

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UBER TECHNOLOGIES, INC and UBER FREIGHT US LLC,
Petitioners

v.

CARMA TECHNOLOGY, LTD.,
Patent Owner

IPR2026-00305

Patent No. 7,840,427

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 7,840,427**

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LIST OF EXHIBITS

EX1001	U.S. Patent No. 7,840,427 (“the ’427 patent”)
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EX1003	Curriculum Vitae of Dr. Petros Ioannou, Ph.D.
EX1004	Prosecution History of U.S. Patent Application No. 12/069,656
EX1005	UK Patent Application No. 2397683A to Olmi (“Olmi”)
EX1006	The American Heritage College Dictionary (excerpt), 4th edition (2004)
EX1007	Prosecution History (excerpt) of European Patent Application No. 08725447.0, May 25, 2012 Letter from M. Weldon to EPO
EX1008	Joint P.R. 4-3 Statement (Dkt. Nos. 95, 95-1, 95-2) in <i>Carma Technology, Corp. v. Uber Technologies, Inc.</i> , Case No. 2:25-cv-00029 (E.D. Tex. Feb. 10, 2026)
EX1009	Dictionary of Computing (excerpt), 5th edition (2004)
EX1010	U.S. Patent Application Publication No. 2003/0040944 to Hileman (“Hileman”)
EX1011	The New Oxford American Dictionary (excerpt), 2nd edition (2005)
EX1012	The Penguin Complete English Dictionary (excerpt) (2006)
EX1013- EX1029	RESERVED
EX1030	U.S. Patent Application Publication No. 2001/0037174 to Dickerson (“Dickerson”)
EX1031	U.S. Patent Application Publication No. 2003/0036935 to Nel (“Nel”)
EX1032	International Patent Publication No. WO 2005/104059 A2 to Bhushan (“Bhushan”)

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EX1033	U.S. Patent No. 5,799,263 to Culbertson (“Culbertson”)
EX1034	“A distributed geographic information system for the daily car pooling problem,” Roberto Wolfler Calvo et al. Computers & Operations Research 31 (2004) 2263-2278 (“Calvo”)
EX1035	U.S. Patent No. 10,520,325 to Lewinson (“Lewinson”)
EX1036	Prosecution History of European Patent App. No. EP08725447A

I. INTRODUCTION

Uber Technologies, Inc. and Uber Freight US LLC (“Petitioners”) request *inter partes* review of claims 1-5, 11-12, and 15 (“the challenged claims”) of U.S. Patent No. 7,840,427 (“the ’427 patent”) (EX1001), which, according to PTO records, is assigned to Carma Technology, Ltd. (“PO”).

II. MANDATORY NOTICES

Real Parties-in-Interest: Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioners identify Uber Technologies, Inc., Uber Freight US LLC, and Uber Freight Holding Corporation as the real parties-in-interest.

Related Matters: The ’427 patent is asserted by PO against Petitioners in *Carma Technology, Corp. v. Uber Technologies, Inc.*, Case No. 2:25-cv-00029 (E.D. Tex.) (“Carma Litigation”). Uber was served with the complaint on March 20, 2025. Thus, this petition is timely under 35 U.S.C. § 315(b).

Petitioners are submitting petitions for *inter partes* review of U.S. Patent Nos. 11,017,668, 11,164,456, 10,916,138 and 10,741,071, which are also asserted by PO in the Carma Litigation.

Counsel and Service Information: Lead counsel: Naveen Modi (Reg. No. 46,224). Backup counsel: (1) Joseph E. Palys (Reg. No. 46,508), (2) Phillip W. Citroën (Reg. No. 66,541), (3) Alexa Lowman (*pro hac vice* to be filed), and (4) Maksim Mints (Reg. No. 78,507).

Service information is Paul Hastings LLP, 2050 M St., N.W., Washington, DC 20036, Tel.: 202.551.1700, Fax: 202.551.1705, email: PH-Uber-Carma-IPR@paulhastings.com. Petitioners consent to electronic service.

III. PAYMENT OF FEES

The PTO is authorized to charge any fees due during this proceeding to Deposit Account No. 50-2613.

IV. GROUNDS FOR STANDING

Petitioners certify under 37 C.F.R. § 42.104(a) that the '427 patent is available for review and Petitioners are not barred/estopped from requesting review on the identified grounds.

V. PRECISE RELIEF REQUESTED AND GROUNDS RAISED

The challenged claims should be canceled as unpatentable based on the following grounds:

Ground 1: Claims 1-5, 11, 12, and 15 are unpatentable under pre-AIA 35 U.S.C. § 102 as being anticipated by UK Patent Application No. GB2397683A to Olmi (“Olmi”) (EX1005).

Ground 2: Claims 1-5, 11, 12, and 15 are unpatentable under pre-AIA 35 U.S.C. § 103 as being obvious over Olmi.

For purposes of this proceeding only, Petitioners assume that the earliest effective filing date of the '427 patent is February 12, 2007, the filing date of U.S.

Provisional Application No. 60/900,808, to which the '427 patent claims priority, without conceding the '427 patent is entitled to such a date.

Olmi published on July 28, 2004, and thus qualifies as prior art at least under Pre-AIA 35 U.S.C. §§ 102(a) and (b).

VI. LEVEL OF ORDINARY SKILL

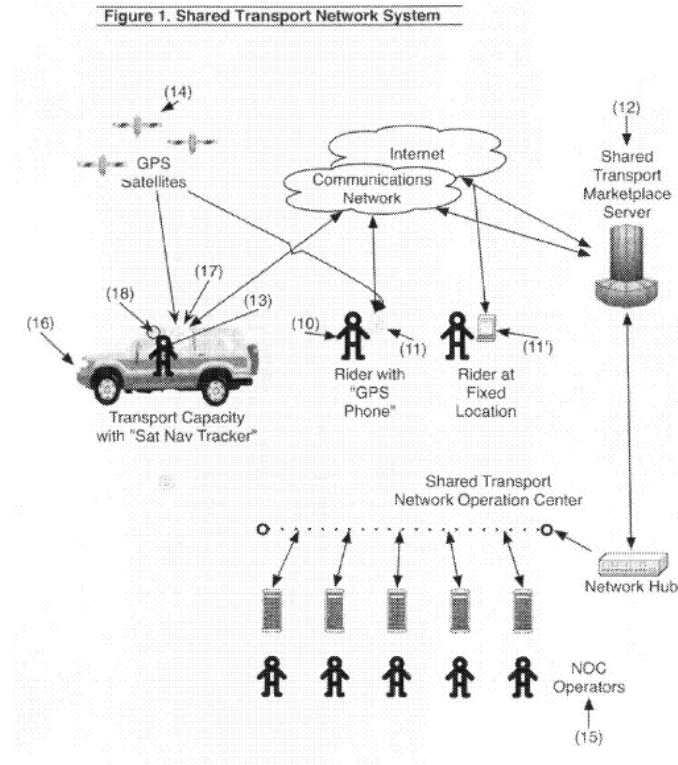
A person of ordinary skill in the art at the time of the alleged invention of the '427 patent (“POSITA”) would have had at least a bachelor’s degree in computer science, computer engineering, software engineering, electrical engineering, or the equivalent and at least two years of experience in technologies relevant to or utilized in transportation systems. (EX1002, ¶¶15-17.)¹ More education can substitute for practical experience and vice versa.

VII. OVERVIEW OF THE '427 PATENT

The '427 patent discloses a shared transport system that is a compilation of conventional techniques, concepts, and components, performing known processes for matching riders and drivers in a transportation network. (EX1002, ¶¶24-34; *infra* §IX.) Indeed, referring to Figure 1, the '427 patent describes a “Shared Transport System” that purportedly “enabl[es] private transport vehicles to serve as an

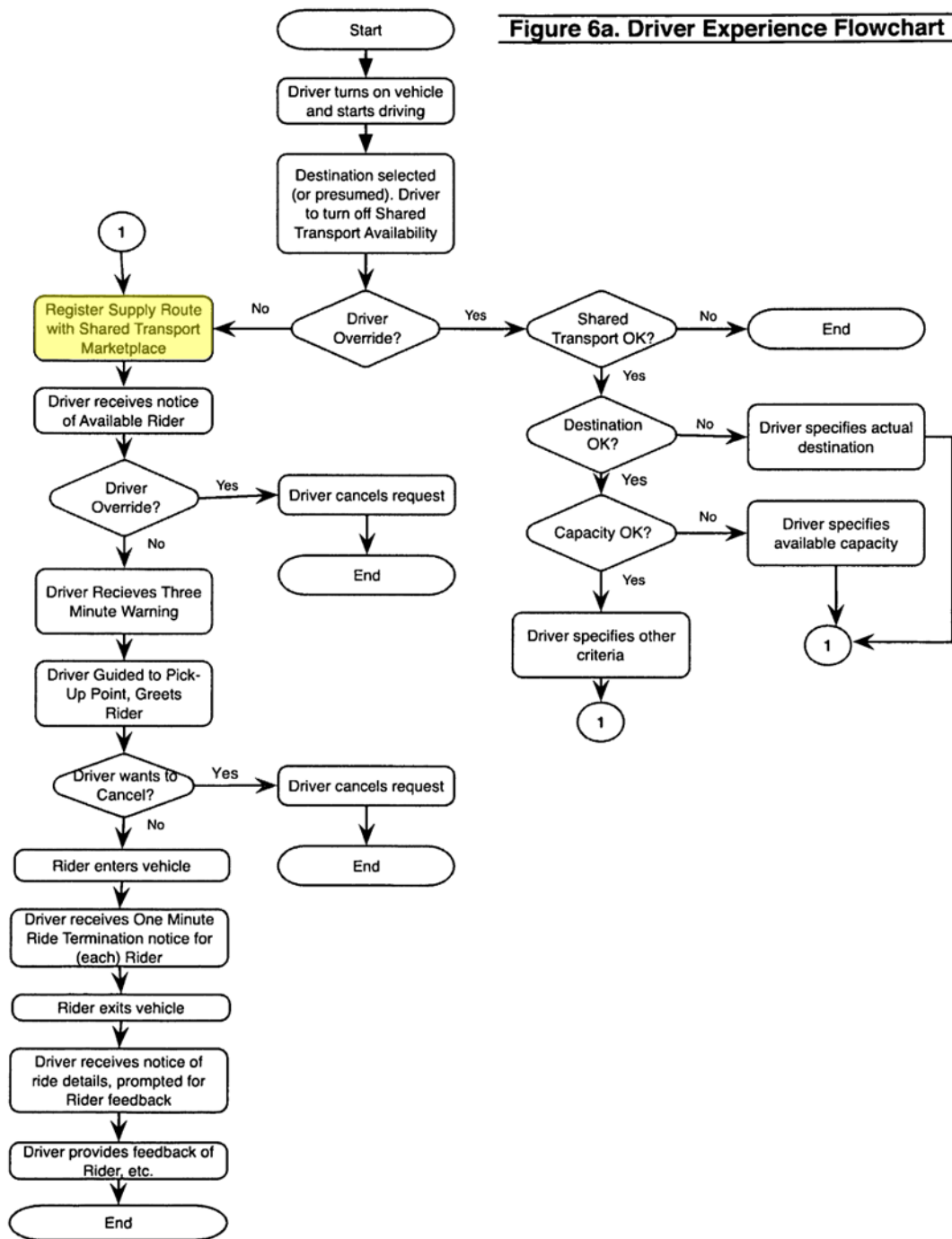
¹ Petitioners submit the declaration of Dr. Ioannou (EX1002), an expert in the field of the '427 patent. (EX1002, ¶¶3-14; EX1003.)

extension of the mass transit system” by matching potential riders with potential drivers. (EX1001, 3:34-36; *id.*, 5:10-11, 7:8-20, FIG. 1 (below).)

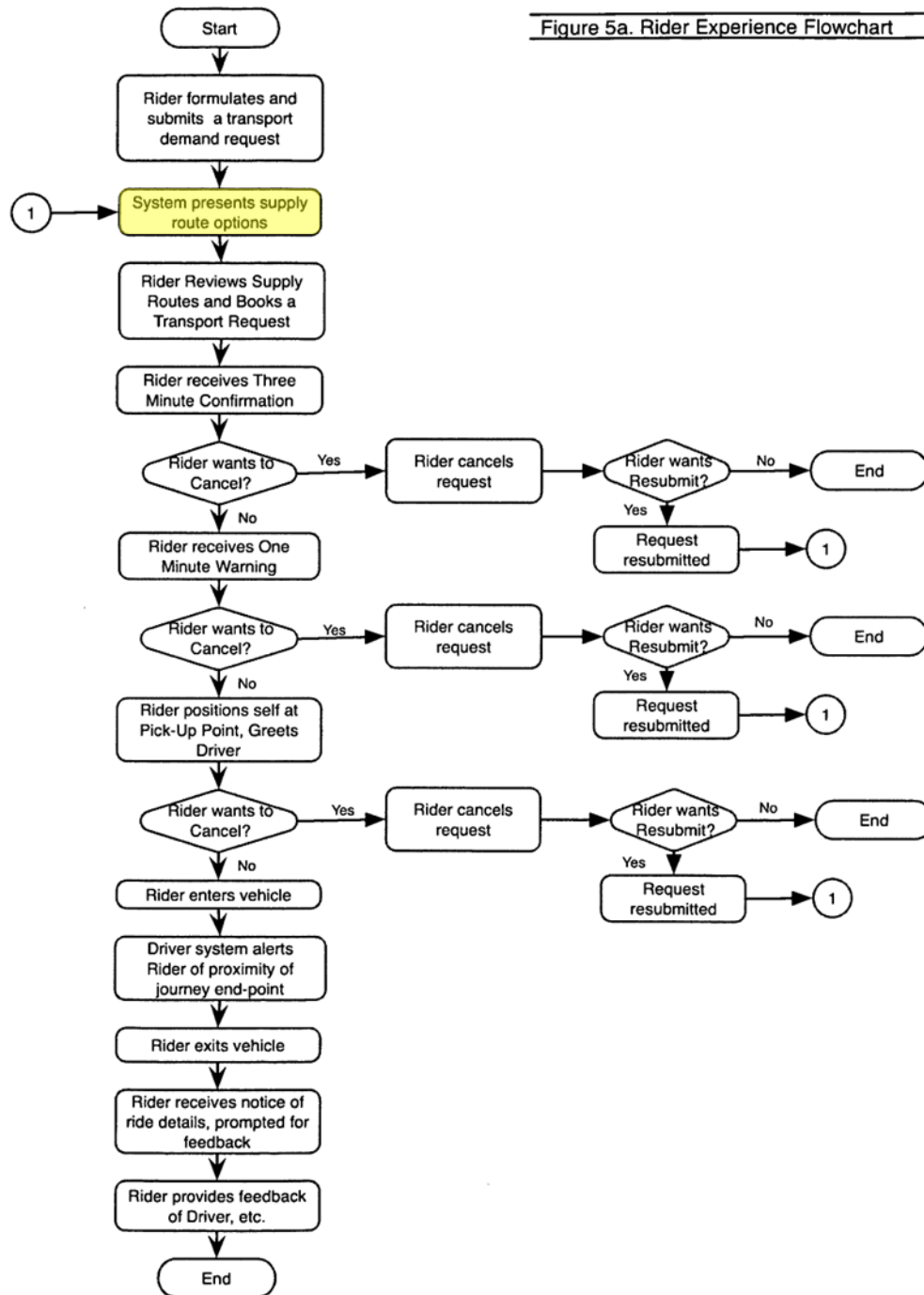


(*Id.*, FIG. 1.)

The '427 patent discloses that a prospective driver may register a supply route with the Shared Transport Marketplace (shown in yellow in Figure 6a (“Driver Experience Flowchart”) below), and that a prospective rider is presented with available supply route options (shown in yellow in Figure 5a (Rider Experience Flowchart) below) after submitting a transport demand request. (*Id.*, 21:62-22:12, FIGs. 5a, 6a.)



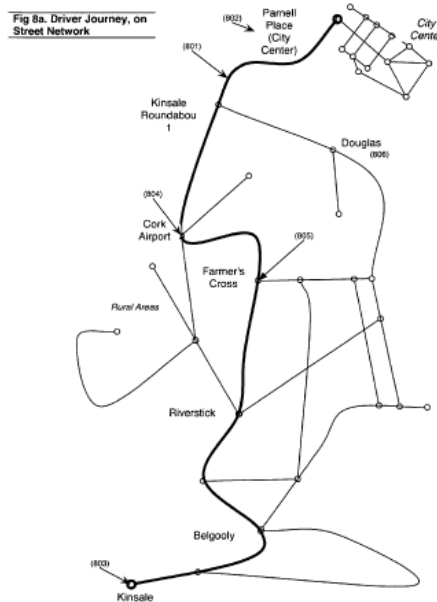
(*Id.*, FIG. 6a (annotated).)



(*Id.*, FIG. 5a (annotated).)

The '427 patent discusses features related to known concepts to “convert[] the computer’s representation of a driver’s route into a format which is more usable for

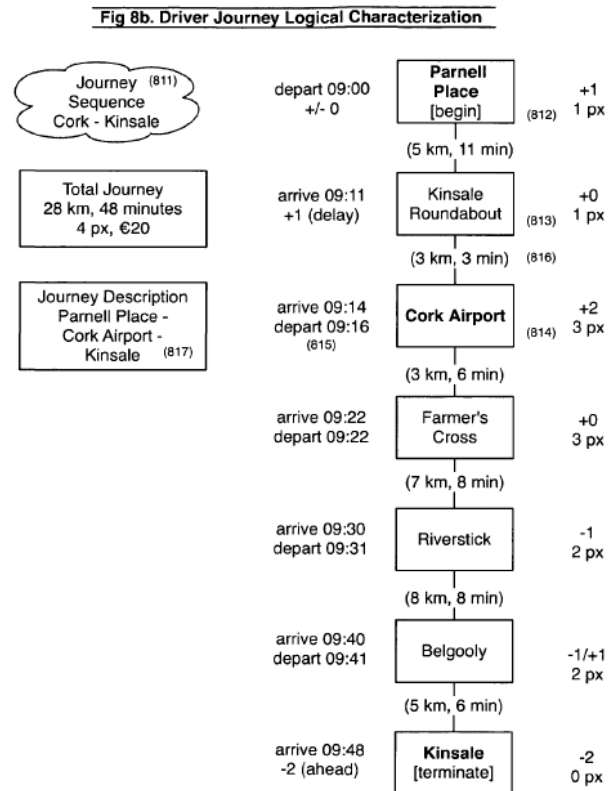
further analysis and presentation.” (*Id.*, 14:49-51.) The system “can present the journey at the end of the route in the format of a very useful and concise set of major stops, rather than incomprehensible list of addresses or geographic co-ordinates.” (*Id.*, 14:66-15:5.) Figure 8a (below) shows the “route of the driver’s journey,” where the path of the driver’s route 801 is from certain points to others (e.g., “from Parnell Place 803 to Cork Airport 804 to Farmer’s Cross 805”). (*Id.*, 14:66-15:8.)



(*Id.*, FIG. 8a.)

The '427 patent explains that “once the geographic representation is abstracted to stop nodes, it is possible to show the driver’s route in a variety of alternate presentations, such as the presentation shown in FIG. 8b.” (*Id.*, 15:9-12, FIG. 8b (below).) Such abstraction encompasses, for example, the presentation shown in Figure 8b below, which includes characterizations of start and end points

as names/labels (e.g., place/location (town) names, etc. in boxes below), activity summary (information accompanying boxes below) at intermediate points (stop nodes), and/or a level of characterization. (*Id.*, 15:9-24, FIG. 8b (below).)



(*Id.*, FIG. 8b.)

The '427 patent explains that, while a city route may have dozens of stops, “perhaps only the most major stops (as coded separately using operator intervention or data entry, for example) would be shown in order to present the information more clearly.” (*Id.*, 15:17-22.) The “major stops of a route, as shown in 817 [of Figure 8b], may not necessarily even include the start or end point.” (*Id.*, 15:22-25; *see also id.*, 15:26-30 (driver journeys “organized as stream of stop nodes”).) Figure 9a

“shows the same network model as FIG. 8a, but trimmed to only show those segments and nodes in the network that have active transport capacity on them.”

(*Id.*, 15:31-45; *see also id.*, 15:56-62 (“schematization of a shared transport network is shown in Fig. 9b, using the model of the 9a network”).)

Fig 9a. Active Network,
Geographical Representation

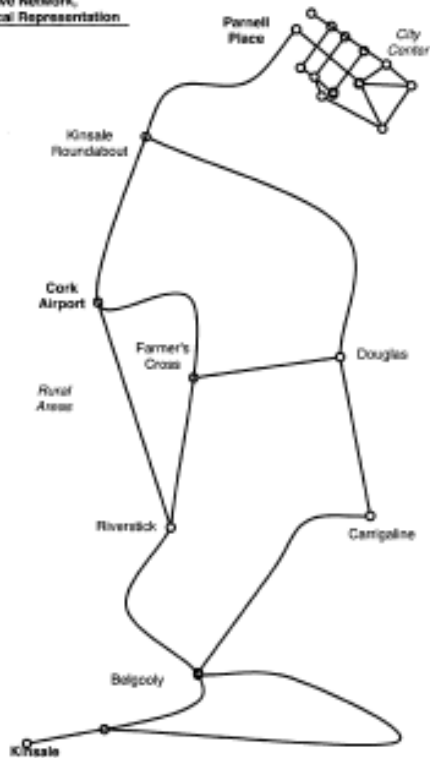


Figure 9b. Active Transport Network,
Logical Presentation



(*Id.*, FIGs. 9a-9b.)

The '427 patent explains that “[t]raditional transport networks have known this for a long time, of course, and so maps of network capacity have

long been available on public transport systems.”² (*Id.*, 15:46-48). And while the ’427 patent represents that such features “have not been applied usefully to carpooling systems or...public shared transport,” the patent acknowledges that “[t]raditional public transport networks have also sought to make their transport more understandable by simplifying the geographic maps into quasi-geographic schematic representations that enhance readability and information display” (*id.*, 15:48-54), and that “programs and techniques” for generating schematic maps automatically **“are known in academia”** (*id.*, 15:56-60).

Moreover, the ’427 patent discusses conventional transportation systems/processes/concepts directed to addressing known transport capacity and demand issues. (*Id.*, 1:15-2:50 (conventional central assigning system and associated vehicle communications devices, dynamic ridesharing concepts, transportation networks, etc.), 3:51-63 (discussing existing traffic measurement systems, use of GPS systems, traffic speed measurement systems), 4:10-18 (discussing existing carpooling systems and mass transport systems that give “confidence” to transport users on available capacity).) Likewise, the ’427 patent recognizes the prior use of graphical representations and stochastic models for improving user confidence in shared transport systems. (*Id.*, 15:39-60.) The ’427

² Emphasis added herein unless stated otherwise.

patent further recognizes that journey planners that show the best available route between start and destination points, and cost and schedule information, “are a well-known concept for public transport.” (*Id.*, 19:52-57.)

As demonstrated below, the features described and claimed in the ’427 patent were known in the prior art before the earliest effective filing date of the ’427 patent. (*Infra* §IX; EX1010, EX1030-EX1035; EX1002, ¶¶18-23.)

VIII. CLAIM CONSTRUCTION

The Board only construes the claims when necessary to resolve the controversy. *Toyota Motor Corp. v. Cellport Sys., Inc.*, IPR2015-00633, Paper No. 11 at 16 (Aug. 14, 2015). Petitioners believe that the following claim terms of the ’427 patent should be construed as indicated in the table below. These constructions are consistent with Petitioners’ claim construction positions taken in the Carma Litigation. Petitioners also indicate below those claim terms that PO has proposed constructions in the Carma Litigation. To the extent Petitioners’ or PO’s proposed constructions are found not to apply, Petitioners also explain in Section IX how the ’427 patent claims are disclosed and/or rendered obvious if no express constructions are applied. (EX1002, ¶¶35-36.)

'427 Patent Term	Constructions
“predetermined transport vehicle journey” (claim 1) / “predetermined journey of a transport vehicle” (claim 15)	<u>Petitioners’ Construction</u> : “A trip along an existing route defined before demand for transport and independently of a transport user’s door-to-door trip.”
“network of nodes” / “nodes” (claims 1, 15)	<u>Petitioners’ Construction</u> : “The pick-up points and drop-off points interconnected by predetermined transport vehicle journey routes.” <u>Patent Owner’s Construction</u> : “Geographic locations (such as addresses or intersections) where a customer could be picked up or dropped off, and street segments between them.”

A. Predetermined Transport Vehicle Journey

A POSITA would have understood that a “predetermined transport vehicle journey,” as used in the ’427 patent, refers to “a trip along an existing route defined before demand for transport and independently of a transport user’s door-to-door trip.”

This construction is consistent with the specification and express admissions made by PO during prosecution. For example, Figure 14a of the specification illustrates an example of a shared transport network, with pick-up locations and active vehicles in the network shown on the map. (EX1001, 6:31-34.) As illustrated, transport user 1401 wants to go from departure point 1406 to arrival location 1409. (EX1001, 16:34-36.) Two transport capacity (1402 and 1403, *i.e.*, vehicles) both pass through 1406—the requested pick-up location of transport user 1401—along their “declar[ed] . . . routes.” (*Id.*, 16:36-38.) But only one of those vehicles—1403—also has registered a route going through 1409, the requested arrival location of transport user 1401. (*Id.*, 16:38-41.) “All other considerations being equal,” the matching engine would match transport user 1401 to vehicle 1403, which is the vehicle whose declared route passes through both the pick-up and drop off locations. (*Id.*, 16:41-44.) Thus, the transport user 1401 would travel along the route vehicle 1403 had defined before the transport user demanded a ride, which route vehicle 1403 had defined independently of the user’s door-to-door trip.

Further confirming this interpretation, the specification explains what would happen if transport capacity 1403 refused to match with transport user 1401: the system could determine that transport capacity 1402 has a route that passes through the user’s pick-up location 1406 and also goes through a location (1408), which is *near* the requested drop-off location (1409). (*Id.*, FIG. 14a, 16:53-58.) Transport

user 1401 would be alerted of this option that gets them near their ultimate destination and could agree to be matched with transport capacity 1402. (*Id.*, 16:53-58.) In this case, transport user 1401 would walk from 1408 to 1409, without redefining transport capacity 1402's route, which, again, was defined independently of the user's door-to-door trip.

This understanding is consistent with and further supported by statements made by Applicant during prosecution. Applicants can disavow claim scope by either “amendment or cancellation of claims” or “statements made by the applicant.” *Nite Glow Indus. Inc. v. Cent. Garden & Pet Co.*, No. 2020-1897, 2021 WL 2945556, at *11 (Fed. Cir. July 14, 2021) (collecting Supreme Court cases). Here, Applicant did both. Specifically, to overcome a rejection over prior art reference Lecouturier, Applicant distinguished Lecouturier as describing a “‘door to door’ approach [that] requires segment by segment direction to a driver, who may have to divert from his natural route to reach the pick-up or drop-off point.” (EX1004, 52-53.) Applicant explained that, by contrast, the claims “provided specific pick-up and drop-off locations [nodes] **that do not require a driver to divert.**” (*Id.*) During a subsequent examiner interview, “Applicant asserted that the ‘abstracting’ step [then reciting ‘abstracting a geographic representation of a transport vehicle journey’] was different than the prior art in that an **existing** route is checked versus the plurality of pickup/dropoff nodes.” (*Id.*, 23.) In response, the examiner “suggested including

that the transport vehicle journey was ‘predetermined’ so that a fluid routing system such as Lecourtier would not disclose the claimed invention. Applicant’s representative agreed.” (*Id.*) Thus, to avoid the prior art, Applicant stated that a transport provider’s trip is along an existing route defined before demand for transport and independently of a transport user’s door-to-door trip, and amended the claim to include the word “predetermined” to capture that idea.

Indeed, Applicant disavowed as “computationally unsolvable” and prohibitively expensive dynamic systems that would track and match drivers and riders based on their live locations, as opposed to matching based on an existing route defined independently of a transport user’s door-to-door trip. (EX1004, 87-88.) *See Techtronic Indus. Co. v. Int’l Trade Comm’n*, 944 F.3d 901, 909 (Fed. Cir. 2019) (specification disavows embodiments that it recognizes as “infeasible” or “impossible”); *AstraZeneca AB v. Mylan Pharms. Inc.*, 19 F.4th 1325, 1335 (Fed. Cir. 2021) (statements in prosecution history that “capture the scope of the actual invention” inform claim construction). Applicant’s statements are consistent with the specification: The transport provider follows his existing route without diverting. Thus, a POSITA would have understood that the patent’s predetermined transport vehicle journey would be a trip along an existing route defined before demand for transport and independently of a transport user’s door-to-door trip.

B. Network of Nodes

A POSITA would have understood that a “network of nodes,” as used in the ’427 patent, refers to “the pick-up points and drop-off points interconnected by predetermined transport vehicle journey routes.”

The first part of the construction (that the nodes are pick-up points and drop-off points) reflects how patent owner repeatedly equated the term “nodes” with pick-up points and drop-off points. (EX1001, 14:28-32 (“The System maintains a matrix of journey time and cost estimates for the *nodes (pick-up and drop-off points)*.”); *id.*, 14:57-59 (“However, for the purposes of establishing a shared transport network, it is useful to establish a network of *pick-up and drop-off points (nodes)*.”); EX1004, 30-31, 61; EX1007, 1.) “A patent’s consistent and clear interchangeable use of the two terms can result in a definition equating the two terms.” *Aortic Innovations LLC v. Edwards Lifesciences Corp.*, 159 F.4th 1, 8 (Fed. Cir. 2025).

The second part of the construction (that the nodes are interconnected by predetermined transport vehicle journey routes) follows from the clear disclosures of the specification and prosecution history. The specification recognizes that a network “interconnects” its components. (EX1001, 3:16-27 (“The *network* system . . . demonstrates how *interconnecting* personal communication devices and computer networks”); *id.*, 5:50-55 (Fig. 9b shows a logical representation of the shared transport network “to emphasize the city center *network’s*

interconnections.”).) This understanding of the word “network” is consistent with the plain and ordinary meaning of “network” as an “interconnected group or system.” (EX1006, 934; EX1009, 226 (“a system made of a number of points or circuits that are interconnected”); EX1012, 935 (“a system of interconnected railways, roads, etc.”); EX1011, 1142 (“an arrangement of intersecting horizontal and vertical lines”).)³

A POSITA reviewing the specification and prosecution history would have then understood that the “network of nodes” are interconnected by the predetermined transport vehicle journey routes. For example, as explained above, Applicant stated during prosecution that the claimed method “provid[ed] *specific pick-up and drop-off locations [nodes] that do not require a driver to divert.*” (EX1004, 53-54.) Applicant made this statement to distinguish prior art reference Lecourtier, which provides an approach that “may have [the driver] divert from his natural route to reach the pick-up or drop-off point.” (*Id.*) Because the pick-up points and drop-off points do not result in the driver diverting from his natural route, these points’ interconnections, along which the driver travels, must be those natural routes—i.e., the predetermined transport vehicle journey routes.

³ Citations to EX1006, EX1009, EX1011, and EX1012 are to the underlying document page number(s).

This understanding is confirmed by Figure 14b, which is a representation of an example shared transport network. (EX1001, 14:52-55, 15:36-39.). Figure 14b is intended to “inform a user how they would use the shared transport network to reach their chosen destination, or what kind of service availability they would have using the system.” (EX1001, 17:28-32.). As can be seen in Figure 14b, with reference to the key in Figure 14a, each of the “Pick-up/Designation Locations” (represented by a bus icon) is located along a line that includes an active transport capacity represented by a black dot. Similarly, in Figure 9a, the nodes in the network are connected by segments “that have active transport capacity on them.” (*Id.*, 15:36-39.) The interconnections between the pick-up and drop-off points are thus the routes along which active transport capacity travels. Because the claimed method will not divert drivers from their natural routes, a POSITA would have understood that these routes that interconnect the nodes are the predetermined transport vehicle journey routes.

Thus, a POSITA would have understood that the patent’s network of nodes would be pick-up points and drop-off points interconnected by predetermined transport vehicle journey routes.

IX. DETAILED EXPLANATION OF GROUNDS

A. Ground 1: Olmi Anticipates Claims 1-5, 11, 12, and 15

1. Summary of Olmi

This Petition relies on Olmi as the primary reference. Although Olmi was not considered during prosecution of the '427 patent, it was a principal reference in a European Patent Office's examination of counterpart application EP08725447A, where the EPO relied on Olmi to reject the claims. (EX1036, 217-22, 251-58.) The applicant ultimately abandoned that EP application without overcoming Olmi. (*Id.*, 263-67.) As demonstrated below, the challenged claims are unpatentable in view of Olmi.

Olmi discloses a method/system that, like the '427 patent, leverages existing features/concepts from public transport and individual transport applications to address transportation problems. (EX1005, 8-9 (§5.1).)⁴ Olmi teaches a transportation sharing process where a central computer system analyzes "submitted itinerary requirements that it receives, and then intelligently groups travellers with compatible itineraries onto the same...transit vehicle" (*id.*, Abstract) to address problems with inefficient use of transportation services, among other things, in

⁴ Citations to EX1005 herein are to the underlying document page number(s) or section number(s).

existing transportation networks (*id.*, 2-7 (“present invention is the breakthrough solution to transport problems and traffic congestion” by providing a “minimal impact system, which easily coexists with other forms of transport, and other traffic control schemes” while “maintaining people-mobility”), 4-7 (§§4.1-4.4); EX1002, ¶37.)

One configuration that Olmi describes relates to carpooling transport. (EX1005, 8.) The carpooling configuration matches prospective passengers with carpool drivers having compatible itineraries involving fixed journeys. (*Id.*) An itinerary is a data structure that specifies a travel plan (e.g., embarkation and disembarkation points, but can include multiple destination points, routing requirements, etc.). (*Id.*, 11-12, 32-35; EX1002, ¶38.)

Olmi explains that both carpool drivers with personal fixed itineraries and potential passengers are considered travellers, i.e., a person with a journey itinerary. (EX1005, 11.) Travellers (both drivers and passengers) submit their predetermined personal itineraries to the central computer system by submitting a “journey request,” which is a data structure or a computer data format which includes a specification of a traveller or passenger itinerary,” as well as “other travel requirements relating to this itinerary.” (*Id.*, 12.) Prospective travellers define their predetermined personal itineraries by using a communicator device to send their journey requests to a central controlling computer system, which stores journey

requests in a “journey requests database.” (*Id.*, 32.) Olmi also explains that “[m]athematically speaking, using the terminology of graph theory,” each traveller/passenger itinerary “can be encoded as a directed graph whose vertices are the embarkation and disembarkation points of the itinerary, and whose direct edges indicate the direction of travel.” (*Id.*, 11; EX1002, ¶39.)

Olmi explains that a vehicle can have a vehicle itinerary, which is a data structure that specifies the travel plan of the vehicle and comprises a “set of prescribed geographic points or addresses to which the vehicle must navigate in a prescribed order” and may include a “specification of the road route that will enable the vehicle to reach the said geographic points or addresses.” (EX1005, 11-12.) “Typically these geographic points [of the vehicle itinerary] will be traveller embarkation and destination points,” e.g., pick-up and drop-off points for passengers of the vehicle, as well as points corresponding to “additional stops en route.” (*Id.*, 12). Similar to traveller itineraries, each vehicle itinerary “can be encoded as a directed graph whose vertices are the said geographic points or addresses, and whose direct edges indicate the direction of travel between these geographic points or addresses.” (*Id.*; EX1002, ¶40.)

For example, carpool drivers may have a “car pool intended itinerary specification,” which “include[s] details of the vehicle itinerary that the car pool driver intends to follow,” as well as “related information such as the number of

available passenger seats in the car pool vehicle.” (EX1005, 12.) A carpool driver may use a communicator device in their vehicle to “submit his car pool intended itinerary specification...to the controlling computer system.” (*Id.*, 35; *see also id.*, 15, 32, 40.) The vehicle itineraries are stored in a “transit vehicle current itineraries database,” which contains transit vehicle records for currently operational transit vehicles, i.e., “a vehicle that is currently conveying travellers, or a vehicle that is currently empty but is ready to convey travellers.” (*Id.*, 34.) Carpool intended itinerary specifications are also “entered in the journey request database as a journey request record, with a relational link set up from this transit vehicle record to this journey request record...because [the carpool driver] is also a traveller, and his personal itinerary forms part of the itinerary commitments of his vehicle.” (*Id.*, 35; EX1002, ¶41.)

Olmi also describes intelligent grouping processes that match vehicles/drivers having a predetermined vehicle journey with a traveller having a compatible journey itinerary and facilitating the transportation of the traveller along the vehicle’s journey route. (EX1005, 15-20 (§§5.5-5.6), 21-27 (§5.7), 35-39.) For example, Olmi describes matching prospective travellers/passengers from the journey request database with available carpool drivers from the transit vehicle current itineraries database. (*Id.*, 35-39.) Olmi also describes other features/components, including a digitised street layout map, communicator devices, controlling computer,

positions/navigation systems, and a data transmission system. (*Id.*, 12-15 (§§5.3-5.4); EX1002, ¶42.)

2. Claim 1

i) [1.pre] “A method of sharing transportation employing a ground transportation network comprising the steps of”

To the extent the preamble of claim 1 is limiting, Olmi discloses the limitations therein. (EX1002, ¶¶43-47; *see also id.*, ¶¶37-42.)⁵ As explained above

⁵ Olmi discloses two configurations—taxibus and carpooling—and explains that the invention may run either configuration separately or both simultaneously. To the extent any features relied on in Ground 1 are deemed attributable solely to the taxibus configuration, a POSITA would have found it obvious to incorporate those features into the carpooling configuration because both configurations address similar problems using similar hardware and system architectures. Olmi’s preferred embodiment likewise integrates features of both configurations, confirming their compatibility and interchangeability. A POSITA would have recognized that incorporating taxibus features into the carpooling configuration involved only routine engineering choices and would predictably yield the same functional benefits described in Olmi. Accordingly, any taxibus-specific features would have been

(*see supra* §IX.A.1), Olmi teaches a transportation sharing process/method (“[a] method of sharing transportation”) where a central computer system analyzes “submitted itinerary requirements that it receives, and then intelligently groups travellers with compatible itineraries onto the same...transit vehicle” (EX1005, Abstract) to address problems with inefficient use of transportation services, among other things, in existing transportation networks (*id.*, 2-7; EX1002, ¶44.) As discussed, Olmi discloses that a carpool or public transport driver submits a predetermined itinerary, a prospective traveller/passenger submits a desired itinerary in the form of a journey request, and an intelligent grouping module matches vehicles/drivers with travellers having compatible journey itineraries and facilitates the transportation of the travellers along the vehicle’s journey route. (EX1005, 15-20 (§§5.5-5.6), 21-27 (§5.7), 35-39; *see also supra* §IX.A.1.)

Olmi’s process also “employ[s] a ground transportation network” as exemplified in Figures 4 and 6 (below). (EX1002, ¶45.)

obvious to implement in the carpooling configuration. (EX1005, 5, 8, 9, 11-14, 30, 40, 59, 66, 70, 78; EX1002, ¶44.)

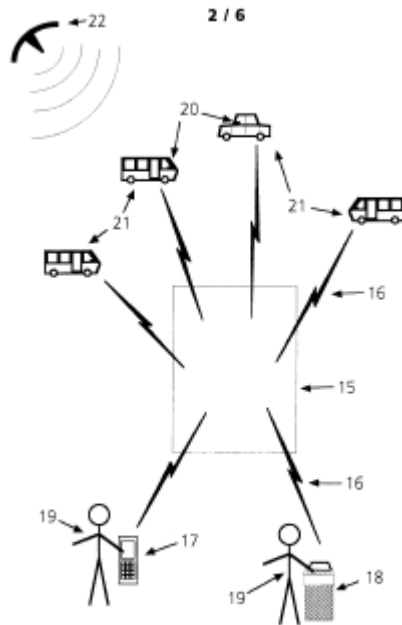


Figure 4

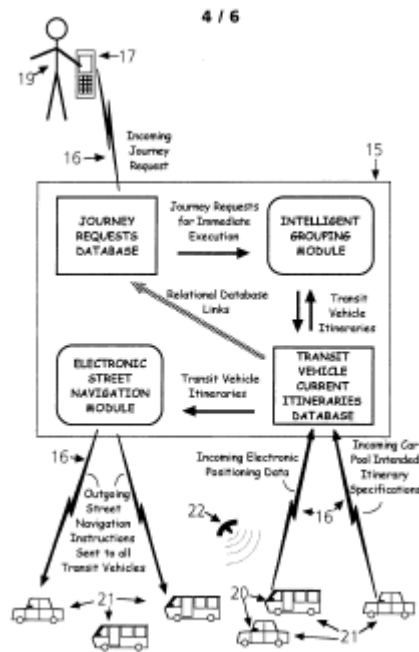


Figure 6

(*Id.*, FIGs. 4, 6.)

Olmi's Figure 4 shows a "central controlling computer system 15 [that] has, by means of the data transmission system 16, a two-way communications connection with the communicator devices 17 and 18 of the prospective travellers 19, and a two-way communications connection with the communicator devices 20 of the transit vehicles 21." (EX1005, 29; *see also id.*, 29-35.) Data transmitted over transmission system 16 includes journey requests detailing traveller itinerary requirements, the controlling computer system's responses to these requests (sent back to travellers), and other categories of information. (*Id.*, 30.) Figure 6 of Olmi "illustrates the data-processing elements of the controlling computer system 15" shown in Figure 4. (*Id.*, 32; *see also id.*, 29.) For example, the controlling computer system's main elements

include “the intelligent grouping module, the journey requests database, the transit vehicle current itineraries database, and the electronic street navigation module,” which together enable the communication and shared transportation functions of Olmi’s ground transportation network/system. (*Id.*, 32.) Olmi explains that the embodiment shown in Figures 4 and 6 is “capable of running the invention’s two main transport modes,” including the carpooling mode. (*Id.*, 30.) Thus, Figures 4 and 6 depict a “ground transportation network” of ground transportation vehicles and passengers, and a controlling computer system that enables communication between entities of the network as part of Olmi’s shared transportation method. (EX1002, ¶46.)

Olmi thus discloses a “shared transportation method employing a ground transportation network.” (*Id.*, ¶47.)

ii) [1.a] “providing a computer network;”

Olmi discloses this limitation. (EX1002, ¶¶48-50.)

As discussed above (*see* §§IX.A.1, IX.A.2.i), Olmi discloses “providing a computer network.” (*Id.*, ¶49.) Olmi’s “single central controlling computer system 15 orchestrates all transit vehicles 21 and travellers 19.” (EX1005, 31.) Olmi explains that every passenger and driver has a “communicator device” (e.g., cellular telephone) that allows them to “interact[] with this transportation invention...to send and/or receive data over the data transmission system (typically to the controlling

computer system).” (*Id.*, 14; *see also id.*, 40 (communicator devices are “desirable in any car pool vehicle regularly participating in car pooling”).) The “data transmission system 16 comprising land lines, **cellular telephone networks**, and Internet transmission is used to provide a two-way data exchange between this centralized controlling computer system 15 and the communicator devices 17 and 20 (of the travellers 19 and transit vehicles 21 respectively).” (*Id.*, 31; *see also id.*, 13 (data transmission system facilitates data transmissions “over the Internet or other **computer networks**”).) Olmi also explains that its transportation sharing features (e.g., for matching drivers and passengers) may be enabled by using an “electronic positioning system...such as the American GPS (Global Positioning System), the broadcast positioning signal of which is received by GPS receivers contained in the vehicle communicator devices (and optionally in passenger communicator devices).” (*Id.*, 31.) Further, Olmi discloses using computer instructions or code (e.g., a set of data-processing instructions) to perform specific data-processing functions. (*Id.*, 12-13.) Thus, Olmi’s system includes a controlling computer system and remotely-located components, such as an electronic positioning system and communicator devices used by travellers and transit vehicle drivers, with communication enabled by a data transmission system operating over a network. (*Id.*, 12-15.)

Thus, Olmi discloses a “computer network” in at least two ways. (EX1002, ¶50.) Olmi provides a controlling computer system 15 (which has interconnected computing components), which is one example of a “computer network.” (*Id.*) Moreover, the controlling computer system 15 along with other remotely-located components (described above) in Olmi’s transportation network, which operate in an interconnected network of associated computer-based devices and associated software/computing components, is another example of a “computer network.” (*Id.*)

iii) [1.b] “establishing an electronic registry in said computer network of capacity containing an indication of the spare transport capacity and location of a plurality of transport vehicles;”

Olmi discloses this limitation. (EX1002, ¶¶51-53.)

As discussed above (*see* §§IX.A.1, IX.A.2.ii), Olmi’s central controlling computer system 15 (alone or collectively with the other components of the Olmi system, each a “computer network”) (§IX.A.2.ii) includes a transit vehicle current itineraries database, which is “an electronic registry...of capacity” (e.g., vehicle transport availability). (§IX.A.1; EX1005, 11-12, 14, 16; EX1002, ¶52.) For example, “[t]he transit vehicle current itineraries database contains a data record, ...call[ed] the transit vehicle record, for each currently operational transit vehicle,” i.e., “a vehicle that is currently conveying travellers, or a vehicle that is currently empty but is ready to convey travellers.” (EX1005, 34.) Each vehicle record in the database includes various data fields, such as “[t]he current geographic position of

the transit vehicle” (“location of a plurality of transport vehicles”) and “[t]he passenger capacity of the transit vehicle” (“indication of the spare transport capacity”). (*Id.*, 34; *see also id.*, 12 (carpool intended itinerary includes the “number of available passenger seats in the car pool vehicle”).)

Thus, Olmi discloses “establishing an electronic registry in said computer network of capacity containing an indication of the spare transport capacity and location of a plurality of transport vehicles,” as claimed. (EX1002, ¶53; *see also* §IX.A.1.)

iv) [1.c] “**establishing a network of nodes in said computer network representing a plurality of pick-up points and a plurality of drop-off points;**”

Olmi discloses this limitation. (EX1002, ¶¶54-65.)

For example, as explained above and discussed further below, Olmi “establish[es] a network of nodes” in the “computer network” (*see supra* §IX.A.2.ii) by generating and maintaining the data structures for traveller and vehicle itineraries, where each itinerary can be encoded as a directed graph whose vertices are the embarkation and disembarkation points (and any other points) of the itinerary (“representing a plurality of pick-up points and a plurality of drop-off points”), and whose direct edges indicate the direction of travel. (*See supra* §IX.A.1; *see also* EX1005, 11 (“Mathematically speaking, using the terminology of graph theory, most **traveller or passenger itineraries** can be encoded as a **directed graph** whose

vertices are the embarkation and disembarkation points of the itinerary, and whose directed edges indicate the direction of travel.”), 12 (“Mathematically speaking most **vehicle itineraries** can be encoded as a **directed graph whose vertices are the said geographic points or addresses**, and whose directed edges indicate the direction of travel between these geographic points or addresses.”).) Olmi explains that a vehicle itinerary may have multiple pick-up and drop-off points because a carpool vehicle may have multiple passengers. (*Id.*, 34 (each transit vehicle record includes a data field reflecting “the **total number of designated passenger places**...in the vehicle”), 81-82 (describing “[g]roup travel by...car pool” where a traveller and their friend can board or alight together, “which means that the transit vehicle has less **pick-up and drop-off points on its route** to slow it down”).) As discussed below, Olmi discloses this limitation under both Petitioners’ and PO’s proposed constructions of “network of nodes” / “nodes.” (EX1002, ¶55.)

Similar to the ’427 patent, Olmi discloses that these pick-up and drop-off locations (“nodes”) may be existing, predefined points, such as those along preexisting routes (e.g., bus stops). (*Id.*, ¶56.) For example, Olmi explains that passengers can specify a destination location in safe and convenient locations other than their true destination, such as a designated shop or similar location. (*Compare* EX1005, 83 (“passengers can specify an address...just a hundred metres away from their home,” e.g., “in front of a local shop or similar location”), *with* EX1001, 14:47-

61 (establish pick-up and drop-off points (nodes) so riders/drivers “can be guided to places that are safe and convenient”).) Similarly, Olmi’s system/method contemplates routing vehicle transports to “**main roads and larger streets (just as with regular buses), with passenger drop-offs and pick-ups taking place exclusively on these main roads.**” (EX1005, 78.)

Olmi also contemplates schemes to eliminate pick-up and drop-off point ambiguities by providing “**pre-defined passenger pick-up (and optionally set-down) points**” that can be used “when making a journey request.” (*Id.*, 88.) For example, Olmi’s shared transport system/process can be integrated with existing public transportation systems, such that fixed embarkation and destination points (e.g., bus stops) may serve as nodes in Olmi’s network of nodes. (*Compare id.*, 19 (“[T]he intelligent grouping module will have the ability to route...a traveller itinerary via existing modes of public travel such as buses and trains as well as by taxibus or car pool transit vehicles. This will enable this invention to seamlessly integrate with existing public transport...”), 62-64 (§§7.16-7.17) (including existing modes of public transport / integrated multi-modal transport system), 63 (“[o]nce existing public travel modes are integrated into this controlling computer system”), 64 (computer system calculates routes and arrange for vehicle transport to a drop-off point (node) “at the appropriate Underground station” to catch a train), and 70 (describing integration of invention with existing public transport modes), *with*

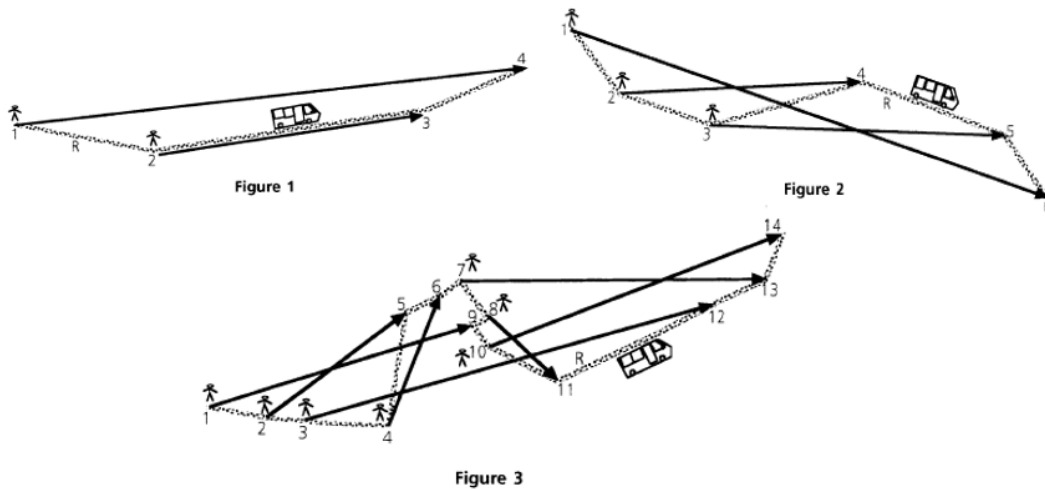
EX1001, 14:61-65 (network of nodes/stops can incorporate “existing databases of stops from existing bus networks”); EX1002, ¶57.)

As discussed below, these fixed pick-up and drop-off nodes/points are likewise included in the “network of nodes” that Olmi’s system/method establishes and processes using traveller and vehicle itinerary data structure information. (EX1002, ¶58.)

As an initial matter, Olmi discloses that these pick-up and drop-off points may be along one or more predetermined/fixed vehicle routes. (*Id.*, ¶59.) For example, Olmi explains that “travellers [passengers or carpool drivers] that have identical pick-up or drop-off points” can be “plac[ed]...on the same transit vehicle.” (EX1005, 74.) Thus, a potential carpool passenger’s pick-up and drop-off points may be along a predetermined route of a carpool driver. (EX1002, ¶59.) Olmi explains that “the invention can also work with existing public transport such as buses, trains or trams,” such that a passenger is matched with a fixed-route transport vehicle with a compatible vehicle itinerary to the itinerary specified in the passenger’s journey request. (EX1005, 70). Thus, a potential passenger’s pick-up and drop-off points may be along a fixed public transport route. (EX1002, ¶59.)

Olmi also discloses that these predetermined routes (along which passengers are picked up and dropped off at predefined points) form a “network of nodes.” (*Id.*, ¶60.) Olmi explains that its intelligent grouping module processes the traveller and

vehicle itineraries including these predefined embarkation and disembarkation points (“nodes”) to match potential riders with vehicle(s) and determine predetermined/fixed vehicle route(s) that intersect traveller nodes. (EX1005, 21-27.) For example, Olmi determines compatibility between a set S of traveller itineraries, as shown in Figures 1-3 below, which correspond to a set S of two travellers (Figure 1), three travellers (Figure 2), and seven travellers (Figure 3), respectively. (*Id.*) Each of the below figures depicts a network of nodes that represents embarkation and destination points maintained in a data structure used by Olmi’s “computer network.” (*Id.*; *see also supra* §§IX.A.1, IX.A.2.ii; *infra* §IX.A.2.v (incorporated herein and further describing features of a network of nodes); EX1002, ¶60.)



(EX1005, FIG. 1 (annotated).)

Olmi's carpool scenario is exemplified using Olmi's Figure 1, annotated below, where route **R** reflects in this example a carpool predetermined journey (*see infra* §IX.A.v) following the path from nodes 1, 2, 3, to 4, such as a predetermined commuting route (e.g., work (node 1) to home (node 4) following the path including node 2 and node 3). (EX1002, ¶61.)

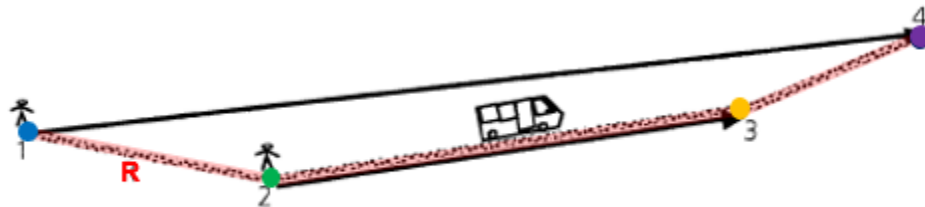


Figure 1

(EX1005, FIG. 1 (annotated).)

Figure 1 also shows a traveller's requested journey reflected by pick-up and drop-off points (nodes 2 to 3) that overlap/intersect the carpool driver's predetermined vehicle journey (from nodes 1, 2, 3, to 4). (*Id.*) Thus, the “pick-up,” “drop-off,” and waypoints along a route (e.g., collectively nodes 1, 2, 3, and 4) form a “network of nodes... representing a plurality of pick-up points and a plurality of drop-off points” that Olmi's computer system 15 “establish[es]..in said computer network” (*see* §IX.A.2.ii) by generating and maintaining traveller and vehicle itineraries based on predefined node data (e.g., fixed locations that may correspond to existing public transportation stops, main street locations, etc. represented as

nodes in Olmi's graph theory-based data structures). (EX1005, 11, 12, 19, 34, 62-64, 81-82; EX1002, ¶62.)

Olmi's system includes a "network of nodes" under Petitioners' proposed construction, i.e., "[t]he pick-up points and drop-off points interconnected by predetermined transport vehicle journey routes." (*See supra* §VIII; *see also infra* §IX.A.2.v.(1) (discussing Petitioners' proposed construction of "predetermined transport vehicle journey"); EX1002, ¶63.) For example, as discussed above and shown in Figure 1, each of the pick-up and drop-off points may be along one or more predetermined transport vehicle journey routes (e.g., a carpool driver's predetermined route or a fixed public transit route), and the pick-up and drop-off points are encoded as vertices (e.g., points 1-4 in Figure 1) in a directed graph, with direct edges (e.g., the connecting lines with arrows in Figure 1) connecting the pick-up and drop-off points and indicating the direction of travel. (EX1005, 11-12, 15-20 (§§5.5-5.6), 21-27 (§5.7), 32-39.) Thus, the pick-up and drop-off points/nodes are interconnected by predetermined/fixed transport vehicle itineraries/routes. (*See supra* §VIII; *see also infra* §IX.A.2.v.(1); EX1002, ¶63.)

Olmi's system also includes a "network of nodes" under PO's proposed construction, i.e., "geographic locations (such as addresses or intersections) where a customer could be picked up or dropped off, and street segments between them," because as discussed above, Olmi discloses representing a predetermined transport

route as a set of geographic locations (e.g., public transportation stops, main street locations, etc.) along which a passenger may be picked up or dropped off, connected by the street segments along that predetermined route indicating the direction of travel. (*See* EX1005, 15-20 (§§5.5-5.6), 21-27 (§5.7), 35-39; *see also supra* §VIII; EX1002, ¶64.)⁶

- v) **[1.d] “abstracting a geographic representation of a predetermined transport vehicle journey by calculating places where said predetermined transport vehicle journey intersects said nodes and representing said predetermined transport vehicle journey in the format of a set of said nodes;”**

Olmi discloses this limitation. (EX1002, ¶¶66-71.)

Element **[1.d]** can be broken down into the following limitations, which are addressed in turn below:

- [i] a geographic representation of a predetermined transport vehicle journey;
- and
- [ii] abstracting [i], which is satisfied by

⁶ To the extent Petitioners’ or PO’s proposed constructions are found not to apply to the claimed “network of nodes,” Olmi discloses a “network of nodes” under any reasonable construction of the term, for the same reasons explained in this ground. (EX1002, ¶65; *see also infra* §IX.A.2.v.(1) (“predetermined transport vehicle journey”).)

[ii.a] calculating places where said predetermined transport vehicle journey intersects said nodes, and

[ii.b] representing said predetermined transport vehicle journey in the format of a set of said nodes.

(1) [1.d.i] “a geographic representation of a predetermined transport vehicle journey”

First, Olmi discloses that a carpool/vehicle driver may take a “predetermined transport vehicle journey.” (EX1002, ¶¶72-77.) As discussed above (*see* §IX.A.1), Olmi discloses that a driver’s vehicle itinerary may comprise a “set of prescribed geographic points or addresses to which the vehicle must navigate in a prescribed order.” (EX1005, 11-12.) As discussed, carpool drivers may have a “car pool intended itinerary specification,” which “include[s] details of the vehicle itinerary that the car pool driver intends to follow.” (*Id.*, 12.) A carpool driver uses a communication device in their vehicle to “submit his car pool intended itinerary specification...to the controlling computer system.” (*Id.*, 35; *see also id.*, 15, 32.) Thus, a carpool/vehicle journey may be a fixed and predetermined established route/path from the carpool driver’s start location to the end location. (EX1002, ¶72.) Similarly, when a driver is operating a transit vehicle on a fixed public transport route (e.g., bus, train, or tram), the vehicle’s journey follows a predetermined route. (EX1005, 70; EX1002, ¶72.)

Olmi discloses a “predetermined transport vehicle journey” under Petitioners’ proposed construction, i.e., “[a] trip along an existing route defined before demand for transport and independently of a transport user’s door-to-door trip.” (*See supra* §VIII; EX1002, ¶73.) As discussed above, a driver may take trips along a predetermined/existing route (e.g., fixed personal itinerary for carpool such as a predetermined commuting route from work to home, or a public transport driver’s fixed vehicle itinerary) (“[a] trip along an existing route”) that a driver has submitted to the central computer system before being matched with a potential passenger (“defined before demand for transport”) and independently of any potential passenger’s submitted journey itinerary (“independently of a transport user’s door-to-door trip”). (*See* EX1005, 19, 62-64, 70, 78, 83, 88; *see also supra* §VIII; EX1002, ¶73.)⁷

Second, Olmi discloses a “geographic representation” of that predetermined transport vehicle journey. (EX1002, ¶74.) Olmi’s carpool scenario is exemplified

⁷ In the Carma litigation, PO disagrees with Petitioners’ proposed construction of the claimed “predetermined transport vehicle journey.” (*See* EX1008, 5, 11.) However, Olmi discloses a “predetermined transport vehicle journey” under any reasonable construction of the term, for the same reasons explained in this ground. (EX1002, ¶73.)

using Olmi's Figure 1, annotated below, where route **R** reflects in this example a carpool predetermined journey following the path from nodes 1, 2, 3, to 4, such as a predetermined commuting route (e.g., work (node 1) to home (node 4) following the path including node 2 and node 3). (EX1002, ¶74.)

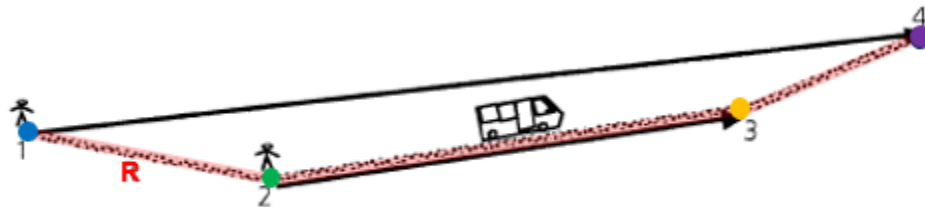
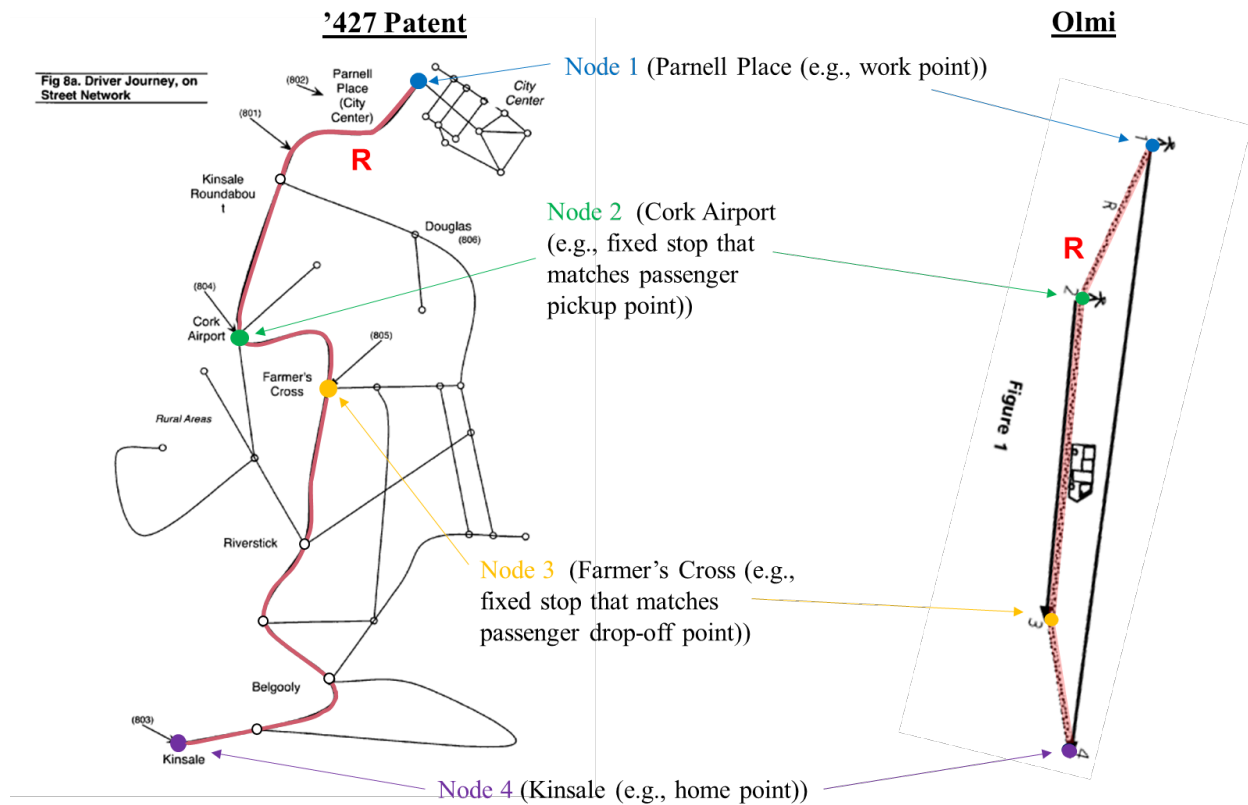


Figure 1

(EX1005, FIG. 1 (annotated).)

The carpool route **R** may be established via the driver's registration of the journey for potential transport sharing, etc., as explained above. (*Id.* 11, 12, 15, 32, 35.) As explained for limitation [1.c] and below for claim 2, the locations along the carpool route **R** (e.g., nodes 1, 2, 3, to 4), including pick-up and drop-off locations for a traveller (e.g., nodes 2, 3), can be fixed locations corresponding to public transportation stops, locations of main streets, etc. (See EX1005, 11, 12, 19, 34, 62-64, 81-82; *see also supra* §IX.A.2.iv; *infra* §IX.A.3; EX1002, ¶75.)

The carpool vehicle journey exemplified using Olmi's Figure 1 teaches, for example, the vehicle journey depicted in Figure 8a of the '427 patent, as comparatively shown below.



(Compare EX1001, FIG. 8a (left, annotated)⁸, with EX1005, FIG. 1 (right, rotated/annotated); EX1002, ¶76.)

⁸ See EX1005, 14:66-15:8 (“The route of the driver’s journey is shown in FIG. 8a as a dark line (801) moving from the north of the map toward the south of the map.... [T]he driver’s route 801 can automatically indicate that the path of this route is from Parnell Place 802 to Cork Airport 804 to Farmer’s Cross 805.”), FIG. 8b (driver journey from “Parnell Place (start)” to “Kinsale (terminate)”.)

Thus, Olmi's Figure 1 discloses an example of "a geographic representation of a predetermined transport vehicle journey" consistent with that described in the '427 patent. (EX1002, ¶77.)

(2) [1.d.ii.a] "calculating places where said predetermined transport vehicle journey intersects said nodes"

Olmi discloses "calculating places where said predetermined transport vehicle journey intersects said nodes." (EX1002, ¶¶78-81.) For instance, the points (e.g., nodes) maintained in Olmi's databases may be associated with, for example, fixed or predetermined stops/pick-up points that are along (i.e., intersect with) the carpool driver/vehicle's predetermined route. As discussed above (*see* §§IX.A.2.iv, IX.A.2.v.(1)), these pick-up and drop-off points ("nodes") may be associated with designated traveller pick-up/destination points provided in the traveller's journey request and itinerary. For example, as shown in Figure 1 (discussed further above and reproduced/annotated below), a traveller's requested journey reflected by pick-up and drop-off points (nodes 2 to 3) overlap/intersect the carpool driver's predetermined vehicle journey R (from nodes 1, 2, 3, to 4). (EX1005, 11, 12, 19, 34, 62-64, 81-82.)

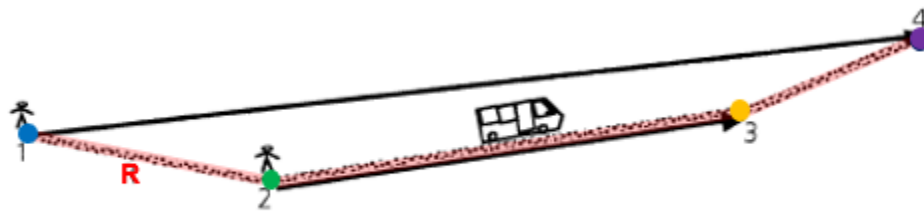


Figure 1

(*Id.*, FIG. 1 (annotated).)

Olmi's system 15 performs processes to facilitate the traveller's requested transport without adversely affecting the carpool driver's original predetermined journey. For example, Olmi explains that a traveller itinerary is defined by embarkation and destination points, that a vehicle itinerary comprises prescribed geographic points or addresses to which the vehicle must navigate in a prescribed order, and that those geographic points are typically traveller embarkation and destination points. Olmi further explains that, in car pooling, the driver submits a car-pool intended itinerary specification that includes the vehicle itinerary the driver intends to follow, typically from the driver's current location to the driver's intended destination, with any additional stops en route also specified. (*Id.*, 11-12, 41-42.) Thus, Olmi's car-pool vehicle has a predetermined journey, and the relevant traveller pick-up and drop-off points are nodes against which that predetermined journey is evaluated. (EX1002, ¶79.)

For instance, as explained above, Olmi's carpooling transportation operations involve a carpool driver who has an established/predetermined vehicle journey path

from a start node to an end node, e.g., work to home (or vice versa). A traveller may send a journey request with pick-up/destination points, which are represented as nodes in the data structures stored in Olmi's itinerary database(s) in accordance with Olmi's teachings. (*See, e.g.*, EX1005, 11-13, 22-24, 32, 42-43.) The central computer 15 processes the request (*see infra* §IX.A.2.v.(3), IX.A.2.vii, incorporated herein) to determine whether the traveller's journey information (e.g., in its itinerary record) matches requirements to support transport, including whether the nodes corresponding to the passenger/traveller's pick-up/drop-off points intersect/overlap with a carpool driver's/vehicle's preexisting route. (EX1005, FIGs. 1-3, 6, 8-9 (matching passengers with carpool drivers having compatible itineraries), 11-12 (carpool intended itinerary specification), 13 (carpool driver has own itinerary), 15-16, 19, 25, 30, 32, 35, 41-48 (discussing carpooling details).) (EX1002, ¶80.) Olmi contemplates that the pick-up and drop-off points (nodes) for a passenger/traveller can be points (nodes) corresponding to existing fixed points (e.g., existing stop/pick-up points along a main street, fixed stop locations, public transportation stop points, etc.) that likewise intersect the carpool's vehicle's preexisting route. (*See supra* §IX.A.2.iv; *infra* §IX.A.3.) Such designated pick-up/drop-off nodes associated with the fixed or predetermined stop/pick-up points (nodes) are directly along the way (and thus intersect) the preexisting route for the carpool driver/vehicle. (EX1002, ¶80.)

Accordingly, Olmi discloses that its system performs processes to calculate locations (e.g., places) where the carpool driver/vehicle's predetermined transport journey intersects pick-up/drop-off points ("calculating places where said predetermined transport vehicle journey intersects said nodes") in the network of such points maintained by Olmi's system (e.g., points represented as nodes in the data structures of Olmi's system). (*See supra* §§IX.A.2.ii-iv; EX1005, 11-13, 23; EX1002, ¶81.)

(3) [1.d.ii.b] **"representing said predetermined transport vehicle journey in the format of a set of said nodes"**

Olmi also discloses "representing said predetermined transport vehicle journey in the format of a set of said nodes." (EX1002, ¶¶82-84.) Olmi explains that a vehicle itinerary, which as discussed above (§IX.A.2.v.(1)) may be a predetermined itinerary input by a carpool driver ("predetermined transport vehicle journey"), is represented as "a data structure or a computer data format" which "comprise[s] a **set of prescribed geographic points** or addresses to which the vehicle must navigate in a prescribed order." (EX1005, 11-12.) "Typically these geographic points [of the vehicle itinerary] will be traveller embarkation and destination points," e.g., pick-up and drop-off points for passengers of the vehicle, as well as points corresponding to "additional stops en route." (*Id.*, 12). Olmi explains that each vehicle itinerary is "encoded as a directed graph whose vertices

are the said geographic points or addresses, and whose directed edges indicate the direction of travel between these geographic points or addresses.” (*Id.*, 12.) Olmi discloses that this encoded vehicle itinerary is stored as part of a transit vehicle record in the controlling computer system’s transit vehicle current itineraries database. (*Id.*, 34.) Thus, a vehicle itinerary is represented/encoded as a set of geographic points/nodes (e.g., pick-up or drop-off points) that is stored within the controlling computer system’s transit vehicle current itineraries database (“representing said predetermined transport vehicle journey in the format of a set of said nodes”). (EX1002, ¶82.)

Accordingly, for the reasons explained above for §§IX.A.2.v-IX.A.2.v.(3), Olmi discloses abstracting a geographic representation of the points/nodes of a predefined vehicle itinerary (“abstracting a geographic representation of a predetermined transport vehicle journey”) by performing processes to calculate locations where the carpool driver/vehicle’s predetermined transport journey intersects pick-up/drop-off points (“calculating places where said predetermined transport vehicle journey intersects said nodes”) and then representing/encoding that vehicle itinerary as a set of geographic points/nodes stored within the central computer’s transit vehicle current itineraries database (“representing said predetermined transport vehicle journey in the format of a set of said nodes”). (EX1002, ¶¶83-84.)

- vi) [1.e] “providing an electronic registry in said computer network of demand containing an indication of the demand for transportation needs of a plurality of transport users;”

Olmi discloses this limitation. (EX1002, ¶¶85-87.)

As discussed above (*see* §§IX.A.1., IX.A.2.i), Olmi discloses that prospective travellers/passengers use their communicator devices to submit journey requests, which include traveller/passenger itinerary specifications, to indicate their travel requirements and preferences, and these journey requests are stored as journey request records in a journey requests database (“electronic registry...of demand”). (EX1005, 12 (“A journey request is defined as a data structure or a computer data format which includes a specification of a traveller or passenger itinerary, and may also include a specification of any other travel requirements relating to this itinerary...”), 32 (“In figure 5 a prospective traveller 19 uses a communicator device 17 to formulate and send his journey request to a central controlling computer system 15 via the data transmission system 16....The data in each such incoming journey request is stored as a journey request record in the journey requests database.”); EX1002, ¶86.) As discussed above (*see* §§IX.A.1, IX.A.2.i), the journey requests database is part of the controlling computer system, which is (alone or collectively with the other components) Olmi’s “computer network,” and thus the journey requests database “provid[es] an electronic registry in said computer network of demand.” (EX1002, ¶86.) The journey requests and corresponding journey request

records stored in the journey requests database provide “an indication of the demand for transportation needs of a plurality of transport users” because the journey requests allow prospective travellers to specify how many traveller seats are required for each journey. (EX1005, 16 (“[T]he journey request will allow travellers to specify the number of traveller seats required on the journey.”), 32 (each journey request record contains a data field reflecting “[t]he number of travellers to be conveyed on the said itinerary”); EX1002, ¶86.)

Thus, Olmi’s journey request database is “an electronic registry in said computer network of demand containing an indication of the demand for transportation needs of a plurality of transport users.” (EX1002, ¶87.)

- vii) [1.f] “**effecting a match in a match engine in said computer network of said transport capacity of at least one transport vehicle in said electronic registry of capacity with said transport demand for a journey of at least one transport user in said electronic registry of demand for transport between at least two of said nodes.**”

Olmi discloses this limitation. (EX1002, ¶¶88-94.)

As explained above (*see* § IX.A.1), Olmi’s controlling computer system 15 (which is, alone or collectively with the other components of the Olmi system, a “computer network” (§IX.A.2.ii)) includes an “intelligent grouping module” (“matching engine in said computer network”), which is “a data-processing module which, on the basis of traveller journey requests” (“transport demand for a journey

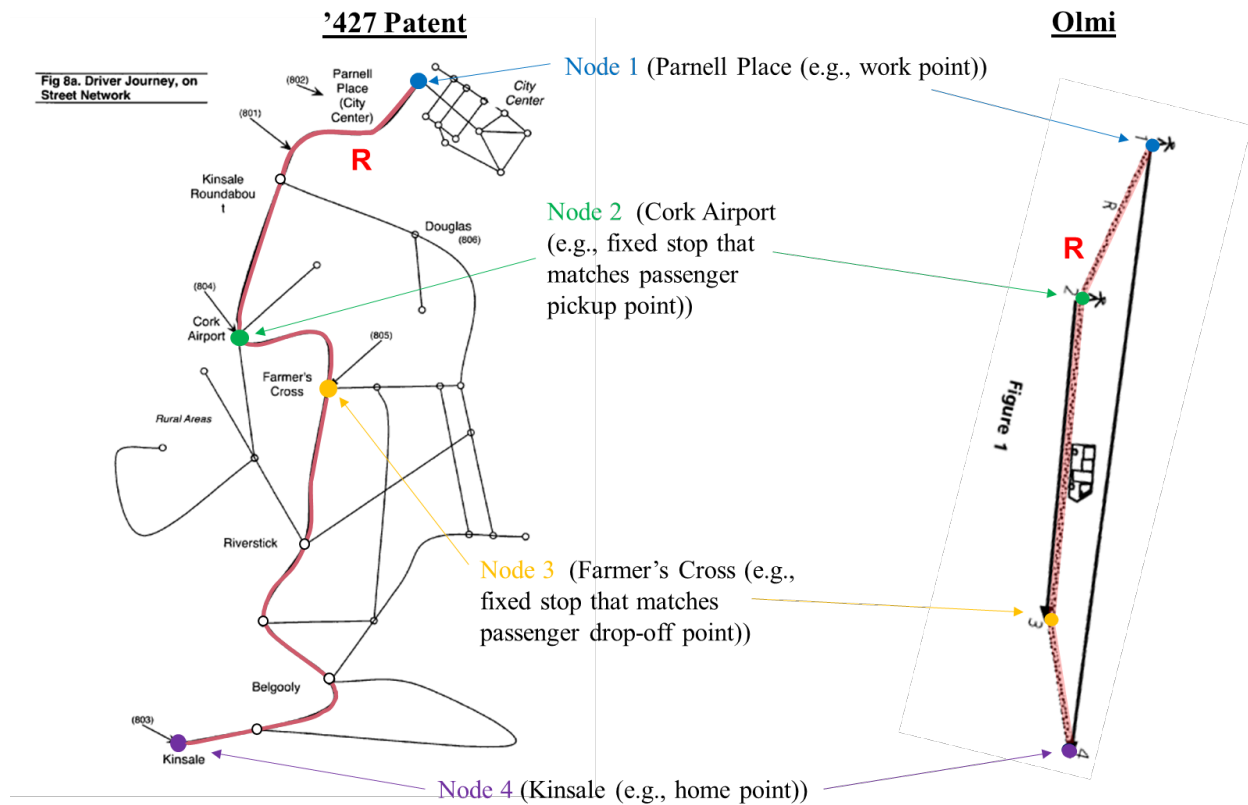
of at least one transport user”) “and on the basis of the transit vehicles available” (“transport capacity of at least one transport vehicle”) “intelligently groups the travellers associated with the journey requests into the said transit vehicles” (“effecting a match in a match engine in said computer network of said transport capacity of at least one transport vehicle...with said transport demand for a journey of at least one transport user”). (EX1005, 13-14; EX1002, ¶89.)

For example, Olmi explains that the “car pooling configuration provides a very effective means of matching prospective passengers with car pool drivers having compatible itineraries.” (EX1005, 9.) A carpool driver’s “car pool intended itinerary specification” contains information about the “number of available passenger seats in the car pool vehicle” (*id.*, 12), which is stored in the “transit vehicle current itineraries database” (“transport capacity of at least one transport vehicle in said electronic registry of capacity”) (*id.*, 34). (EX1002, ¶90.) A prospective carpool passenger can submit in their journey request “[t]he number of travellers to be conveyed” and “[a] specification of the type of transit vehicle requested by the traveller,” e.g., “a car pool vehicle” (“transport demand for a journey of at least one transport user”). (EX1005, 32; EX1002, ¶90.)

Olmi also discloses that the intelligent grouping module matches traveller(s) to a vehicle “for transport between at least two nodes.” (EX1002, ¶91.) Olmi discloses that the journey request includes traveller/passenger itinerary information,

including the traveller's embarkation and destination points (and any other points). (EX1005, 11 (traveller/passenger itinerary includes at least "the traveller's **embarkation point** and the traveller's **destination point**"), 21 ("[E]ach traveller itinerary...is expressed as a directed graph whose vertices encode the traveller's **embarkation and destination points (and any other points)**, and whose directed edges indicate the direction of travel."), 32 (journey request record includes a data field specifying the "itinerary of the traveller").) Similarly, a car pool intended itinerary specification includes "details of the vehicle that the car pool driver intends to follow," including a starting point (e.g., "**current location point or address**") and "**intended destination point or address**," as well as any "additional stops en route." (*Id.*, 12.)

For example, as discussed above (*see* §IX.A.2.v.(1)) and again shown below, route **R** reflects a carpool driver/vehicle's predetermined journey following the path from nodes **1**, **2**, **3**, to **4** (such as a predetermined commuting route (e.g., work (**node 1**) to home (**node 4**) following the path including **node 2** and **node 3**). (EX1002, ¶92.) As discussed, each of these nodes may be predefined and correspond to, e.g., fixed locations that may correspond to existing public transportation stops, main street locations, etc. (*See* §IX.A.2.v.(1).)



(Compare EX1001, FIG. 8a (left, annotated),⁹ with EX1005, FIG. 1 (right, rotated/annotated).)

⁹ See EX1001, 14:66-15:8 (“The route of the driver’s journey is shown in FIG. 8a as a dark line (801) moving from the north of the map toward the south of the map.... [T]he driver’s route 801 can automatically indicate that the path of this route is from Parnell Place 802 to Cork Airport 804 to Farmer’s Cross 805.”), 15:9-12 (discussing that “once the geographic representation is abstracted to stop nodes” as discussed with respect to Figure 8a’s geographic representation, “it is possible to show the

Consistent with Olmi's teachings (explained above), the carpool driver/vehicle's itinerary information would include capacity information, such as available seats in the vehicle, and related route information (**R** going from a starting point (**node 1**) to a destination point (**node 4**) via nodes **2** and **3**). (EX1005, 12, 21-23, 41-42.) As also explained, the carpool predetermined route **R** may be established via the driver's registration of the journey for potential transport sharing, resulting in data structures stored in Olmi's driver/vehicle itinerary databases in the controlling computer system of the computer network. (See EX1005, 34-35, 41-42; *see also supra* §§IX.A.1, IX.A.2.(ii)-(v).) The route **R** follows a path that intersects two nodes (**node 2** and **node 3**), which as explained above, may be fixed stop/pick-up points that were determined to be along route **R** (e.g., intersects predetermined route **R**). (See EX1005, 11-12, 21-23, 31-33, 42; *see also supra* §§IX.A.2.v(1)-IX.A.2.v(2).) A prospective passenger (e.g., a user) may provide a journey request that seeks transport for one or more people from locations corresponding to **node 2** to **node 3**, which as shown in this example, match the intersecting nodes along route **R**. (EX1005, 11-12, 21-23, 31-33, 42.) Thus, the passenger's journey request would

driver's route in a variety of alternate presentations, such as the presentation shown in FIG. 8b"); FIG. 8b (driver journey from "Parnell Place (start)" to "Kinsale (terminate)").)

reflect the requested transport (e.g., demand for one or more seats for transport from embarkation point (node 2) to destination point (node 3)). Consistent with Olmi's teachings and the system discussed above for limitation [1.d], Olmi's grouping module would process the requests to identify a match between the requested demand (e.g., passenger's journey request for at least one person's transport from node 2 to node 3 (e.g., at least two of said nodes)) with the available capacity (e.g., carpool driver/vehicle's available seats) traveling along route R that includes the predetermined journey from nodes 1, 2, 3, to 4. (See *supra* §§IX.A.2.iii, IX.A.2.v.(2)-(4), IX.A.2.vi; see also *infra* §IX.A.3; EX1005, 12-19, 32-34, 62-64, 70, 78, 83, 88; EX1002, ¶93.)

Thus, for the reasons explained above, and in §§IX.A.1-§§IX.2.ii-IX.A.2.vi, Olmi discloses “effecting a match in a match engine” (e.g., intelligent grouping module) “in said computer network” (computer system 15 or collective system (§IX.A.2.ii)) “of said transport capacity of at least one transport vehicle in said electronic registry of capacity” (e.g., carpool vehicle with seat availability as set forth in vehicle/carpool driver itinerary data structures and stored in vehicle itinerary database, see, e.g., *supra* §IX.A.2.iii) “with said transport demand for a journey of at least one transport user in said electronic registry of demand for transport between at least two of said nodes” (e.g., traveller/passenger journey request including transport demand regarding transport for a user(s) between two locations (e.g.,

transport start/end point demand) that correspond to preestablished nodes maintained in the network of nodes of Olmi's system that intersect the carpool driver/vehicle's predetermined route). (See *supra* §§IX.A.1, IX.A.iv-IX.A.2.vi; EX1002, ¶94.)

3. Claim 2: "A method as set forth in claim 1 wherein the step of establishing said network of nodes is determined from an existing database of stops for bus networks."

Olmi discloses claim 2. (EX1002, ¶¶95-96.)

As discussed for limitation [1.c], Olmi discloses that, similar to the '427 patent, Olmi's shared transport system/process can be integrated with existing public transportation systems, such that establishing the network of nodes may be determined from a preexisting group of nodes corresponding to, e.g., bus stops in bus networks. (See §IX.A.2.iv; *compare* EX1005, 19 ("[T]he intelligent grouping module will have the ability to route...a traveller itinerary via existing modes of public travel such as buses and trains as well as by taxibus or car pool transit vehicles. This will enable this invention to seamlessly integrate with existing public transport..."), 62-64 (§§7.16-7.17) (including existing modes of public transport / integrated multi-modal transport system), 63 ("[o]nce existing public travel modes are integrated into this controlling computer system..."), 64 (computer system calculates routes and arrange for vehicle transport to a drop-off point (node) "at the appropriate Underground station" to catch a train), *and* 70 (describing integration of

invention with existing public transport modes), *with* EX1001, 14:61-65 (network of nodes/stops can incorporate “existing databases of stops from existing bus networks”).) Thus, Olmi discloses integrating existing public transport modes, including bus stops and train stations, into the controlling computer system, and a POSITA would have understood that “the step of establishing said network of nodes” (e.g., creating, storing, and maintaining data structures in the database(s) of computer system 15 relating to, e.g., the embarkation/destination points of travellers and vehicles) would have involved “determin[ing]” the points/nodes in the network “from an existing database of stops for bus networks” or other public transportation networks. (EX1002, ¶96.)

4. Claim 3: “A method as set forth in claim 1 wherein the step of establishing said network of nodes is determined by creating an in-vehicle system.”¹⁰

Olmi discloses claim 3. (EX1002, ¶¶97-98.)

¹⁰ Petitioners reserves their right to address any §112 issues in other proceedings relating to the claimed “establishing said network of nodes...by **creating** an in-vehicle system.” For purposes of this proceeding, Petitioners assume claim 3 encompasses using an in-vehicle system to establish the network of nodes, consistent with the specification of the ’427 patent, which explains that a “network of stops can, for example, be...created by the in-vehicle system 17.” (EX1001, 14:59-65.)

As discussed for limitations [1.b]-[1.c], Olmi discloses “establishing a network of nodes” corresponding to a plurality of pick-up and drop-off points along a predetermined carpool journey route. (§IX.A.2.iii, IX.A.2.iv.) Olmi further discloses that all transit vehicles are equipped with a vehicle communicator device, which may be an in-vehicle cellular telephone, wireless PDA, or similar device (“in-vehicle system”). (EX1005, 40-41.) Olmi discloses that a driver inputs their predetermined vehicle itinerary (which may contain multiple stops) by using the user interface of a vehicle communicator device. (*Id.*, 14 (“[A]ny car pool vehicle drivers use **communicator devices** to send their **car pool intended itinerary specifications**, to a controlling computer system....”), 32 (“[C]ar pool vehicle drivers will use a **communicator device** to submit their **car pool intended itinerary specification** to the controlling computer system....”), 41-42 (“At the journey start, a driver thus identified who wants to engage in car pooling must **inform the controlling computer system of his intended itinerary**....The **user interface of the vehicle communicator device** would be designed so as to let the driver easily specify the destination address (or addresses) on his itinerary....”).) Thus, Olmi discloses that a vehicle driver establishes the stops/nodes of the predetermined vehicle journey (“wherein the step of establishing said network of nodes”) by creating the journey/network using an in-vehicle communicator device/system (“is determined by creating an in-vehicle system”). (EX1002, ¶98.)

5. Claim 4: “A method as set forth in claim 1 wherein said geographic representation is received from a GPS unit.”

Olmi discloses claim 4. (EX1002, ¶¶99-103.)

Olmi discloses that each vehicle communicator device and passenger communicator device (*see* §IX.A.2.ii) contains a “GPS unit” that determines the current location of the vehicle/passenger and transmits the location information to the controlling computer system. (EX1005, 14 (Olmi’s system includes an “electronic positioning system” which may be the “American GPS (Global Positioning System)”), 15 (“[A]ll transit vehicles are equipped with a communicator device; and...the electronic positioning system is able to locate the geographic position of all operational transit vehicles....[I]t is advantageous for the electronic positioning system to be able to locate travellers as well as transit vehicles...”), 29 (“An electronic positioning system 22 provides the controlling computer system with data regarding the current geographic location of the transit vehicle communicator devices 20 and (optionally) some passenger communicator devices 17.”), 31 (“The electronic positioning system 22 in this embodiment is a satellite positioning system such as the American GPS (Global Positioning System), the broadcast positioning signal of which is received by GPS receivers contained in the vehicle communicator devices (and optionally in passenger communicator devices). These GPS receivers transmit electronic positioning data to the controlling computer system via the data transmission system.”), FIG. 6; EX1002, ¶100.)

Olmi discloses that the “geographic representation” of a carpool driver’s predetermined vehicle journey is “received from a GPS unit” in a couple ways. (EX1002, ¶101; *see* §IX.A.2.v.(1).)

First, the “driver’s intended itinerary...comprises his **current location** point or address and his intended destination point or address” (EX1005, 12), where the current location is determined using electronic positioning data (*id.*, 31). Olmi also discloses that geographical representation data is kept up-to-date with geographic position data from each of the transit vehicles. (*See* §IX.A.2.v; EX1005, 34 (“The transit vehicle current itineraries database is regularly maintained by data processing instructions which ensure the current geographic position data field (1) for each transit vehicle record is kept updated with the latest geographic position data for that transit vehicle, received from the electronic positioning system.”).) Thus, a POSITA would have understood that the itinerary information used to create the geographic representation of the predetermined journey (*see* §IX.A.2.v.(1)) relies on current location data from the vehicle communicator device’s GPS unit (“wherein said geographic representation is received from a GPS unit”). (EX1002, ¶102.)

Second, Olmi discloses that vehicles may have “in-car satellite navigation systems” that “make use of a digitized street layout map, and make use of data from a satellite electronic positioning system, in order to provide the car driver with real-time navigation instructions which are based on, and dynamically respond to, the

vehicle's current geographic location.” (EX1005, 14; *see also id.*, 18 (navigation module uses current geographic location that “rely on a **digitised street layout map** and use an electronic positioning system to provide current location data”), 31 (navigation module uses electronic position data to determine current vehicle location and “by relating this current location to a **digitised street layout map**, will provide the vehicle driver with **real-time** navigation instructions...”).) Thus, a POSITA would have understood that the geographic representation of a predetermined vehicle itinerary may be provided via digitized street layout map and real-time navigation instructions using data from the GPS unit (“wherein said geographic representation is received from a GPS unit”). (EX1002, ¶103.)

6. Claim 5: “A method as set forth in claim 1 further comprising the step of gathering data to display real time transport capacity between selected nodes of said plurality of nodes.”

Olmi discloses claim 5. (EX1002, ¶¶104-108.)

As discussed for limitation [1.b], Olmi discloses collecting capacity information (“transport capacity”) and storing it in a transit vehicle current itineraries database. (*Supra* §IX.A.2.iii; *see also* EX1005, 34 (“The transit vehicle current itineraries database contains a data record, which we shall call the transit vehicle record, for each currently operational transit vehicle. By a currently operational transit vehicle we mean a vehicle that is currently conveying travellers, or a vehicle that is currently empty but is ready to convey travellers. The format of

the transit vehicle record includes...[t]he passenger **capacity** of the transit vehicle (excluding the driver); that is, the total number of designated passenger places (seated or standing) in the vehicle.”.)

Olmi discloses that this stored capacity information reflects “real time transport capacity.” (EX1002, ¶106.) Olmi discloses that real-time transportation data is used in its matching and route determination and navigation features. (EX1005, 16-17 (data transmissions occur “more or less instantaneously,” as “such speed is necessary if the invention is to operate effectively in **real time**”), 18, 27 (navigation module can dynamically adapt transport vehicle routing using real-time electronic position data), 30 (configuration where the vehicle itinerary data from the database on system 15 is sent to the navigation module in vehicles 2, to provide navigation operations), 38, 42 (“transit vehicle record details the car pool vehicle’s **real-time current location**, the vehicle’s intended itinerary, and the **number of available passenger seats in the vehicle**” (“capacity”), which is also included in a new journey request record in the journey request database), 44 (real-time countdown to estimated carpool vehicle arrival time provided on passenger’s communicator device), 47 (similar for taxibus arrival time), 62 (integrating public transport modes where computer system 15 “must have real-time knowledge of the current location, routing, and destination of all participating public transport vehicles”), 64 (similar teachings), 76 (intelligent grouping module performing

optimization processes based on real-time traffic conditions), 88-89 (similar), 94-95 (real-time countdown to pick-up). As such, a POSITA would have understood that the capacity information stored in the transit vehicle current itineraries database reflects “real time transport capacity.” (EX1002, ¶106.)

Olmi further discloses features for displaying the real-time transport capacity. (*Id.*, ¶107.) As discussed for limitation [1.f], Olmi discloses that the controlling computer system’s intelligent grouping module matches a prospective passenger with a suitable car pool vehicle based on capacity and other features. (*See* §IX.A.2.vii.) Olmi explains that “[a]s soon as a suitable car pool vehicle is found, **the controlling computer system provides details to the passenger:** the vehicle’s distance from the passenger (in minutes), an estimate for the total car pool journey time (in minutes), and the cost of this car pool journey.” (EX1005, 43.) “Should the controlling computer system find more than one suitable car pool option, **a list of the suitable vehicles will be detailed on the passenger’s communicator device,**” upon which the passenger may “select[] any vehicle from the list in order to proceed with the car pool trip.” (*Id.*) Figure 8 below “shows part of the sequence of user-interface events on the text display screen of a communicator device when a passenger submits a journey request to the controlling computer system” for, e.g., “car pool transport.” (*Id.*, 29.)

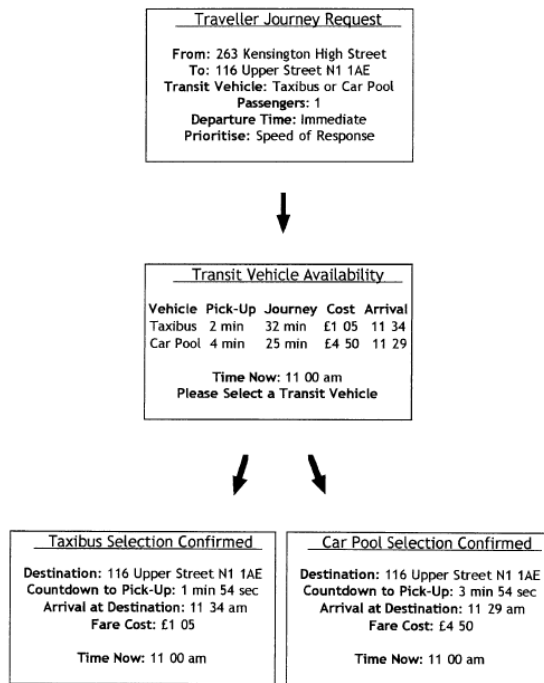


Figure 8

(*Id.*, FIG. 8.)

As shown at the top of Figure 8, a traveller submits a “traveller journey request” including capacity (i.e., passengers) and selected nodes (e.g., pick-up and drop-off points marked “from” and “to”). (*Id.*, FIG. 8.) As discussed for limitation [1.c], these nodes may be part of a predefined set of node data corresponding to fixed locations such as existing public transportation stops, main street locations, etc. (*See* §IX.A.2.iv.) As further shown in the middle of Figure 8, after a user inputs a traveller journey request and available transit options are identified, the controlling computer system displays on the passenger’s communicator device the “transit vehicle availability,” which shows real-time data corresponding to vehicles currently

available that meet the passenger's capacity requirements, pick-up and drop-off locations, and other specifications. (EX1005, FIG. 8; EX1002, ¶108.)

Accordingly, Olmi discloses that the controlling computer system gathers transit vehicle data to display real-time transit options (reflecting vehicles that meet the transport capacity requirements) for trips between two selected pick-up and drop-off locations (from a plurality of fixed/predetermined nodes) ("the step of gathering data to display real time transport capacity between selected nodes of said plurality of nodes"). (EX1002, ¶108.)

7. Claim 11: "A method as set forth in claim 1 further comprising the step of generating transport user displays of real time transport information according to the stored capacity and to real time vehicle monitoring."

Olmi discloses claim 11. (EX1002, ¶¶109-113.)

Olmi discloses claim 11 in the context of transport user displays that are displayed to the passenger both before and after vehicle selection. First, as discussed for claim 5, Olmi discloses gathering data to generate a display on a transport user's communicator device of real time transport capacity (e.g., available vehicles) between user-selected nodes ("the step of generating transport user displays of real time transport information"). (See §IX.A.6.) As further discussed for claim 5, this displayed data is based on and reflects the capacity information stored in the transit vehicle current itineraries database ("according to the stored capacity"). (*Id.*) Olmi also explains that the controlling computer system provides details such as "the

vehicle's distance from the passenger (in minutes),” as shown in yellow in Figure 8 below. (EX1005, 43.)

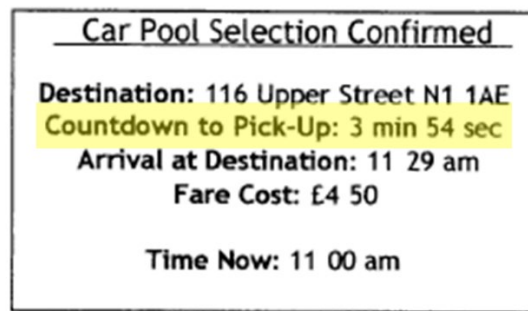
Transit Vehicle Availability				
Vehicle	Pick-Up	Journey	Cost	Arrival
Taxibus	2 min	32 min	£1 05	11 34
Car Pool	4 min	25 min	£4 50	11 29
Time Now: 11 00 am				
Please Select a Transit Vehicle				

(*Id.*, FIG. 8 (excerpted/annotated); *see also id.*, 29, 32, 43, 47; EX1002, ¶110.)

As discussed for claim 4, each vehicle communicator device and passenger communicator device contains a GPS unit that determines the current location of the vehicle/passenger and transmits the location information to the controlling computer system. (*See* §IX.A.5.) Thus, a POSITA would have understood that the displayed real-time distance information (i.e., the distance a potential transport vehicle is from a passenger) is generated based on the real-time location of the passenger and real-time location of the vehicle (“according...to real time vehicle monitoring”). (EX1002, ¶111.) Accordingly, Olmi discloses generating a display to the transport user (“the step of generating transport user displays”) before vehicle selection that is comprised of real-time vehicle location information for vehicles with available

capacity (“of real time transport information according to the stored capacity and to real time vehicle monitoring”). (*Id.*)

Similarly, after a passenger selects a vehicle, “[t]he waiting passenger’s communicator device will generally provide a countdown to the estimated time of arrival of his requested car pool...vehicle,” as shown below in Figure 8. (EX1005, 86.)



(*Id.*, FIG. 8 (excerpted/annotated); *see also id.*, 29, 32, 43, 47.) A POSITA would have understood that this transport user display showing real-time distance/location information is also generated based on the available vehicle capacity (since the selected vehicle is chosen from a list of vehicles displayed based on available capacity) and on the real-time passenger vehicle monitoring discussed above, which allows for calculating distance/time between the passenger and the vehicle. (EX1002, ¶¶112-113.) Accordingly, Olmi also discloses generating a display to the transport user (“the step of generating transport user displays”) after vehicle selection that is comprised of real-time vehicle location information for a selected

vehicle with available capacity (“of real time transport information according to the stored capacity and to real time vehicle monitoring”). (*Id.*)

8. Claim 12: “A method as set forth in claim 11 wherein said display is in the form of a departure board.”

Olmi discloses claim 12. (EX1002, ¶¶114-116.)

Petitioners demonstrate above how Olmi discloses/suggests claim 11. (§IX.A.7.) As discussed for claims 4 and 11, Olmi discloses “display[ing]” transportation-related information on a “transit vehicle availability” display of the passenger’s communicator device, as reproduced below.

<u>Transit Vehicle Availability</u>				
Vehicle	Pick-Up	Journey	Cost	Arrival
Taxibus	2 min	32 min	£1 05	11 34
Car Pool	4 min	25 min	£4 50	11 29
Time Now: 11 00 am				
Please Select a Transit Vehicle				

(EX1005, FIG. 8 (excerpted).)

Olmi also discloses that this information may be displayed “in the form of a departure board.” (EX1002, ¶116.) For example, Olmi discloses that rather than using a portable communicator device (e.g., cellular telephone or wireless PDA), the traveller communicator device may be in the form of a “roadside kiosk communicator device unit,” which “comprise[s] a display screen and keyboard (or a

more robust virtual touch-screen keyboard),” and is “incorporated into bus stops or similar roadside structures” and “located both on high streets and on quieter residential streets.” (EX1005, 40.) Olmi explains that these “roadside kiosk communicator device[s]” are “easily spotted since the kiosk structure will be clearly visible from the road.” (*Id.*, 44.) A POSITA would have understood that a public display located at bus stops or similar structures that, like other communicator devices, is capable of displaying transit vehicle availability like in Figure 8 above, is a “departure board.” (EX1002, ¶116.)

9. Claim 15

i) [15.pre] “A ground transportation network comprising”

Olmi discloses this limitation for the same reasons discussed for limitation [1.pre] (describing a “ground transportation network”). (See §IX.A.2.i; EX1002, ¶117.)

ii) [15.a] “a computer network;”

Olmi discloses this limitation for the same reasons discussed for limitation [1.a] (describing a “computer network”). (See §IX.A.2.ii; EX1002, ¶118.)

iii) [15.b] “an electronic registry of capacity in said computer network containing an indication of the spare transport capacity and location of a plurality of transport vehicles;”

Olmi discloses this limitation for the same reasons discussed for limitation [1.b] (describing the Olmi system including an electronic registry of capacity like that claimed in limitation [15.b]). (See §IX.A.2.iii; EX1002, ¶119.)

iv) **[15.c] “a display system for displaying a network of nodes in said computer network representing a plurality of pick-up points and a plurality of drop-off points;”**

Olmi discloses this limitation. (EX1002, ¶¶120-123.) As discussed for limitation [1.c], Olmi discloses establishing “a network of nodes in said computer network representing a plurality of pick-up nodes and a plurality of drop-off points,” where the network of nodes corresponds to the pick-up/drop-off points of a carpool driver’s predetermined vehicle journey. (See §IX.A.2.iv.) As discussed for claim 4, Olmi discloses that vehicles may have in-car satellite navigation systems (“a display system”) that display digitized street layout maps which provide the car driver with real-time navigation instructions corresponding to their predetermined itinerary (i.e., the “network of nodes” corresponding to the route) and based on the vehicle’s current location.¹¹ (See §IX.A.5.) Accordingly, Olmi provides “a display system for displaying” the network features of limitation [15.c]. (EX1002, ¶123.)

¹¹ For reasons explained in this section and above for claim 1, Olmi discloses the claimed “network of nodes” under Petitioners’ proposed construction. (EX1002,

- v) **[15.d] “an electronic registry of demand in said computer network containing an indication of the demand for transportation needs of a plurality of transport users;”**

Olmi discloses this limitation for the same reasons as discussed for limitation [1.e] (describing the Olmi system including an electronic registry of demand like that claimed in limitation [15.d]). (See §IX.A.2.vi; EX1002, ¶124.)

- vi) **[15.e] “a matching engine in said computer network to effect a match of said transport capacity of at least one transport vehicle in said electronic registry of capacity with said transport demand for a journey of at least one transport user in said electronic registry of demand;”**

Olmi discloses this limitation for the same reasons as discussed for limitation [1.f]. (See §IX.A.2.vii; EX1002, ¶125.)

- vii) **[15.f] “a processor in said computer network for abstracting a geographic representation of said transport demand for a journey relative to said nodes by calculating places where a predetermined journey of a transport vehicle intersects said nodes and representing said predetermined journey in the format of a set of said intersected nodes.”**

¶121; *see supra* §§VIII, IX.A.2.iv.) Likewise, even without features proposed in Petitioners’ construction, Olmi discloses a “network of nodes” consistent with the ’427 patent for the same reasons explained in this ground. (EX1002, ¶122.)

Olmi discloses this limitation for similar reasons discussed for limitations [1.d]-[1.f]. (See §§IX.A.2.v-IX.A.2.vii; EX1002, ¶¶126-128.) The analysis for those limitations demonstrates how the computer system 15, or system including system 15, (“computer network”) in Olmi includes a central controlling computer system that would have performed the same features recited in limitation [15.f]. (See §§IX.A.1, IX.A.2.v-IX.A.2.vii.) Olmi explains that the controlling computer system is a “data-processing system...comprising a set of distributed (typically portable or mobile) computer processors,” and thus Olmi discloses that “a processor in said computer network” would have performed the same features recited in limitation [15.f]. (EX1005, 13; EX1002, ¶126.)

Further, as explained for limitation [15.d], Olmi discloses maintaining a registry of demand (§IX.A.9.v). Likewise, as explained for limitation [1.d], Olmi discloses abstracting a geographic representation of a predetermined transport vehicle journey by calculating places where that journey intersects the nodes and representing the predetermined journey in the format of a set of the intersected nodes, similar to that claimed in limitation [15.f]. (§IX.A.2.v; EX1002, ¶127.)

Thus, for similar reasons discussed above for those limitations/claims, Olmi discloses “a processor in said computer network for abstracting a geographic representation of said transport demand for a journey relative to said nodes by calculating places where a predetermined journey of a transport vehicle intersects

said nodes and representing said predetermined journey in the format of a set of said intersected nodes,” as claimed. (See §§IX.A.2.v-IX.A.2.vii, IX.A.9.iv-IX.A.9.v (incorporated herein); EX1002, ¶128.)

B. Ground 2: Olmi Renders Claims 1-5, 11, 12, and 15 Obvious

1. Claims 1-5, 11, 12, and 15

As discussed in Section IX.A, Olmi’s carpooling configuration anticipates claims 1-5, 11, 12, and 15. (See §IX.A.) Olmi discloses that the invention has “two main configurations: electronic navigation taxibus transport, and car pooling transport.” (EX1005, 8.) The features of Olmi’s system discussed in Ground 1 are attributable either to the carpooling configuration alone or both the carpooling and taxibus configurations. (EX1002, ¶129-.) Nevertheless, to the extent it is found that Ground 1 relies on features that are attributable solely to the taxibus configuration and those features are found to be part of an embodiment separate from Olmi’s carpooling configuration—neither of which is true—a POSITA would nonetheless have found it obvious to implement those features in the carpooling configuration. (*Id.*, ¶130.)

Olmi explains that “[t]his invention can run either of these configurations separately, or **can run them both at the same time.**” (EX1005, 8.) Thus, a POSITA would have understood that Olmi’s system has the flexibility such that taxibus features and carpool features may be integrated into the same system/method that

runs both configurations at the same time. (EX1002, ¶131.) Olmi also explains that “[t]he car pooling configuration of this invention,” while more simplistic than the taxibus, still “manages to solve **all the problems** of car pooling described in section 4.3” of Olmi, similar to the taxibus configuration. (EX1005, 9.) Furthermore, Olmi discloses that the preferred embodiment of Figures 4 and 6 (described in §IX.A), which operates using a central controlling computer system rather than a distributed series of processors incorporated in the communicator devices (EX1005, 29-30), incorporates features of both the taxibus and carpooling configurations. (*Id.*, 31-66.) In addition to being compatible with the same hardware embodiments, “[i]n both taxibus and car pooling, the transportation capabilities of this invention are completely scalable.” (*Id.*, 9.) A POSITA would therefore have understood that the taxibus and carpooling configurations address substantially similar problems and rely on similar hardware architectures, and accordingly would have recognized that the taxibus features could be readily implemented in a carpooling system. (EX1002, ¶¶131-132.)

For example, even if the features discussed above—such as integration with existing public transportation systems or the use of predetermined, fixed embarkation and destination stops in Olmi’s network of nodes, (*see, e.g.*, §§IX.A.2.iv, IX.A.2.v.(1))—were deemed to be disclosed solely in the context of the taxibus configuration, a POSITA would have understood that those same features

could likewise be advantageously used in the carpooling configuration. (EX1002, ¶133.) As Olmi explains, “[i]t is anticipated that just by introducing a taxibus service...the general public will start to make better use of existing public transport” because the taxibus service would allow for an easier and more efficient experience going to and from public “transport departure and arrival points (train stations, bus stops, and so forth).” (EX1005, 62.) A POSITA would have understood that integrating the carpooling configuration with existing public transport stops would predictably yield similar benefits, because, for example, drivers and passengers could share rides when arriving at or departing from a public transport stop, or could share rides that bridge two modes of public transport (e.g., between bus and train). (EX1002, ¶133.) Integrating public transport stops into Olmi’s network of nodes would also have enabled the use of kiosk communicator devices at bus stops (*see* §IX.A.8), which would have advantageously provided access to carpooling services for passengers who either did not have a personal communicator device with them or whose personal communicator devices were not configured to use the carpooling service. (*Id.*, ¶133.) Including these features (and others that may be found to be associated with Olmi’s taxibus service) in the carpooling configuration would have been a routine design choice that would predictably yield a more efficient carpooling system capable of servicing a broader population. Such integration would, in turn, foreseeably reduce traffic and parking congestion, lower pollution, and improve

overall quality of life, consistent with the benefits Olmi attributes to the invention. (See, e.g., EX1005, 2-3; EX1002, ¶133.)

Accordingly, a POSITA would have had good reason to implement, and had a reasonable expectation of success in implementing, such a modification in Olmi's system/process, especially given it would have involved the application of known technologies (e.g., known shared transport system features, as discussed above) according to known techniques (e.g., known software and hardware techniques for implementing such features, as described in Olmi). (EX1002, ¶¶134-135.) Such a modification would have predictably resulted in a modified Olmi system/process in which a shared transport system (e.g., in a carpooling configuration) is configured to incorporate taxibus features, thereby yielding a more robust and efficient carpooling system. (*Id.*) *KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

X. CONCLUSION

Accordingly, Petitioners request institution based on the above grounds.

Respectfully submitted,

Dated: March 12, 2026

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Counsel for Petitioners

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. §42.24(d), the undersigned certifies that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 7,840,427 contains, as measured by the word-processing system used to prepare this paper, 13,467 words. This word count does not include the items excluded by 37 C.F.R. §42.24 as not counting towards the word limit.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on March 12, 2026, I caused a true and correct copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 7,840,427 and supporting exhibits to be served via express mail on the Patent Owner at the following correspondence address of record as listed on Patent Center:

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