obviousness based on Knockart-Feldman-Peterson (Claims 27-28)	61
1.	Knockart-Feldman-Peterson Combination.....	61
2.	Application of Knockart-Feldman-Peterson	62

G.	[GROUND 7] – Obviousness based on Knockeart-Feldman-Craine	
	(Claim 31)	64
1.	Craine	64
2.	Application of Knockeart-Feldman-Craine.....	64
IV.	MANDATORY NOTICES UNDER 37 C.F.R § 42.8(a)(1)	66
A.	Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1).....	66
B.	Related Matters Under 37 C.F.R. § 42.8(b)(2)	66
C.	Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3).....	66
D.	Service Information	67
V.	FEES	67
VI.	CONCLUSION	67

EXHIBITS

GM-1001	U.S. Patent No. 10,444,028 to Edward H. Nortrup (“the ’028 patent”)
GM-1002	Excerpts from the Prosecution History of the ’028 patent (“the Prosecution History”)
GM-1003	Expert Declaration of Dr. Michael Braasch
GM-1004	U.S. Patent Pub. No. 2003/0055542 to Knockeart et al. (“Knockeart”)
GM-1005	U.S. Patent Pub. No. 2002/0026278 to Feldman et al. (“Feldman”)
GM-1006	U.S. Patent Pub. No. 2005/0096840 to Simske (“Simske”)
GM-1007	U.S. Patent No. 7,203,598 to Whitsell (“Whitsell”)
GM-1008	U.S. Patent No. 6,615,133 to Boies et al. (“Boies”)
GM-1009	U.S. Patent No. 5,845,227 to Peterson (“Peterson”)
GM-1010	U.S. Patent No. 7,027,915 to Craine (“Craine”)
GM-1011	<i>Bearing Straight</i> Forbes (May 4, 1998) (Located at https://www.forbes.com/forbes-life-magazine/1998/0504/096.html?sh=7d25a7166b54)
GM-1012	J. Hightower and G. Borriello, "Location systems for ubiquitous computing," in <i>Computer</i> , vol. 34, no. 8, pp. 57-66, Aug. 2001, doi: 10.1109/2.940014
GM-1013	U.S. Patent Pub. No. 2003/0009277 to Fan et al. (“Fan”) (cited during prosecution of the ’028 patent)

GM-1014	U.S. Patent No. 6,377,810 to Geiger et al. (“Geiger”)
GM-1015	U.S. Patent No. 6,456,854 to Chern et al. (“Chern”)
GM-1016	U.S. Patent Pub. No. 2004/0192299 to Wilson et al. (“Wilson”)
GM-1017	U.S. Patent Pub. No. 2004/0224702 to Chaskar (“Chaskar”)

General Motors LLC (“Petitioner” or “GM”) petitions for *Inter Partes* Review (“IPR”) of claims 1-31 (“the Challenged Claims”) of U.S. Patent No. 10,444,028 (“the ’028 patent”).

I. REQUIREMENTS FOR IPR

A. Grounds for Standing

Petitioner certifies that the ’028 patent is available for IPR. GM is not barred or estopped from requesting review of the Challenged Claims on the below-identified grounds.

B. Challenge and Relief Requested

Petitioner requests IPR of the Challenged Claims on the grounds listed below. A declaration of Dr. Michael Braasch (GM-1003) supports this Petition.

Ground	Claim(s)	Basis Under 35 U.S.C. § 103
1	1-7, 9-10, 12-21, 25-26, 29, 31	Knockeart in view of Feldman
2	7-8	Knockeart in view of Feldman and Simske
3	10-11, 30	Knockeart in view of Feldman and Whitsell
4	14, 22-24	Knockeart in view of Feldman and Boies
5	14	Knockeart in view of Feldman, Boies, and Peterson
6	27-28	Knockeart in view of Feldman and Peterson

Ground	Claim(s)	Basis Under 35 U.S.C. § 103
7	31	Knockeart in view of Feldman and Craine

The '028 patent claims priority to a provisional application filed on February 5, 2004 (“Critical Date”). Petitioner has applied prior art that predates this date and has used the Critical Date as the date of invention for purposes of this IPR.¹

The references are prior art under 35 U.S.C. §102.

Reference	Filed	Published
Knockeart	09/19/2002	03/20/2003
Feldman	08/28/2001	02/28/2002
Simske	11/03/2003	05/05/2005
Whitsell	09/26/2000	04/10/2007
Boies	02/27/2001	02/02/2003
Peterson	02/09/1996	12/01/1998
Craine	12/11/2002	04/11/2006

¹ Petitioner does not concede that any of the Challenged Claims enjoy priority to February 5, 2004. GM-1003, ¶¶18-20. The analysis here remains the same regardless of whether February 5, 2004 or a later date is used as the date of invention.

II. SUMMARY OF THE '028 PATENT

A. Brief Description

The '028 patent specification describes location technologies for “providing route, navigation, traffic, and or direction information to a traveler.” GM-1001, 1:43-60. A monitoring facility can monitor and transmit “information relating to traffic conditions.” *Id.*, 2:35-44. “For example, a tracking facility may track traffic patterns and locate an abnormal traffic condition (e.g. an accident, construction, traffic congestion, or vehicles traveling [at] significantly slower rates than a speed limit or predicted speed) and a warning facility may be used to warn vehicles in close proximity to the abnormal traffic condition.” *Id.*, 27:23-28. Identifying traffic conditions can include “collecting a plurality of cell phone locations; and mapping the locations of the cell phone locations.” *Id.*, 5:41-44, 20:11-35, 26:66-27:3; *see also* GM-1003, ¶¶24-25.

The system can calculate a route to a user specified destination based on the starting point of the user. GM-1001, 23:26-32. This can include presenting “a map with a route 2902 and an alternate route based on traffic condition information 2904.” *Id.*, 24:5-7; GM-1003, ¶27.

The '028 patent further describes allowing a user to “enable, disable, or otherwise control the access of the mobile communication facilities location” for the user giving “the user the ability to selectively turn on or off another part[y’s]

ability to access an associated location.” GM-1001, 45:31-46:8, 48:7-38; GM-1003, ¶26.

An overview of location sharing and privacy in prior art systems is provided in Section VIII of Dr. Braasch’s Declaration. GM-1003, ¶¶39-45.

B. Summary of the Prosecution History

The application that led to the ’028 patent was filed on Dec. 16, 2015 with 31 claims. GM-1002, 160-164. In a first office action, the examiner rejected all claims under §103 based on Fan in view of Nishimura. *Id.*, 246-253. The examiner determined that original claim language of “wherein each of the plurality of cell phones further has a user initiated permission set to permit a requestor to obtain its location” was satisfied by Fan’s disclosure of users registering with a system that records information about mobile units, including location. *Id.*, 249; GM-1013, [0036]-[0037]. In response, the applicant amended claim 1, and received another office action rejecting the amended claims based on the same Fan-Nishimura combination. GM-1002, 280-297; *see also* GM-1003, ¶¶28-32.

The applicant then amended claim 1 again to recite, in part, “permit a user to selectively enable or disable access to user cellphone location data,” arguing that Fan did not disclose “a list of authorizations that permit a user to selectively enable or disable access to the cellphone location information received from a user.” GM-1002, 303-311 (emphasis original). The examiner then allowed the claims, citing

this last claim amendment and the corresponding applicant arguments as the reason for allowance. *Id.*, 330-336; *see also* GM-1003, ¶¶33-35. However, as demonstrated by the references cited herein, user initiated authorization to “permit *a user to selectively enable or disable* access to user cellphone location data,” was known in the prior art.²

C. Level of Ordinary Skill in the Art

A person of ordinary skill as of the Critical Date (“POSITA”) would have had a minimum of a bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field plus 2-5 years of work and/or research experience in the field of navigation systems. GM-1003, ¶19. Graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education. *Id.*

D. Claim Construction

No formal claim constructions are presently necessary since “claim terms need only be construed to the extent necessary to resolve the controversy.”

Wellman, Inc. v. Eastman Chem. Co., 642 F.3d 1355, 1361 (Fed. Cir. 2011); GM-

² All emphasis added unless otherwise noted.

1003, ¶¶36-38.³

III. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. [GROUND 1] – Obviousness based on Knockeart-Feldman (Claims 1-7, 9-10, 12-21, 25-26, 29, 31)

1. Knockeart⁴

Knockeart describes a navigation system in which a user uses an in-vehicle system to enter a destination that is transmitted to a server that “computes a route to the destination and transmits the computed route to the in-vehicle system.” GM-1004, Abstract. The in-vehicle system communicates wirelessly with the server “over a standard analog cellular telephone system” or “digital cellular telephone links[.]” *Id.*, [0074], [0078], [0086]. The server uses traffic information “to determine a fastest route from a starting to a destination location.” *Id.*, [0077]. In addition to the route information, the server also downloads a “spot map” to the vehicle such that “[t]he planned route is shown in conjunction with the spot map, as is the vehicle’s DGPS based location.” *Id.*, [0282]. In another example, Knockeart describes that the in-vehicle system “receiv[es] from the server a map

³ Petitioner does not concede that the Challenged Claims satisfy all statutory requirements including 35 U.S.C. § 112.

⁴ All descriptions of the references and combinations thereof are incorporated into the mapping of each claim element throughout the petition.

that includes a specification of the road network in the vicinity of the planned route” such as a map depicting “a ‘corridor’ around the planned route[.]” *Id.*, [0010]. The in-vehicle system “display[s] the received map in conjunction with a representation of the planned route, and a location of the vehicle.” *Id.*; *see also* GM-1003, ¶¶48-50.

Knockeart discloses use of a “traffic database,” which includes typical speeds that can be used in route planning, and can also include real-time data “obtained from probe vehicles.” GM-1004, [0170]. The server system “makes use of some or all vehicles 100 as ‘probes’ for collecting traffic information” which is fed into the traffic database. *Id.*, [0318]. The server system can also “send[] updated traffic information to the external information system,” so that the “vehicle navigation system can be a source of traffic information in addition to, or instead of, being a consumer of traffic information from external information system 130.” *Id.* “[T]raffic ‘profile’ data is collected by the in-vehicle systems in probe vehicles.” *Id.*, [319]. The in-vehicle system in a probe vehicle can “detect when the vehicle’s speed is significantly slower than would be expected based on the class of road being traveled, on or based on traffic related data that is stored in the vehicle and which relates the expected speed to the road segment being traveled on,” and “immediately reports the exception to the server system so that the server system can update its traffic database 524 to reflects[sic] unexpected traffic

conditions.” *Id.* Further, “[t]he operator of the vehicle has the option of enabling or disabling either mode of data collection through the user interface of the in-vehicle system.” *Id.*, [0324]; *see also* GM-1003, ¶¶51-53.

2. Feldman

Feldman describes a navigation system for “finding optimal routes between given points, estimating travel times and initiating alerts and route alterations when unexpected traffic events change the vehicular traffic situation picture.” GM-1005, [0099], [0100]. Feldman describes “modeling and processing vehicular traffic data and information” including “acquiring a variety of the vehicular traffic data and information associated with the oriented road section network” to calculate “mean normalized travel time (NTT) value for each oriented road section[.]” *Id.*, [0018]. Feldman’s system uses the calculated NTTs to “predict[] a future complete vehicular traffic situation picture associated with the entire oriented road section network[.]” *Id.* Feldman’s system can perform “path identification using vehicular traffic data and information acquired from mobile sensors of a cellular phone mobile communication network[.]” *Id.*, [0024]; *see also* GM-1003, ¶¶54-55.

Similar to Knockeart, Feldman’s system collects traffic data using “mobile sensors or electronic devices physically located in or attached to vehicles[.]” GM-1005, [0007]. This can include “mobile wireless devices such as cellular

telephones” to provide “dynamic vehicle location and velocity data and information[.]” *Id.*, [0008]; *see also id.*, [0009], [0036], [0038], [0053]. Feldman uses cellular phone probe information for “calculating velocities of vehicles, for example, by acquiring series of exact locations of the vehicles located along roads in known time intervals[.]” *Id.*, [0005]. The system selects a subset of available cellular phones by selecting devices that “are in high probability moving-vehicle-carried.” *Id.*, [0059]; *see also id.*, [0058]-[0060]. “Those cellular phones that are suspected as being ‘vehicle-carried’ are immediately tracked for their locations using the handovers themselves as ‘footprints’ or ‘footsetps’[sic], and/or other locating capability of the cellular phone network.” *Id.*, [0061]. “The tracking of the ‘moving’ phones is done by polling their locations in known time intervals.” *Id.*, [0062]; *see also* GM-1003, ¶¶56-57.

3. Knockeart-Feldman Combination

Multiple reasons would have prompted a POSITA to beneficially apply the teachings of Feldman to Knockeart to implement all or a portion of Knockeart’s in-vehicle systems as cellular phones for the purpose of collecting probe vehicle traffic data. GM-1003, ¶¶58-67. Alternatively or additionally, a POSITA would have been prompted to implement Knockeart’s system to utilize Feldman’s vehicular traffic data collected by tracking “vehicle-carried” cellular telephones as one of the external traffic information sources expressly described in Knockeart.

GM-1005, [0007]-[0009], [0036], [0038], [0053], [0058]-[0062]; GM-1004, [0077], (“an external information system 130 can provide traffic-related information that is used by server system 125 to determine a fastest route from a starting to a destination location”), [0170], [0317]-[0318], [0351]; GM-1003, ¶¶59-60. In either case, the resulting system would have used Feldman’s techniques for collecting traffic information using vehicle-carried cellular phones to populate Knockeart’s traffic database used to determine fastest routes between starting points and destinations. *Id.*

Multiple reasons would have prompted a POSITA to modify Knockeart based on Feldman to use Feldman’s traffic data collected from vehicle-carried cellular phones to provide at least part of the vehicle traffic information used by Knockeart’s system as described above. GM-1003, ¶¶58-67. First, as explained by Feldman, “currently, there is a significantly larger potential number of vehicles associated with cellular telephone types of a mobile wireless communication network or system compared to the potential number of vehicles associated with GPS types[.]” GM-1005, [0009]; GM-1003, ¶59. As discussed above, Knockeart describes implementations having dedicated in-vehicle systems using “an onboard computer” which performs functions including determining and relaying vehicle location information. GM-1004, [0007]-[0009]; [0112]-[0114], [0122], [0138]. Yet Feldman recognizes what a POSITA would have known: there were far fewer

of such in-vehicle systems than vehicle-carried cell phones during the relevant timeframe. GM-1005, [0009]; GM-1003, ¶60. As Feldman discloses, in systems relying on only dedicated, in-vehicle systems for collecting traffic information “the potential number of mobile sensors or electronic devices providing dynamic vehicle location and velocity data and information to the computerized central traffic data and information handling system is limited[.]” GM-1005, [0009]. Therefore, a POSITA would have recognized that it would have been beneficial to replace, enhance, or supplement at least some of the in-vehicle location tracking systems described by Knockart with cell phone based location tracking (as taught by Feldman) because, as Feldman expressly recognizes, “there is a significantly larger potential number of vehicles associated with cellular telephone types of a mobile wireless communication network or system” therefore providing a greater number of potential probes for assessing traffic, leading to more accurate traffic information. GM-1005, [0009]; GM-1003, ¶60. Such an implementation would have not only increased the accuracy of traffic information but also would have allowed traffic information to be collected for a larger geographic area (larger number of roads) due to the ability to collect traffic information for roads that experience less vehicle traffic. GM-1003, ¶60.

Second, a POSITA would have recognized that by the Critical Date (February 2004), cell phone use was becoming more widespread, with smart

phones including more and more functionality. GM-1003, ¶61; GM-1005, [0053] (“A growing number of mobile wireless communication devices are increasingly being installed or carried in vehicles”). Feldman’s teachings “provide[] a variety of vehicular traffic related service applications to end users, *on the basis of existing infrastructure* of vehicular traffic data and information acquisition and collection, such as by using a cellular phone mobile communication network[.]” GM-1005, [0102]. Utilizing cell phones already in the possession of many if not most drivers, and the existing cellular phone infrastructure, to collect traffic data would have eliminated the need for users of the system to have multiple pieces of potentially expensive computing equipment—i.e., both a cell phone (for communication and other non-traffic/navigation related purposes) and a dedicated in-vehicle navigation/location system. GM-1003, ¶61. Thus, the Knockart-Feldman combination would have reduced the costs of using such a system for users and increased convenience, thereby both increasing the customer base and the number of available traffic probe devices. *Id.*

Third, such a modification would have allowed the system to acquire traffic data from “an ‘arbitrary’, non-pre-determined or non-designated, population or group of vehicles...therefore, resulting in a potentially large number of mobile sensors or electronic devices providing dynamic vehicle location and velocity data and information to the computerized central traffic data and information handling

system” rather than only from devices of subscribers to the specific service. GM-1005, [0013], [0035]; GM-1003, ¶62. “Hence, acquiring the vehicular traffic data and information from the data providing network does not depend at all on a specific group of mobile sensor device carrying end users.” GM-1005, [0102]. Increasing the number of devices used to collect traffic data would have increased the accuracy and geographic range of the traffic data. GM-1003, ¶62.

Fourth, Feldman describes an “important benefit” of its cellular phone based traffic data collection techniques is that they are “generally applicable and complementary to various different ‘upstream’ prior art techniques of gathering, collecting, or acquiring, vehicular traffic data and information, and, generally applicable and complementary to various different ‘downstream’ prior art techniques of electronically communicating, sending, or distributing, the analyzed, modeled, and processed, vehicular traffic data and information in vehicular traffic related service applications to end users.” GM-1005, [0019]. Specifically, “[t]he present invention is implemented for acquiring, modeling, and processing vehicular traffic data and information, *in order to be compatible with a wide variety of end user types of traffic related service applications.*” *Id.*, [0102]. Thus, a POSITA would have applied Feldman’s teachings to Knockart to improve traffic data collection in Knockart’s system because Feldman’s teachings

are intentionally contemplated as being compatible with and beneficial to such systems. GM-1003, ¶63.

Fifth, Feldman’s “sequence of generating dynamic three-dimensional vehicular traffic situation pictures *serves as a highly accurate and precise data base for vehicular traffic related service applications.*” GM-1005, [0103], [0011] (“highly accurate and precise, yet, practicable and implementable techniques for analyzing, modeling, and processing, the acquired, collected, or gathered, vehicular traffic data and information”). A POSITA would have recognized that utilizing a “highly accurate and precise data base for vehicular traffic” would have improved the accuracy and performance of Knockart’s navigation system. GM-1003, ¶64.

Sixth, Knockart expressly discloses that the in-vehicle system communicates wirelessly with the server “over a standard analog cellular telephone system” or “digital cellular telephone links[.]” *Id.*, [0074], [0078], [0086]. Thus, it would have been obvious to implement Knockart’s in-vehicle system using cell phones (as suggested by Feldman) because cell phones were already configured to utilize such cellular telephone systems. GM-1003, ¶65.

Seventh, a POSITA would have been prompted to modify Knockart’s navigation system to utilize vehicle-carried cell phones to populate at least some of the traffic data in the traffic database 524 (as suggested by Feldman) because doing so would be merely the application of a known technique to a known system ready

for improvement to yield predictable results. GM-1003, ¶66. Indeed, “when a patent ‘simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.’” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). Here, both Knockeart and Feldman disclose navigation systems that collect traffic information from probe vehicles to calculate fastest travel routes, and a POSITA would have recognized that applying Feldman’s suggestions to Knockeart’s navigation system would have led to predictable results with a reasonable expectation of success in modifying Knockeart’s system in view of Feldman without significantly altering or hindering the functions performed by Feldman’s system. GM-1003, ¶66. Indeed, Knockeart expressly contemplates “[o]ther embodiments” not expressly described and Feldman’s cell phone-based traffic data collection technique provides just such an embodiment. GM-1004, [0420]. Indeed, it was well-known in the art prior to 2004 to utilize cell phones as probes to collect traffic data. *See e.g.*, GM-1006, [0012]-[0013]; GM-1007, 1:42-54, 2:56-3:2; GM-1010, 7:51-54; GM-1003, ¶67.

4. Application of Knockeart-Feldman

[1.P] A computer program product that, when executing on one or more computers performs the steps of:

Knockeart discloses “a vehicle navigation system...includ[ing] an onboard computer”:

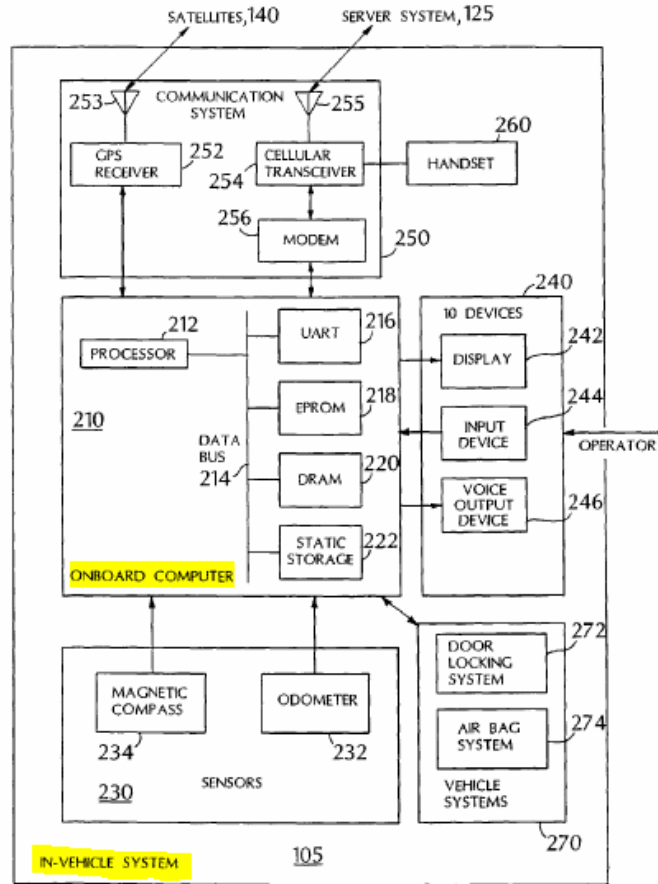


FIG. 2

GM-1004, [0038], FIG. 2 (annotated). “The onboard computer is programmed to perform” the functions of the Knockart-Feldman system. GM-1004, [0038]; GM-1003, ¶¶68-69. The “onboard computer 210 includes a processor” and memory storing “software components of in-vehicle system 105 which execute on onboard computer 210[.]” GM-1004, [0114], [0146]; *id.*, [0145]-[0147], [0166]-[0168], [0356]-[0357], [0403], claim 35.

[1.1] automatically receiving a current location; and

Knockart’s in-vehicle system “track[s] the location of the vehicle” such as by “receiving a reference signal from a positioning system, for example receiving

signals from GPS satellites, and computing position data related to the location of the vehicle using the received reference signal.” GM-1004, [0010]; *id.*, [0011]-[0014]. This includes “***receiving a specification of a first location*** which includes coordinates, such as latitude and longitude, of the first location.” *Id.*, [0014]. In another example, Knockeart describes receiving “location data related to the vehicle’s current location” and by the in-vehicle system communicating this information to the server system. *Id.*, [0176]; *see also id.*, [0071], [0075], [0086]-[0088], [0122] (“GPS receiver 252 repeatedly provides location-related information to onboard computer 210”); GM-1003, ¶70.

[1.2] presenting a roadway map of an area proximate the current location,

Knockeart’s server downloads a “spot map” to the vehicle such that “[t]he planned route is shown in conjunction with the spot map, as is the vehicle’s DGPS based location.” GM-1004, [0282]; *id.*, [0006]; GM-1003, ¶71. In another example, Knockeart describes that the in-vehicle system “receiv[es] from the server a map that includes a specification of the road network in the vicinity of the planned route” such as a map depicting “a ‘corridor’ around the planned route[.]” GM-1004, [0010]. The in-vehicle system “display[s] the received map in conjunction with a representation of the planned route, and a location of the vehicle.” *Id.*

[1.3] wherein the map includes at least one route from the current

location to a destination based at least in part on a traffic condition,

As discussed above, Knockeart's in-vehicle system displays "a map that includes a specification of the road network in the vicinity of the planned route" such as a map depicting "a 'corridor' around the planned route[.]" GM-1004, [0010]. Specifically, the in-vehicle system "display[s] the received map in conjunction with a representation of the planned route, and a location of the vehicle." *Id.*; *see also id.*, [0074] ("a starting location (or other location-related data), speed and heading, and a desired destination are uploaded from the in-vehicle system to the server system and then a planned route is downloaded from the server system to the in-vehicle system."); GM-1003, ¶74.

Knockeart further describes "collecting traffic information" including "receiving traffic related data from a set of vehicles and updating a traffic database using the received traffic related data." GM-1004, [0030]. The system then "plan[s] a ***route*** through the road network ***from a starting to a destination location using the speed information associated with the road segments.***" *Id.* For example, "traffic-related information...is used by server system 125 to determine a fastest route from a ***starting to a destination location.***" *Id.*, [0077]. That is, "server system 125 makes use of a traffic database 524 when planning routes that are based on expected travel time." *Id.*, [0317]; *see also id.*, [0315]-[0319], [0170] ("...link speeds that it uses for route planning"), [0004], [0089], [0254]-[0255],

[0351]. Knockeart also discloses that, in at least some embodiments, the starting location is the current location of the vehicle. GM-1004, FIG. 15A, [0086] (“vehicle’s starting location” determined based on GPS coordinates), [0176]; GM-1003, ¶¶72-73.

Knockeart goes on to describe that route planning uses information from a “link speeds database 1910, which includes expected travel speeds for all the links in main roads network 100.” GM-1004, [0330]. Probe vehicles can report exception messages to the server when “a traffic exception has occurred” such as “a travel speed along a link is substantially slower or faster than expected[.]” *Id.*, [0337]; *see also id.*, [0338]-[0342]. The server “updates traffic database 524, which it uses to plan routes, based on the exception messages it receives from the probe vehicles.” *Id.*, [0340]. The server uses traffic exception data to “reset[] its expected speeds for the links on which exceptions have been reported[.]” *Id.*, [0341]. As described above, these link speeds reflecting exceptional traffic conditions are used for route planning. *Id.*, [0170], [0316]-[0319], [0254]-[0255] (“the server system may know that certain links are congested with slower than expected speeds for their road classes” and “[t]he route planning algorithm would then tend to avoid such a congested link if there are alternative routes that can be taken.”), [0351]; GM-1003, ¶75.

[1.4] wherein the traffic condition is at least in part based on a plurality of cell phone speeds estimated through an assessment of

multiple locations of each of a plurality of cell phones,

Knockeart discloses use of a “traffic database,” which includes typical speeds that can be used in route planning, and can also include real-time data “obtained from probe vehicles[.]” GM-1004, [0170]; GM-1003, ¶76. The server system “makes use of some or all vehicles 100 as ‘probes’ for collecting traffic information” which is fed into the traffic database. GM-1004, [0318]; GM-1003, ¶77. The server system can also “send[] updated traffic information to the external information system,” so that the “vehicle navigation system can be a source of traffic information in addition to, or instead of, being a consumer of traffic information from external information system 130.” GM-1004, [00318]. “[T]raffic ‘profile’ data is collected by the in-vehicle systems in probe vehicles.” *Id.*, [0319]. “At the server system, navigation application 512 receives the logged speed information from a number of probe vehicles” and “[u]sing this collected information, the navigation application updates traffic database 524.” *Id.*, [0325]; GM-1003, ¶¶78-79.

Navigation applications executed by the in-vehicle systems “collect[] on an ongoing basis a history (a profile) of the speed that the vehicle travels on links of the main roads network (or equivalently the transit times on the links).” GM-1004, [00321]. Knockeart further discloses that probe vehicle speeds are estimated through an assessment of multiple locations of each of the probe vehicles. GM-

1003, ¶78. For example, “the in-vehicle system *tracks the vehicle’s location* on main roads network 1000 that is stored in in-vehicle database 432.” GM-1004, [0322]. The in-vehicle system uses, for example, “GPS location estimates” to determine vehicle locations. *Id.* Using this vehicle location information, “[t]he in-vehicle system records the time the vehicle takes to travel from one end to the other of the link and stores a reference to the link, the time of day, and the speed traveled along the link in the link speed log.” *Id.* This link speed information is then provided to the server, such as “over a cellular telephone connection with the server system.” *Id.*, [0323]; GM-1003, ¶78.

In another example, the in-vehicle system in a probe vehicle can “detect when the vehicle’s speed is significantly slower than would be expected based on the class of road being traveled, on or based on traffic related data that is stored in the vehicle and which relates the expected speed to the road segment being traveled on,” and “immediately reports the exception to the server system so that the server system can update its traffic database 524 to reflects[sic] unexpected traffic conditions.” GM-1004, [0319].

To the extent Knockeart does not explicitly disclose the use of cell phone speeds estimated through an assessment of multiple locations of each of a plurality of cell phones, as described in Section III(A)(3), *supra*, in the Knockeart-Feldman combination, vehicle-carried cellular phones are used as probes to populate at least

some of the traffic information in the traffic database. GM-1003, ¶80. Feldman describes that it was known to collect traffic data using “mobile sensors or electronic devices physically located in or attached to vehicles[.]” GM-1005, [0007]. Such known mobile sensors included “mobile wireless devices such as *cellular telephones*” that provided “dynamic *vehicle location and velocity data* and information[.]” *Id.*, [0008]; *see also id.*, [0009], [0035]-[0036], [0038], [0053]. In the Knockeart-Feldman system, as taught by Feldman in its background section, cellular phone probe information is used for “*calculating velocities of vehicles*, for example, by *acquiring series of exact locations* of the vehicles located along roads in known time intervals[.]” *Id.*, [0005]; GM-1003, ¶81. In another example, Feldman describes that “[t]hose cellular phones that are suspected as being ‘vehicle-carried’ are immediately *tracked for their locations*[.]” GM-1005, [0061]. “The tracking of the ‘moving’ phones is done by *polling their locations in known time intervals*.” *Id.*, [0062]. This cell phone location data is then used to calculate “a mean normalized travel time (NTT) value for each oriented road section[.]” *Id.*, [0066]. A POSITA would have recognized that such road link travel times would have been used to determine probe vehicle speeds in the combined system, as discussed above as “speed” is a comparison of time to distance. GM-1003, ¶81. Specifically, “normalized travel time refers to a travel time normalized with respect to *a pre-determined distance*” which a POSITA

would have recognized as providing, or at least rendering obvious, an estimated speed for the cell phone. GM-1005, [0055]; GM-1003, ¶81. For example, Feldman describes calculating “the velocity of a given vehicle on the different road sections of the identified path[.]” GM-1005, [0055]. “A statistical processing of the velocities of all mobile sensors 62 that traveled on a specific oriented road section during the time period of an assessment cycle yields a normalized travel time (NTT) value...on that specific oriented road section[.]” *Id.*

[1.5] wherein each of the plurality of cell phones further has a user initiated permission set comprised of a list of authorizations that permit a user to selectively enable or disable access to user cellphone location data.

As discussed above, Knockart describes using vehicles as probes to collect traffic data, which, in the Knockart-Feldman combination, includes using vehicle-carried cell phones as probes. GM-1004, [0318]-[0319]; GM-1005, [0061] (“***cellular phones*** that are suspected as being ‘vehicle-carried’ are immediately tracked for their locations” to calculate travel times for road segments); *id.*, [0062]-[0066]. Knockart discloses that “[t]wo modes of data collection are used” for collecting probe vehicle location/speed data. GM-1004, [0319]; GM-1003, ¶83. Furthermore, “[t]he operator of the vehicle has the option of **enabling or disabling either mode of data collection through the user interface** of the in-vehicle system.” GM-1004, [0324], *see also* GM-1005, [0064] (discussing requiring “the knowledge and consent of the[] drivers” before “[t]racking vehicles”). A POSITA

would have recognized from this disclosure that Knockeart provides that each cell phone in the Knockeart-Feldman combination has a user initiated permission set comprised of a list of authorizations that permit a user to selectively enable or disable access to user cellphone location data. GM-1003, ¶84. Specifically, a POSITA would have recognized that a user interface that presents options for “enabling or disabling” multiple modes of location data collection provides the claimed “list of authorizations” for selectively enabling or disabling access to user cellphone location data. *Id.*, ¶85. Further, as Dr. Braasch explains, “protection of a user’s private information, including location information, was a known concern well before 2004 and a POSITA would have been aware of many prior art references disclosing user interfaces that allowed users of mobile devices” to protect their location information. GM-1003, ¶82; *see also id.*, ¶¶39-45.

Knockeart further describes that the user interface of the in-vehicle cellular phone probes in the resulting Knockeart-Feldman combination “includes multiple push buttons associated with display 242” that allow the user “to *select alternatives* shown on display 242, or to scroll the *list* of displayed alternatives” when selecting between multiple available options. GM-1004, [0118], *see also* [0032] (“accepting a selection from the *list* of categories”), [0211] (“...scrolling lists from which the operator chooses”), [0219] (“...selecting from a displayed list of choices”), [0230]. A POSITA therefore would have recognized that the

multiple available options for “enabling or disabling” probe location data collection described by Knockeart would have been provided as a “list of displayed alternatives” in the Knockeart-Feldman combination to allow the user to scroll the available options to select one of the available options. GM-1003, ¶¶85-86; GM-1004, [0324], [0118]. Alternatively, it would have been obvious to provide the options provided by Knockeart’s user interface for enabling or disabling the multiple modes of location data collection as a “list” based on Knockeart’s teachings for scrolling lists of available options presented by the user interface because the in-vehicle systems of probe vehicles (implemented as cell phones in the Knockeart-Feldman combination) are expressly described as presenting lists for allowing users to make selections and therefore implementing the “enabling or disabling” options using such lists would have eliminated the need for developing another method of allowing such user selection. GM-1003, ¶¶87-88.

[2] The computer program product of claim 1, wherein each of the plurality of cell phones communicates its respective locations through a cellular network infrastructure to a server for calculation of the traffic condition.

As described in Section III(A)(3), *supra*, in the Knockeart-Feldman system, vehicle-carried cell phones are used to provide at least some of the traffic data in the database, as taught by Feldman. GM-1003, ¶89. Feldman discloses that “mobile sensors or electronic devices provid[e] dynamic ***vehicle location*** and velocity data and information ***to the computerized central traffic data and***

information handling system.” GM-1005, [0035]; *see also id.*, [0053], [0071].

These mobile devices include “cellular phones.” *Id.*, [0053]. Feldman further discloses that “[d]ata acquisition from cellular phones is controlled by a server connected to a particular *cellular phone network.*” GM-1005, [0060]; *id.*, [0061] (“cellular phones that are suspected as being ‘vehicle-carried’ are immediately tracked for their locations”); GM-1003, ¶¶89-90; *see also* GM-1004 [0074], [0078], [0086] (communication between in-vehicle system and the server over a cellular network infrastructure). Feldman further discloses that “processing steps” for “calculating a mean normalized travel time (NTT) value for each oriented road section” “take[s] place in a server” using the obtained cell phone location data. GM-1005, [0065]-[0066].

Additionally or alternatively, Knockeart discloses that the in-vehicle system (implemented in whole or in part as a cell phone in the Knockeart-Feldman system) “*tracks the vehicle’s location* on main roads network” using “GPS location estimates it receives from its GPS receiver[.]” GM-1004, [0322].

Knockeart describes that the in-vehicle system uses this location information to determine “the time the vehicle takes to travel” each link and records “a reference to the link, the time of day, and the speed traveled along the link in the link speed log.” *Id.* While this embodiment describes the travel time and speed calculations as being performed by the in-vehicle system, a POSITA would have recognized

that it would have been obvious to transmit the raw location data to the server to allow the server to calculate the travel times and speeds on each link for each vehicle (per Feldman's suggestion). GM-1003, ¶91. Such an implementation would have allowed for processing needs to be shifted to the server, thereby reducing the amount of processing and memory capacity required for the in-vehicle system. *Id.* This would have especially been beneficial in the Knockeart-Feldman combination in which the in-vehicle systems for probe vehicles are implemented as cell phones. *Id.* Additionally, "when [] there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp." *KSR*, 550 U.S. at 421. Here, there are only two options for the location at which the travel time and speed of each probe vehicle is determined using location data: at the vehicle or at the server. GM-1003, ¶91. Therefore, it would have been obvious to move such functionality to the server. GM-1003, ¶¶91-92. For example, Knockeart describes an embodiment in which "the in-vehicle *system provides the vehicle's location to the server system*[" GM-1004, [0390]. Knockeart further discloses that in-vehicle system communicates wirelessly with the server over a cellular network. *Id.*, [0074], [0078], [0086].

[3] The computer program product of claim 1, wherein each of the plurality of cell phones communicates its respective speed through a cellular network infrastructure to a server for calculation of the traffic condition.

Feldman discloses that in the predictable combination “mobile sensors or electronic devices provid[e] dynamic vehicle location and *velocity data* and information *to the computerized central traffic data and information handling system.*” GM-1005, [0035]; *see also id.*, [0013]. This data is communicated over a cellular network infrastructure. GM-1005, [0060]-[0061]; GM-1003, ¶¶93-94. As described above, in the Knockeart-Feldman combination, the “mobile sensors or electronic devices” are cell phones. GM-1005, [0008]-[0009], [0035]-[0036], [0038], [0053]. Similarly, Knockeart discloses that the in-vehicle system records “a reference to the link, the time of day, and the *speed traveled* along the link in the link speed log” for each link traversed and “sends the logged profile information it has stored in link speed log 1920 *to the server system...over a cellular telephone connection* with the server system.” GM-1004, [0322]-[0323], [0325] (“*At the server system*, navigation application 512 *receives the logged speed information* from a number of probe vehicles”), [0336]-[0338], [0347]-[0348]. Knockeart further describes the in-vehicle system transmitting data “identifying the link and the *travel speed, to the server system*” to identify “traffic exception[s].” *Id.*, [0338]; GM-1003, ¶¶95-96.

[4] The computer program product of claim 1, wherein access to user cellphone location data is granted following a confirmation of at least one entry on the list of authorizations.

Knockeart discloses that the user devices include a user interface that allows the user to “scroll the list of displayed alternatives” and “*select alternatives*” when navigating menus to make selections. GM-1004, [0118], [0032], [0211], [0219], [0230]. This includes “*enabling or disabling*” location data collection for the user’s in-vehicle system. GM-1004, [0324]. Specifically, “[t]he operator of the vehicle has the option of *enabling or disabling*” location data collection. *Id.* A POSITA would have recognized that selecting the alternative to enable collection of location data provides confirmation of at least one entry on the list of authorizations and that such a selection would have granted access to user cellphone location data in the Knockeart-Feldman combination in which at least some of the probe devices are vehicle-carried cell phones. GM-1003, ¶¶97-98.

[5] The computer program product of claim 1, wherein the user initiated permission set is accessed through a user interface presented on a user device.

Knockeart discloses “[t]he operator of the vehicle has the option of *enabling or disabling* either mode of data collection *through the user interface* of the in-vehicle system.” GM-1004, [0324]; GM-1003, ¶99. The claims do not require the “user device” to be distinct from the “cell phone” from which the location data is collected. GM-1003, ¶99.

However, to the extent that claim 5 is read narrowly such that the user device is distinct from the cell phone from which the location data is collected,

such functionality would have been obvious based on the teachings of the Knockeart-Feldman combination. GM-1003, ¶¶100-102. For example, Knockeart discloses “individual operators can have stored profiles that are stored in the vehicle and may have corresponding storage on the server system.” GM-1004, [0237]. The server system “includes a remote configuration system” accessible over the Internet that the user can access to “modify their records in user profiles 2232 that are stored at the server system.” *Id.*, [0405]. A POSITA would have recognized from this disclosure that the user would have been able to access the profile from any internet connected device, such as a cell phone or computer distinct from the location information collecting cell phone, to “modify” the user profile. GM-1003, ¶101; GM-1004, [0408] (“The user can access the remote configuration system in a variety of ways, including over the Internet”).

Alternatively, it would have been obvious to allow the user to modify the profile from other computing devices other than the location information-collecting cell phone to increase user convenience. GM-1003, ¶102. For example, such access would have allowed for modification of the profile with a keyboard and mouse enabled device, to make modifications to the profile quicker and easier. *Id.* “A user’s profile is downloaded by the server system to the in-vehicle system in that user’s vehicle, or can alternatively be stored on the server system.” GM-1004, [0405]. To the extent Knockeart does not expressly disclose that the user selected

options for enabling or disabling location tracking are stored as part of the user profile, it would have been obvious to store such information in the user profile.

GM-1003, ¶102. Knockeart states that “[i]nformation in the user profiles can include *various types of information*[.]” GM-1004, [0405]. A POSITA would have recognized that it would have been beneficial to include the user’s preference for enabling or disabling location tracking in the user profile so that the user did not need to enter such a selection every time the user enters a new destination.

GM-1003, ¶102. Additionally, the user profile data structure already exists and therefore a new, additional data structure for storing such user selection information would not need to be created from scratch. GM-1003, ¶102.

[6] The computer program product of claim 1, further comprising receiving a navigation request to assist a driver in navigating to the destination.

Knockeart discloses “a navigation system for accepting *route planning request* from the vehicles[.]” GM-1004, [0041]; GM-1003, ¶103. For example, “the user provides a destination specification to the remote configuration system and the server system downloads a planned route to the destination” as part of a “route planning request[.]” GM-1004, [0408], *see also* [0072] (“...enable an operator of a vehicle to specify a desired destination, and then to be guided by the system to that destination”), [0073]-[0074], [0084]-[0090].

[7] The computer program product of claim 1, wherein the plurality of cell phones is selected from a candidate set of cell phones in an area proximate the route.

Knockeart describes “***enabling a subset of an available set of probe vehicles*** to provide the traffic related data[.]” GM-1004, [0031]. For example, Feldman describes that in the predictable combination, selecting a “sample population” of cell phones from a “huge” number of available probe cell phones. GM-1005, [0058]; GM-1003, ¶106. “The choice of sample units is done by making sure that they are in high probability moving-vehicle-carried” to create an “initial choice of sensor population[.]” GM-1005, [0059]. Subsequently, “[t]hose cellular phones that are suspected as being ‘vehicle-carried’ are immediately tracked for their locations.” *Id.*, [0061]. The system then selects a subset of the subset of available cellular phones by “filter[ing] out cellular phones that are recognized as ‘noise’ such as by removing “cellular phones that stopped moving.” *Id.*, [0062]. “Once the ‘moving’ sensors are identified, method/system 10 ***includes them in the sample population***[.]” *Id.*, [0063]. Feldman additionally discloses that the estimated link travel times derived from probe vehicle information is used in “finding optimal routes between given points,” and therefore a POSITA would have recognized that the subset of probe cell phones would be cell phones located in an area proximate the route as this link speed information is the information that

is relevant to planning the route. *Id.*, [0099]; *see also id.*, [0100]-[0101]; GM-1004, [0030], [0077], [0170], [0315]-[0319]; GM-1003, ¶¶104-106.

[9] The computer program product of claim 1, wherein the destination is received from a source that is remote from a device on which the roadway map is presented.

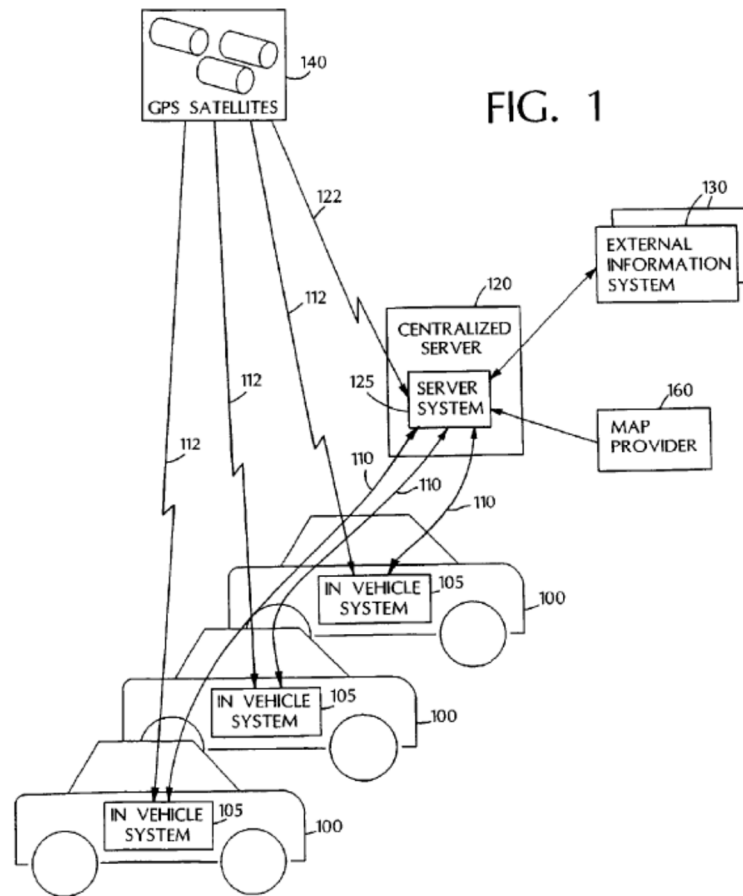
Knockeart's server system "includes a ***remote*** configuration system" accessible over the Internet that the user can access to "modify their records in user profiles 2232 that are stored at the server system." GM-1004, [0405]. This information can include "a list of frequent destinations [specified] over the Internet[.]" *Id.* "A user's profile is ***downloaded*** by the server system ***to the in-vehicle system*** in that user's vehicle, or can alternatively be stored on the server system." *Id.* The user can "later in the vehicle choose a particular destination in that list by selecting from a display of the list by the in-vehicle system." *Id.*; *see also* [0408]. Thus, the destination is received (as part of the user profile) from a remote source. GM-1003, ¶¶107-109. As previously discussed, the roadway map is presented on the in-vehicle system. GM-1004, [0010]-[0011], [0282], [0074]; GM-1003, ¶107.

As another example, the user specifies a point of interest ("yellow pages") category and "the server downloads the specific listings in the selected yellow pages category to the in-vehicle system" and [t]he operator then selects from the downloaded list." GM-1004, [0231], [0230], [0181]; GM-1003, ¶109.

[10] The computer program product of claim 1, further including a triangulation system.

[12] The computer program product of claim 10, wherein the triangulation system includes global positioning system (GPS) triangulation.

“[T]he location of the vehicle can be estimated using the Global Positioning System (GPS). In GPS, *multiple satellites* emit signals that allow an in-vehicle GPS receiver to *estimate its absolute location*.” GM-1004, [0007]; *id.*, [0012]-[0014], [0071], [0075], [0086]. A POSITA would have recognized that estimating an absolute location from signals received from multiple satellites is a form of triangulation and thus Knockeart-Feldman provides claims 10 and 12. GM-1003, ¶¶110-113 (citing GM-1011, 2 (“A receiver that picks up three (four is better) [GPS satellite] signals can then determine a precise location on the surface of the earth through the technique known as ‘triangulation.’”); GM-1012, 1).



GM-1004, FIG. 1.

[13] The computer program product of claim 1, wherein the map includes a visual indication of traffic on the route.

Knockeart discloses determining “the *current traffic conditions on the operator’s trips*” and that “the traffic conditions are categorized into a small number of categories, such as normal, congested, and severely congested, and each category is *displayed graphically to the operator using a different icon.*” GM-1004, [0394]. A POSITA would have recognized that displaying traffic data on the

links “on the operator’s trips” provides this claim. GM-1003, ¶114; GM-1004, [0006], [0010]-[0011], [0074].

[14] The computer program product of claim 1, further comprising providing an estimation of how much time is predicted to travel through the traffic condition.

Knockeart discloses identifying link travel times for each link in the route. GM-1003, ¶115. Specifically, the server system “plan[s] a ***route*** through the road network from a starting to a destination location ***using the speed information associated with the road segments.***” GM-1004, [0030]; *id.*, [0077], [0089], [0254], [0315]-[0319], [0337]-[0342]. The “link speeds database...includes expected travel speeds for all the links in main roads network 100.” *Id.*, [0330]. The system can plan routes “based on ***lowest expected travel time***” along the route. *Id.*, [0254]. A POSITA would have recognized that the combined expected travel speeds/times for each link along the planned route is one of numerous examples in Knockeart that provide the claimed “traffic condition.” GM-1003, ¶115.

Knockeart further describes “display[ing] characteristics” of available routes, such as “time” to traverse the route. GM-1004, [0413], *see also* Claim 24 (“notifying the user according to an estimated travel time to the destination”); GM-1003, ¶116. A POSITA would have recognized that displaying a traversal time for the route (for which travel times for each link have been determined) discloses providing an

estimation of how much time is predicted to travel through the traffic condition.

GM-1003, ¶116.

[15] The computer program product of claim 1, wherein the traffic condition is a historical traffic condition.

Knockeart describes that each probe vehicle system “collects on an ongoing basis ***a history*** (a profile) ***of the speed that the vehicle travels*** on links of the main roads network[.]” GM-1004, [0321], [0243]. This historic speed data is stored along with a “time of day” that the link was traversed. *Id.*, [0321]-[0322].

Knockeart further describes that the system stores the “expected” link travel speed according to “time of day.” *Id.*, [0337]. In a further example, Knockeart discloses that “[m]ultiple travel times are stored for each link, for instance, to account for the variations due to ***morning and evening busy periods.***” *Id.*, [0330]; *see also id.*, [0336] (describing storing start and end times of “busy period[s]” and “[e]xpected speed” during such times for each link). The ’028 patent identifies travel time at a particular “time of day” as an example of the claimed “historical traffic condition.” GM-1001, 6:60-7:3, 18:23-27; GM-1003, ¶117.

Feldman expands on Knockeart’s disclosure, describing that the system collects “***historical and/or event related vehicular traffic data and information.***” GM-1005, [0014]; *id.*, [0036], [0053], [0084]-[0085], [0090]-[0093], [0100]. The link travel time prediction tools “are products of the analysis of ***historical*** vehicular traffic data and information.” *Id.*, [0092]. Feldman uses this “historical

vehicular traffic data and information” to, among other things, identify “correlation and interrelation of the vehicular traffic situation picture between different oriented road sections as a function of time.” *Id.*, [0093]. This information is also used to identify historic “behavior pattern[s]” of each road section “as a function of time, for example, during minute and hourly progression of a day.” *Id.*, [0092]. The system can thereby identify a traffic “behavior pattern” for each road segment “in different circumstances, such as different days of the week, holidays, special events, weather conditions, and so on.” *Id.*; GM-1003, ¶118.

A POSITA would have recognized that historic travel information for each of (i) time of day, (ii) day of the week, (iii) holidays, (iv) special events, and (v) weather conditions provide examples of the claimed historical traffic condition. GM-1003, ¶119. A POSITA would have applied this teaching of Feldman to the Knockeart-Feldman combination (and would have had a reasonable expectation of success in doing so) to account for each of the historic events described by Feldman when determining link travel speeds/times (in addition to Knockeart’s expressly discussed “morning and evening busy periods”) because doing so would have increased the functionality of the resulting system by allowing predicted travel speeds/times to account for a wider array of historical events, thereby improving the accuracy of travel speed/time predictions. *Id.*; GM-1004, [0330]-[0335]; GM-1005, [0092]. Additionally, such a modification would have provided

additional useful information to both the system and drivers when selecting a route to the destination. GM-1003, ¶119. Such a modification is also merely the application of a known technique to a known system ready for improvement to yield predictable results. *Id.* Indeed, Knockeart expressly contemplates that “other types of intervals” other than busy periods of the day “can be used to store the speed information.” GM-1004, [0336]; GM-1005, [0092].

[16] The computer program product of claim 15, wherein the historical traffic condition includes traffic information based at least in part on an event recorded at a time of the historical traffic condition, and wherein the at least one route from the current location to the destination is further based at least in part on a comparison of the event recorded at the time of the historical traffic condition and a currently occurring event.

The '028 patent discloses that examples of events recorded at a time of the historical traffic condition include “time of year, time of day, type of day, holiday information, weekend information, construction information, school vacation information, and accident information.” GM-1001, 6:60-7:3; *id.*, 18:23-27. As discussed with respect to claim [15], *supra*, the Knockeart-Feldman combination tracks historical traffic conditions (road segment travel time/speed) for just such events, including time of day “different days of the week, holidays, special events, weather conditions, and so on.” GM-1005, [0092]; GM-1004, [0321]-[0322], [0330]-[0337] (“Expected speed” for road segments at various times of day); GM-1003, ¶¶120-122.

Knockeart also discloses comparing the event recorded at the time of the historical traffic condition and a currently occurring event to identify exceptional traffic conditions. GM-1003, ¶123. For example, the system records historic travel times according to time of day events (morning and evening “busy period[s]”) and then the system “detects that a traffic exception has occurred if a travel speed along a link is *substantially slower or faster than expected* (e.g. 75% of the expected speed or slower) for that link *at that time of day.*” GM-1004, [0330]-[0337]. A POSITA would have recognized that this disclosure indicates a comparison of the current travel time (currently occurring event) to the historic travel time for that time of day (event recorded at a time of the historical traffic condition) to identify the traffic exception. GM-1003, ¶123.

When the in-vehicle system identifies such a traffic exception, it reports the exception to the server system. GM-1004, [0338]-[0340]. The server system uses this traffic exception information and “updates traffic database 524, *which it uses to plan routes*[.]” *Id.*, [0340]. A POSITA would have recognized that because the traffic exception detected based on a comparison of the currently occurring event and the event recorded at the time of the historical traffic condition is used to update travel times used to plan routes for vehicles, this provides the claim recitation of: wherein the at least one route from the current location to the destination is further based at least in part on a comparison of the event recorded at

the time of the historical traffic condition and a currently occurring event. GM-1003, ¶124. Knockeart’s “server system resets its expected speeds for the links on which exceptions have been reported after a period of time when no more exceptions are reported by probe vehicles for those links.” GM-1004, [0341]-[0342].

Feldman similarly discloses accounting for historical traffic conditions. *See* GM-1005, [0092] (“Every oriented road section has its own behavior pattern, and different behavior patterns describe the behavior in different circumstances, such as different days of the week, holidays, special events, weather conditions, and so on.”). Just as in Knockeart, Feldman discloses that “while regular situations are handled with these tools, unexpected vehicular traffic developments are identified from the current vehicular traffic situation pictures by ***comparing them to regular vehicular traffic behavior patterns.***” GM-1005, [0095]. That is the most “recently calculated NTT values on each oriented road section is compared to the [historical] pattern that describes the behavior of this oriented road section.” *Id.* A “significant discrepancy from the pattern activates a respective correction of the NTT values” used to calculate fastest routes in the Knockeart-Feldman combination. *Id.*; GM-1003, ¶¶125-126. Feldman goes on to provide details on using such identified discrepancies (based on comparison of current and historic traffic conditions during similar events) to identify “a major event with prolonged

influence” to correct NTT values used to identify fastest routes over a correction period. GM-1005, [0095]-[0098]; GM-1003, ¶126.

[17] The computer program product of claim 16, wherein the event is a weather condition.

Feldman discloses that in the Knockeart-Feldman combination, the event can include “weather conditions.” GM-1005, [0092], [0095]; GM-1003, ¶127.

[18] The computer program product of claim 16, wherein the event is a time of day.

Knockeart discloses that in the Knockeart-Feldman combination, the event can include a “time of day” such as “morning and evening busy periods.” GM-1004, [0330]-[0337], [0321]-[0329]; *see also*, GM-1005, [0092], [0095]; GM-1003, ¶128.

[19] The computer program product of claim 16, wherein the event is a day of a week.

Feldman discloses that in the Knockeart-Feldman combination, the event can include a “day[] of the week.” GM-1005, [0092], [0095]; GM-1003, ¶129.

[20] The computer program product of claim 16, wherein the event is a day of a year.

[21] The computer program product of claim 16, wherein the event is a holiday.

Feldman discloses that in the Knockeart-Feldman combination, the event can include a “holiday[.]” GM-1005, [0092], [0095]; GM-1003, ¶¶130-131. A POSITA would have recognized that tracking traffic conditions on particular

“holidays” provides, or at least renders obvious, that the event is a day of a year because holidays are generally understood as annually occurring days of the year and a POSITA would have recognized that such days of the year would likely have abnormal traffic patterns compared to typical traffic patterns. GM-1003, ¶130. Therefore, the Knockeart-Feldman combination provides both claims [20] and [21].

[25] The computer program product of claim 1, wherein the traffic condition is a real time traffic condition that represents traffic on the route at a time when the roadway map is presented.

Knockeart discloses that the routes are planned at least in part on “***current traffic information*** for the operator’s trips.” GM-1004, [0392]. Specifically, “[t]he server system uses its traffic database, which include ***current link speeds*** on segments of the road network, to determine the ***current traffic conditions*** on the operator’s trips.” *Id.*, [0394]. Such real time traffic conditions representing traffic on the route at a time when the roadway map is presented include “traffic exception[s]” reflecting that the current “travel speed along a link is substantially slower or faster than expected” as compared to historic travel data. *Id.*, [0337]; GM-1003, ¶132.

Feldman similarly discloses identifying “***current*** vehicular traffic situation pictures” using “several ***recently calculated*** NTT values on each oriented road section[.]” GM-1005, [0094]-[0095]. In the Knockeart-Feldman combination, this

“current vehicular traffic situation picture” is used to “provid[e] a variety of vehicular traffic related service applications to end users” including a fastest route to the destination. *Id.*, [0097], [0098]-[0099], [0100] (describing generating “[a] recommendation based on the current vehicular traffic situation picture” for “route recommendation types of traffic related service applications”); *see also id.*, [0018], [0102], Abstract, Claim 1; GM-1003, ¶133.

[26] The computer program product of claim 1, wherein the roadway map further comprises a second route to the destination such that a user can select the second route as an alternate route through a user interface.

Knockeart describes an embodiment in which “the server system plans and downloads ***several routes***, for instance planned according to different criteria, such as shortest time, shortest distance, etc.” and “[t]he in-vehicle system displays characteristics of the alternatives (e.g., time, distance) and ***the operator selects one.***” GM-1004, [0413]. Knockeart further renders obvious displaying the second route on the roadway map. GM-1003, ¶134.

[29] The computer program product of claim 1, further comprising, presenting a user interface to save a future destination for future choosing, wherein the future choosing selects the saved future destination and forms the destination.

Knockeart discloses that the vehicle operator can identify a “desired destination” for a current trip by selecting from “***a list of previously stored destinations*** in a user’s ‘profile’” or “a list of recently specified destinations.”

GM-1004, [0211], [0217]-[0218]. Knockeart explains that “profiles that are stored in the vehicle” or “on the server system...can *hold typical destinations*, such as ‘work,’ ‘home,’ ‘airport,’ etc. for which *the operator has previously specified particular locations*.” *Id.*, [0237].

Knockeart’s system “includes a remote configuration system” accessible over the Internet that the user can access to “modify their records in user profiles 2232 that are stored at the server system.” *Id.*, [0405]. The profile can store previously entered destinations that the operator can select to set the destination for a current trip from previously entered destinations or “a list of frequent destinations.” *Id.*

A POSITA would have recognized from these disclosures of Knockeart that the user specifies the list of frequent destinations over the Internet using a user interface including an input device such as “multiple push buttons” or “an alphanumeric keyboard.” GM-1003, ¶¶135-137; GM-1004, [0118], [0223]. Alternatively, it would have been obvious to use a user interface to enter destinations for storage as part of the user profile because user interfaces were well-known (including being described throughout Knockeart) and would have provided a known and convenient way to enter the frequent destinations. GM-1003, ¶137. Additionally, a POSITA would have recognized that the above-mentioned “recently specified destinations” would have been previously entered

using a presented user interface described by Knockeart. *Id.*; GM-1004, [0210]-[0219] (describing a user interface including “scrolling lists from which the operator chooses” options for entering a destination), [0118] (describing the system user interface).

[31] The computer program product of claim 1, further comprising a warning system adapted to warn a driver traveling on the route of the traffic condition, wherein the warning is based on a proximity of the driver, as determined by the current location, to an adverse traffic condition.

As discussed above, Knockeart’s server system “provides current traffic information for the operator’s trips” to the in-vehicle system. GM-1004, [0392]. “If the received traffic data indicates an exceptional traffic condition on the specified path, ***the user is notified of the traffic condition.***” *Id.*, [0042]. The system can also “actively contact[] a user if an exceptional traffic condition occurs on one of the user’s previously specified trips” such as through a pager message, email, or telephone call. *Id.*, [0395]. Feldman describes providing “***alerts*** and route alterations when ***unexpected traffic events*** change the vehicular traffic situation picture.” GM-1005, [0099]; *id.*, [0101] (“...providing traffic alerts and alternative route recommendation types of traffic related service applications to end users”). Feldman describes that “an alert is sent to the driver” for an “‘unexpected’ traffic event” even if the event is “way off the recommended route”

if it is within a close enough proximity to the driver to affect the route. *Id.*, [0101]; GM-1003, ¶¶138-139.

B. [GROUND 2] – Obviousness based on Knockart-Feldman-Simske (Claims 7-8)

1. Simske

Simske describes “a navigation routing system” that, similar to Knockart and Feldman, identifies current traffic conditions “[b]ased on GPS tracking information obtained from other GPS-enabled devices along various available navigation routes” and uses this information along with information on “historical traffic flow patterns” to determine “a time-optimized navigation route” to one or more destinations. GM-1006, [0004]-[0005], [0012]. As in Feldman, the GPS-enabled devices “may comprise a portable telephone[.]” *Id.*, [0013]. Simske’s system “determines a travel time for each available route identified by route calculator 52 *using GPS-based tracking information for devices 14 traveling along the identified available routes.*” *Id.*, [0015]. The system is “configured to automatically monitor and acquire GPS information corresponding to each GPS-enabled device **14** within a particular operating region.” *Id.*, [0023], [0025]. The navigation system “access[es] position data 80 for each device 14” in the “operating region” and from this set of probe devices “*identifies particular devices 14 traveling along available navigation routes* identified by route calculator 52” and determines traffic flow rates from the identified devices along

the routes to identify the fastest route. *Id.*, [0026], [0027]-[0030]; GM-1003, ¶¶140-141.

2. Application of Knockeart-Feldman-Simske

[7] The computer program product of claim 1, wherein the plurality of cell phones is selected from a candidate set of cell phones in an area proximate the route.

[8] The computer program product of claim 7, wherein the selection of the plurality of cell phones from the candidate set of cell phones is based at least in part on a comparison of a location of each of the plurality of cell phones to a location of the route.

As discussed above, Feldman teaches that the mobile sensors for determining traffic conditions along route segments include “mobile wireless devices such as cellular telephones[.]” GM-1005, [0008]; *see also id.*, [0007]-[0010], [0035]-[0038], [0053], [0061]-[0062]. Simske demonstrates that in the Knockeart-Feldman-Simske combination, the navigation system starts with a set of candidate mobile sensor devices within “a particular geographic region” near the vehicle requesting navigation guidance and then selects a set of “***particular devices 14 traveling along available navigation routes identified by route calculator***” from the candidate set of devices. GM-1006, [0016], [0023]-[0026]; GM-1003, ¶¶145-146. These identified routes are “routes associated with the desired travel destinations” calculated “from a current location” of the requesting vehicle and therefore the plurality of probe cell phones from the candidate set is based at least in part on a comparison of the location of the cell phones (along the

identified routes) to a location of the route (the current location and one or more destinations for the route). GM-1006, [0012], [0015], [0020]; GM-1003, ¶146. Similar to the disclosures of Knockeart and Feldman, Simske confirms that information from the identified probe devices is used “to determine flow rate data 84 for each available navigation route.” GM-1006, [0026].

A POSITA would have been prompted to modify Knockeart-Feldman based on Simske to select cell phones located in vehicles along the available routes to the destination(s) for measuring traffic flow of various route options from the set of available candidate devices to achieve known benefits and would have had a reasonable expectation of success in applying such a modification. GM-1003, ¶142. For example, a POSITA would have recognized that using only traffic flow data from devices located on or along available routes to the destination (rather than traffic flow data from all available probe devices) would have reduced the amount of traffic data needed to be stored in volatile memory and processed to calculate a best route, thereby saving both memory and processing resources. *Id.* Such a modification would have also saved communication resources by reducing the amount of traffic flow data that would need to be transmitted between various devices and processors of the resulting system. *Id.*, ¶143. Such a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results. *Id.*, ¶144; *KSR*, 550

U.S. at 417. Indeed, using only relevant data when making such a determination would have been recognized as a best practice in designing such a system. GM-1003, ¶144.

C. [GROUND 3] – Obviousness based on Knockart-Feldman-Whitsell (Claims 10-11, 30)

1. Whitsell

Whitsell describes a “real-time traffic and navigation guidance” system that utilizes “cellular telephones...to provide route- and location-specific traffic information.” GM-1007, 2:56-66. These “mobile devices are used to learn commonly traveled routes by periodically monitoring and recording location and, optionally, corresponding time-of-day information,” and “[t]hus, a mobile device associated with a given motorist or vehicle can be used to develop a record of traveled routes, possibly with associated travel times and destination information, for that motorist.” *Id.*, 2:62-3:2; *id.*, 6:19-30. Each mobile device can “determine its own location based on triangulating signals received from geographically dispersed communication towers 12 associated with the wireless communications network 40.” *Id.* 7:39-49.

2. Application of Knockart-Feldman-Whitsell

[10] The computer program product of claim 1, further including a triangulation system.

[11] The computer program product of claim 10, wherein the triangulation system includes cell phone tower triangulation.

Whitsell demonstrates that in the Knockeart-Feldman-Whitsell combination, each probe cell phone can “determine its own location based on triangulating signals received from geographically dispersed communication towers 12 associated with the wireless communications network 40.” GM-1007, 7:39-43; GM-1003, ¶¶154-155.

A POSITA would have been prompted to modify Knockeart-Feldman based on Whitsell to include a cell phone tower triangulation system and would have had a reasonable expectation of success in doing so. GM-1003, ¶¶148-151. For example, cell phone tower triangulation, as taught by Whitsell, would have allowed the devices to determine their locations in dense urban environments or mountainous regions where buildings or natural features can block GPS signals, making GPS somewhat unreliable. *Id.*, ¶149. Cell tower triangulation would have led to more accurate location determination in some scenarios in such environments. Cell phone triangulation would have also provided a backup location determination method in the event of failure of the GPS system. *Id.*, ¶150. Such a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results. *Id.*, ¶¶151; *KSR*, 550 U.S. at 417.

[30] The computer program product of claim 1, wherein the route is further based at least in part on a prior recording of an actual route traveled from a location proximate the current location to the destination by a user represented by a device at the current location.

Whitsell teaches that in the Knockeart-Feldman-Whitsell combination, “mobile devices are used to *learn commonly traveled routes* by periodically monitoring and *recording* location and, optionally, corresponding time-of-day information” and “[t]hus, a mobile device associated with a given motorist or vehicle can be used to *develop a record of traveled routes, possibly with associated travel times* and destination information, for that motorist.” GM-1007, 2:62-3:2. Whitsell goes on to describe:

[O]perating software and supporting circuitry that *enables the mobile terminal 50 to “learn” the routes traveled by the owner* of a given mobile terminal 50. In the basic concept, the traffic information processor 60 records location information optionally with time information such that, over time, clear patterns of travel may emerge. Subsequently, when a given motorist is traveling in a vehicle with an associated mobile terminal 50, *the traffic information processor 60 uses current location and/or time information to predict the most likely route of travel* and, possibly, the most likely destination for the motorist.

GM-1007, 6:19-30, *see also* FIG. 7, 3:39-48, 3:61-4:11, 9:42-59, 10:9-39, 17:61-18:10 GM-1003, ¶155.

A POSITA would have been prompted to modify Knockeart-Feldman based on Whitsell to record actual routes traveled from a location proximate the current location to the destination by a user represented by a device at the current location and would have had a reasonable expectation of success in doing so. GM-1003, ¶¶152-153. For example, a POSITA would have recognized that applying Whitsell’s suggestion to record routes repeatedly traveled by users of the system

from common departure and destination locations would have beneficially allowed the system to gather travel time information for such routes. This would have facilitated Knockeart's route planning functionality by providing a source of travel time information for routes frequently traveled by the user. *Id.*, ¶152. Recording such frequently traveled routes and using that information for future route determination (as suggested by Whitsell) would have improved the system by providing travel time information that includes the driver's particular driving tendencies and preferences, therefore making the historic travel time information for such routes specific to the user. *Id.* As Whitsell teaches, there are "dramatic benefits gained by providing route-specific information to a given motorist[.]" GM-1007, 8:39-43. Such a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results. GM-1003, ¶153; *KSR*, 550 U.S. at 417.

D. [GROUND 4] – Obviousness based on Knockeart-Feldman-Boies (Claims 14, 22-24)

1. Boies

Boies discloses a navigation system "for determining an optimum route for a vehicle based on historical data." GM-1008, 1:41-56. "The historical data used may include measured data obtained from other vehicles[.]" *Id.* Boies recognizes that "the occurrence of certain traffic situations, such as a road being blocked, an accident, road construction, and the like, influence the travel time." *Id.*, 1:20-25.

Boies therefore collects historical traffic data for a variety of conditions, teaching that:

The historical data may be any type of data that may affect the selection of optimum routes. For example, the historical data may include ***environmental condition information, weather condition information, traffic condition information***, road condition information, criminal activity information, traffic law enforcement information, accident information, and the like.

GM-1008, 2:60-66. Using this information, “estimated times of traversing a leg [of a route] may be determined for various conditions” which can be used to identify an “optimum route[.]” *Id.*, 3:60-4:8, 2:60-66; GM-1003, ¶156.

2. Knockeart-Feldman-Boies Combination

A POSITA would have been prompted to apply the teachings of Boies to the Knockeart-Feldman combination to track historical traffic data for various road conditions including construction and accidents and to provide an estimation of how much time is predicted to travel through these and other traffic conditions. GM-1003, ¶¶157-160. As discussed in Ground 1, *supra*, the Knockeart-Feldman combination is already configured to track historical traffic conditions (road segment travel time/speed) for just such events, including time of day “different days of the week, holidays, special events, weather conditions, ***and so on.***” GM-1005, [0092]; *see also* GM-1004, [0321]-[0322], [0330]-[0337]. Boies compliments this teaching of Knockeart-Feldman, observing that “the occurrence of certain traffic situations, such as a road being blocked, an accident, road

construction, and the like, influence the travel time” and expands on the examples of various historic traffic condition that affect travel time (including accidents and construction). GM-1008, 1:20-25; GM-1003, ¶157.

Multiple reasons would have prompted a POSITA to modify Knockeart-Feldman based on Boies to track historical traffic condition information during road conditions including accidents and construction and to provide an estimation of how much time is predicted to travel through such conditions. GM-1003, ¶¶158-160.

First, as discussed in Ground 1, *supra*, Feldman teaches that “[e]very oriented road section has its own behavior pattern” which “describe[s] the behavior in different circumstances.” GM-1005, [0092]. Feldman gives several example circumstances, including “holidays, special events, [and] weather conditions” while also expressly contemplating that other undisclosed conditions would also affect travel times on road segments. *Id.* (“...and so on”); GM-1003, ¶158. Boies echoes this teaching of Feldman, disclosing that traffic conditions such as abnormal weather and time of day affect traffic conditions while providing additional examples of such road conditions, including construction and accidents and therefore provides the additional examples that Feldman suggested a POSITA would have known. *Id.*; GM-1008, 3:60-4:8, 9:35-39; 3:20-23, 1:22-24; GM-1005, [0092].

Second, Boies teaches that “the occurrence of certain traffic situations, such as a road being blocked, an accident, road construction, and the like, *influence the travel time*” and that systems that “do not take into consideration” these factors, which “may cause delays in traveling along the path,” will provide less than optimum routing recommendations. GM-1008, 1:20-38. A POSITA therefore would have applied Boies to Knockeart-Feldman to improve the resulting system by taking these road conditions which “influence the travel time” into consideration when determining optimum routes to improve route determination accuracy. *Id.*; GM-1003, ¶159. Similarly, a POSITA would have applied Boies’ teaching to provide an estimation of how much time is predicted to traverse such traffic conditions to Knockeart-Feldman to allow for such factors to be considered (either by the system and/or the user) when selecting a best route for avoiding such adverse conditions. GM-1003, ¶159.

Third, such a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results for which a POSITA would have had a reasonable expectation of success. GM-1003, ¶160; *KSR*, 550 U.S. at 417.

3. Application of Knockeart-Feldman-Boies

[14] The computer program product of claim 1, further comprising providing an estimation of how much time is predicted to travel through the traffic condition.

Boies describes that each “route” or “travel path” includes several “legs,” each of which is subject to “certain traffic situations” which may “influence the travel time.” GM-1008, 1:20-56, 2:59-3:16. Boies further describes that, in the Knockeart-Feldman-Boies combination, the system collects historical traffic data for a variety of conditions, including “environmental condition information, weather condition information, traffic condition information, road condition information, criminal activity information, traffic law enforcement information, accident information, and the like.” *Id.*, 2:59-66. Boies then describes that, “estimated times of traversing a leg may be determined for various conditions.” *Id.*, 3:64-67; *id.*, 3:60-4:8. A POSITA would have recognized that this disclosure of Boies indicates that the Knockeart-Feldman-Boies system estimates how much time is predicted to travel through a traffic condition by determining the times required to travel the route legs subject to the traffic condition (such as construction, an accident, inclement weather, etc.). GM-1003, ¶161.

As previously discussed, Knockeart describes that the system “plan[s] a *route* through the road network from a starting to a destination location *using the speed information associated with the road segments*.” GM-1004, [0030]; *id.*, [0077], [0089], [0254], [0315]-[0319], [0337]-[0342]. Therefore, a POSITA would have recognized that in the Knockeart-Feldman-Boies system, the estimation of the amount of time predicted to travel through various road

conditions is provided to the server system for use in calculating the optimum route. GM-1003, ¶162. Knockeart further describes “display[ing] characteristics” of available routes, such as “time” to traverse the route. GM-1004, [0413], *see also* Claim 24.

[22] The computer program product of claim 16, wherein the event is a type of road condition.

[23] The computer program product of claim 22, wherein the type of road condition is roadwork.

[24] The computer program product of claim 22, wherein the type of road condition is an accident.

Boies demonstrates that, in the Knockeart-Feldman-Boies combination, the system collects historical traffic data for a variety of road conditions affecting travel time, including “accident information” and “construction.” GM-1008, 2:59-66, 3:20-25, 3:60-4:8, 9:28-39, 11:17-20, 12:15-18, 1:22-25, FIG. 7; GM-1003, ¶163.

As discussed in Ground 1, *supra*, in the resulting combination, the system compares the event recorded at the time of the historical traffic condition and a currently occurring event to identify exceptional traffic conditions and a POSITA would have understood that this would have included the road condition events of roadwork and accidents in the Knockeart-Feldman-Boies combination. GM-1003, ¶164; GM-1004, [0331]-[0337].

For example, Feldman similarly discloses that “[e]very oriented road section has its own behavior pattern, and different behavior patterns describe the behavior in different circumstances, such as different days of the week, holidays, special events, weather conditions, and so on.” GM-1005, [0092]. Feldman discloses that “while regular situations are handled with these tools, unexpected vehicular traffic developments are identified from the current vehicular traffic situation pictures by *comparing them to regular vehicular traffic behavior patterns.*” *Id.*, [0095].

That is, the most “recently calculated NTT values on each oriented road section is compared to the [historical] pattern that describes the behavior of this oriented road section.” *Id.* A “significant discrepancy from the pattern activates a respective correction of the NTT values” used to calculate fastest routes in the Knockeart-Feldman combination. *Id.*; GM-1003, ¶164. Feldman goes on to provide details on using such identified discrepancies (based on comparison of current and historic traffic conditions during similar events) to identify “a major event with prolonged influence” to correct NTT values used to identify fastest routes over a correction period. GM-1005, [0095]-[0098]; GM-1003, ¶164.

E. [GROUND 5] – Obviousness based on Knockeart-Feldman-Boies-Peterson (Claim 14)

1. Peterson

Peterson discloses a system that monitors “instantaneous rates of travel” by measuring “changing position data” of probe vehicles, calculates an “estimated

elapsed time for each of the highway segments,” and then determines “a shortest elapsed time route” for an “origin-destination combination” for a driver. GM-1009, 3:35-50; 4:35-43; 6:46-49, 1:13-22. An in-vehicle navigation unit provides “[t]he estimated elapsed time to destination” and “the recommended route” to the driver. *Id.*, 11:25-32, 4:13-16 (“The computer will...provide further directions and the arrival time.”). This information can be communicated via audio or visually via a “display terminal.” *Id.*, 12:34-49; GM-1003, ¶¶165-166.

Peterson’s system identifies “change[s] in elapsed travel time as a result of traffic build-up, for different departure times.” GM-1009, 6:55-57. The user can “indicate departure time if the user is not commencing travel immediately” and the system uses the indicated departure time along with historical traffic data to “provide a more accurate assessment of elapsed travel time.” *Id.*, 12:13-25; GM-1003, ¶166.

2. Application of Knockeart-Feldman-Boies-Peterson

[14] The computer program product of claim 1, further comprising providing an estimation of how much time is predicted to travel through the traffic condition.

As discussed in Ground 4, *supra*, Boies describes that, “estimated times of traversing a leg may be determined for various conditions” such as inclement weather, traffic, accidents, etc. GM-1008, 3:64-67, *id.*, 3:60-4:8. Peterson demonstrates that in the Knockeart-Feldman-Boies-Peterson combination, the

“[t]he estimated elapsed time” and “the recommended route” for traveling through legs/segments experiencing such traffic conditions is communicated to the driver via audio or visually via a “display terminal.” GM-1009, 11:25-32, 12:34-49, 6:46-54, 17:20-27; GM-1003, ¶¶169-170.

A POSITA would have been prompted to apply Peterson to Knockeart-Feldman-Boies to communicate the estimated time to travel through a route leg/segment experiencing a traffic condition to the driver to allow the driver to determine if they would like to take a different route. GM-1003, ¶¶167-168. Communicating such information to the driver also would allow the driver to inform others if they are going to be late to a destination due to the traffic condition. *Id.* Communicating this information to the driver also would have improved the user experience by giving the driver a better overall idea of what to expect along the suggested route. *Id.*

F. [GROUND 6] – Obviousness based on Knockeart-Feldman-Peterson (Claims 27-28)

1. Knockeart-Feldman-Peterson Combination

Multiple reasons would have prompted a POSITA to apply the teachings of Peterson to the Knockeart-Feldman combination to present an estimated time of arrival for the suggested route to the driver and to provide a user interface that allows the driver to enter an intended departure time for the destination to

hear/view the effect of departure time on travel time and would have had a reasonable expectation of success in doing so. GM-1003, ¶¶171-174.

First, both modifications would have given the driver additional information that would improve the user experience and allow the driver to make informed decisions about which route to travel or whether to switch routes to avoid various traffic conditions. *Id.*, ¶171. This information is “particularly important for a user who is disoriented or unfamiliar with the area.” GM-1009, 12:2-6.

Second, presenting an estimated time of arrival to the driver would have allowed the driver to inform others of when they will arrive at a destination so that they can plan accordingly. GM-1003, ¶172.

Third, allowing the user to enter/change departure time and view the effects on travel time would have allowed a user to select a best or most convenient departure time. *Id.*, ¶173. Such modifications also would have been merely the application of known techniques to a known system ready for improvement to yield predictable results. GM-1003, ¶174; *KSR*, 550 U.S. at 417.

2. Application of Knockeart-Feldman-Peterson

[27] The computer program product of claim 1, further comprising presenting an estimated time of arrival at the destination based at least in part on the traffic condition.

Peterson demonstrates that in the Knockeart-Feldman-Peterson system, the in-vehicle navigation unit provides “[t]he estimated elapsed time to destination”

via audio or visually via a “display terminal.” GM-1009, 11:25-32, 12:2-6, 12:34-49, 4:13-16. As discussed in Ground 1, *supra*, the route to the destination is determined at least in part on the traffic condition. GM-1004, [0030], [0077], [0315]-[0319], [0330], [0170]; GM-1009, 3:35-50, 4:35-61, 9:48-10:10; GM-1003, ¶175.

[28] The computer program product of claim 27, further comprising receiving an intended leave time for the destination, and further comprising presenting a user interface to adjust the intended leave time such that a user can understand an effect of leave time on estimated travel time.

Peterson demonstrates that the Knockeart-Feldman-Peterson system determines “change[s] in elapsed travel time as a result of traffic build-up, for different departure times.” GM-1009, 6:55-57. The resulting system provides a user interface that allows the driver to “indicate departure time if the user is not commencing travel immediately” and uses the indicated departure time along with historical traffic data to “provide a more accurate assessment of elapsed travel time.” *Id.*, 12:13-25. A POSITA would have recognized that such a system would have beneficially allowed the driver to change the departure time and receive an updated “elapsed travel time” for the new departure time and thus would have been able to understand an effect of leave time on estimated travel time. GM-1003, ¶176.

G. [GROUND 7] – Obviousness based on Knockeart-Feldman-Craine (Claim 31)

1. Craine

Craine describes “[a] personal traffic congestion avoidance system” that includes “a traffic monitoring database or service that provides current traffic affecting events in the region thereto.” GM-1010, Abstract. “When a traffic affecting event is located in the designated vicinity of the current location of the motor vehicle...an alert warning is generated and delivered to the GPS-based navigational system and displayed on the visual display.” *Id.* “The alert signal, which contains location information regarding the traffic affecting event, may be displayed on the navigational system visual display or audibly broadcasted to the driver.” *Id.*, 3:1-4; *id.*, 2:64-3:4; GM-1003, ¶177.

2. Application of Knockeart-Feldman-Craine

[31] The computer program product of claim 1, further comprising a warning system adapted to warn a driver traveling on the route of the traffic condition, wherein the warning is based on a proximity of the driver, as determined by the current location, to an adverse traffic condition.

As discussed in Ground 1, *supra*, Knockeart discloses that “[i]f the received traffic data indicates an exceptional traffic condition on the specified path, ***the user is notified of the traffic condition.***” GM-1004, [0042]; *see also* GM-1005, [0099]-[0101]. Per Craine, in the Knockeart-Feldman-Craine combination, the system identifies “[w]hen a traffic affecting event occurs” and “determine[s] ***whether the***

traffic affecting event is in the designated vicinity, on a roadway currently used by the driver, or on a roadway that may be affected by the traffic affecting event *based on the current location of the motor vehicle.*” GM-1010, 2:56-64. “If the motor vehicle is in the designated vicinity...*an alert signal* is created ... [and] *displayed on the navigational system visual display* or audibly broadcasted to the driver.” *Id.*, 2:64-3:4; *see also* 4:4-23, 6:41-55, 7:4-15 (“transmitting a traffic alert signal 61 from said remote computer 40 to said motor vehicle 10 when said traffic affecting event 75 is *within a preselected distance* of said motor vehicle 10[.]”). GM-1003, ¶¶181-183.

A POSITA would have been prompted to apply *Craine* to *Knockeart-Feldman* to generate an alert to warn a driver traveling on the route of the traffic condition based on a proximity of the driver to the traffic condition and would have had a reasonable expectation of success in doing so. GM-1003, ¶¶178-180. Providing such an alert would have beneficially allowed the driver to “immediately change his or her route to avoid the traffic affecting event” or “request assistance from the GPS-based navigational system route guidance feature to find an alternative route[.]” GM-1010, 3:5-12, 4:19-23; GM-1003, ¶178. Providing such alerts based on proximity to the traffic condition would have improved the system by providing the alert to the driver at a time that is most beneficial for the driver. GM-1003, ¶179. For example, alerting the driver to a traffic condition occurring

100 miles away would be unnecessary and potentially distracting as it is likely that the traffic condition will clear by the time the driver reaches that point of the route. *Id.* Additionally, the driver may forget about the alert by the time they reach the condition, or may be overwhelmed with too many alerts if the driver is alerted to all traffic conditions along the route rather than only traffic conditions within a proximity of the driver. *Id.* Such a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results. GM-1003, ¶180; *KSR*, 550 U.S. at 417.

IV. MANDATORY NOTICES UNDER 37 C.F.R § 42.8(a)(1)

A. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1)

Petitioner General Motors LLC and parent company General Motors Company (collectively, “GM”) are the real parties-in-interest. No other parties had access to or control over this Petition, and no other parties funded this Petition.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

Petitioner is not aware of any disclaimers, reexamination certificates, pending district court proceedings, or IPR petitions addressing the '028 patent.

C. Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner provides the following designation of counsel.

Lead Counsel	Backup counsel
Timothy W. Riffe, Reg. No. 43,881 Fish & Richardson P.C. 60 South Sixth Street, Suite 3200	Patrick J. Bisenius, Reg. No. 63,893 Fish & Richardson P.C. 60 South Sixth Street, Suite 3200

Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 Email: IPR45343-0072IP1@fr.com	Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 PTABInbound@fr.com
--	---

D. Service Information

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service by email at IPR45343-0072IP1@fr.com

(referencing No. 45343-0072IP1 and cc'ing PTABInbound@fr.com, riffe@fr.com, bisenius@fr.com).

V. FEES

Petitioner authorizes charge of Deposit Account No. 06-1050 for any fees.

VI. CONCLUSION

Petitioner requests IPR and cancellation of the Challenged Claims.

Attorney Docket No. 45343-0072IP1
IPR of U.S. Patent No. 10,444,028
Respectfully submitted,

Dated: June 5, 2023

/Timothy W. Riffe/

Timothy W. Riffe, Reg. No. 43,881
Patrick J. Bisenius, Reg. No. 63,893
Fish & Richardson P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402
T: 202-783-5070
F: 877-769-7945

(Control No. IPR2023-00994)

Attorneys for Petitioner

CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,995 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated: June 5, 2023

/Timothy W. Riffe/
Timothy W. Riffe, Reg. No. 43,881
Patrick J. Bisenius, Reg. No. 63,893
Fish & Richardson P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402
T: 202-783-5070
F: 877-769-7945

Attorneys for Petitioner

CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on June 5, 2023, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided by Federal Express, to the Patent Owner, by serving the correspondence address of record as follows:

ONELLO & MELLO LLP
20 Burlington Mall Road, Suite 425
Burlington, MA 01803-4127

/Michael Stanwyck/
Michael Stanwyck
Fish & Richardson P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402
(202) 783-5070