

PANASONIC AUTOMOTIVE

GM HPDC PRODUCT SPECIFICATION

10/1/2018

PASDL PRODUCT MANUAL

AUDIO MANAGER

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DIAGNOSTICS ← Cruise admin & test App

ETHERNET MESSAGES

FACEPLATE

POWER MANAGEMENT

SETTINGS

WI-FI ← Cruise admin & test App

AUDIO MANAGER

This feature basically describes about providing raw PCM audio to the existing In-vehicle Infotainment System. For its implementation in HPDC, Stock Android functionality is used. Bluetooth, Ethernet, Wi-Fi, USB, Interface output are some of the capabilities being used for input and output of the audio/video data. Output to the IVI shall meet the required PCM audio sample rate and bit depth requirement. Stock Android media player is used to play the media content on IVI.

How does it works?

When the vehicle starts, HPDC sends out audio source connect request to IVI, which makes it the default aux audio source on every boot cycle. Later, the system begins to play the songs/playlists from the paired device via HPDC. Media player options such as Play, Pause, Next, Previous, etc. can be executed either from a paired device or IVI system.

BLUETOOTH

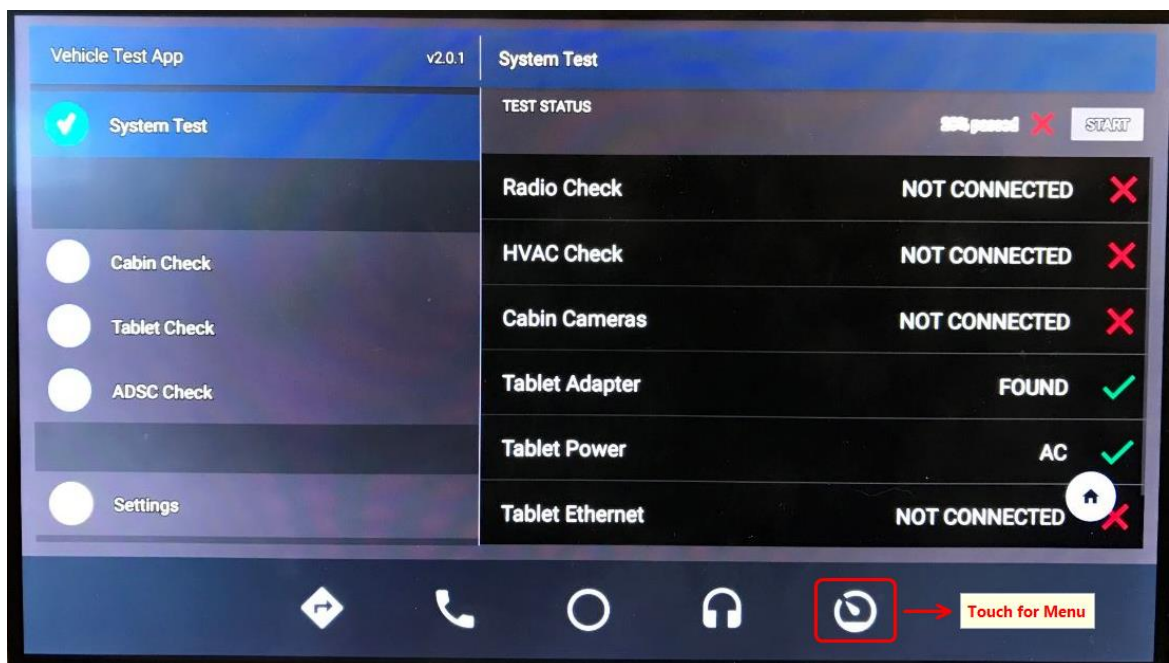
Bluetooth User guide

The Bluetooth feature allows the HPDC system to act as an extension of your phone's music via wireless technology called *Bluetooth*[®]. *Bluetooth*[®] is like an invisible cable that connects one device to one other device. It is important to remember that the features of HPDC available to the user are dependent on the *Bluetooth*[®] functionality of the user's phone. Currently HPDC does not support hands free phone call feature. Bluetooth audio is the only feature that is supported at this time.

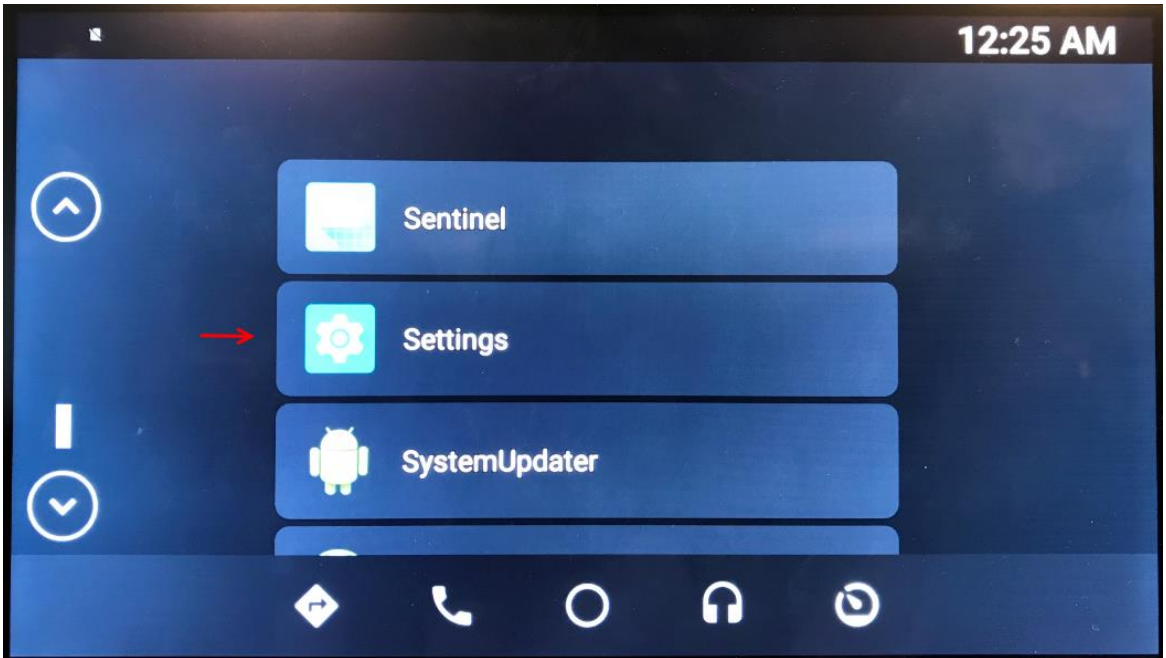
In order to use the Bluetooth audio capability you must pair the cell phone with HPDC. (Pairing is the establishment of the initial connection of the two devices, telling each other that they exist and they trust each other). You'll find the option in SETTINGS

Steps to pair and connect a phone:

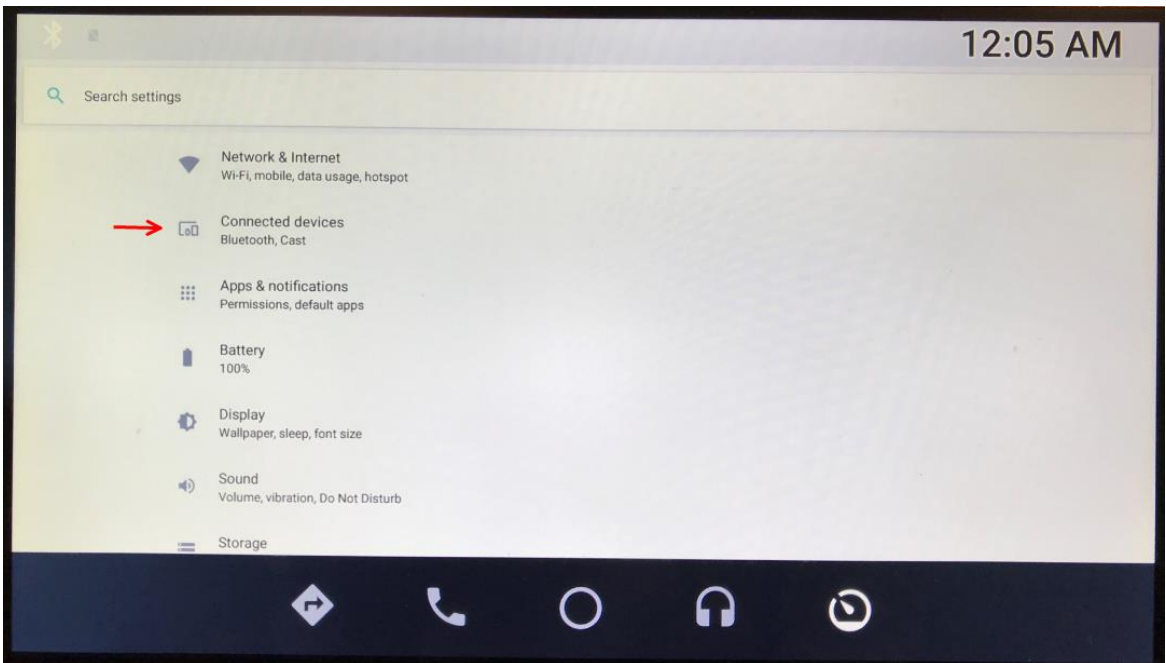
- Press Menu soft button on the HPDC display



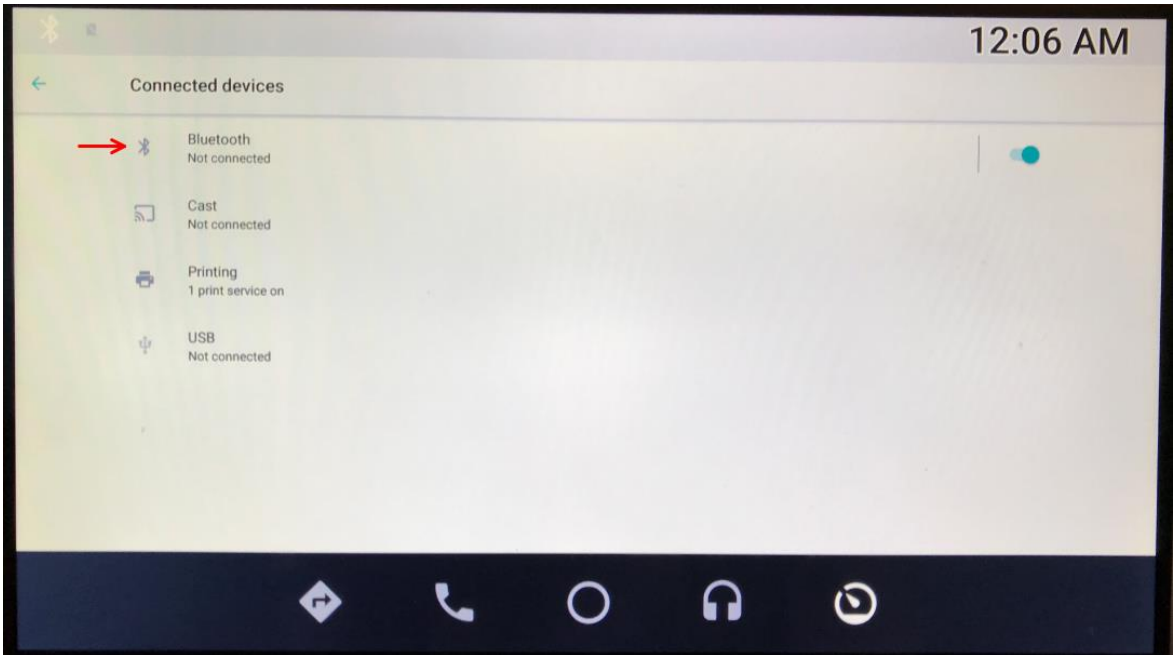
- Select Settings



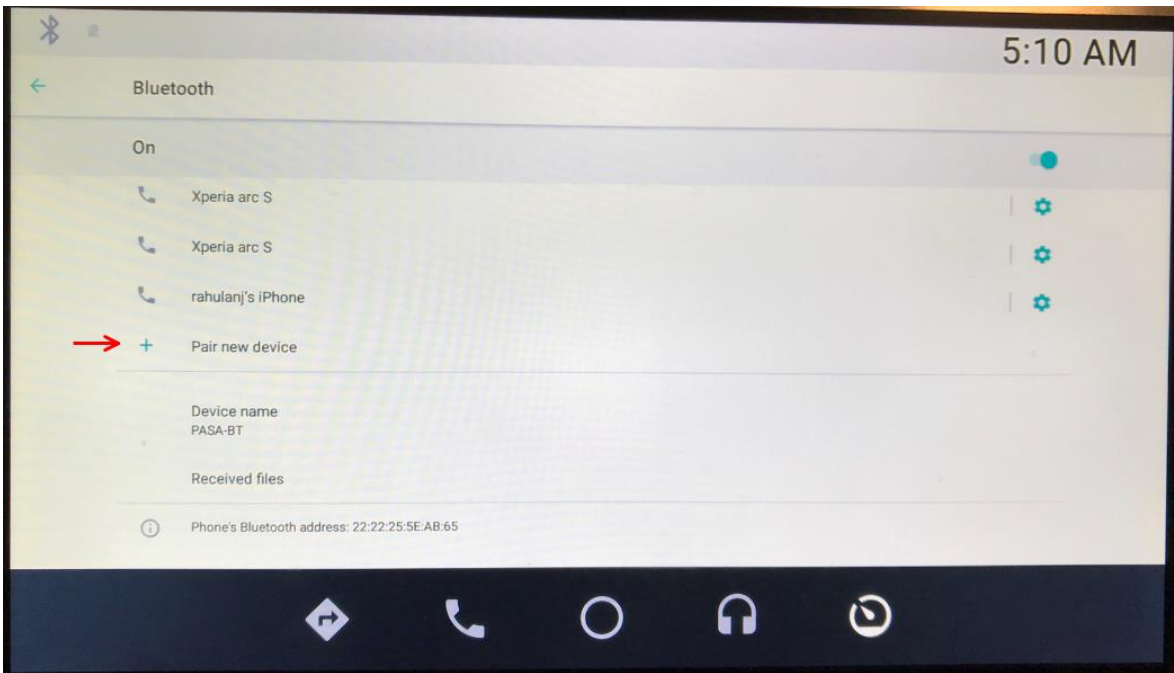
- Select connected devices



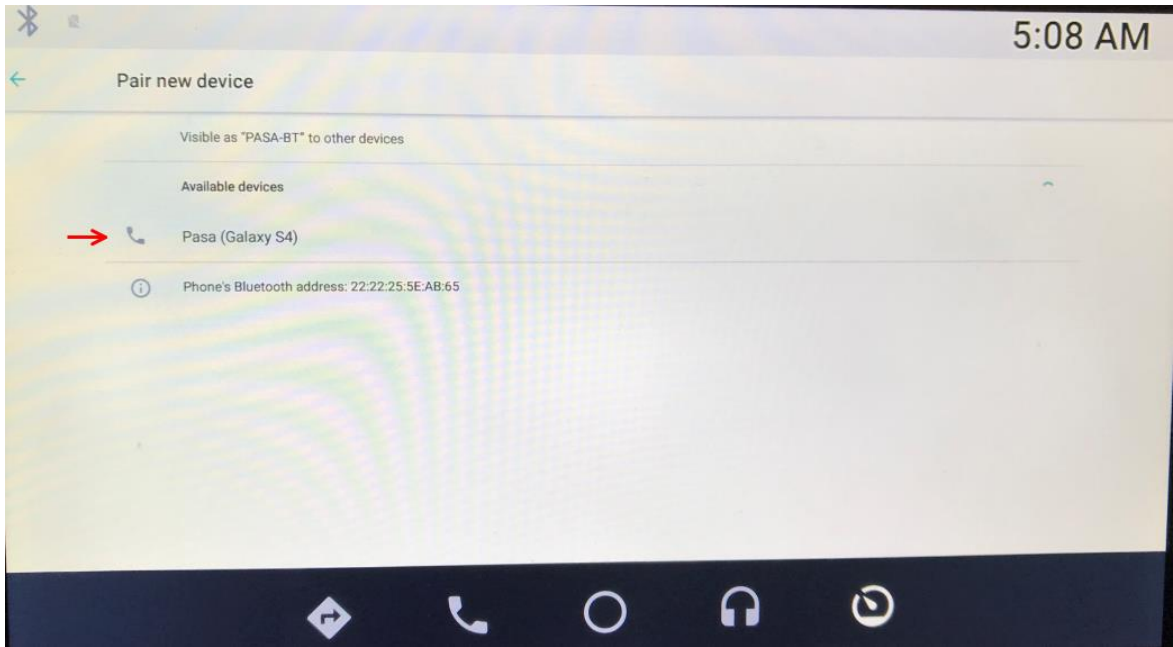
- Select Bluetooth



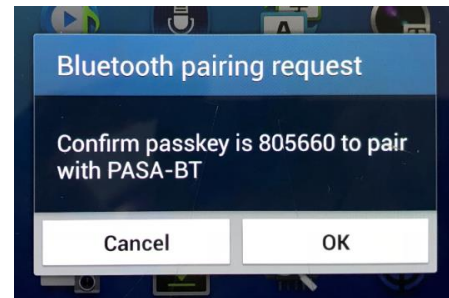
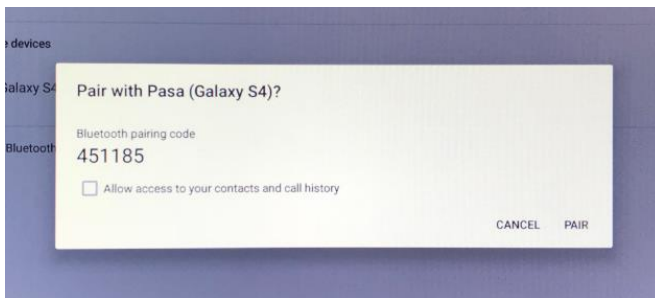
- Select + Pair new device



- Select the device to be paired from the displayed list



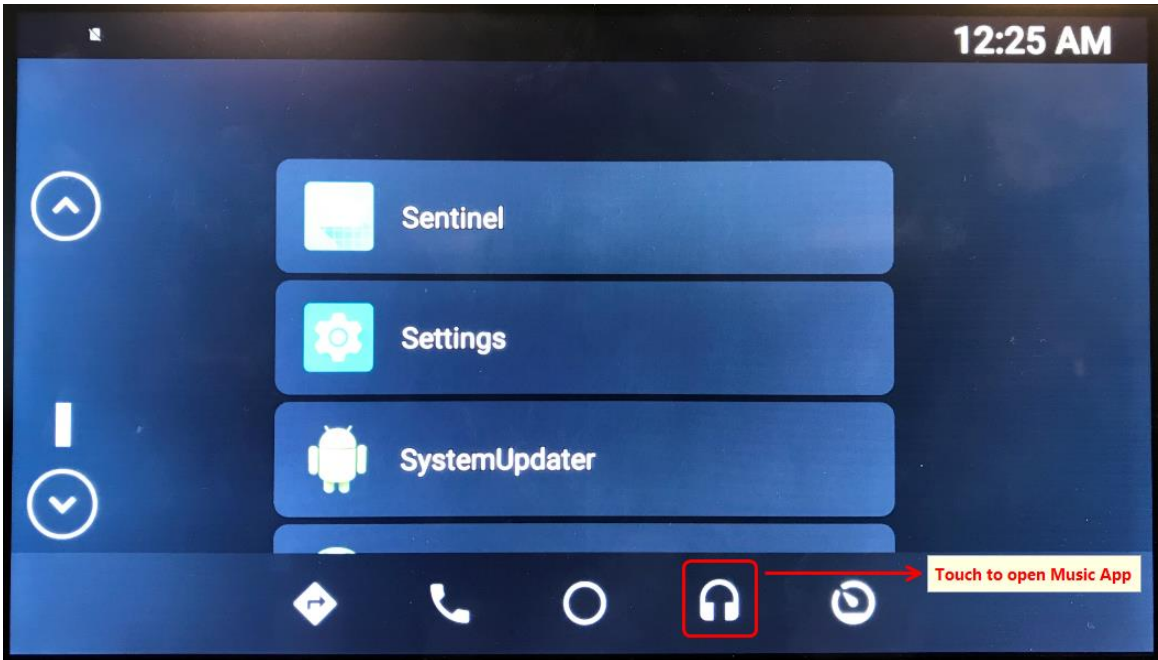
- Confirm pairing both on HPDC display and on the device



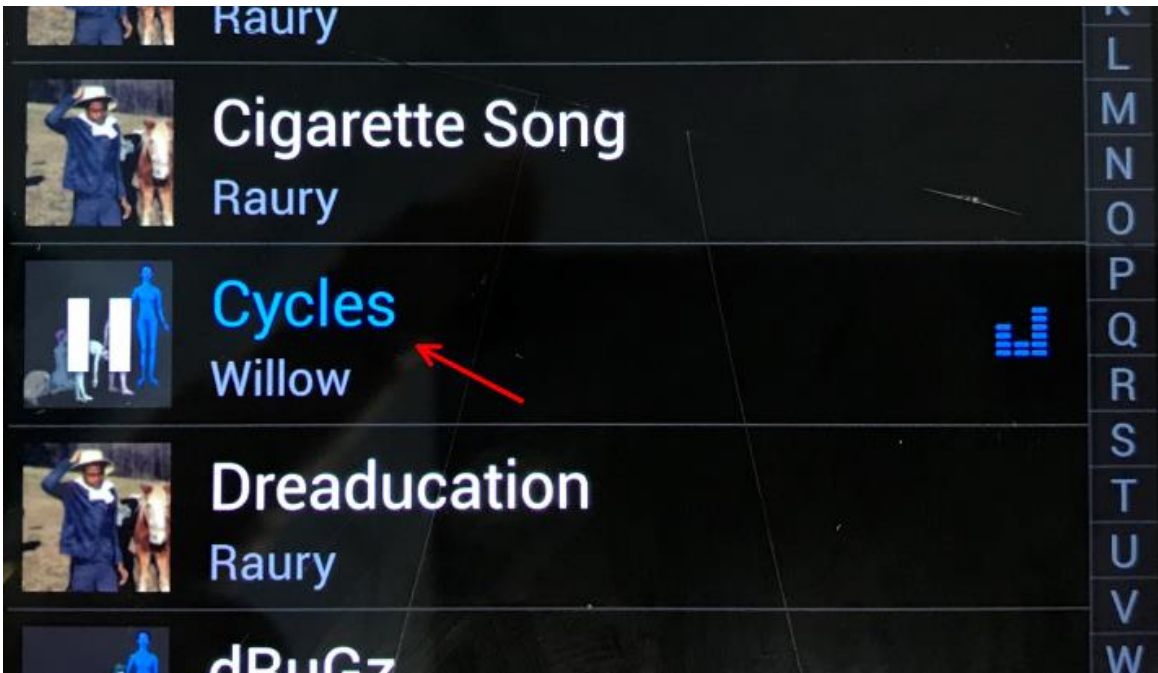
HPDC uses secure simple pairing methodology for successful pairing. Once pairing is successful your phone and HPDC trust each other. Automatic connection should begin. Pairing should only need to be performed once. Subsequent connections should occur automatically when you get in the car and your phone's *Bluetooth*® feature is turned on. HPDC can pair (store in memory) up to 10 devices, however only one phone can be connected at a time. To connect a paired device, select the desired device to be connected.

Steps to play Bluetooth audio:

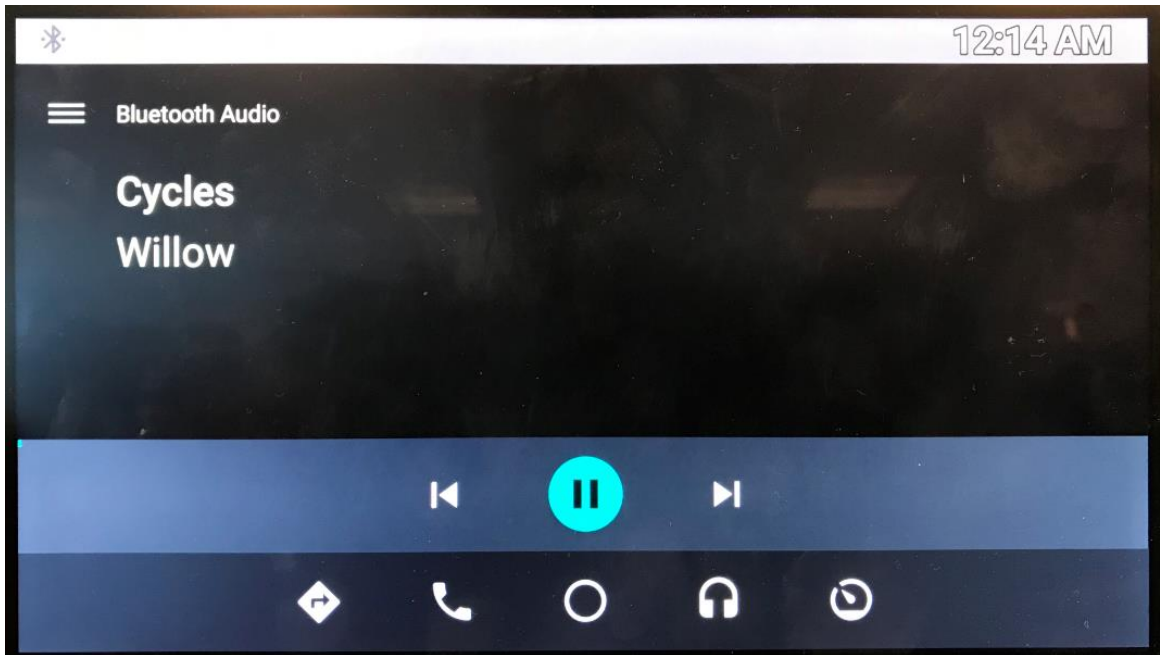
- Launch the Music App on the HPDC



- Launch the desired music app on the phone
- Play a track on the phone with the selected music app



- Bluetooth audio should be playing on the HPDC



- Next/Previous track can be selected either on the phone or on the HPDC display.
- Audio can be paused either on the phone or on the HPDC display.

While Bluetooth audio is active, an incoming call on the connected device will pause the audio and let the user to attend the call on the device. Similarly, if the user makes an outgoing call on the connected device, the audio will be paused allowing the user to connect the call on the device. Once the call has been completed the Bluetooth audio will be resumed.

Troubleshooting tips: If at any time Bluetooth is not functioning as expected, it is recommended to perform a soft reset on your phone. This is normally done by removing the battery for a short time. If problems still occur you may choose to delete the pairing from both device and pair them again. For phone specific information contact your carrier's tech support.

DIAGNOSTICS

Upon system start-up the Diagnostics shall be accessible via Cruise App. Following Diagnostics messages can be accessed by Cruise App.

Diagnostic Messages	Descriptions
High or Low Variant	List the enumerations as High and Low
Bluetooth Status	List the enumerations as Bluetooth Enabled and Bluetooth Not Enabled
Wi-Fi Status	List the enumerations as Wi-Fi Enabled and Wi-Fi Not Enabled
USB Status	List the enumerations as USB Supported and USB Not Supported
Ethernet On/Off	List the enumerations as Ethernet On and Off
Input Voltage	Display input voltage to HPDC
SoC Thermistor Temperature	Display operating temperature of the SoC chip (die)
PMICThermistor Temperature	Display operating temperature of the PMIC chip (die)
Thermistor TH2 Temperature	Display Themistor TH2 temperature
MSM Thermistor TH3 Temperature	Display Themistor TH3 temperature
EMMC Thermistor TH4 Temperature	Display Themistor TH4 temperature
PWM Duty Cycle	Display PWM duty cycle
Available Wi-Fi Networks	Display information about all available networks
Connected Wi-Fi Network	Display Information (SSID, RSSI, etc) of the currently connected network.
Wi-Fi MAC Address	Display MAC address of Wi-Fi
Bluetooth MAC address	Display MAC address of Bluetooth
Ethernet MAC address	Display MAC address of Ethernet
ECU Serial Number	Display ECU serial number
ECU Part Number	Display customer ECU part number
ECU SW Part Number	Display customer ECU SW part number
ECU HW Part Number	Display System Supplier ECU HW Number
SW Version Number	Display System Supplier ECU SW Version Number
HW Version Number	Display System Supplier ECU HW Version Number
HW Supplier ID	Display HW Supplier ID
Boot Cycle Counter	Display boot cycle counter
FIDM HW Version	Display FIDM HW Version Number as requested by GM/Cruise
FIDM FW Version	Display FIDM FW Version Number as requested by GM/Cruise
End of life for read/write	
Input Voltage Limit Error – DTC	DTC to detect if the input voltage exceeded allowed range

Thermistor Temperature Limit Error - DTC	DTC to detect if any thermistor temperature exceeded allowed range
Android Update Fails - DTC	DTC to detect if the Android SW update fails
Bluetooth/WiFi Chip Fails -DTC	DTC to detect in case of Bluetooth/WiFi Chip failure
Ethernet Link fails to establish - DTC	DTC to detect if Ethernet Link fails to establish
Ethernet HW Error - DTC	DTC to detect in case of Ethernet HW failure
Display Firmware Update Error - DTC	DTC to detect if the display firmware update fails
Serializer CRC Video Link Error - DTC	DTC to detect in case of Serializer CRC Video Link Error
Serializer I ² C Back Channel Error - DTC	DTC to detect in case of Serializer I ² C Back Channel Error

ETHERNET MESSAGES

Note: Accessible only with the use of a SAM in production software.

Network messages are sent between the HPDC and the Radio Module using Ethernet with TCP and 802.1x authentication. The HPDC complies with the latest IEEE 802.3 Ethernet protocols and uses the 100Mb standard.

Messages are defined by a 2-Byte Message ID. The message ID is followed by a Status Byte and a predefined data payload.

See the attached list of Ethernet messages.

ID	Message Name
\$A001	HPDC Session
\$A002	HPDC EOL Tester Version
\$A005	HPDC Rapid Shut Down
\$A006	HPDC Reboot
\$A007	HPDC Reboot Ethernet
\$A008	HPDC Panasonic Serial Number
\$A009	HPDC Serial Number
\$A010	HPDC Customer Part Number
\$A013	HPDC Hardware Configuration
\$A015	HPDC Customer Traceability Data (ESN)
\$A017	HPDC Model Number
\$A018	HPDC Software Version
\$A020	HPDC Boot Cycle Counter
\$A021	HPDC Input Voltage
\$A027	HPDC Serializer Display Reset
\$A028	HPDC eMMC ROM/RAM Check
\$A041	HPDC Thermistor Reading
\$A045	HPDC Thermistor SOC
\$A046	HPDC PMIC Temperature
\$A050	HPDC Processor Mode
\$A051	HPDC CPU Clock Speed
\$A060	HPDC Software Update
\$A061	HPDC Last Software Update Status
\$A071	HPDC Display On/Off
\$A072	HPDC Logging Mode On/Off
\$A073	HPDC RX-5V Serializer On/Off
\$A083	HPDC FTMDaemon Start/Stop
\$A084	HPDC USB Data Transfer Test
\$A090	HPDC Production Ready Enable/Disable
\$A091	HPDC Key Event
\$A092	HPDC Touch Event

Ethernet Messages (continued)

ID	Message Name
\$A100	BT MAC Address (READ ONLY)
\$A101	BT On/Off
\$A102	BT Audio Internal Loopback On/Off
\$A200	Wi-Fi MAC Address (READ ONLY)
\$A201	Wi-Fi On/Off
\$A202	Wi-Fi List SSID
\$A300	A2B Bit Error Rate (BER)
\$A305	A2B Slave Manufacturer ID
\$A400	USB Audio Output Volume
\$A402	USB Audio Output On/Off
\$A406	USB Audio Test Tone
\$A500	PWM Duty Cycle
\$A501	PWM Frequency (READ ONLY)
\$A502	PWM On/Off
\$A602	LAN MAC Address
\$A603	LAN Packet Error Rate (PER)
\$A604	LAN Status
\$A605	LAN Performance Test
\$A701	LVDS Bit Error Rate (BER)
\$A702	LVDS Common Mode Signal
\$A703	LVDS Jitter
\$A705	LVDS Static Images On/Off
\$A706	LVDS Dynamic Images On/Off

A complete description of each command is beyond the scope of this document. For more information please contact a member of the PASA HPDC Systems Team

FACEPLATE

This feature covers Application Programming Interface (API) for HPDC which will allow GM or Cruise Application to control Faceplate brightness. This feature consisting of Pulse Width Modulation (PWM) is only applicable to the high variant of HPDC.

How does it works?

1. MCTM will read dimming signal from LS GMLAN and send it to HPDC via Ethernet.
2. GM or Cruise Application will create PWM signal based on the dimming signal received via Ethernet.
3. HPDC will send the PWM signal to Faceplate.

PWM signal will have signal frequency of 1 KHz and duty cycle of 20~80%.

POWER MANAGEMENT

This feature describes the operating voltage and criteria under which the HPDC must remain fully functional and exhibit stable operation to the end user. For HPDC, power moding has only two modes Power ON and Power OFF mode. HPDC powers up when the voltage is or between the operating range i.e. 5V – 16V. If the voltage value is outside of the given range, HPDC will simply turn off/shut down. HPDC can be powered up by using battery voltage or USB voltage (i.e. VBus). HPDC shall be fully functional within 15 seconds of power up time.

All the electrical and mechanical components along with integrated modules will function normally when exposed to range of temperature between -40C to +55C (Degree Celsius).

In case of sudden power loss, HPDC will avoid any file system corruption or performance degradation.

All inputs and outputs of the HPDC are protected from overloads resulting from battery shorts or short to ground.

How does it works?

1. Power ON, when voltage range is between 5V to 16V.
2. Power OFF, when voltage range is outside of 5V to 16V.

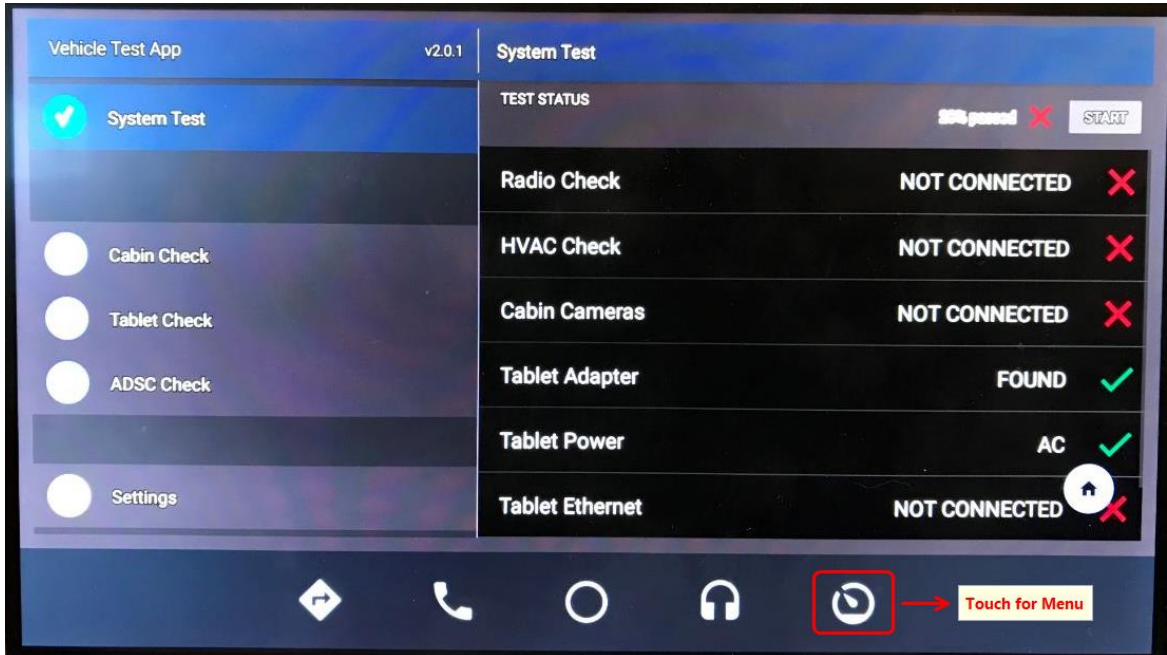
Harness/HW version tables:

	3S	Comment
Power Connector		
Pin 1	Ground	
Pin 2	V_Batt	
Pin 3	Open	
Pin 4	Open	
	3S	Comment
GPIO Connector		
Pin 1	PWM	
Pin 2	Ground	
Pin 3	Open	
Pin 4	Open	
Pin 5	+12V IN	
Pin 6	Ground	
Pin 7	+12V OUT	
Pin 8	+5V OUT	
Pin 9	Open	
Pin 10	Open	
Pin 11	Open	
Pin 12	Open	
Pin 13	Ground	
Pin 14	A2B-	
Pin 15	A2B+	
Pin 16	Ground	
Pin 17	Open	
Pin 18	Open	
Pin 19	Ground	
Pin 20	Ground	

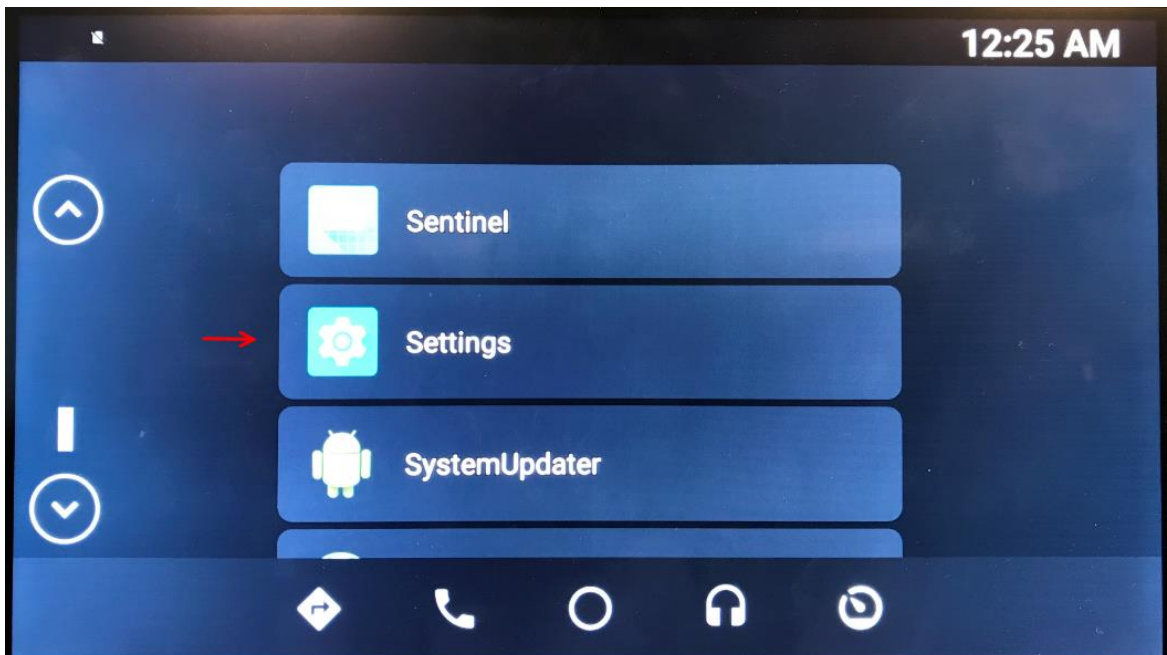
Settings

Steps to select Setting Menu:

- Press Menu soft button on the HPDC display

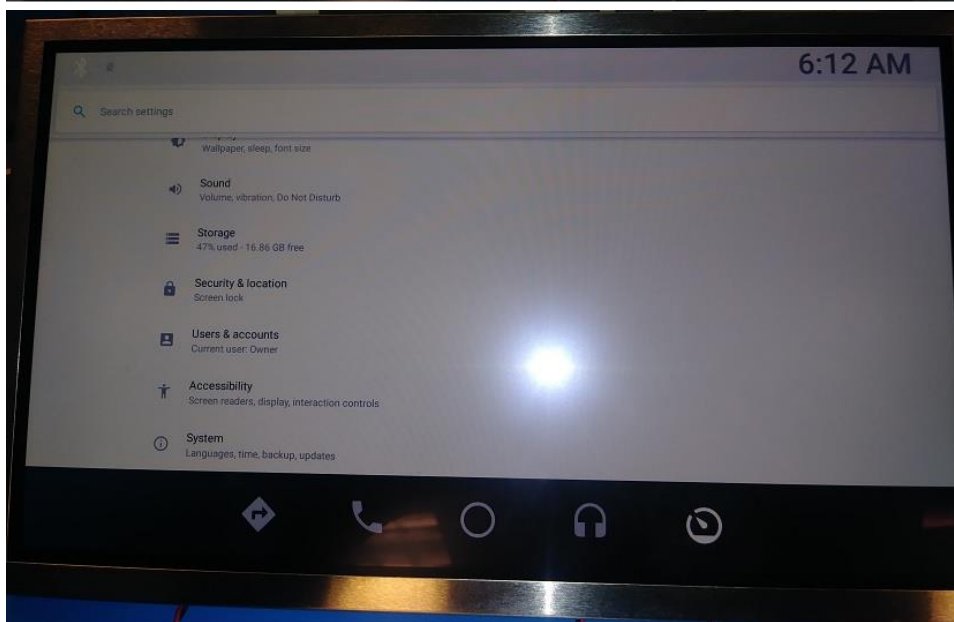
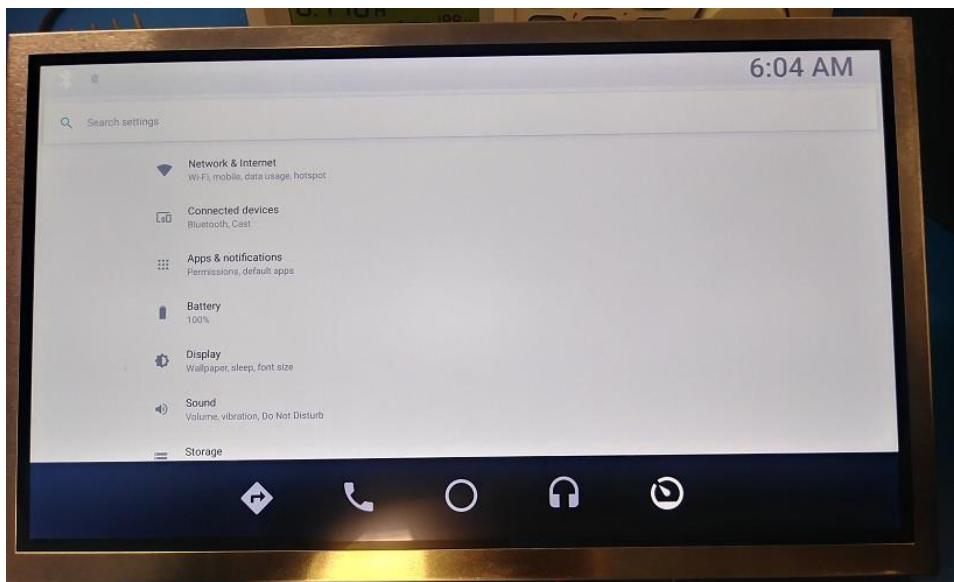


- Select Settings



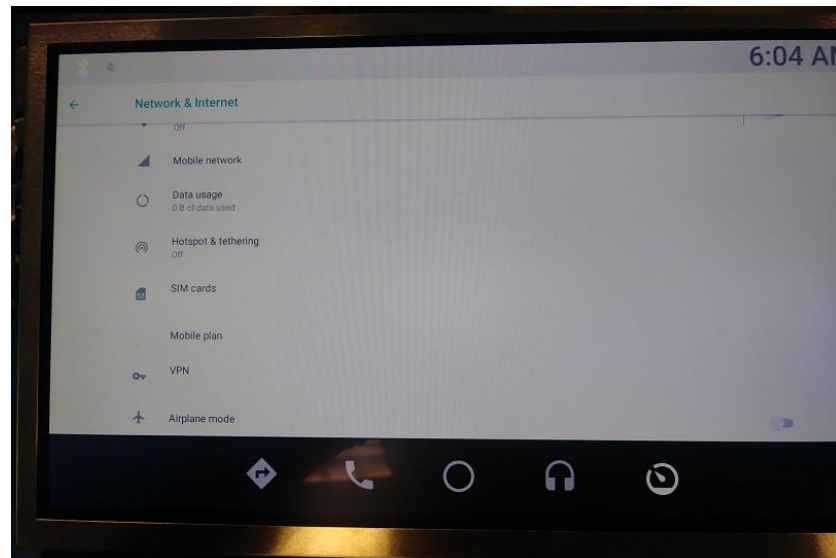
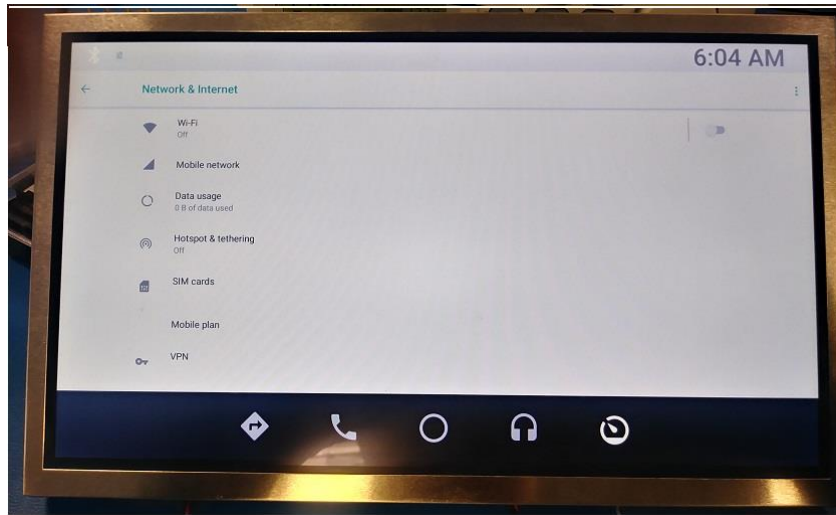
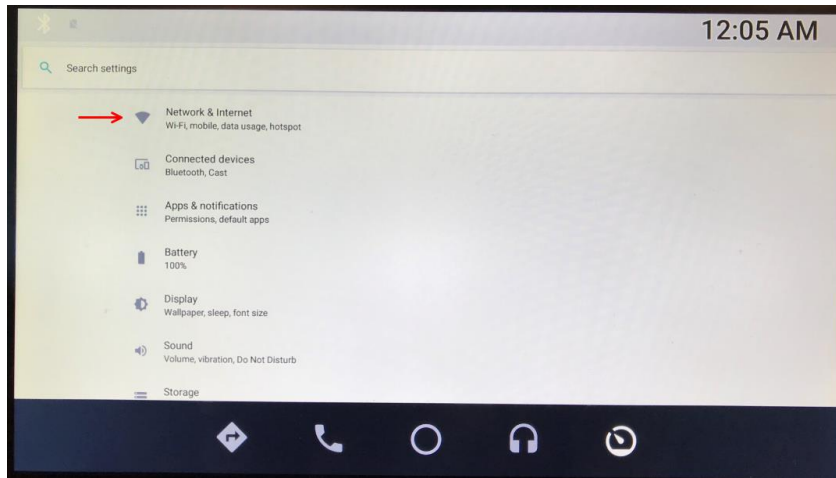
Settings Menu Items:

- 1- Network & Internet
- 2- Connected devices (Bluetooth, Cast)
- 3- Apps & Notifications (Permissions, default apps)
- 4- Battery (%100)
- 5- Display (Wallpaper, sleep, font size)
- 6- Sound (Volume, vibration, Do Not Disturb)
- 7- Storage (4% used – 15.39 GB free)
- 8- Security & location (Screen lock)
- 9- User & accounts (Current user: Owner)
- 10- Accessibility (Screen readers, display, interaction controls)
- 11- System (Languages, time, backup, updates)



1- Network & Internet


Select Network & Internet



a. **Wi-Fi.**


Refer to Wi-Fi section for setting details.

b. **Mobile network.**

Tap  Settings > Network & Internet > Mobile network

- Data roaming access: Configure access to mobile networks while roaming.
- Roaming: Enable or disable data while roaming on other mobile networks.
- Signal strength: View mobile signal strength.
- Network mode: Change the network mode.
- Access Point Names: Choose or add APNs.
- Network operators: Choose available and preferred networks.


c. **Data usage**

Tap  Settings > Network & Internet > Data usage.

The following options are available:

- Mobile data: Enable mobile data services.
- Alert me about data usage: Enable alerts for when your mobile data usage reaches the amount you chose.
- Mobile data usage: Monitor mobile data usage by app.
- Billing cycle and data warning: Set the day of the month to start the bill cycle for your device.

d. **Hotspot & tethering .**

Tap  Settings > Network & Internet > Mobile hotspot and tethering > Mobile hotspot

- Tap On/Off to turn on Mobile hotspot.
- Activate Wi-Fi on the target device.
- Scan for Wi-Fi hotspots and select your device's Mobile hotspot.
- Enter your device's Mobile hotspot password on the target device.

Tap  Settings > Network & Internet > Mobile hotspot and tethering

- Tap Bluetooth tethering to share your device's Internet connection using Bluetooth.
- Connect the computer to the device using a USB cable, and then tap USB tethering.

e. **SIM cards.**

Tap  Settings > Network & Internet > SIM cards

- Tap Lock SIM card to enable the feature.
- Tap Change SIM card PIN to create a new PIN.

f. **Mobile plan.**

g. VPN.

Tap  Settings > Network & Internet > VPN

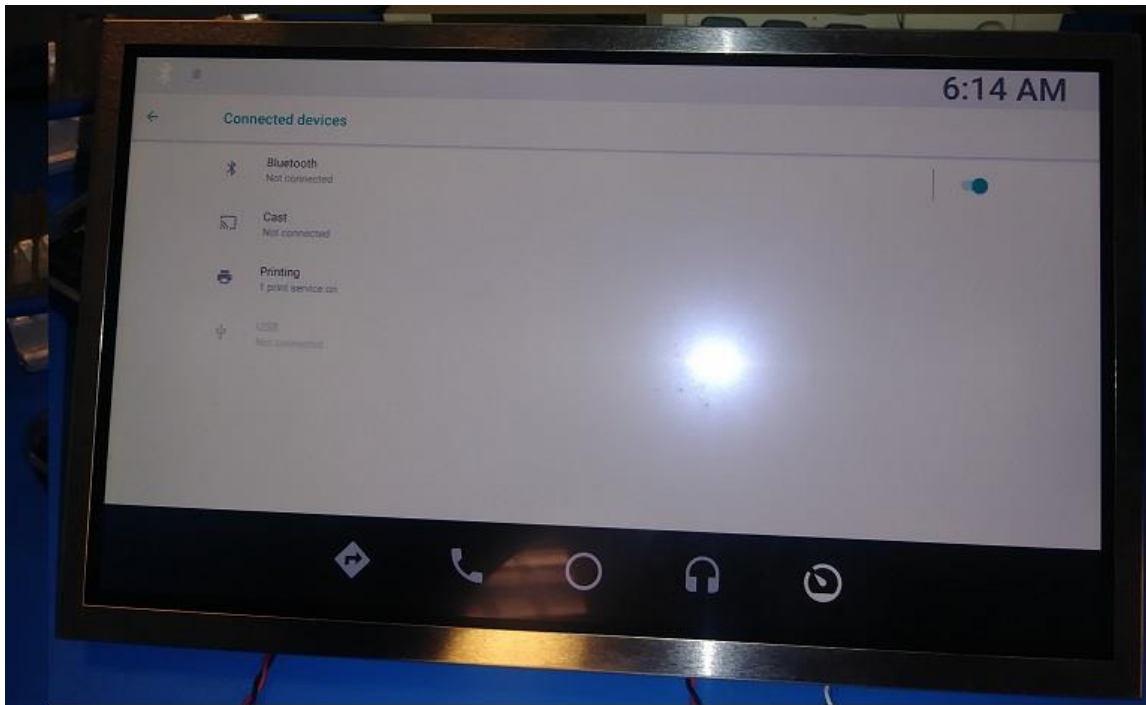
- Tap + Add VPN profile and follow the prompts to set up your VPN.

h. Airplane mode.

Tap  Settings > Network & Internet > Airplane mode

- Tap On/Off to enable this feature.

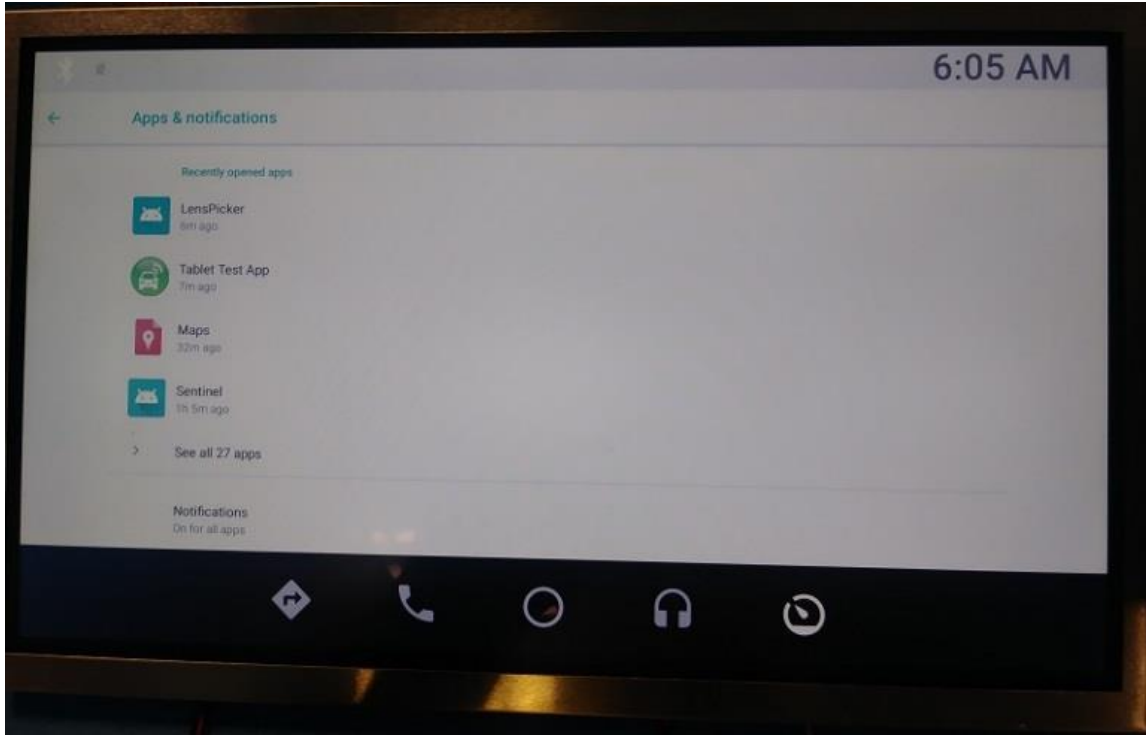
2- Connected devices




- a. Bluetooth.
Refer to Bluetooth section for setting details.
- b. Cast
- c. Printing
- d. USB

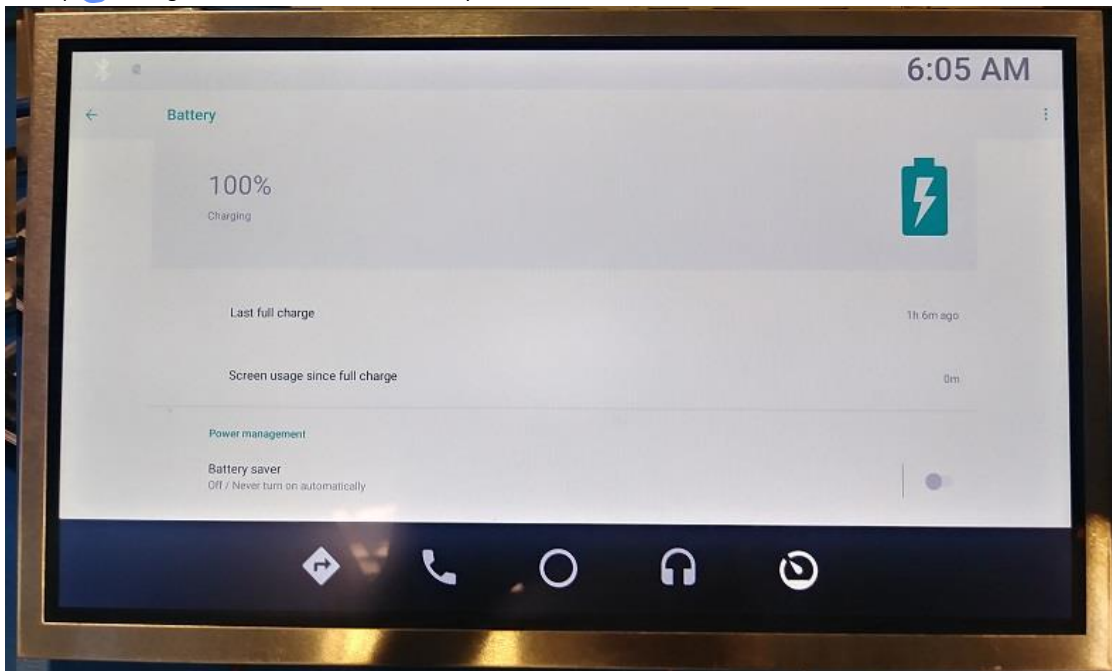
3- Apps & Notifications

The Apps list displays all preloaded and downloaded apps. You can uninstall, disable, or hide apps from view.




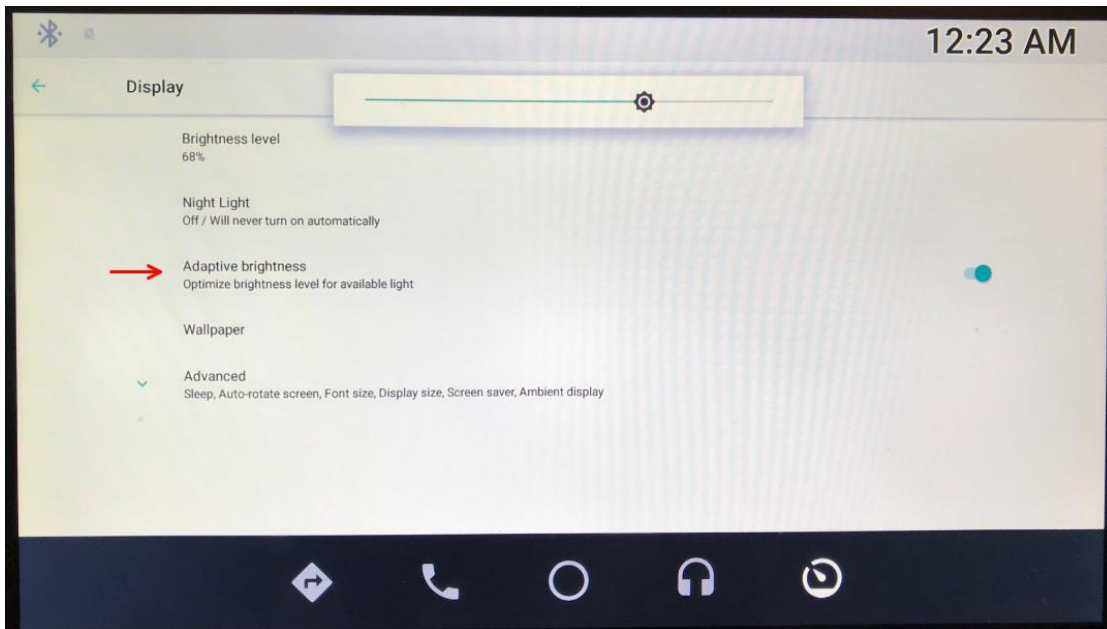
4- Battery

- View how battery power is used for device activities.
- Tap  Settings > Network & Internet > Battery



5- Display

Tap  Settings > Network & Internet > Display



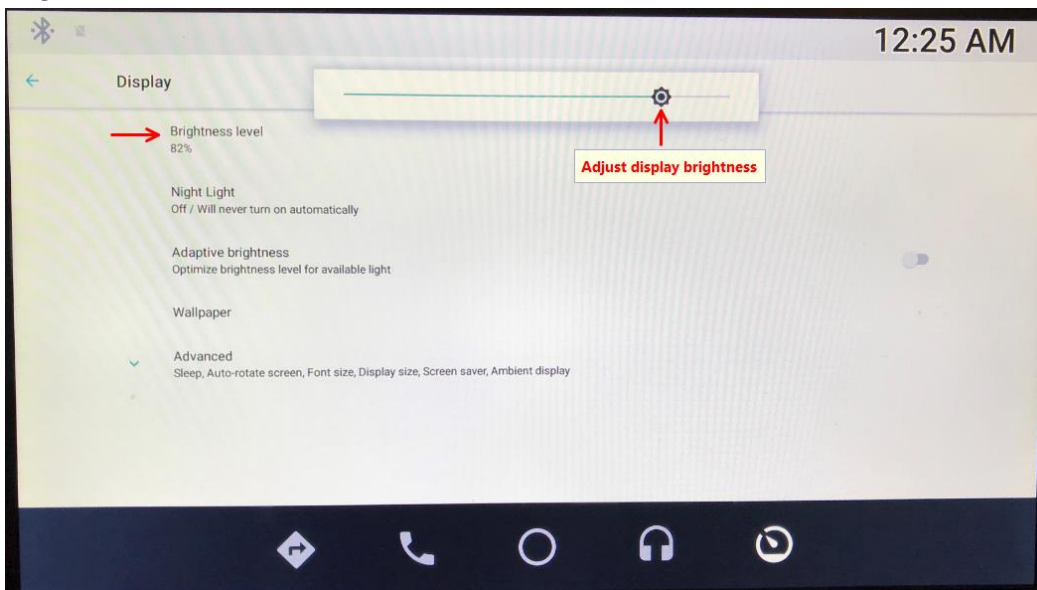
Tap an option to customize:

- Brightness level
- Night Light
- Adaptive brightness
- Wall paper
- Advanced (Sleep, Auto-rotate screen, Font size, Display size, Screen saver, Ambient display)

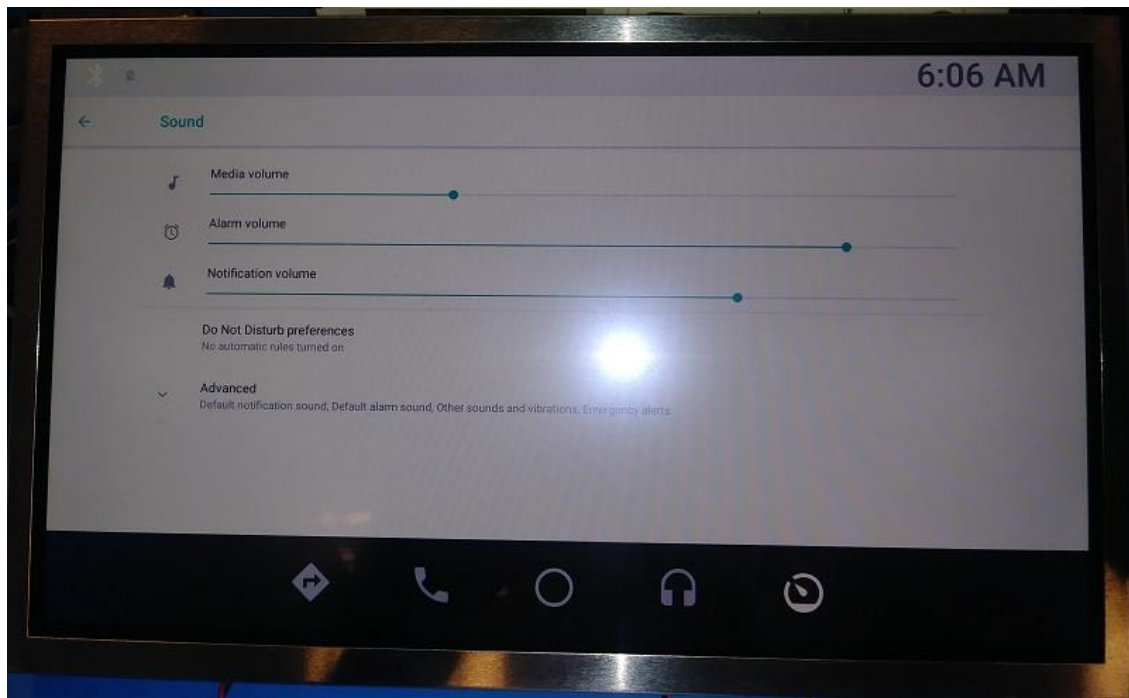
Adjusting HPDC Display Brightness:


HPDC Display brightness can be adjusted through settings. Display brightness can be set to automatic with the adaptive brightness turned On as follows:

Brightness level



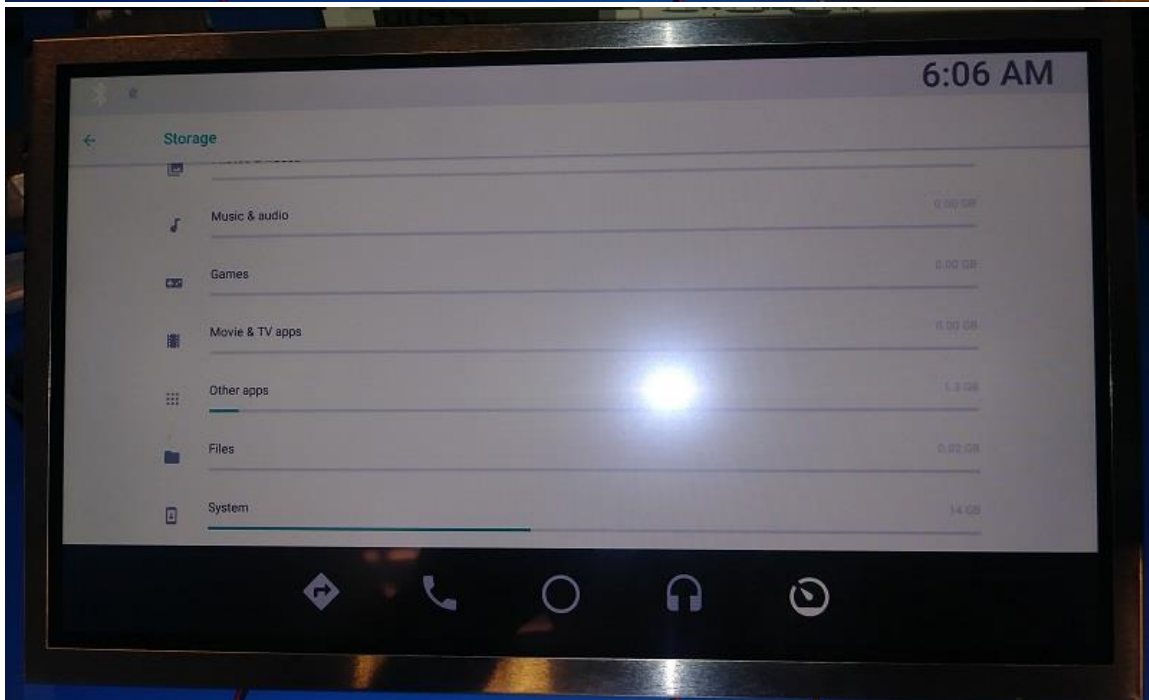
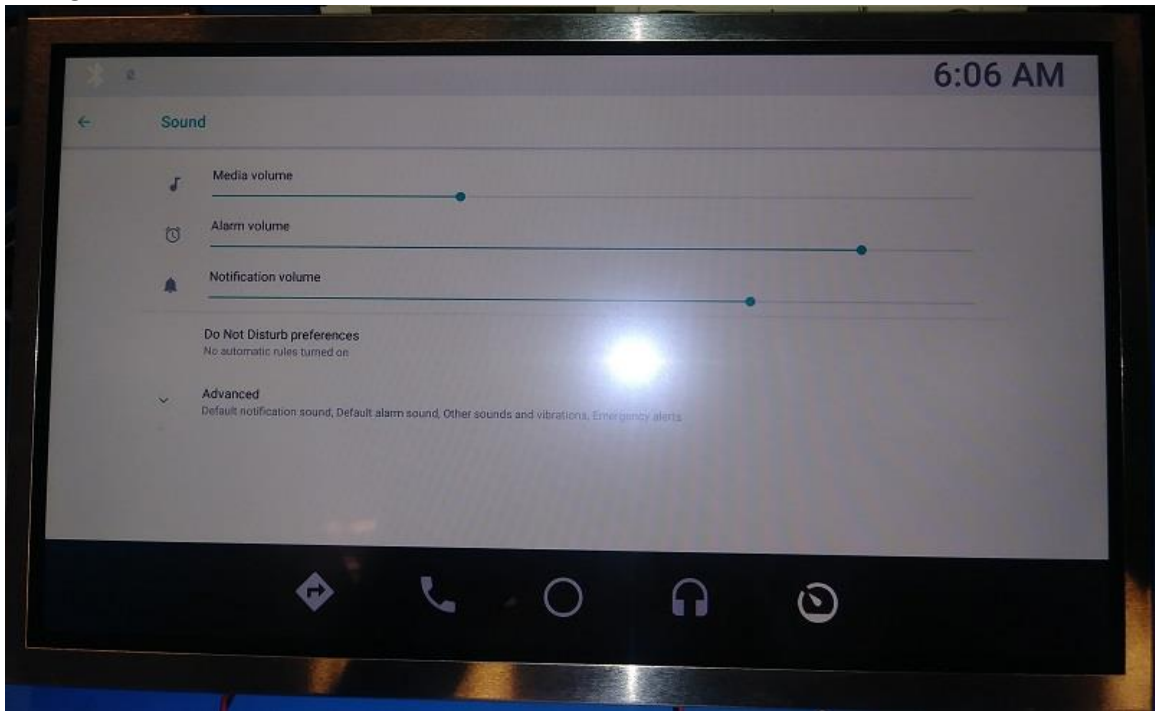
6- Sound



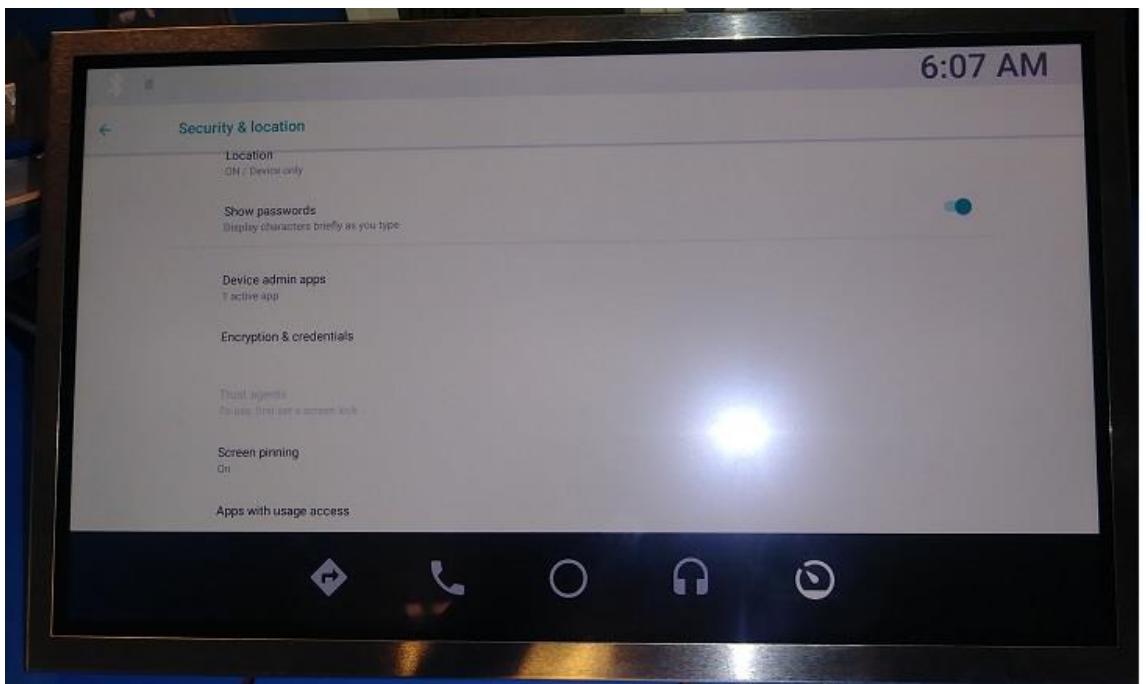
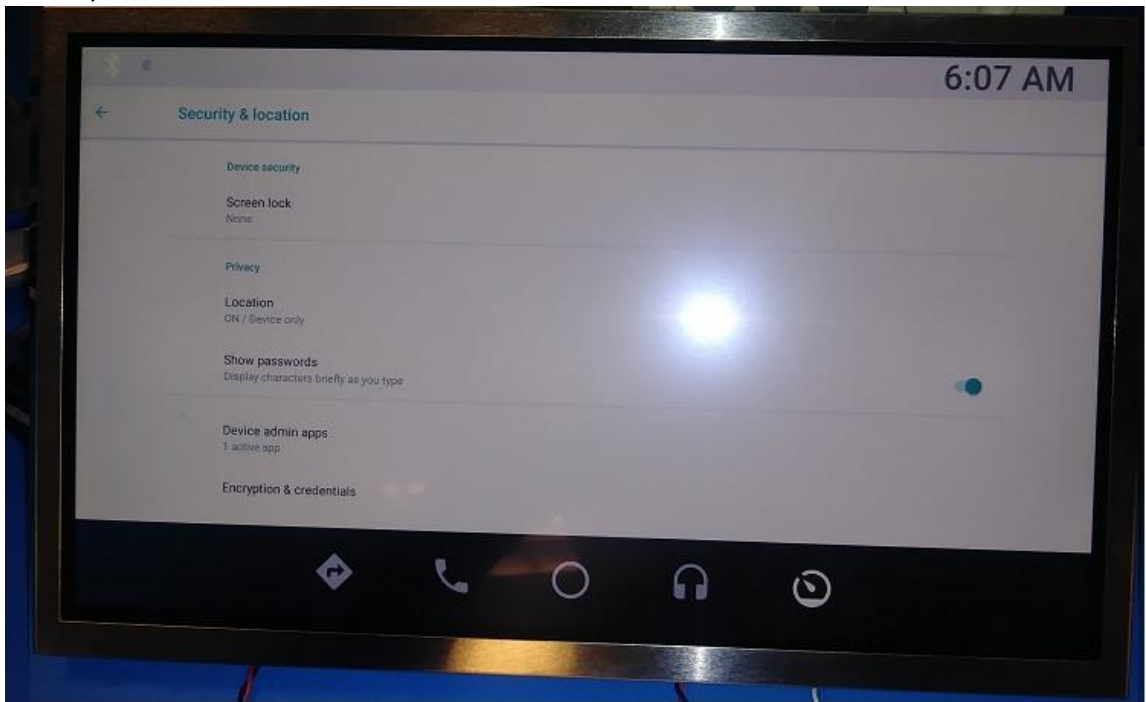
Tap  Settings > Network & Internet > Sound

Drag the sliders to adjust (Media volume, Alarm volume, and Notification volume)

7- Storage



8- Security & location



a. Screen lock:

The various Screen lock types offer high, medium, or no security. Choose from the following: Swipe, Pattern, PIN, Password, and None.

Tap  Settings > Network & Internet > Security & location > Screen lock.

b. Location:

Set location services to be turned on or Off

Tap  Settings > Network & Internet > Security & location > Location


Tap On/Off to turn on or off the Location services.

c. Show passwords

Display password characters briefly as you type them.

d. Device admin apps

Manage your device administrators and application installation privileges.

Tap  Settings > Network & Internet > Security & location > Device admin apps

Tap an option to enable it as a device administrator.

e. Encryption & credentials

f. Trust agents

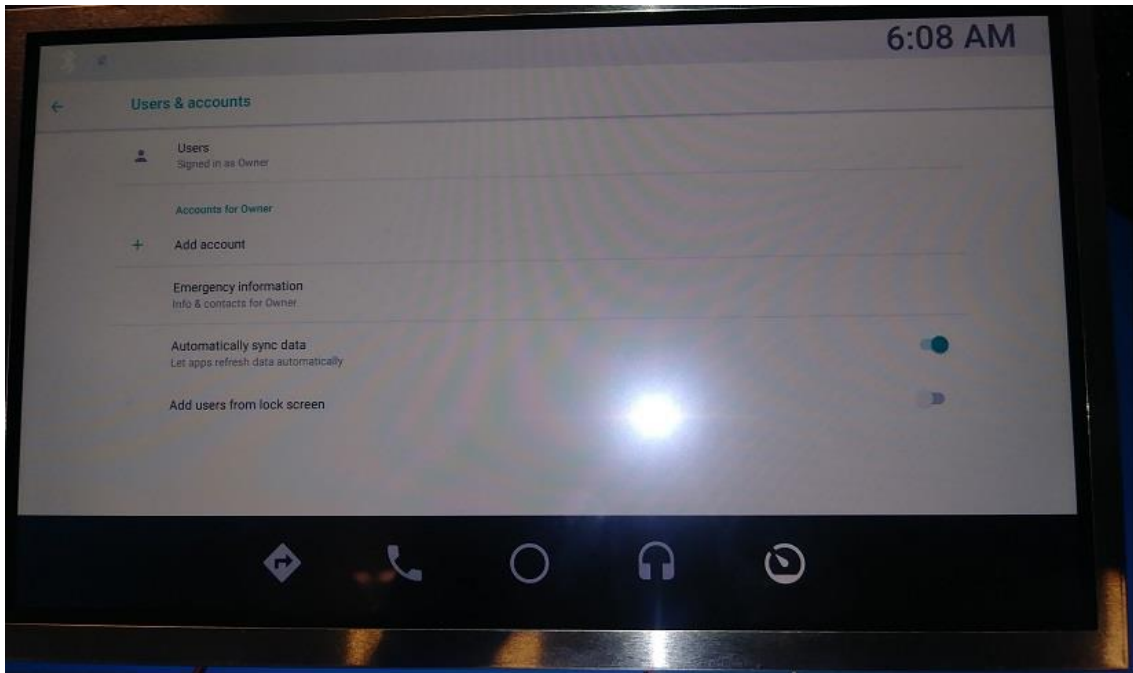
Perform selected actions when trusted devices are connected. This option is only displayed when a lock screen is enabled.

g. Screen printing

Tap Add service and follow the prompts to add a print service.

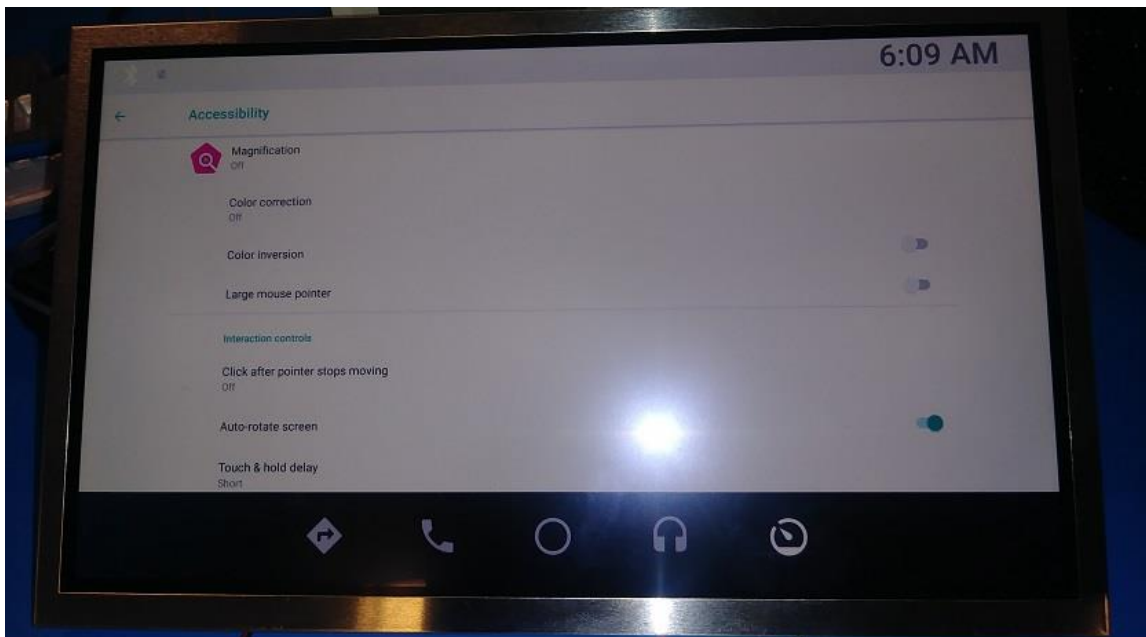
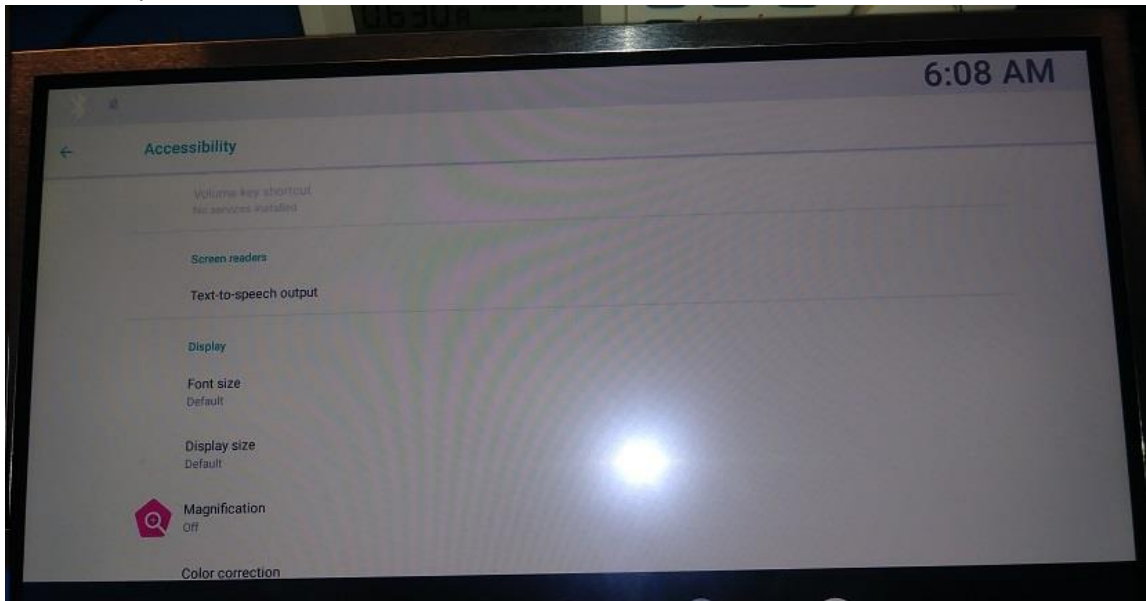
h. Apps with usage access

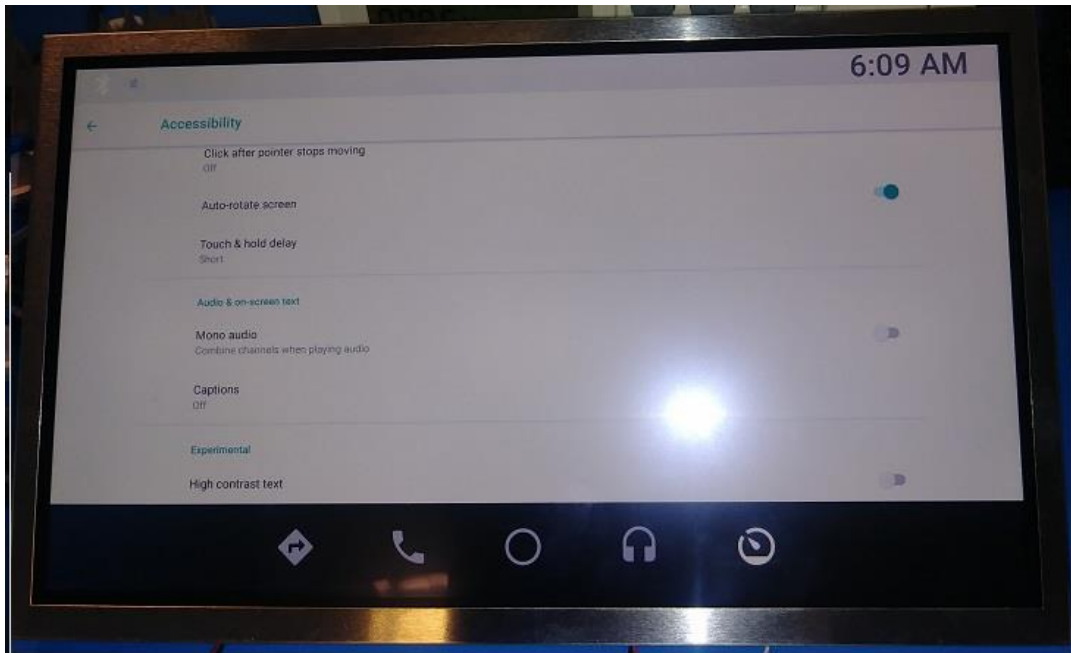
9- User & accounts



- a. User.
(Signed in as Owner)
- b. **Account for Owner.**
+ Add account.
- c. Emergency Information.
(Info & contact for Owner)
- d. Automatically sync data.
(Let apps refresh data automatically)
- e. Add users from lock screen

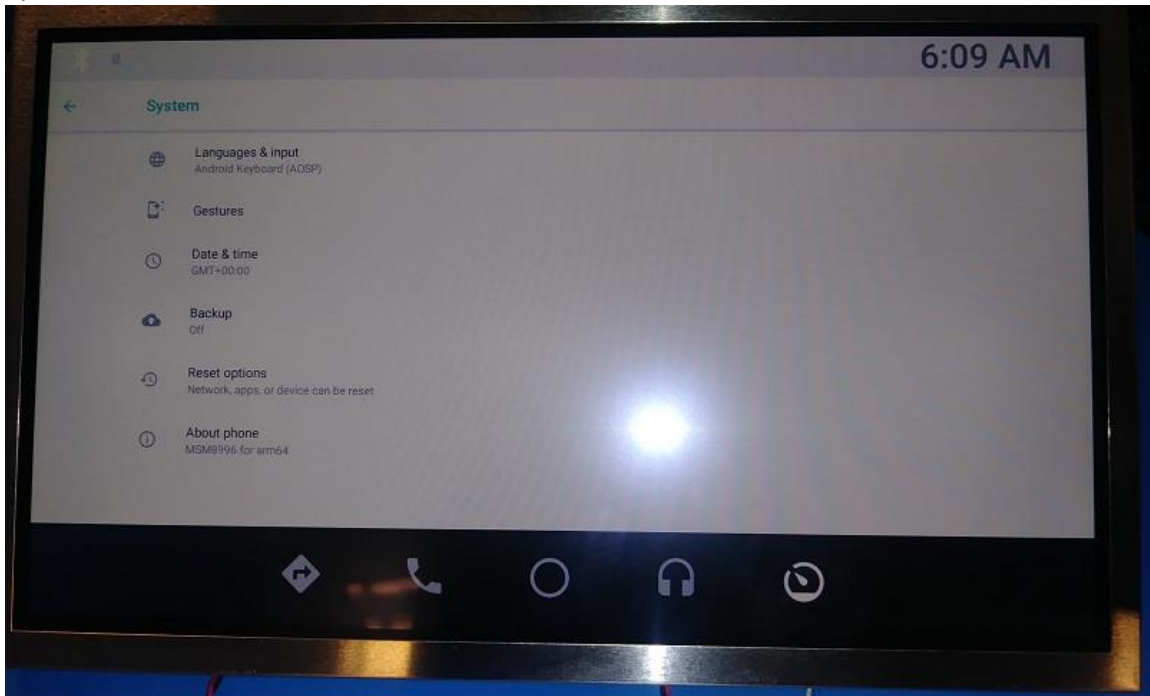
10- Accessibility





- a. Volume key shortcut.
(No services installed)
- b. **Screen reader.**
 - Text-to-speech output.
- c. **Display.**
 - Font size.
(Default)
 - Display size.
(Default)
 - Magnification.
(Off)
 - Color correction.
(Off)
 - Color inversion.
 - Large mouse pointer.
- d. **Interaction controls.**
 - Click after pointer stops moving.
(Off)
 - Auto-rotate screen.
 - Touch & hold delay.
(Short)
- e. **Auto & on-screen text.**
 - Mono audio
(Combine channels when playing audio)
 - Caption.
(Off)
- f. **Experimental.**
 - High contrast text.

11- System



- a. Languages & Input.
(Android Keyboard(ADSP))
- b. Gestures.
- c. Date & Time .
(Off)
- d. Backup.
(Off)
- e. Reset options.
(Network, Aps, or device can be reset)
- f. About phone.
(MSM8996 for arm64)

Wi-Fi

Wi-Fi User guide

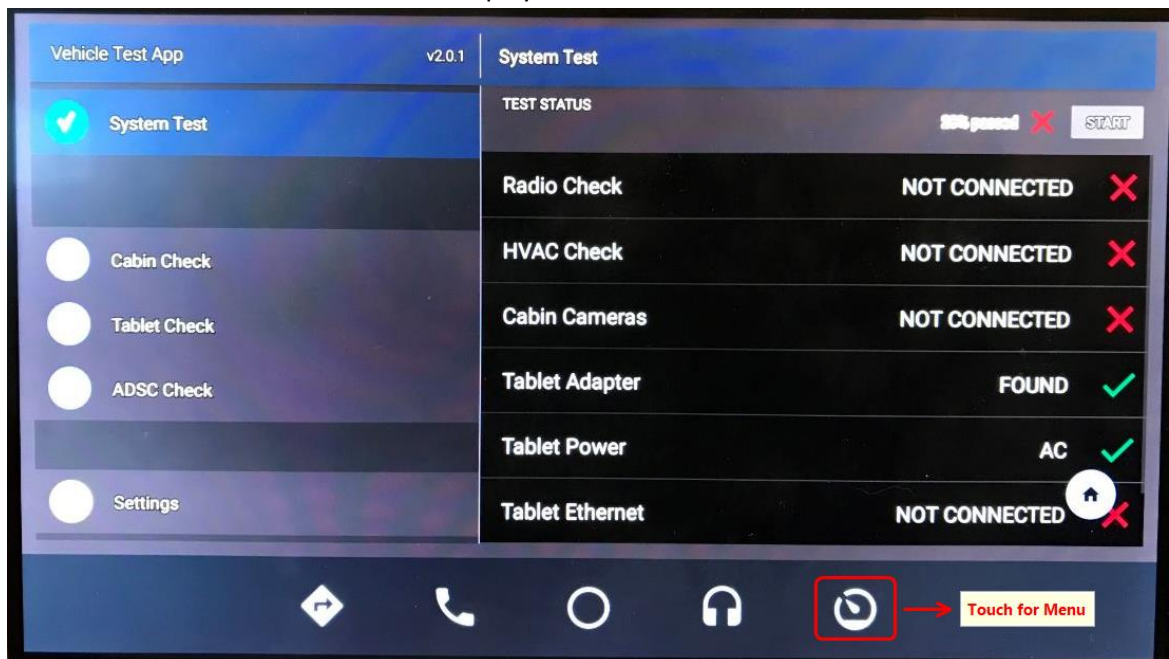
The Wi-Fi feature allows the HPDC system to connect to any available network for internet access from the list of all hotspots within range . The Wi-Fi Module shall be able to turn this mode ON or OFF.

Currently HPDC does not support acting as a Wi-Fi hotspot for other Wi-Fi enabled devices. Wi-Fi direct services and casting solutions are not supported at this time.

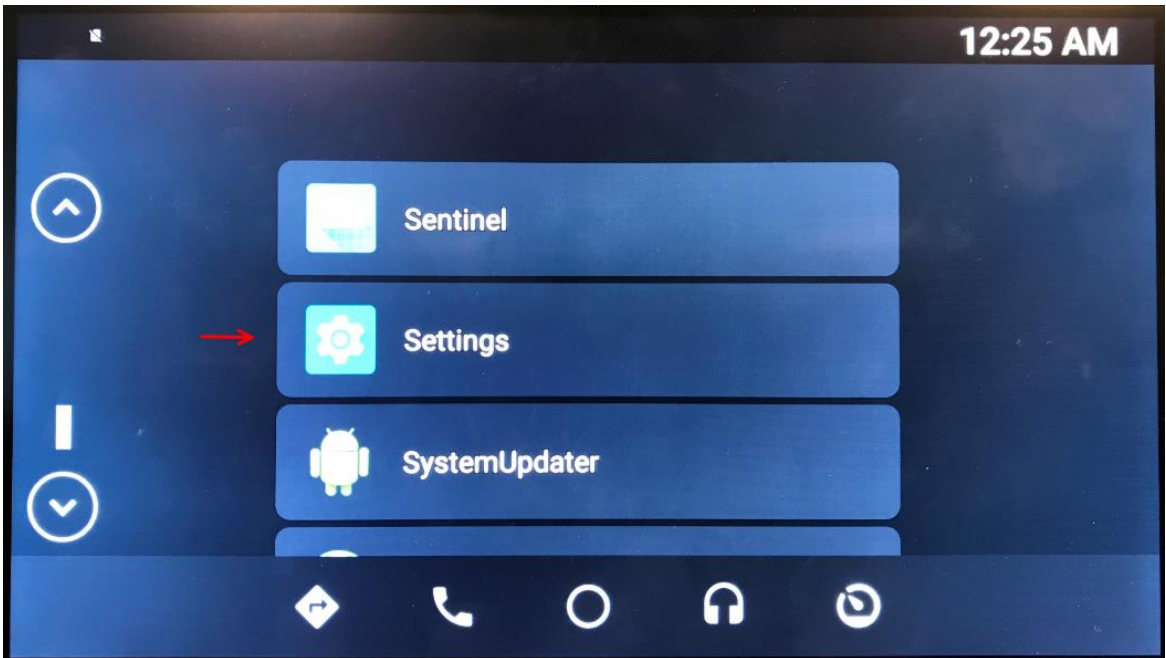
In order to use Wi-Fi, you must first connect the HPDC to an available network. You'll find the option in SETTINGS.

Steps to connect to a Wi-Fi network:

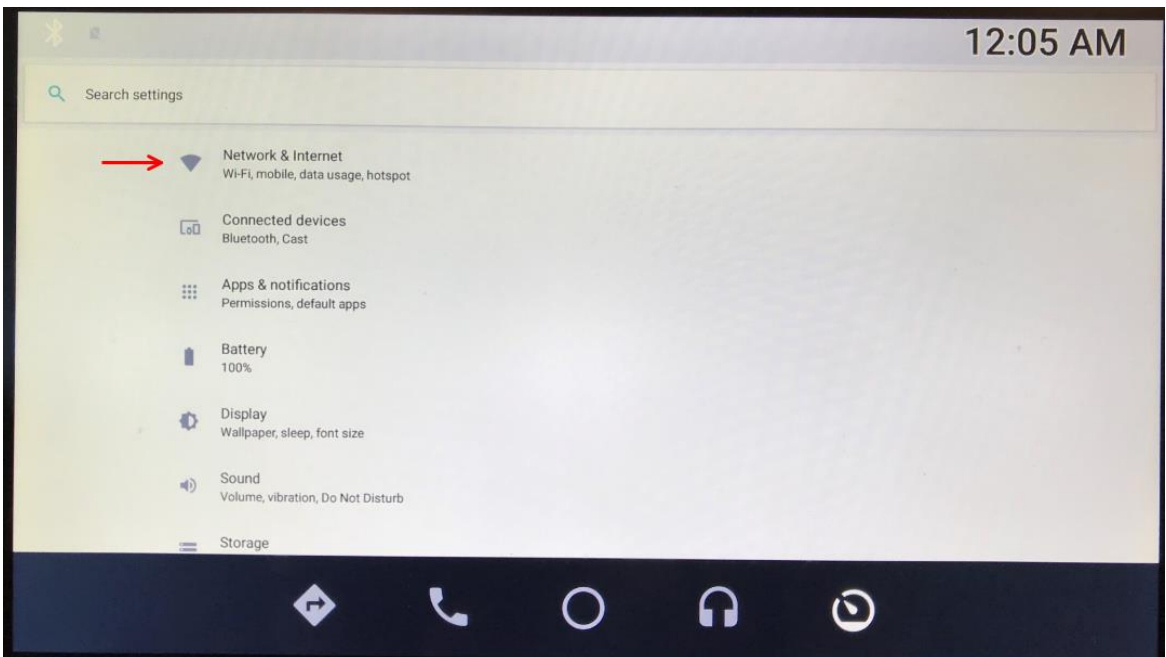
- Press Menu soft button on the HPDC display



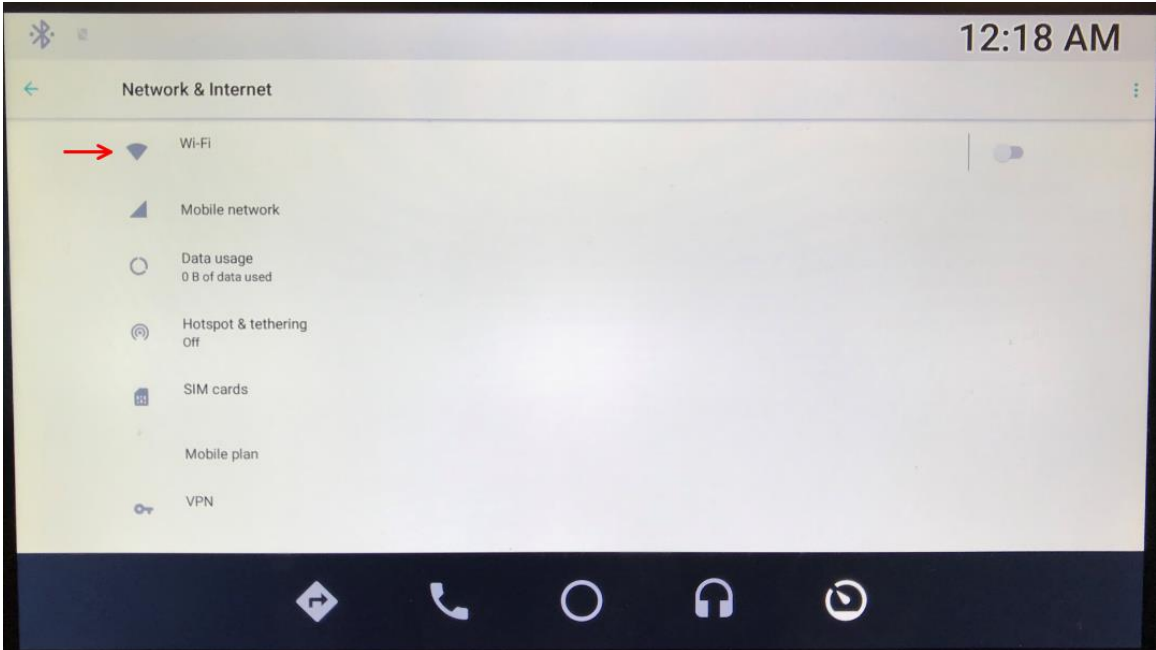
- Select Settings



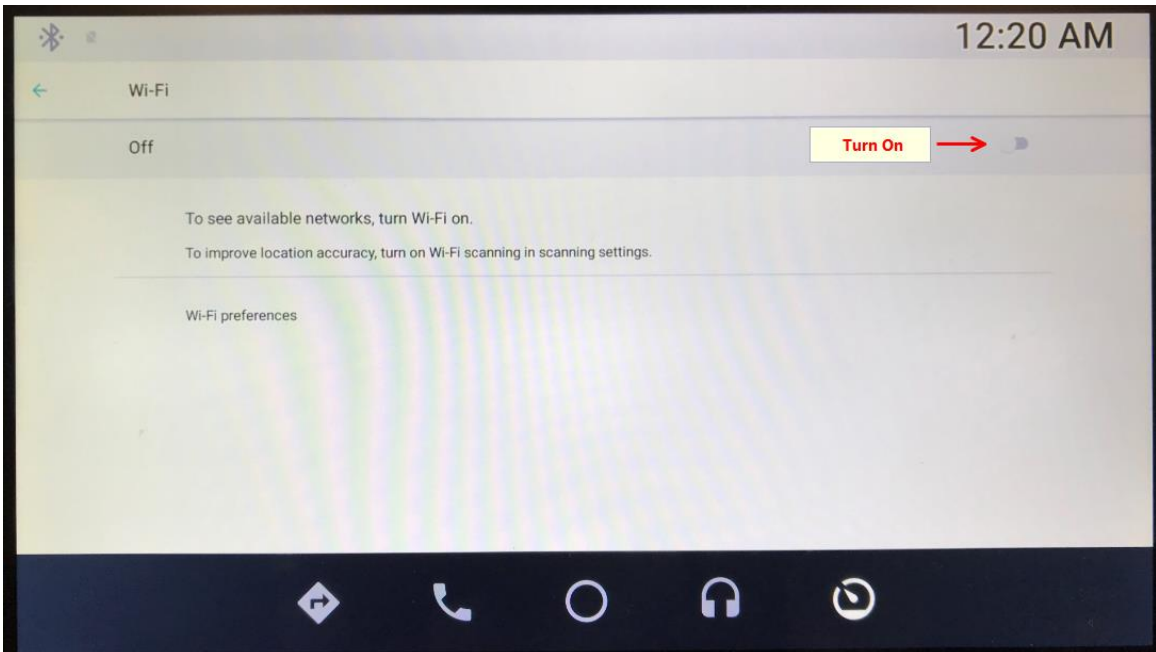
- Select Network & Internet



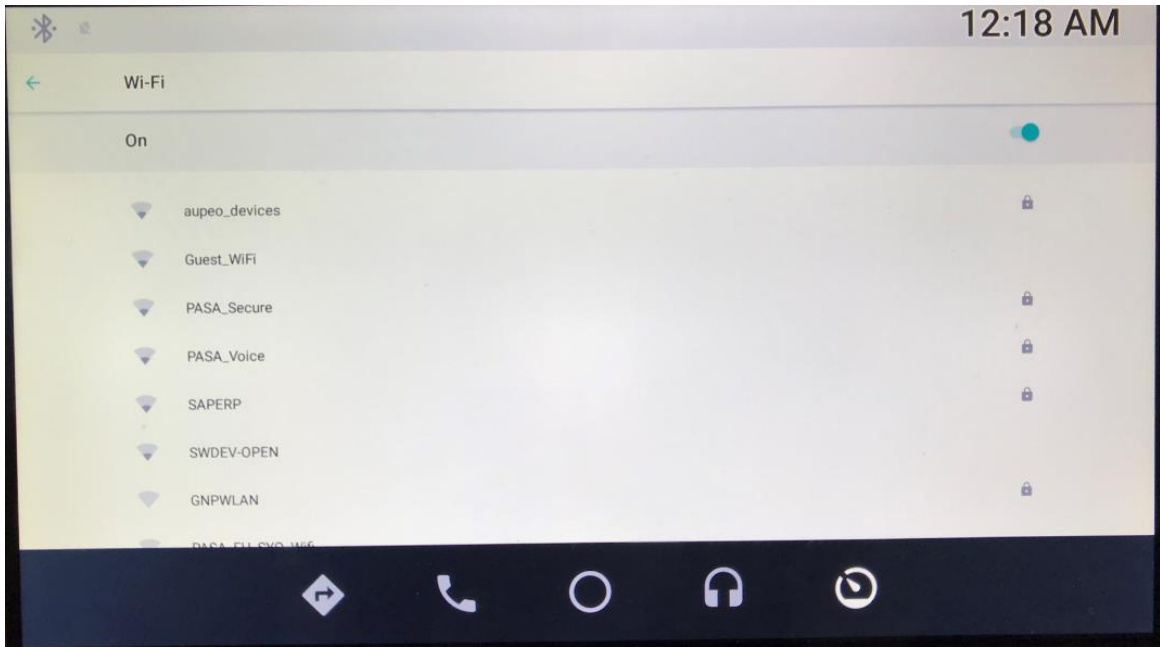
- Select Wi-Fi



- Turn the option to On



- Select a network from the available hotspots



- Enter the Wi-Fi password as requested by the hotspot to be connected

Frequency stability for frequencies operating in UNII are maintained within the band of operation under all conditions of normal operation.

FCC/ISED Regulatory notices

Modification statement

Panasonic Automotive Systems of America has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

Panasonic Automotive Systems of America n'approuve aucune modification apportée à l'appareil par l'utilisateur, quelle qu'en soit la nature. Tout changement ou modification peuvent annuler le droit d'utilisation de l'appareil par l'utilisateur.

Interference statement

This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. The antenna should be installed and operated with minimum distance of 20 cm between the radiator and your body.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. L'antenne doit être installée de façon à garder une distance minimale de 20 centimètres entre la source de rayonnements et votre corps.

Wireless notice

This device complies with FCC/ISED radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the ISED radio frequency (RF) Exposure rules. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Le présent appareil est conforme à l'exposition aux radiations FCC / ISED définies pour un environnement non contrôlé et répond aux directives d'exposition de la fréquence de la FCC radiofréquence (RF) et RSS-102 de la fréquence radio (RF) ISED règles d'exposition. L'émetteur ne doit pas être colocalisé ni fonctionner conjointement avec à autre antenne ou autre émetteur.

FCC Class B digital device notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CAN ICES-3 (B) / NMB-3 (B)

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de classe B est conforme à la norme canadienne ICES-003.

