

A hand holds a black smartphone with the text "android auto" on its screen. A black cable is plugged into the bottom of the phone. In the background, the interior of a car is visible, including a steering wheel, a large infotainment screen displaying a navigation map, and a center console with various buttons and a digital display showing "9:04", "LTE", and a battery level indicator. The overall scene is dimly lit, with the car's interior lights providing the main illumination.

android  
auto

# WHO WILL 'OWN' THE DASHBOARD?

**BY BILL HOWARD**

It's been said that vehicles have evolved into powerful computers on wheels. In a logical next step, many are now capable of combining forces with the devices we carry around with us.



The automotive dashboard may be coming full circle. The infotainment system--essentially, the car radio on steroids--has the chance to again be an open system, at least more open, with the advent of Apple CarPlay and Google's Android Auto. The hardware in the dash may still be the automaker's product, but the important part, control of the entertainment and information, could be shared among the automaker, Apple and Google.

The first vehicles with Apple CarPlay and Google's Android Auto are now on the market. They control a handful of smartphone apps of Apple's and Google's choosing. They replicate a simplified version of the phone display on the automaker's color LCD in the center stack, showing only the applications available to use. The apps can be controlled by the touchscreen or control wheel, the steering wheel controls and the voice input button.

The programs available include the Apple- and Google-developed music, phone and navigation apps plus several other music and audiobook apps. Google goes slightly further and includes third-party messaging and texting apps (with strict controls on what can be input while driving).

For car owners, the two biggest wins could be access to navigation in cars lacking on-board navigation and access to more kinds of music than ever before. But there's a catch: The entry-level trim lines on the first vehicles that offer CarPlay and Android Auto either don't have a color display suitable for navigation, or the infotainment head unit isn't compatible with CarPlay and/or Android Auto. Sometimes the display and electronics that support CarPlay or Android Auto come only on the vehicles that also have navigation built in.

For automakers, the win is the

Photos courtesy Chevrolet

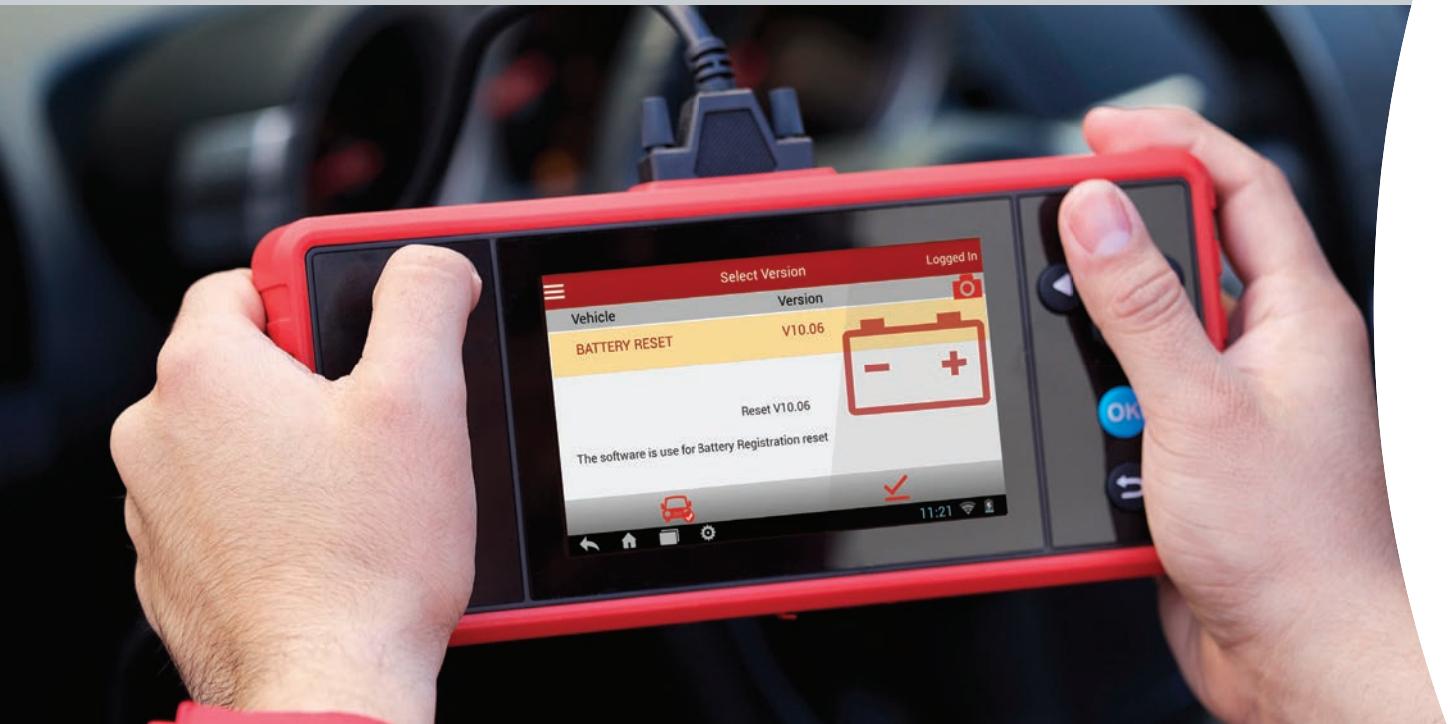
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## Who Will 'Own' the Dash?



Apple CarPlay, here in a Mercedes, works with all iPhone 5 and iPhone 6 models. Android represents 80% of phones sold worldwide but CarPlay has a majority share among high-end luxury brands. Most carmakers offer both, although one may arrive before the other.

ability to offer infotainment through an alternative interface that may be easier to use than the automakers' own. The automakers are still stuck with design choices for the physical interface, particularly touchscreens that are hard to tap accurately when the car is bouncing along the road, although improvements in voice control mitigate some touch issues. For Apple and Google, the win comes from access to the first of the 250 million cars and trucks on the road in the U.S. and 1.2 billion throughout the world. Some of the interactions

between the infotainment system and the occupants have the potential to generate revenue when CarPlay or Android Auto and their database of points of interest (POIs) are used to choose the local diner over Panera and then decide on Courtyard Marriott vs. Best Western.

### A Familiar Experience

What is the appeal to automakers for allowing Apple and Google inside the dashboard? For one thing, CarPlay and Android Auto don't threaten the hardware side of the business, if hard-

ware means head units. (But it could also mean entire vehicles, which Apple and Google are developing.) Apple and Google want to work as a partner in the infotainment hardware ecosystem. They don't want to supplant the deals automakers have forged with Bose, Kenwood, Panasonic/ELS, Pioneer or Sony for mainstream or premium audio, or the even-higher-end brands such as Bowers & Wilkins, Burmeister and Mark Levinson.

More importantly, the music and phone apps work pretty much the way they do on the phone or when they're embedded into a vehicle's native infotainment system. Android Auto and CarPlay may be comforting to drivers and passengers who find car infotainment systems complex to use but who don't want to take those last-resort steps like reading the manual.

Automakers may believe they can manage the relationship with Apple and Google and remain in control. Whether that happens over the long term is uncertain, since the tech companies are sitting on lots of cash. Automakers build millions of vehicles, but it's been a long time since GM was the world's biggest company by market value. Right now the three biggest companies in the world are all tech companies and all with products for the automotive dashboard, although it's not their main focus. Apple, Google and Microsoft are the 800-pound gorillas, not Toyota, GM and Ford.

### How They Work

Apple CarPlay and Google Android Auto are more alike than different—simplified onscreen interface, a handful of apps supported, including the ones you really need (navi, music, phone). Here's how Apple CarPlay works: First, start with an iPhone 5 or 6 (the ones with the skinny Lightning connector at the phone end) and make sure it's running iOS 7 or later



Apple CarPlay's home screen shows eight icons in fixed order: Phone, Music, Maps (navigation), Messages (texts and replies, all spoken), Now Playing (current music), then the home page for the automaker's features (here, Hyundai), followed by other apps.

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(most likely it is). You'll need to pair the phone with Bluetooth and connect via the cable. The phone does part of its work over Bluetooth wireless, part via a USB phone connection.

When you start your car and go to the car's own home screen, on the first page there'll be an Icon for Apple CarPlay. Press that to enter CarPlay. A CarPlay screen has two rows of four icons each. In the screen's left margin, a rounded rectangle button to take you to the CarPlay home screen, the outside temperature supplied by the car, cellular signal strength, cellular connection (that is, 3G, 4G LTE), and battery strength. On the first CarPlay screen you'll see Apple's core apps. Apple's Phone, Music, Maps and Messages apps are on the top row and in that order, always, followed by Now Playing (music details) and the button with the automaker's logo that returns you to the home screen of the automaker (or the head unit if you have a replacement head unit). The last two spots on the home screen are Apple Audiobooks and Apple Podcasts.



The center stack display of the Volvo XC90 SUV, an early Apple CarPlay adopter, is arranged vertically. The Sensus Connect display is designed to look and work like a tablet; the physical button below the screen takes the place of the second row Home button with the automaker's logo.

The apps that follow are in alphabetical order. As of late 2015 there are 10: At Bat (Major League Baseball), Audible (audio books), Audiobooks.com, CBS Radio, iHeart Radio, Overcast (podcasts), Pandora (music streaming and recommendations), Rdio (music streaming, recently acquired by Pandora), Spotify (on-demand music streaming) and Stitcher (aggregated on-demand news, podcasts; being merged into Deezer). If every app is on a vehicle, then there'd be three screens total.

There are some exceptions to the screen layout. Volvo's well-received XC90 midsize SUV has a center stack display resembling a portrait-display tablet computer with a dedicated physical button that takes you to the Volvo home screen, so CarPlay doesn't need a Volvo button.

### The Same, Only Different

Compared to CarPlay, Google's Android Auto is the same, only different. CarPlay provides access to core functions in a way that reminds the user of how his Android phone works. Visually, the home screen is different from CarPlay, and it's fluid based on what the user is doing and what the Google Now personal assistant (what Siri is to Apple) predicts he needs.

The key apps are arrayed along a bar at the bottom of the screen: Navigation, Communication (phone), Home, Music and Audio, and Car Apps. The top of the screen is a navigation suggestion based on who's been called recently or a search that was performed, and the lower section provides reminders, such as appointments. The upper right corner shows battery life, a clock and a microphone button that can be pressed for immediate access to voice input.

As of late 2015, Android Auto has more than 40 apps, and they're a broader array. They include messaging and video calls (video only when

the car is parked) such as NextPlus, EvolveSMS, OnChatt, Telegram Messenger, WhatsApp, TextMe, Talkray, TextPlus, Threema and ICQ. Audio and radio apps include big time names Amazon Music, iHeart Radio, Pandora, Spotify, Stitcher and TuneIn, plus a dozen others.

Android phones, led by Samsung, account for four of five devices sold worldwide, according to International Data Corp. Apple has a 14% worldwide market share as of the second half of 2015. In the U.S., it's much higher (44%), according to ComScore Reports. Among auto brands, it's generally agreed that the owner of an affordable car is more likely use an Android phone while the higher-end vehicles are majority-iPhone.

Some automakers were Android Auto- or Apple iOS-exclusive in 2015, the first year for both interfaces. Most automakers will adopt both because they need to support only two standards to cover virtually every phone. (The Microsoft Phone and Blackberry don't have much market share.) Even if, say, iPhone owners represent only a third of the buyers of an affordable-brand automaker, that's a lot of the market to ignore if your competitor supports CarPlay.

Much was made, briefly, of a recent story that Porsche would support only Apple CarPlay on the 2017 Porsche 991/2, supposedly because Google wanted too much information—"a complete OBD II dump whenever someone activates Android Auto"—while Apple just wants to know if the car is in motion. Google a) responded that Google doesn't collect that much information, b) declined to list what it does collect and c) noted that owners must opt in to share information collected by their vehicles. There's some indication Google early on may have asked for a deeper level of information and automakers pushed back; Google isn't commenting. It could also be a

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The button bar at the bottom of an Android Auto screen (shown here in a 2015-16 Hyundai Sonata) takes the user to (from left): Navigation, Communication (phone), Home, Music and Audio, and Car Apps. The Sonata is unique in that all 2015 models were compatible even though Android Auto shipped midway through the production run. At its launch, Google's Android Auto offered more than 40 smartphone apps more than Apple. That and Google's "longer olive branch" to automakers may give Google an early advantage.

standard negotiating tactic: Ask for too much, settle for about half.

Near term, Google and Android Auto may have an advantage over CarPlay. Mark Boyadjis, senior analyst for automotive technology at IHS Technology, said, "Google seems to be extending a longer olive branch to the automakers." It's also more open to which apps are made available, including those that compete in some way with Google's own apps.

Boyadjis said the automakers have concerns about what happens if they cede too much control to Apple and Google. While those companies have simplified their interfaces in ways that many automakers haven't yet matched, the automakers' controls and displays today do a better job of interfacing with some functions of the vehicle. Right now, Android Auto and CarPlay don't have access to HVAC controls.

"If you like head-up displays, you'll see Apple and Google don't link [display on HUDs]," Boyadjis notes. The same goes for the multi-information displays (MIDs) between the speedometer and tachometer that can show

the next route instruction, the music currently playing or the name of an incoming caller.

Google has agreed to allow more apps into Android Auto, including some that duplicate some of Android Auto's music or communications functions. Maps and navigation so far are off-limits to outside app developers. Owners of Apple and Android phones would dearly love Waze, the mapping, congestion-reporting, cop-tracking app. Apple users would like the option of Google Maps much more than Android users want Apple Maps. But mapping and related POI-finder features are at the heart of revenue opportunities, if the search engine seamlessly steers you to a merchant. The built-in navigation in many cars has POI lookups and restaurant-hotel-entertainment recommending tools that can be sources of revenue. If motorists are more comfortable with the search-and-recommendation tools from Apple and Google, they may use them more, and for automakers a slice of a big revenue pie is good enough.

Ford circa 2000 thought there was big money in telematics and brokering information. Under Chairman Jacques Nasser, Ford set up WingCast that was a good idea a decade ahead of its time, and both WingCast and Nasser were gone by 2002. CarPlay, Android Auto and Sync are proof that they're workable once prices come down and cellular data connections improve.

### Apple CarPlay vs....

Before CarPlay, Apple in 2012 announced Siri EyesFree, a narrowly cast app that integrates the Siri voice command system into the vehicle. Siri's voice recognition software, not the vehicle's, ponders the questions asked and provides spoken answers with no results on either the phone or car display. The purpose is to keep drivers from looking at the phone while under way. Siri EyesFree does not interact directly with features of the car, so it wouldn't be able to change the cabin temperature to 68° or tune the car radio, just as CarPlay can't.

Ford AppLink is more of a direct



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## Who Will 'Own' the Dash?

competitor to CarPlay and Android Auto. Announced in 2012, it's an open standard that any automaker can adopt. So far, Toyota has signed on. It provides a common application programming interface (API) that developers can write to without having

to modify their application for each car brand and head unit. The developer still has to meet Ford's standards and the apps have to be vetted and approved by Ford.

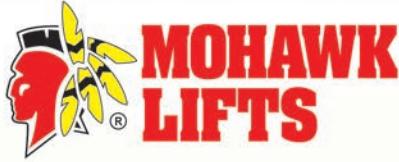
Ford continues to offer Ford Sync and Lincoln Sync as its main infotain-

ment interface on those makes. Sync 3, rolling out this year, is generally agreed to be a most workable Sync, after seven years of mixed reviews, bugs and slow processors. Sync was a joint project with Microsoft; it was the first time automakers had a head unit that could be upgraded via a software download. The underlying operating system for Sync 3 is now provided by Research in Motion's QNX OS.

Microsoft's plan to dominate the automotive market through visible ownership of the dashboard seems to be sidetracked and the Microsoft logo on the dashplate is gone (the QNX monicker won't be added). But the Ford-Microsoft partnership lives on at the back end in the Ford Service Delivery Network working off the Microsoft Azure cloud (online) computing service. As Ford explains it, the network "will provide Ford a global platform to enable over-the-air software updates as well as expanded availability of MyFord and MyLincoln Mobile connected services with features like scheduled remote start, vehicle finder and vehicle status (fuel or charge level, tire pressure)." At the same time, Ford will begin offering an OnStar-like embedded telematics cellular modems to provide updates anywhere, anytime, and offer more services that owners will pay for.

MirrorLink is an open standard from the Connected Car Consortium pushing mirroring of the phone's display onto the center stack display, much as CarPlay and Android Auto do. MirrorLink can be used across phone operating systems, including those with lesser market share than Apple iOS and Google Android. Its adoption has been slow and a look at the list of supported cars shows more outside the U.S. than inside.

If you think smartphone navigation features replicated to the center stack LCD would be beneficial to people buying under-\$20,000 econoboxes




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## Who Will 'Own' the Dash?



Smart phone is connected USB, "Apple CarPlay" or "Android Auto" is displayed on the system home screen

Once a smartphone is connected on the 2016 Honda Civic, the car's home screen shows a button for either CarPlay or Android Auto functions. The 2016 Honda Civic is the second Honda to be introduced (after Accord) with support for both Apple CarPlay and Google Android Auto. It can be had on every trim line except the entry-level Civic LX.

and the lowest trim lines of costlier cars, you'd be right. But those are the makes and models least likely to be compatible with CarPlay and Android Auto. New-car options carry a higher markup than the vehicle itself, so automakers may not willingly cede ground and allow someone else's nav system to be part of the car, IHS' Boyadjis notes.

Here's an example—the 10th generation 2016 Honda Civic that debuted in the fall, which was the best-selling (retail sales) compact car of 2014. It's generally agreed that the entry models of any car line are bare-bones to appeal to buyers who want the essential capabilities (size, handling, core safety features) of that model line without paying a lot for extras. The baser the base trim line, the lower the sales, sometimes as little as 5% of the model mix.

Honda is unusual in that the simplest trim line, the LX (about \$19,000), accounts for almost a third of sales, not 5% to 10%. These vehicles can't be had with navigation. There's a color LCD in the center stack but not the Honda Display Audio LCD that's necessary for Android Auto or CarPlay or built-in naviga-

tion. The middle trim lines, Civic EX and EX-T, each with about a fifth of Civic sales (at \$21,000 to \$24,000), are unusual in not offering on-board navigation, but Android Auto and CarPlay can fill the bill. The EX-L (\$25,000) makes the motorist choose between Honda Sensing and Honda navigation for that price, but that's okay because for \$1800 more he gets both and more bells and whistles.

### Who Benefits Most?

For motorists, there's little downside to Apple CarPlay and Android Auto. They get a growing number of phone applications replicated on a 6- to 10-in. display. Navigation is upgradeable via downloads and they're not paying \$100 to \$200 for a new maps disc every couple of years; each phone they own will have faster processors, while embedded car navigation is stuck at 2016 performance levels.

If a vehicle doesn't have Android Auto or Apple CarPlay in 2016, most likely it will in 2017. If it doesn't, buyers will still have (probably) a basic Bluetooth phone connection and USB jacks for playing music and charging; the vehicle may also have one or two streaming music services

such as Pandora or Spotify that can be controlled by the car's audio system. The exception again may be on the entry trim line.

Drivers should look for more apps to be allowed to connect via Android Auto or CarPlay. Car enthusiasts would love a lap timer or acceleration- and g-meter. There are enough Uber drivers that the driver app could be made accessible through the car's display.

For the automaker, the reason to increasingly share access to the dashboard is that it relieves the company of extra development work. There's also the possibility of shared revenue streams.

At the same time, automakers want to be wary of sharing too much information with Apple and Google since Apple is building its own car and Google is running around Silicon Valley with self-driving car prototypes. In the tech industry, this cautious mating dance is known as "co-opetition," or cooperating with companies that are also possible competitors. It's like porcupines and romance: It's best done with caution. **M**

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