

**UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

**TESLA, INC.,
Petitioner**

v.

**iQAR INC.,
Patent Owner**

U.S. Patent No. 10,882,399 B2

Case No. IPR2024-00543

**PATENT OWNER'S HEARING DEMONSTRATIVES
April 29, 2025**

The '399 Patent Identified a Problem With the Prior Art

In most automotive vehicles, an operator controls the power applied to the vehicle (e.g., the engine of the vehicle) by operating the ignition, break and gas petals. Additional control is typically provided by operational assisting devices, such as a cruise control, that help to keep the vehicle at a constant speed, or within a range of speeds. However, such operational assisting devices typically do not optimize the power consumption of the vehicle, or control the speed and/or power provided to the vehicle based on an optimal power consumption level.

*Ex. 1001, '399 Patent at 1:46-55
(see also Paper 1, Petition at 3)*

The '399 Patent's Inventive Solution

In FIG. 1B, the power management system receives external inputs, including information on the location and grade (e.g., steepness of any uphill/downhill portions) of the road, the distances traveled. The power management system also includes or deduces information about the route (e.g., from point A to point B), and the acceptable range of speeds that the vehicle may travel over this route (e.g., between 45 and 55 mph). The power management system may also receive information about the state of the vehicle, including the velocity at which it is traveling, and the weight of the vehicle. Finally, the power management system may include operational parameters such as the performance of the engine, aerodynamic performance, and rolling resistance of the vehicle. Given this information, the power management system may calculate applied power to the engine, and may derive a speed (or set of speeds) that optimizes the applied power. As shown in FIGS. 1A and 1B, the total energy used

In some variations, the entire route (or the entire predicted route) may be divided up into N segments. The number (N) of segments may be fixed or may depend upon the route. The more segments that the route is split into, the more accurate the model may be. However, more segments may also

*Ex. 1001, '399 Patent at 7:11-27, 14:38-45,
(see also Paper 13, Response at 4)*

The '399 Patent – Claim 1

1. A method of electric vehicle operation, comprising:
determining a segment of a vehicle route;
determining information about an external environment of a vehicle, information about operational status of the vehicle, information from external command input telemetry in combination with user command inputs to the vehicle including voice command inputs; and
applying calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed.

*Ex. 1001, '399 Patent at Claim 1,
(see also Paper 1, Petition at v)*

All of the Petition's Grounds Rely on Hongo

Ground	Basis
Ground 1	Claims 1, 2, 5, 6, 9-12, 15, 16, 19, 20 obvious over <u>Hongo</u> , Obradovick, Niki
Ground 2	Claims 3, 4, 13, 14 obvious over <u>Hongo</u> , Obradovick, Niki, Kudo
Ground 3	Claims 7, 17 obvious over <u>Hongo</u> , Obradovick, Niki, Kuroda
Ground 4	Claim 8, 18 obvious over <u>Hongo</u> , Obradovick, Niki, Newstrom

Paper 2, Petition at 1

The Prior Art Fails to Teach What the Claims Require

- ✗ Hongo does not “***determin[e] a segment of a vehicle route***”
- ✗ Hongo does not “*appl[y] calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed*”
- ✗ The prior art does not teach dependent claim 6
- ✗ The prior art does not teach dependent claim 8

Hongo Does Not “*Determin[e] A Segment of a Vehicle Route*”

- Hongo is unaware of the vehicle’s route
- Petitioner’s arguments are premised on a misunderstanding of Hongo’s operation
- Hongo’s BKN are not “segment[s] of a vehicle route”

The '399 Patent Repeatedly Emphasizes that a “Route” Includes a Destination

plied to the engine), a route is determined 201 from the starting position and an actual or estimated ending position,

The route is determined based on the current position of the vehicle and a final destination position. The destination position may be explicitly provided by the operator of the vehicle (e.g., as an operator input), or it may be derived. In

The route used by the power management device typically includes a starting position (e.g., the current position of the vehicle, which may be indicated by GPS), an ending position, as described above, and any intermediate positions between the initial and the final positions. In some varia-

road, the distances traveled. The power management system also includes or deduces information about the route (e.g., from point A to point B), and the acceptable range of speeds

*Ex. 1001, '399 Patent at 11:48-49, 11:64-67, 14:6-10, 7:14-16
(see also Paper 13, Response at 7)*

The Claims Require that an Already Known “Route” Be Divided Into “Segment[s]”

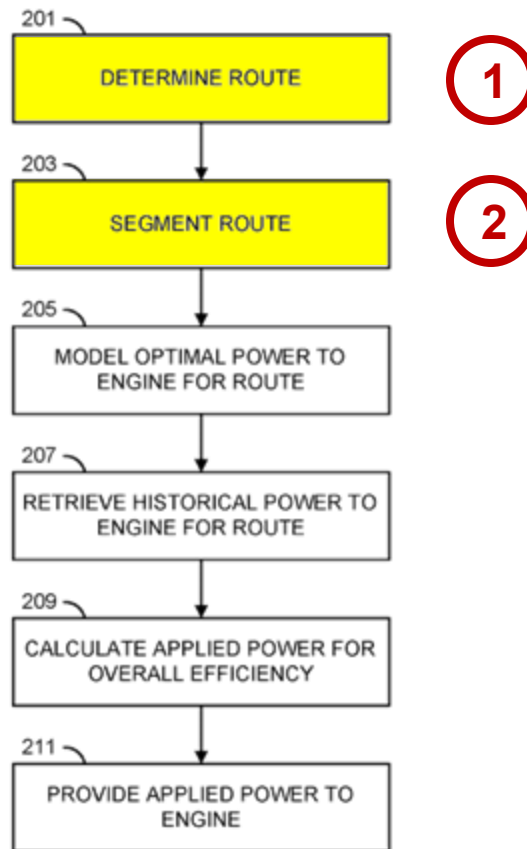


FIG. 2

*Ex. 1001, '399 Patent at Fig. 2,
(see also Paper 13, Response at 8)*

Hongo Is Unaware of the Vehicle's Route – It Considers Only Current Position

[0001]

[Technical Field of the Invention] The present invention relates to an on-vehicle target vehicle speed determining device that determines a target speed of a moving vehicle based on its current location. Accordingly, the target vehicle speed determining device of the present invention is useful for a vehicle speed control device such as an adaptive cruise control system that automatically controls the speed of a vehicle, or an overspeed warning device.

[0008]

[Means for Solving the Problem, and Effects of the Invention] In order to solve the above problems, the following means are effective. That is, the first means, in an in-vehicle target vehicle speed determining device that determines a target speed of a vehicle based on the current position of the vehicle while it is driving, has an environmental information acquiring means that acquires real-time road environment information related to weather and sunlight conditions that can change naturally over time, and a road environment considering means for determining a target speed of the vehicle based on the current position and the real-time road environment information.

*Ex. 1005, Hongo, ¶¶ [0001], [0008],
(see also Paper 13, Response at 9)*

Patent Owner Submitted Unrebutted Expert Testimony: Hongo Does Not Know the Vehicle's Route

97. Unlike the '399 patent's claims (and its consistent specification disclosures), Hongo does not consider or determine the vehicle's destination. Hongo is concerned only with the vehicle's current position. As a result, it does not determine the "route" the vehicle will take. In fact, the words "destination" and "route" do not appear in the text of Hongo. Consequently, because it does not know the vehicle's destination and route, Hongo's system also cannot determine or utilize any current or future route "segments" as part of its methodology.

98. A POSITA would understand that doing so would be impossible as without understanding the vehicle's destination or the route it will travel, the task of "determining a segment of a vehicle route" would be impossible.

*Ex. 2007, Hoff Decl, ¶¶ 97-98
(see also Paper 13, Response at 9)*

Petitioner Misinterpreted How Hongo Operates

The Hongo system further includes a “driving history recording means 140” (“means 140”) and a “road environment considering means 110” (“means 110”), “each [of which is] realized by software running on [a] computer.” TESLA-1005, [0026]. Means 110 includes “driving history search means 130, and preferred value estimating means 150.” *Id.*; TESLA-1003, ¶¶39-40.

Means 140 generally serves two functions in the data flow shown in FIG. 2. First, in a “trace mode,” means 140 generates data for storage in “driving block DB 20” (“DB 20”). TESLA-1005, [0027]. This is accomplished by “acquir[ing] position information (current position coordinates r) from the GPS 170” and “dividing it into sections approximately every 20m in the driving direction on the road being driven...” *Id.* The information is stored in driving block DB 20, which “specif[ies] the block number BKN of [a] driving block,” along with associated information, such as “block range coordinates (r1, r2) of each driving block,” “legal speed limit Vs of the driving block,” and “the minimum radius of curvature R.” *Id.*; TESLA-1003, ¶41.

Paper 2, Petition at 8-9

Petitioner's Expert Premised His Opinions on This Same Misinterpretation of Hongo

8 Q In your understanding of Hongo,
9 Hongo is collecting GPS positions, then
10 dividing those collected GPS positions up
11 into 20-meter sections, and those
12 sections are stored as historical data,
13 correct?

14 A Yeah. I mean, there's a block
15 that is for every block there is an
16 associated location information. Is that
17 what you mean?

18 Q Yes. And that location
19 information came from the GPS in Hongo,
20 correct?

21 A Correct.

*Ex. 2008, Morellas Depo., 16:8-21
(see also Paper 13, Response at 11)*

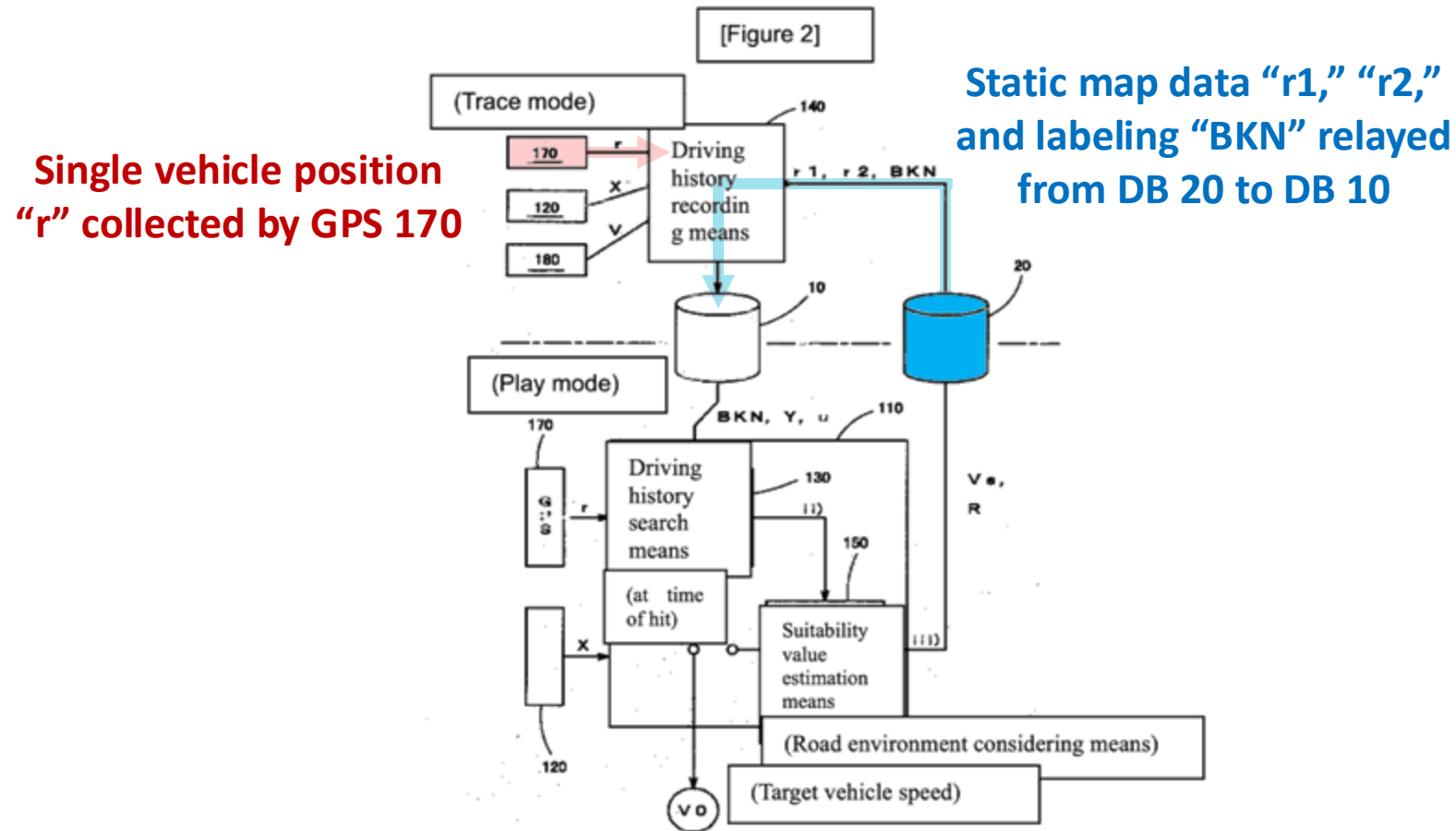
Hongo Does Not Operate in the Way the Petition Argued It Does

[0027]

[Trace mode] In the trace mode, the driving history recording means 140 acquires position information (current position coordinates r) from the GPS 170, and the position of a driving block (block number) that is defined by dividing it into sections approximately every 20m in the driving direction on the road being driven on is identified. The driving block DB20 is a database used to specify the block number BKN of this driving block; here, the block range coordinates (r1, r2) of each driving block, the legal speed limit Vs of the driving block, the minimum radius of curvature R of the driving block, and the like are stored in association with the block number BKN.

*Ex. 1005, Hongo, ¶ [0027]
(see also Paper 13, Response at 11)*

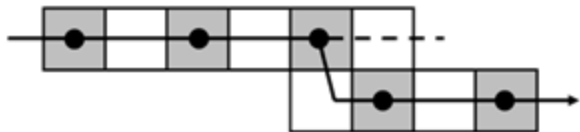
Hongo Does Not Operate in the Way the Petition Argued It Does



Ex. 1005, Hongo, Fig. 2
(see also Paper 13, Response at 11-12)

Patent Owner Submitted Unrebutted Evidence Explaining the Actual Purpose of Hongo's Blocks

139. Hongo does not teach what sampling rate should be used. But even if one assumes that Hongo's system was able to obtain GPS position data at a very fast rate such as 1 sample every second, this would not cause it to operate in the way the Petition assumes it does. During the data collection mode (or "trace mode") driving blocks along the path of vehicle travel would be skipped over and no data collected. Moreover, in many cases, only a single GPS position would be collected per block. Likewise, during playback mode driving blocks stored in DB 10 would be skipped over and not used. The below example shows this. If, for instance, the vehicle is traveling along a roadway at 90 mph or 40 m/s (a high rate of speed is used to simply the drawing), only every other block will be identified (the gray shading). If the vehicle then exits onto another roadway, the first block on this roadway will be skipped and only the second block will be identified:



141. As I have explained, typical GPS systems available at the time of the '399 patent would have made it difficult to either (1) match current positions with stored positions, or (2) accurately characterize 20m of roadway with collected GPS position information. With ± 10 m accuracy and a 1 Hz sampling rate, some data collected would be assigned to the correct BKN and some data collected would

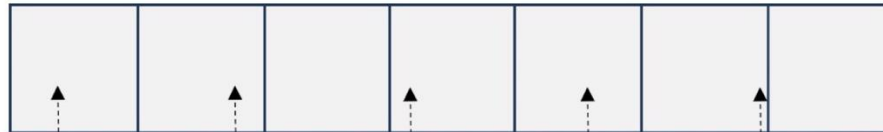
142. Put another way, in my opinion, a POSITA would have understood that Hongo's blocks are simply designed to address these sampling frequency and GPS accuracy limitations. But this does not transform Hongo's system from one that merely considers the vehicle's current position (this is what Hongo does), into one that determines and segments the vehicle's route (which it does not do).

*Ex. 2007, Hoff Decl, ¶¶ 139, 141-142
(see also Paper 13, Response at 17)*

Hongo's BKN Are Not “Segment[s] of a Vehicle Route”

131. A POSITA would have considered Hongo's blocks—and the 20m sections of road represented by block range coordinates (r1, r2)—to be analogous to the fixed, static distance markers on a highway. Highways often include distance markers every 1/10 of a mile to allow drivers to report their position in the event they experience an accident or vehicle breakdown. If a vehicle breaks down right next to a mile marker, the driver is able to determine the vehicle's position as corresponding to the marker (*i.e.*, “at mile marker 51.7”). However, in many cases, the vehicle breaks down between mile markers resulting in the driver determining the vehicle's location with less precision (*i.e.*, “between mile marker 51.7 and 51.8”).

Map data:



Current position:



*Ex. 2007, Hoff Decl., ¶¶ 131, 136
(see also Paper 13, Response at 16-17)*

Petitioner Does Not Dispute that Hongo Is Indifferent to Whether the Vehicle Actually Traverses Hongo's "Block Range Coordinates"

125. Put another way, while Hongo's system stores "block range coordinates (r1, r2)" in each BKN, these are not points over which the vehicle has (or ever necessarily will) travel. They are just road location data stored in DB 20 that is provided to means 140 when generating historical data for storage in DB 10. *See id.*

126. So, while "block range coordinates (r1, r2)" are stored in each block, Hongo's system never determines if the vehicle passed coordinate r1. Likewise, Hongo never determines if the vehicle is in fact traveling to coordinate r2. All that matters is that the vehicle is currently located at a point that falls somewhere within the block coordinate range.

127. For example, imagine an example BKN with "block range coordinates (r1, r2)" spanning 20m along a portion of a roadway that includes an exit ramp. As long as Hongo's GPS 170 collects a position within the range (r1, r2) it will identify the example BKN regardless of whether the vehicle continues along the roadway or takes the exit ramp. This is because Hongo is concerned only with the vehicle's *current position*. It is indifferent to where the vehicle is going.

*Ex. 2007, Hoff Decl, ¶¶ 125-127
(see also Paper 13, Response at 14)*

The Claims Require Determining “Segment[s] of a Vehicle Route,” Not Just Generic Pieces of Roadway

1. A method of electric vehicle operation, comprising:
determining a segment of a vehicle route;
determining information about an external environment of a vehicle, information about operational status of the vehicle, information from external command input telemetry in combination with user command inputs to the vehicle including voice command inputs; and
applying calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed.

*Ex. 1001, '399 Patent, Claim 1
(see also Paper 18, Sur-Reply at 7)*

The Prior Art Fails to Teach What the Claims Require

- ✗ Hongo does not “*determin[e] a segment of a vehicle route*”
- ✗ Hongo does not “*appl[y] calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed*”
- ✗ The prior art does not teach dependent claim 6
- ✗ The prior art does not teach dependent claim 8

The Claims Plainly Require Prospective Calculations of Both Power and Speed

1. A method of electric vehicle operation, comprising:
determining a segment of a vehicle route;
determining information about an external environment of a vehicle, information about operational status of the vehicle, information from external command input telemetry in combination with user command inputs to the vehicle including voice command inputs; and
applying calculated electric power to the vehicle to travel
along the segment of the vehicle route at a calculated speed.

*Ex. 1001, '399 Patent, Claim 1
(see also Paper 13, Response at 22-23)*

The Central Purpose of the '399 Patent Is To Optimize Power and Speed For the Vehicle's Route

In FIG. 1B, the power management system receives external inputs, including information on the location and grade (e.g., steepness of any uphill/downhill portions) of the road, the distances traveled. The power management system also includes or deduces information about the route (e.g., from point A to point B), and the acceptable range of speeds that the vehicle may travel over this route (e.g., between 45 and 55 mph). The power management system may also receive information about the state of the vehicle, including the velocity at which it is traveling, and the weight of the vehicle. Finally, the power management system may include operational parameters such as the performance of the engine, aerodynamic performance, and rolling resistance of the vehicle. Given this information, the power management system may calculate applied power to the engine, and may derive a speed (or set of speeds) that optimizes the applied power. As shown in FIGS. 1A and 1B, the total energy used

*Ex. 1001, '399 Patent, 399 7:11-27
(see also Paper 13, Response at 24-25)*

The Prior Art Fails to Teach What the Claims Require

- ✗ Hongo does not “*determin[e] a segment of a vehicle route*”
- ✗ Hongo does not “*appl[y] calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed*”
- ✗ The prior art does not teach dependent claim 6
- ✗ The prior art does not teach dependent claim 8

Dependent Claim 6

1. A method of electric vehicle operation, comprising:
determining a segment of a vehicle route;
determining information about an external environment of a vehicle, information about operational status of the vehicle, information from external command input telemetry in combination with user command inputs to the vehicle including voice command inputs; and
applying calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed.

6. The method of claim 1, wherein vehicle route segment determination further comprises determining multiple route segments, each route segment having a separate calculated speed and selected drive train parameters.

*Ex. 1001, '399 Patent, claims 1, 6
(see also Paper 13, Response at 32-33)*

It is Undisputed that Hongo's System Never Determines More than a Single BKN at a Time

236. All that this means, however, is that Hongo's system identifies one block number at any given moment. Once again Hongo's driving blocks are "sections" of a road network, they are not "segments of a vehicle route."

237. For instance, Hongo states that "[I]n step 41, the block on which the vehicle is running is specified based on the input current position r[.]" Ex. 1005, ¶¶ [0044]; *see also* ¶¶ [0046]-[0048] mentioning that the "vehicle speed" is updated if the "block number BKN has changed."); *see also* Figure 6.

238. But what Hongo does not do is determine multiple such blocks simultaneously. Because of this, a POSITA would understand that Hongo's system does not determine "multiple route segments" as required by this claim.

*Ex. 2007, Hoff Decl., ¶¶ 236-238
(see also Paper 13, Response at 32-33)*

The '399 Patent Divides the Vehicle's Route Into Multiple Segments to Improve Optimization Calculation Accuracy

In some variations, the entire route (or the entire predicted route) may be divided up into N segments. The number (N) of segments may be fixed or may depend upon the route. The more segments that the route is split into, the more accurate the model may be. However, more segments may also

*Ex. 1001, '399 Patent, 14:38-45
(see also Paper 13, Response at 32-33)*

The Prior Art Fails to Teach What the Claims Require

- ✗ Hongo does not “*determin[e] a segment of a vehicle route*”
- ✗ Hongo does not “*appl[y] calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed*”
- ✗ The prior art does not teach dependent claim 6
- ✗ The prior art does not teach dependent claim 8

Dependent Claim 8

8. The method of claim 1, wherein the step of determining information about operational status of a vehicle further comprises the step of communicating with a remote database.

*Ex. 1001, '399 Patent, claim 8
(see also Paper 13, Response at 34)*

Petitioner Points Only to Irrelevant Prior Art Functionality

FIG. 4 is a flow diagram that better illustrates the operation of the system. When database manager 22 is first initialized, it loads database 20 (from a CD, DVD, hard disk, wireless connection to server, etc.) into solid state memory. Of course, it should be noted that, where database 20 is extremely large, database manager 22 can simply load a relevant portion of the database into solid state memory, such as a portion of the database corresponding to a 50 mile radius around a current geographic location. Loading the database into memory is indicated by block 60 in FIG. 4. It should also be noted that the Database Manager can unload unused portions and load new portions as the location of the queries change. This is exemplified by block 65 in FIG. 4.

*Ex. 1012, Newstrom, 8:27-38
(see also Paper 13, Response at 34)*

Patent Owner Submitted Unrebutted Evidence Explaining Why Newstrom's System Would Not Engage in Remote Communication During Operation

254. Once initialized, Newstrom's in vehicle database remains static and unchanging while the vehicle is in traveling to a destination. Moreover, it would be impractical for Newstrom's system to query a remote database for lane departure determinations, as these decisions must be made swiftly and without delay. Communication with a remote database would introduce latency into the process. Instead, Newstrom just employs locally stored data during this time.

255. Additionally, I do not find anywhere the Petition specifying the location of the "server" in Newstrom, leaving open the possibility that it could be another internal storage unit within the vehicle rather than the "remote database" required by the '399 patent's claims.

*Ex. 2007, Hoff Decl., ¶¶ 254-255
(see also Paper 13, Response at 35)*