

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

DALE PROGRESS LTD.,

Plaintiff,

v.

HYUNDAI MOTOR COMPANY,

Defendant.

CIVIL ACTION NO. 2:18-cv-525

JURY TRIAL DEMANDED

PLAINTIFF'S ORIGINAL COMPLAINT

Plaintiff Dale Progress Ltd. ("Plaintiff"), by and through its undersigned counsel, files this Original Complaint against Defendant Hyundai Motor Company ("Defendant") as follows:

NATURE OF THE ACTION

1. This is an action for violation of 35 U.S.C. §§ 271(a) and 35 U.S.C. §§ 271(b). This is a patent infringement action to stop Defendant's infringement of United States Patent No. 9,686,504 ("the '504 patent") entitled "Remote Resource Access Interface Apparatus" and the United States Patent No. 8,320,461 ("the '461 patent") entitled "Remote Resource Access Interface Apparatus". A true and correct copy of the '504 patent is attached hereto as Exhibit A. A true and correct copy of the '461 patent is attached hereto as Exhibit B. Plaintiff is the owner by assignment of the '504 and '461 patents. Plaintiff seeks monetary damages and injunctive relief.

PARTIES

2. Plaintiff is a limited liability company having a principal place of business located at 83 Gasan digital 1-ro Partners Tower 1, 2nd Floor, Suite #204, Gasan-Dong Geumcheon-Gu, Seoul, 08589, Korea.

3. Upon information and belief, Defendant is a corporation organized and existing under the laws of the State of California with a principal place of business located at 10550 Talbert Ave, Fountain Valley, CA 92708. Defendant can be served with process by serving National Registered Agents, Inc., 818 West Seventh Street, Suite 930 Los Angeles, CA 90017.

JURISDICTION AND VENUE

4. This action arises under the Patent Laws of the United States, 35 U.S.C. § 1 *et seq.*, including 35 U.S.C. §§ 271, 281, 283, 284, and 285.

5. This Court has subject matter jurisdiction over this case for patent infringement under 28 U.S.C. §§ 1331 and 1338(a).

6. The Court has personal jurisdiction over Defendant because: Defendant is present within or has minimum contacts within the State of Texas and the Eastern District of Texas; Defendant has purposefully availed itself of the privileges of conducting business in the State of Texas and in the Eastern District of Texas; Defendant has sought protection and benefit from the laws of the State of Texas; Defendant regularly conducts business within the State of Texas and within the Eastern District of Texas; and Plaintiff's cause of action arises directly from Defendant's business contacts and other activities in the State of Texas and in the Eastern District of Texas.

7. More specifically, Defendant, directly and/or through intermediaries, ships, distributes, uses, offers for sale, sells, and/or advertises products and services in the United States, the State of Texas, and the Eastern District of Texas including but not limited to the Accused Instrumentalities as detailed below. Upon information and belief, Defendant has committed patent infringement in the State of Texas and in the Eastern District of Texas. Defendant solicits and has solicited customers in the State of Texas and in the Eastern District of Texas. Defendant has

paying customers who are residents of the State of Texas and the Eastern District of Texas and who each use and have used the Defendant's products and services in the State of Texas and in the Eastern District of Texas.

8. Venue is proper in the Eastern District of Texas pursuant to 28 U.S.C. §§ 1400(b). On information and belief, Defendant is incorporated in this district, or has a regular and established business presence in this district located at 3680 US-259, Longview, TX 75605 and has transacted business in this district, and has directly and/or indirectly committed acts of patent infringement in this district.

COUNT I – PATENT INFRINGEMENT

9. Plaintiff refers to and incorporates herein the allegations of Paragraphs 1-8 above.

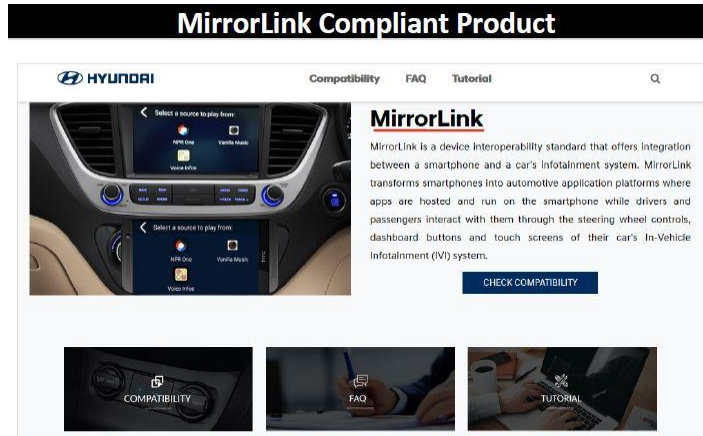
10. The '504 patent was duly and legally issued by the United States Patent and Trademark Office on June 20, 2017 after full and fair examination. Plaintiff is the owner by assignment of the '504 patent and possesses all rights of recovery under the '504 patent, including the exclusive right to sue for infringement and recover past damages and obtain injunctive relief.

11. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides apparatus and methods that infringe the '504 patent. Claim 2 of the '504 patent provides, among other things, "a remote resource access interface apparatus comprising: a touch input detection unit configured to detect touch input on a display screen and to generate touch position information on a display screen; a communication unit configured to receive supportable key information from a compatible portable device, the communication unit further configured to transmit input key information to the portable device and to receive video information from the portable device; a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen

specification of the portable device, wherein the screen specification includes screen resolution information regarding the screen resolutions supported by the portable device; and a key advisor unit configured to output the supportable key information to the video output unit wherein the key advisor unit is configured to receive the touch position information through the touch input detection unit, and wherein the adjusted video information is video data adjusted to screen resolution supported by the video output unit on the basis of the screen resolution information supported by the portable device, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information matches key values of the portable device.”

12. Defendant has been and is now infringing the ‘504 Patent in the State of Texas, in this judicial district, and elsewhere in the United States, by, among other things, directly or through intermediaries, making, using, importing, testing, providing, supplying, distributing, selling, and/or offering for sale apparatus and methods (including, without limitation, the Defendant’s products including MirrorLink functionality of the Azera, identified herein as the “Accused Instrumentality”) that provide a remote resource access interface device, covered by at least claim 2 and 8 of the ‘504 Patent to the injury of Dale Progress Ltd. Defendant is directly infringing, literally infringing, and/or infringing the ‘504 Patent under the doctrine of equivalents. Defendant is thus liable for infringement of the ‘504 Patent pursuant to 35 U.S.C. § 271.

13. Claim 2 of the ‘504 patent, claims a remote resource access interface apparatus comprising:



Source: <https://sync.hyundai.co.in/>

Analyst comment – VNC Automotive provides OEM solutions using MirrorLink standards.

a touch input detection unit configured to detect touch input on a display screen and to generate touch position information on a display screen;



Source:

[Can C-ITS benefit from MirrorLink? Dr. Jorg Brakenseiek, Chief Architect and Chair of Technical WG](#)

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

pointer event: touch screen action in which the user touches the screen with one (virtual) finger only at a single location

touch event: touch screen action in which the user touches the screen with two or more separate fingers at different locations

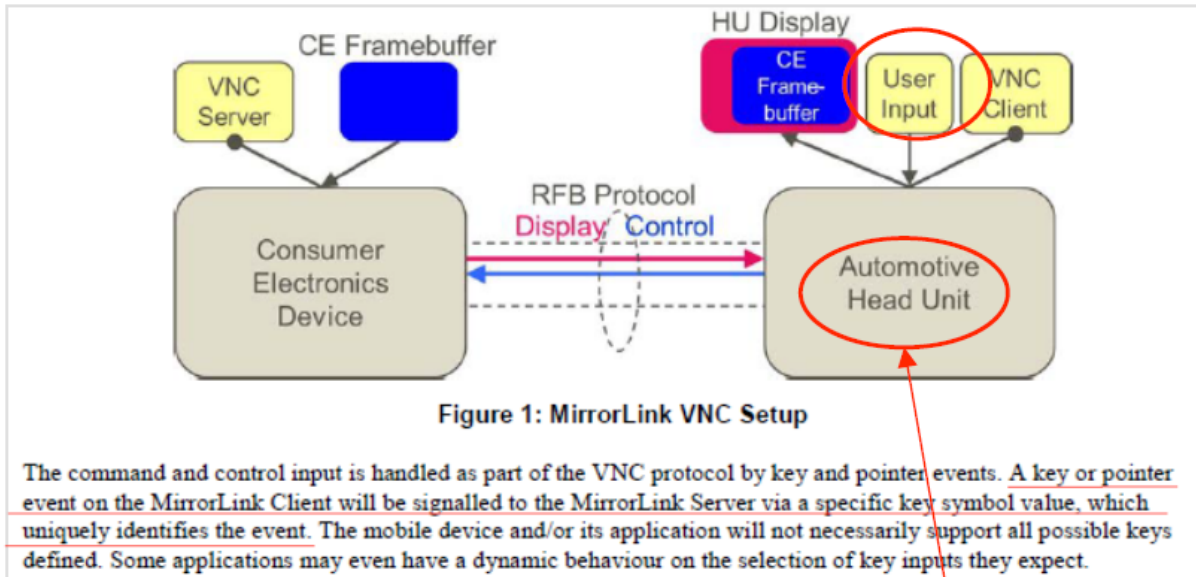
NOTE: touch events are used to describe more complex touch action, like pinch-open or pinch-close

Source:

[ETSI TS 103 544-13 V1.3.0 \(2017-10\)](#)

[Publicly Available Specification \(PAS\)- Intelligent Transport Systems \(ITS\)- MirrorLink®: Part 13: Core Architecture](#)

Analyst comment – MirrorLink supports pointer events and touch events where a pointer event means touching with one finger and a touch event means touching with two or more separate fingers on a touch screen.



Source:
[ETSI TS 103 544-2 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS);
[MirrorLink®: Part 2: Virtual Network Computing \(VNC\) based Display and Control](#)

Analyst comment – To support pointer events and touch events, **the automotive head unit (HU)** has to have a touch input detection unit to detect them on a display screen and to generate touch position information on a display screen to process them accordingly. (MirrorLink Client = Head Unit, Server = Consumer Electronic Device such as smartphone).

a communication unit configured to receive supportable key information from a compatible portable device, the communication unit further configured to transmit input key information to the portable device and to receive video information from the portable device;

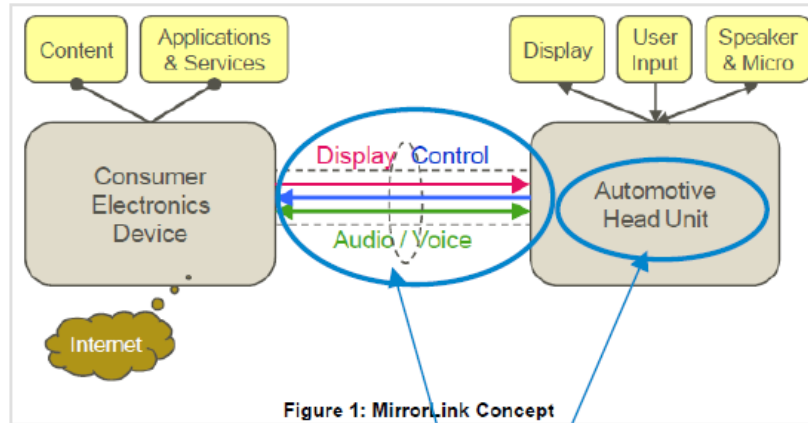


Figure 1: MirrorLink Concept

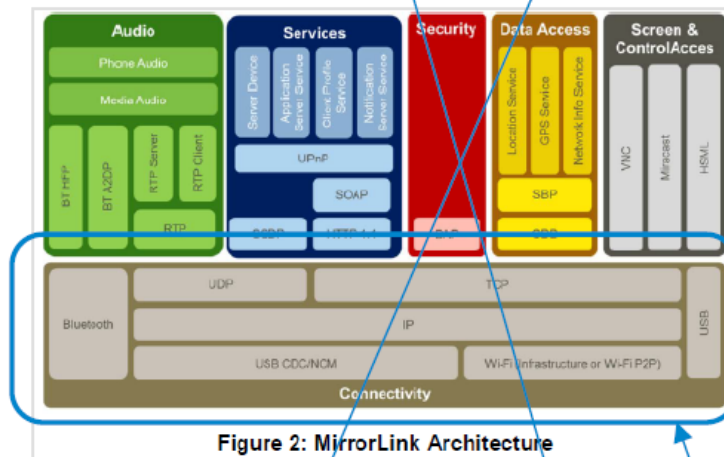


Figure 2: MirrorLink Architecture

Source:
[ETSI TS 103 544-13 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS): MirrorLink®
 Part 13: Core Architecture

Analyst comment – The automotive HU has to communicate with a consumer electronic device such as smartphone by using one or more of the connectivity protocols. It means the automotive HU has to have a communication unit.

7.4 Event Configuration Messages

The *ServerEventConfiguration* and *ClientEventConfiguration* message pair provides additional information about event handling, i.e. which key and pointer events are natively supported on the VNC Server and Client. This information helps the Server to map specific incoming VNC Client events to Server events.

The message flow is shown in Figure 8.

Field	Type	Bit	Description
2	U16		Keyboard layout – Language code (according ISO 639-1 [9])
2	U16		Keyboard layout – Country code (according ISO 3166-1 [10] alpha-2)
2	U16		UI Language – Language code (according ISO 639-1 [9])
2	U16		UI Language – Country code (according ISO 3166-1 [10] alpha-2)
4	U32	Bit l	Knob keys (Bit mask according Table A.1) <ul style="list-style-type: none"> • '1': Client supports knob key events • '0': Client does not support knob key events
4	U32	Bit m	Device keys (Bit mask according Table B.2) <ul style="list-style-type: none"> • '1': Client supports device key events

Source:

[ETSI TS 103 544-2 V1.3.0 \(2017-10\)](#)

[Publicly Available Specification \(PAS\): Intelligent Transport Systems \(ITS\):](#)

[MirrorLink®: Part 2: Virtual Network Computing \(VNC\) based Display and Control](#)

Analyst comment – The communication unit in the client (=Automotive HU) transmits [keyboard layout](#), various key, and pointer events (=input key information) to the server (=portable device) via [ClientEventConfiguration](#) message.

7.3 Display Configuration Messages

7.3.1 General

The *ServerDisplayConfiguration* and *ClientDisplayConfiguration* message pair exchanges additional display information between the VNC Client and the Server. Based on the received information the VNC Client may change the pixel format, sending a *SetPixelFormat* message. The VNC Server will use this information to optionally provide higher resolution virtual framebuffer copies. The message flow is shown in Figure 5.

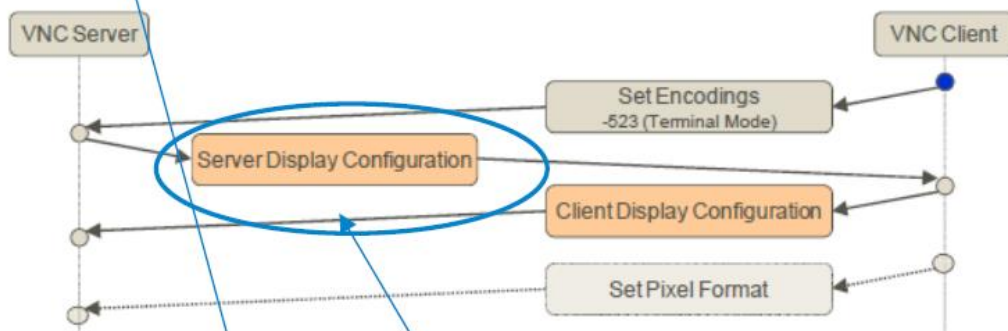


Figure 5: Server and Client Display Configuration

Source:
[ETSI TS 103 544-2 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS);
 MirrorLink®: Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – The client receives video info such as resolution from the server (=consumer device such as smartphone) via ServerDisplayConfiguration.

a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding the screen resolutions supported by the portable device; and



Source:

Can C-ITS benefit from MirrorLink? Dr. Joro Brakenseiek, Chief Architect and Chair of Technical WG

Analyst comment – A video output unit (automotive head unit) displays the same video (e.g., GPS navigation image) from the portable device (e.g., smartphone) in the form of a visual image. It is well known in the art that their image resolutions are different. Next page tells MirrorLink specification on scaling images due to the resolution difference between a portable device and an automotive head.

7.3.2 Framebuffer Scaling (VNC Server)

The MirrorLink VNC Server shall down-scale its framebuffer to fit into the framebuffer resolution provided from the MirrorLink Client in the *ClientDisplayConfiguration* message. The MirrorLink VNC Server shall follow the framebuffer down-scaling configurations, as given in Table 10.

Table 10: Framebuffer Downscaling Configurations

MirrorLink Client Framebuffer FB _{Client}	MirrorLink Server Framebuffer FB _{Server}	
	FB _{Server} < 1 024 x 600	FB _{Server} ≥ 1 024 x 600
FB _{Client} < 800 x 480 (MirrorLink 1.0 - 1.2 Clients only)	FB _{Client} or 800 x 480	FB _{Client} or 800 x 480

7.3.3 Framebuffer Scaling (VNC Client)

The MirrorLink Client shall support up-scaling to the framebuffer resolution provided in *ClientDisplayConfiguration* message.

The MirrorLink Client shall provide valid VNC Client display width and height [pixel] within the *ClientDisplayConfiguration* message.

The MirrorLink Client may request a smaller framebuffer resolution from the MirrorLink Server (sending a

Source:
[ETSI TS 103 544-2 V1 3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS);
 MirrorLink®: Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – VNC specification tells how to scale framebuffer resolution of the client (=automobile head unit) and the server (=consumer electronic device) since they are typically different. Typically smartphones have much higher resolution than automobile head units.

a key advisor unit configured to output the supportable key information to the video output unit wherein the key advisor unit is configured to receive the touch position information through the touch input detection unit, and



Source:
 From MirrorLink to Digital Key
 The role of smartphone in the connected car
 Dr. Jorg Brakensiek, Chief Architect and Chair of
 Technical WG

Message	Origin	Parameter	Mandatory Values
Pointer Event	Client	Button-mask	(as specified in RFB)
		x-position	
		y-position	
Client Cut Text	Client	Length	(as specified in RFB)
		Text	
Bell	Server	No parameter	(as specified in RFB)
Server Cut Text	Server	Length	(as specified in RFB)
		Text	

NOTE: For the RFB message structure, please refer to the dedicated RFB specification, as given in [1].

Source:
 ETSI TS 103 544-2 V1.3.0 (2017-10)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS);
 MirrorLink® - Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – A head unit (=client) has to have a unit equivalent to a key advisor unit to output the supported keys (e.g., navigation configuration keys) to the display unit (=the video output unit) and also communicate pointer and touch events to the server (=smartphone).

Message	Origin	Parameter	Mandatory Values
PointerEvent	Client	Button-mask	(as specified in RFB)
		x-position	
		y-position	
Client Cut Text	Client	Length	(as specified in RFB)
		Text	
Bell	Server	No parameter	(as specified in RFB)
Server Cut Text	Server	Length	(as specified in RFB)
		Text	

NOTE: For the RFB message structure, please refer to the dedicated RFB specification, as given in [1].

Source:
[ETSI TS 103 544-2 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS):
 Mirror link: Part 2: Virtual Network Computing (VNC) based Display and Control

7.5.5. PointerEvent

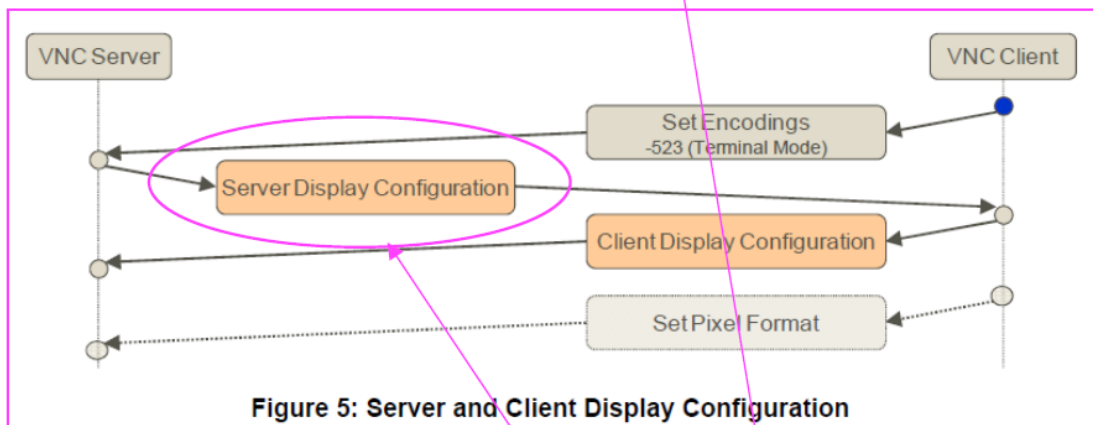
A PointerEvent message indicates either pointer movement or a pointer button press or release. The pointer is now at (x-position, y-position), and the current state of buttons 1 to 8 are represented by bits 0 to 7 of button-mask, respectively; 0 means up, 1 means down (pressed).

Source: [RFC 6143 The Remote Framebuffer Protocol](#)

Analyst comment – To send touch positions to the server (=portable device) from a client (=head unit) via RFB message, the head unit has to have a unit with key advisor function that can receive the touch position information from the touch screen as specified in the standard.

wherein the adjusted video information is video data adjusted to screen resolution supported by the video output unit on the basis of the screen resolution information supported by the portable device, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information matches key values of the portable device.

The MirrorLink Client shall provide a display, which allows any CCC drive-certified application to be displayed, while the MirrorLink Client is in drive mode. The MirrorLink Client's minimum resolution shall be 800 x 480 on a screen area of size 133,3 mm x 80 mm at a distance of 900 mm. Applications may adapt to the provided screen details, exceeding the minimum resolution, but are not required to do so.



Source:
[ETSI TS 103 544-2 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS):
 MirrorLink® Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – The resolution of a HU has to be minimum 800x480 and the display on each HU has different resolution. The video output unit has to adjust images to fit on the resolution supported by the video output unit to display them properly. The server (=portable unit) communicates the server display configuration to the client and video output unit can scale images based on the screen resolution info supported by the portable unit.



Source:

<https://www.lelong.com.my/honda-city-2009-dvd-navigation-system-2-mirror-link-oripunva-169902780-2016-11-Sale-P.htm>

Analyst comment – As shown in a photo of Honda City 2009 DVD Navigation System with 2 Way MirrorLink, the touch position information in the head unit is mapped to the supportable key information of the portable device such that the touch position information matches key values of the portable device. See next page about key event mapping configured via *ClientEventConfiguration* message.

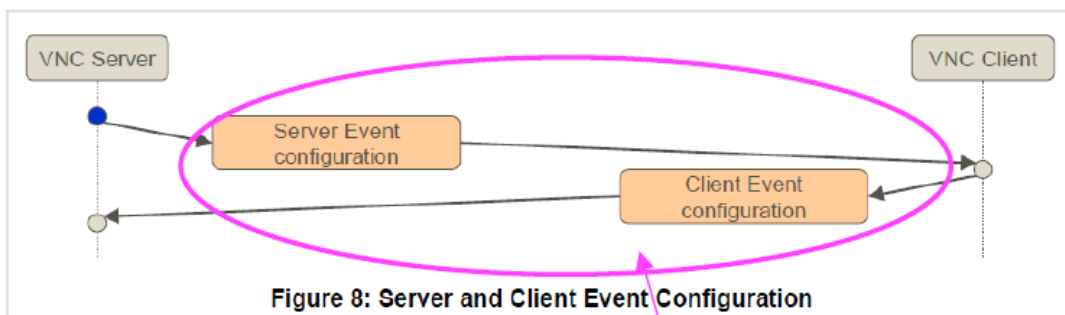


Figure 8: Server and Client Event Configuration

Table 12: ClientEventConfiguration Message

# bytes	Type	Value	Description
1	U8	128	Message-type
1	U8	4	Extension-type
2	U16	28	Payload length
2	U16		Keyboard layout – Language code (according ISO 639-1 [9])
2	U16		Keyboard layout – Country code (according ISO 3166-1 [10] alpha-2)
2	U16		UI Language – Language code (according ISO 639-1 [9])
2	U16		UI Language – Country code (according ISO 3166-1 [10] alpha-2)
4	U32	Bit 1	Knob keys (Bit mask according Table A.1) <ul style="list-style-type: none"> • '1': Client supports knob key events • '0': Client does not support knob key events
4	U32	Bit n	Device keys (Bit mask according Table B.2) <ul style="list-style-type: none"> • '1': Client supports device key events • '0': Client does not support device key events
4	U32	Bit n	Multimedia keys (Bit mask according Table B.2) <ul style="list-style-type: none"> • '1': Client supports multimedia key events • '0': Client does not support multimedia key events

Source:
[ETSI TS 103 544-2 V1.3.0 \(2017-10\)](#)
[Publicly Available Specification \(PAS\): Intelligent Transport Systems \(ITS\);](#)
[MirrorLink®: Part 2: Virtual Network Computing \(VNC\) based Display and Control](#)

Analyst comment – The client (=automobile head unit) and the server (=portable device) exchange **supported keys** and their events via **event configuration messages** so that the touch position information in the client can match key values of the portable device.

COUNT II – PATENT INFRINGEMENT

14. Plaintiff refers to and incorporates herein the allegations of Paragraphs 1-13 above.

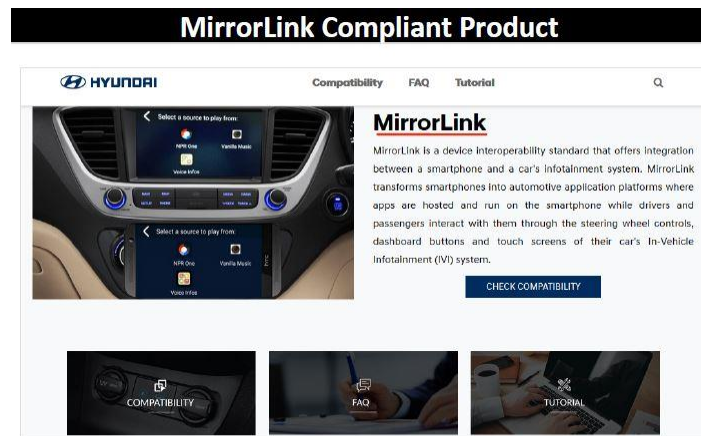
15. The ‘461 patent was duly and legally issued by the United States Patent and Trademark Office on November 27, 2012 after full and fair examination. Plaintiff is the owner by assignment of the ‘461 patent and possesses all rights of recovery under the ‘461 patent, including the exclusive right to sue for infringement and recover past damages and obtain injunctive relief.

16. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides apparatus and methods that infringe the '461 patent. Claim 9 of the '461 patent provides, among other things, “a remote resource access interface apparatus comprising: a key input unit configured to generate input key values; a communication unit configured to transmit a connection establishment request message to determine compatibility with a portable device and in order to establish a connection and, if compatible, to receive a connection establishment response message including screen resolution information and supportable key information from the portable device, the communication unit further configured to transmit input key information and to receive video information from the portable device after establishing the connection; a video output unit configured to display the video information in the form of a visual image, the video output unit having a display screen larger than the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit; and a key advisor unit configured to extract the supportable key information from the connection establishment response message and output the supportable key information to the video output unit, wherein the key advisor unit displays on a display screen of the video output unit, if a key configuration mode is activated, keys of the portable device and is configured to receive corresponding keys through the key input unit, and wherein key values corresponding to the keys of the key input unit match key values of the portable device, and wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.”

17. Defendant has been and is now infringing the '461 Patent in the State of Texas, in this judicial district, and elsewhere in the United States, by, among other things, directly or through

intermediaries, making, using, importing, testing, providing, supplying, distributing, selling, and/or offering for sale apparatus and methods (including, without limitation, the Defendant’s products including MirrorLink functionality of the Azera identified herein as the “Accused Instrumentality”) that provide a remote resource access interface device, covered by at least claim 9 of the ‘461 patent to the injury of Dale Progress Ltd. Defendant is directly infringing, literally infringing, and/or infringing the ‘461 patent under the doctrine of equivalents. Defendant is thus liable for infringement of the ‘461 patent pursuant to 35 U.S.C. § 271.

18. Claim 9 of the ‘461 patent, claims a remote resource access interface apparatus comprising:



Source: <https://sync.hyundai.co.in/>

Analyst comment – VNC Automotive provides OEM solutions using MirrorLink standards.

a key input unit configured to generate input key values;



Source:
[Can C-ITS benefit from MirrorLink? Dr. Joro Brakensejek, Chief Architect and Chair of Technical WG](#)

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

pointer event: touch screen action in which the user touches the screen with one (virtual) finger only at a single location

touch event: touch screen action in which the user touches the screen with two or more separate fingers at different locations

NOTE: touch events are used to describe more complex touch action, like pinch-open or pinch-close

Source:
[ETSI TS 103 544-13 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS): MirrorLink®:
 Part 13: Core Architecture

Analyst comment – MirrorLink supports pointer events and touch events where a pointer event means touching with one finger and a touch event means touching with two or more separate fingers on a touch screen.

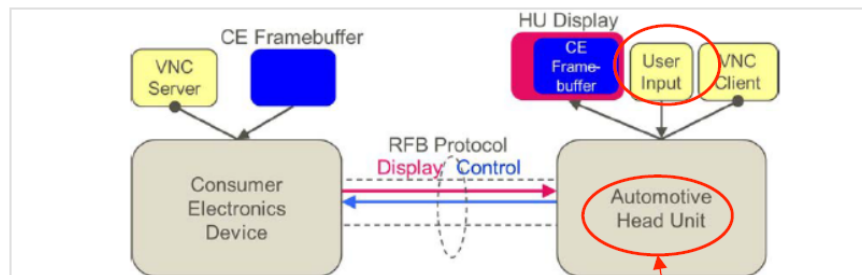


Figure 1: MirrorLink VNC Setup

The command and control input is handled as part of the VNC protocol by key and pointer events. A key or pointer event on the MirrorLink Client will be signalled to the MirrorLink Server via a specific key symbol value, which uniquely identifies the event. The mobile device and/or its application will not necessarily support all possible keys defined. Some applications may even have a dynamic behaviour on the selection of key inputs they expect.

Source:
[ETSI TS 103 544-2 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS):
 MirrorLink®: Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – To support pointer events and touch events, the automotive head unit (HU) has to have a touch input detection unit to detect them on a display screen and to generate touch position information on a display screen to process them accordingly. (MirrorLink Client = Head Unit, Server = Consumer Electronic Device such as smartphone).

a communication unit configured to transmit a connection establishment request message to determine compatibility with a portable device and in order to establish a connection and, if compatible, to receive a connection establishment response message including screen resolution information and supportable key information from the portable device, the communication unit further configured to transmit input key information and to receive video information from the portable device after establishing the connection;

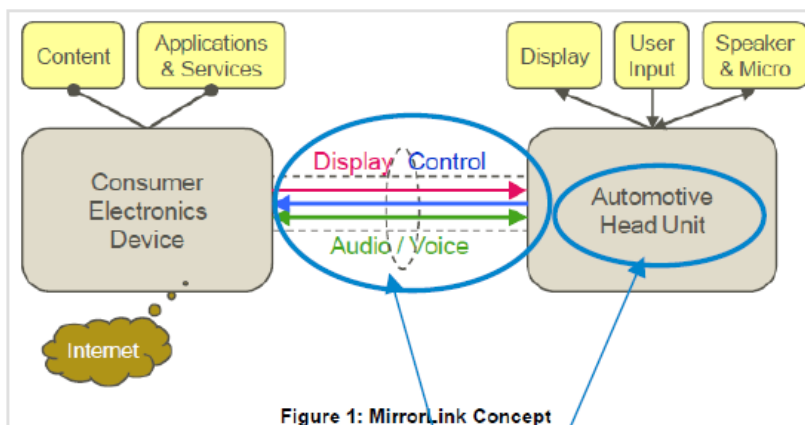


Figure 1: MirrorLink Concept

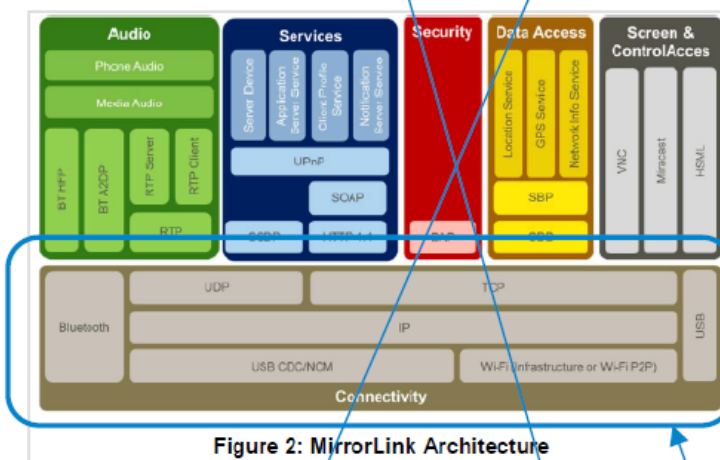


Figure 2: MirrorLink Architecture

Source:
[ETSI TS 103 544-13 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS): MirrorLink®
 Part 13: Core Architecture

Analyst comment – The automotive HU has to communicate with a consumer electronic device such as smartphone by using one or more of the connectivity protocols. It means the automotive HU has to have a communication unit.

7.4 Event Configuration Messages

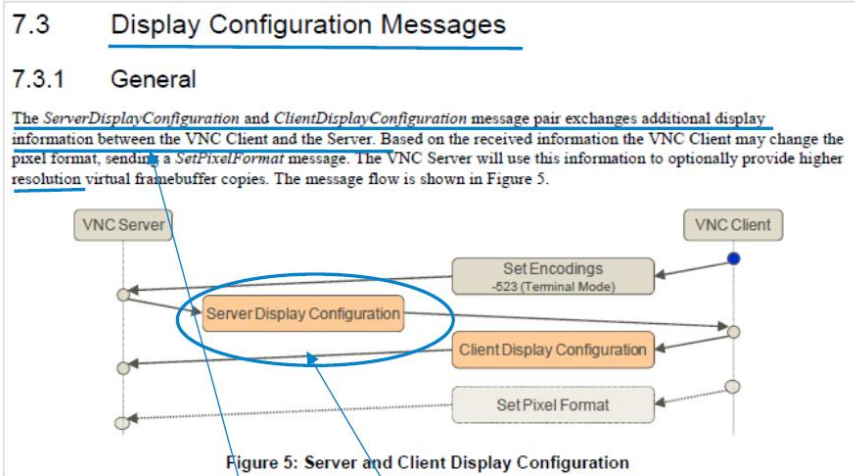
The *ServerEventConfiguration* and *ClientEventConfiguration* message pair provides additional information about event handling, i.e. which key and pointer events are natively supported on the VNC Server and Client. This information helps the Server to map specific incoming VNC Client events to Server events.

The message flow is shown in Figure 8.

Length	Code	Field	Description
2	U16		Keyboard layout – Language code (according ISO 639-1 [9])
2	U16		Keyboard layout – Country code (according ISO 3166-1 [10] alpha-2)
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4	U32	Bit m	Device keys (Bit mask according Table B.2) <ul style="list-style-type: none"> • '1': Client supports device key events

Source:
 ETSI TS 103 544-2 V1.3.0 (2017-10)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS);
 MirrorLink®: Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – The communication unit in the client (=Automotive HU) transmits keyboard layout, various key, and pointer events (=input key information) to the server (=portable device) via ClientEventConfiguration message.



Source:
 ETSI TS 103 544-2 V1.3.0 (2017-10)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS);
 MirrorLink®: Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – The client receives video info such as resolution from the server (=consumer device such as smartphone) via ServerDisplayConfiguration.

a video output unit configured to display the video information in the form of a visual image, the video output unit having a display screen larger than the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit; and



Source:
[Can C-ITS benefit from MirrorLink? Dr. Jörn Brakenseiek, Chief Architect and Chair of Technical WG](#)

Analyst comment – A video output unit (=automotive head unit) displays the same video (e.g., GPS navigation image) from the portable device (e.g., smartphone) in the form of a visual image. It is well known in the art that their image resolutions are different. Next page tells MirrorLink specification on scaling images due to the resolution difference between a portable device and an automotive head.

7.3.2 Framebuffer Scaling (VNC Server)

The MirrorLink VNC Server shall down-scale its framebuffer to fit into the framebuffer resolution provided from the MirrorLink Client in the *ClientDisplayConfiguration* message. The MirrorLink VNC Server shall follow the framebuffer down-scaling configurations, as given in Table 10.

Table 10: Framebuffer Downscaling Configurations

MirrorLink Client Framebuffer FB _{Client}	MirrorLink Server Framebuffer FB _{Server}	
	FB _{Server} < 1 024 x 600	FB _{Server} ≥ 1 024 x 600
FB _{Client} < 800 x 480 (MirrorLink 1.0 - 1.2 Clients only)	FB _{Client} or 800 x 480	FB _{Client} or 800 x 480

7.3.3 Framebuffer Scaling (VNC Client)

The MirrorLink Client shall support up-scaling to the framebuffer resolution provided in *ClientDisplayConfiguration* message.

The MirrorLink Client shall provide valid VNC Client display width and height [pixel] within the *ClientDisplayConfiguration* message.

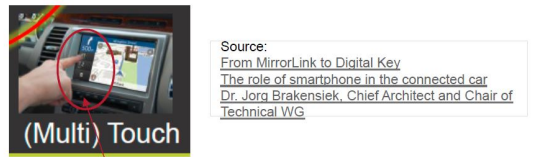
The MirrorLink Client may request a smaller framebuffer resolution from the MirrorLink Server (sending a

Source:
[ETSI TS 103 544-2 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS);
 MirrorLink® Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – VNC specification tells how to scale framebuffer resolution of the client (=automobile head unit) and the server (=consumer electronic device) since they are typically different. Typically smartphones have much higher resolution than automobile head units.

a key advisor unit configured to extract the supportable key information from the connection establishment response message and output the supportable key information to the video output unit, wherein the key advisor unit displays on a display screen of the video output unit, if a key

configuration mode is activated, keys of the portable device and is configured to receive corresponding keys through the key input unit, and



Source:
From MirrorLink to Digital Key
The role of smartphone in the connected car
Dr. Jorg Brakensiek, Chief Architect and Chair of
Technical WG

Message	Origin	Parameter	Mandatory Values
PointerEvent	Client	Button-mask x-position y-position	(as specified in RFB)
Client Cut Text	Client	Length Text	(as specified in RFB)
Bell	Server	No parameter	(as specified in RFB)
Server Cut Text	Server	Length Text	(as specified in RFB)

NOTE: For the RFB message structure, please refer to the dedicated RFB specification, as given in [1].

Source:
ETSI TS 103 544-2 V1 3.0 (2017-10)
Publicly Available Specification (PAS): Intelligent Transport Systems (ITS)
MirrorLink® Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – A head unit (=client) has to have a unit equivalent to a key advisor unit to output the supported keys (e.g., navigation configuration keys) to the display unit (=the video output unit) and also communicate pointer and touch events to the server (=smartphone).

Message	Origin	Parameter	Mandatory Values
PointerEvent	Client	Button-mask x-position y-position	(as specified in RFB)
Client Cut Text	Client	Length Text	(as specified in RFB)
Bell	Server	No parameter	(as specified in RFB)
Server Cut Text	Server	Length Text	(as specified in RFB)

NOTE: For the RFB message structure, please refer to the dedicated RFB specification, as given in [1].

Source:
ETSI TS 103 544-2 V1 3.0 (2017-10)
Publicly Available Specification (PAS): Intelligent Transport Systems (ITS)
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7.5.5. PointerEvent

A PointerEvent message indicates either pointer movement or a pointer button press or release. The pointer is now at (x-position, y-position), and the current state of buttons 1 to 8 are represented by bits 0 to 7 of button-mask, respectively; 0 means up, 1 means down (pressed).

Source: RFB 6143 The Remote Framebuffer Protocol

Analyst comment – To send touch positions to the server (=portable device) from a client (=head unit), via RFB message, the head unit has to have a unit with key advisor function that can receive the touch position information from the touch screen as specified in the standard.

wherein key values corresponding to the keys of the key input unit match key values of the portable device, and wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.

The MirrorLink Client shall provide a display, which allows any CCC drive-certified application to be displayed, while the MirrorLink Client is in drive mode. The MirrorLink Client's minimum resolution shall be 800 x 480 on a screen area of size 133,3 mm x 80 mm at a distance of 900 mm. Applications may adapt to the provided screen details, exceeding the minimum resolution, but are not required to do so.

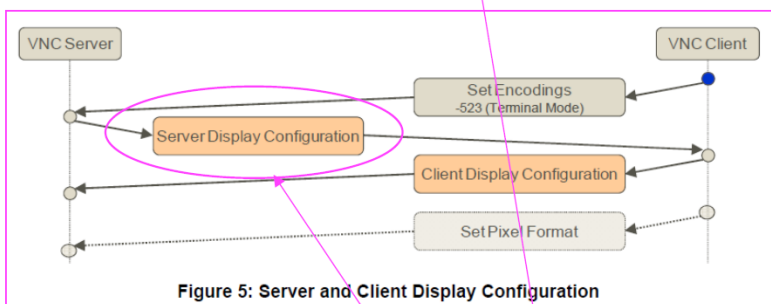
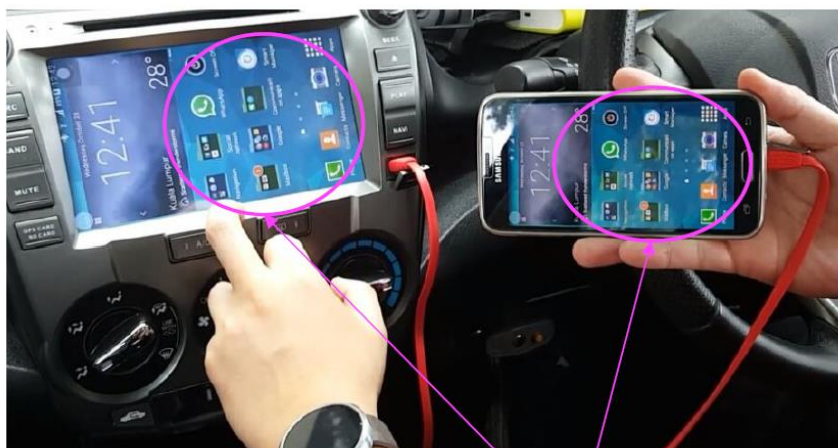


Figure 5: Server and Client Display Configuration

Source:
[ETSI TS 103 544-2 V1 3 0 \(2017-10\)](https://www.etsi.org/ETSI/TS_103_544-2_V1_3_0_2017-10)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS);
 MirrorLink® Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – The resolution of a HU has to be minimum 800x480 and the display on each HU has different resolution. The video output unit has to adjust images to fit on the resolution supported by the video output unit to display them properly. The server (=portable unit) communicates the server display configuration to the client and video output unit can scale images based on the screen resolution info supported by the portable unit.



Source:
<https://www.lelong.com.my/honda-city-2009-dvd-navigation-system-2-mirror-link-oriunva-169902780-2016-11-Sale-P.htm>

Analyst comment – As shown in a photo of Honda City 2009 DVD Navigation System with 2 Way MirrorLink, the touch position information in the head unit is mapped to the supportable key information of the portable device such that the touch position information matches key values of the portable device. See next page about key event mapping configured via *ClientEventConfiguration* message.

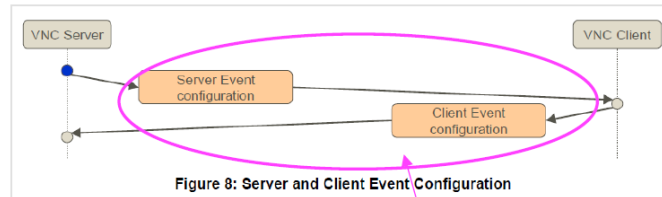


Figure 8: Server and Client Event Configuration

Table 12: ClientEventConfiguration Message

# bytes	Type	Value	Description
1	U8	128	Message-type
1	U8	4	Extension-type
2	U16	28	Payload length
2	U16		Keyboard layout – Language code (according ISO 639-1 [9])
2	U16		Keyboard layout – Country code (according ISO 3166-1 [10] alpha-2)
2	U16		UI Language – Language code (according ISO 639-1 [9])
2	U16		UI Language – Country code (according ISO 3166-1 [10] alpha-2)
4	U32	Bit 1	Knob keys (Bit mask according Table A.1) • '1': Client supports knob key events • '0': Client does not support knob key events
4	U32	Bit n	Device keys (Bit mask according Table B.2) • '1': Client supports device key events • '0': Client does not support device key events
4	U32	Bit n	Multimedia keys (Bit mask according Table B.2) • '1': Client supports multimedia key events • '0': Client does not support multimedia key events

Source:
[ETSI TS 103 544-2 V1.3.0 \(2017-10\)](#)
 Publicly Available Specification (PAS): Intelligent Transport Systems (ITS);
 MirrorLink® Part 2: Virtual Network Computing (VNC) based Display and Control

Analyst comment – The client (=automobile head unit) and the server (=portable device) exchange supported keys and their events via event configuration messages so that the touch position information in the client can match key values of the portable device.

19. Defendant’s aforesaid activities have been without authority and/or license from Plaintiff.

20. To the extent 35 U.S.C. § 287 is determined to be applicable, Plaintiff is informed and believes its requirements have been satisfied with respect to the ‘504 and ‘461 patent.

21. Plaintiff is entitled to recover from Defendant the damages sustained by Plaintiff as a result of the Defendant’s wrongful acts in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

JURY DEMAND

Plaintiff hereby requests a trial by jury pursuant to Rule 38 of the Federal Rules of Civil Procedure.

PRAYER FOR RELIEF

Plaintiff respectfully requests that the Court find in its favor and against the Defendant, and that the Court grant Plaintiff the following relief:

- A. A judgment in favor of Plaintiff that Defendant has infringed one or more of the claims, directly, jointly, and/or indirectly the '504 and '461 patent;
- B. A permanent injunction pursuant to 35 U.S.C. § 283, enjoining Defendant and their officers, directors, agents servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from infringement, inducing the infringement of, or contributing to the infringement of the '504 patent, or such other equitable relief the Court determines is warranted;
- C. An award to Plaintiff of damages adequate to compensate Plaintiff for the Defendant's acts of infringement together with pre-judgment and post-judgment interest;
- D. That, should Defendant's acts of infringement be found to be willful from the time that Defendant became aware of the infringing nature of their actions, which is the time of filing of Plaintiff's Original Complaint at the latest, that the Court award treble damages for the period of such willful infringement pursuant to 35 U.S.C. § 284;
- E. Any further relief that this Court deems just and proper.

Dated: December 3, 2018

Respectfully submitted,

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