CarPlay Developer Guide

March 2026

Developer

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Introduction

CarPlay is a smarter, safer way to use your iPhone in the car. CarPlay takes the things you want to do with your iPhone while driving and puts them right on your car's built-in display. CarPlay Ultra builds on the capabilities of CarPlay and provides the ultimate in-car experience by deeply integrating with the vehicle to deliver the best of iPhone and the best of the car.

In addition to getting directions, making calls, sending and receiving messages, and listening to music, people can interact with your widgets, Live Activities, and apps in CarPlay and CarPlay Ultra.

Widgets and Live Activities

Provide drivers with glanceable information and real-time updates via widgets and Live Activities. Widgets appear to the left of CarPlay Dashboard and support interaction on touchscreen vehicles. Live Activities are shown in CarPlay Dashboard, or as a notification.

Your app does not need to be a CarPlay app to support widgets and Live Activities in CarPlay.

CarPlay apps

Enable your app in CarPlay by supporting the CarPlay framework. The following categories of apps are supported.

- Audio apps
- Communication apps (SiriKit Messaging or VoIP Calling)
- Driving task apps
- EV charging apps
- Fueling apps
- Navigation apps (route guidance with turn-by-turn directions)
- Parking apps
- Public safety apps
- Quick food ordering apps
- Voice-based conversational apps

Note	This guide does not cover CarPlay automaker apps (a specific category of app published by automakers).

Guidelines

Guidelines for widgets in CarPlay

1. If your widget is not functional or suitable for use in the car, set the disfavored location modifier to include CarPlay.
    - If your widget is a game or requires extensive user interaction. For example, if your widget endlessly refreshes its content each time you tap (more than 6 taps/refreshes).
    - If your widget is non-functional or doesn't serve a practical purpose in the car. For example, if your widget relies on data protection classes A or B it will generally be non-functional in CarPlay because most people use CarPlay while their iPhone is locked.
    - If your widget's primary purpose is to launch your app on iPhone. For example, if the primary purpose of your widget is to launch your app, but your app isn't a CarPlay app, your widget will be non-functional in CarPlay.

    For details on the disfavored location modifier, see Widgets in CarPlay.

Guidelines for all CarPlay apps

1. Your CarPlay app must be designed primarily to provide the specified feature (e.g. CarPlay audio apps must be designed primarily to provide audio playback services, CarPlay parking apps must be designed primarily to provide parking services, etc.).
2. Never instruct people to pick up their iPhone to perform a task. If there is an error condition, such as a required log in, you can let them know about the condition so they can take action when safe. However, alerts or messages must not include wording that asks people to manipulate their iPhone.
3. All CarPlay flows must be possible without interacting with iPhone.
4. All CarPlay flows must be meaningful to use while driving. Don't include features in CarPlay that aren't related to the primary task (e.g. unrelated settings, maintenance features, etc.).
5. No gaming or social networking.
6. Never show the content of messages, texts, or emails on the CarPlay screen.
7. Use templates for their intended purpose, and only populate templates with the specified information types (e.g. a list template must be used to present a list for selection, album artwork in the now playing screen must be used to show an album cover, etc.).
8. All voice interaction must be handled using SiriKit (with the exception of CarPlay navigation and voice-based conversational apps, see below).

Additional guidelines for CarPlay audio apps

1. Never show song lyrics on the CarPlay screen.

Additional guidelines for CarPlay communication apps (SiriKit messaging or VoIP calling)

1. Communication apps must provide either short form text messaging features, VoIP calling features, or both. Email is not considered short form text messaging and is not permitted.
2. Communication apps that provide text messaging features must support all 3 of the following SiriKit intents:
   - Send a message (`INSendMessageIntent`)
   - Request a list of messages (`INSearchForMessagesIntent`)
   - Modify the attributes of a message (`INSetMessageAttributeIntent`)
3. Communication apps that provide VoIP calling features must support CallKit, and the following SiriKit intent:
   - Start a call (`INStartCallIntent`)

Additional guidelines for CarPlay driving task apps

1. Driving task apps must enable tasks people *need* to do while driving. Tasks must actually *help* with the drive, not just be tasks that are done while driving.
2. Driving task apps must use the provided templates to display information and provide controls. Other kinds of CarPlay UI (e.g. custom maps, real-time video) are not possible.
3. Do not show CarPlay UI for tasks unrelated to driving (e.g. account setup, detailed settings).
4. Do not periodically refresh data items in the CarPlay UI more than once every 10 seconds (e.g. no real-time engine data).
5. Do not periodically refresh points of interest in the POI template more than once every 60 seconds.
6. Do not create POI (point of interest) apps that are focused on finding locations on a map. Driving tasks apps must be primarily designed to accomplish tasks and are not intended to be location finders (e.g. store finders).
7. Use cases outside of the vehicle environment are not permitted.

Additional guidelines for CarPlay EV charging apps

1. EV charging apps must provide meaningful functionality relevant to driving (e.g. your app can't just be a list of EV chargers).
2. When showing locations on a map, do not expose locations other than EV chargers.

Additional guidelines for CarPlay fueling apps

1. Fueling apps must provide meaningful functionality relevant to driving (e.g. your app can't just be a list of fueling stations).
2. When showing locations on a map, do not expose locations other than fueling stations.

Additional guidelines for CarPlay parking apps

1. Parking apps must provide meaningful functionality relevant to driving (e.g. your app can't just be a list of parking locations).
2. When showing locations on a map, do not expose locations other than parking.

Additional guidelines for CarPlay public safety apps

1. Your app must be designed primarily to assist public safety organizations (firefighters, law enforcement, and ambulance) in the performance of their responsibilities such as dispatch, routing, and vehicle and location search.

Additional guidelines for CarPlay navigation (turn-by-turn directions) apps

1. Navigation apps must provide turn-by-turn directions with upcoming maneuvers.
2. The base view must be used exclusively to draw a map. Do not draw windows, alerts, panels, overlays, or user interface elements in the base view. For example, don't draw lane guidance information in the base view. Instead, draw lane guidance information as a secondary maneuver using the provided template.
3. Use each provided template for its intended purpose. For example, maneuver images must represent a maneuver and cannot represent other content or user interface elements.
4. Provide a way to enter panning mode. If your app supports panning, you must include a button in the map template that allows people to enter panning mode since drag gestures are not available in all vehicles.
5. Touch gestures must only be used for their intended purpose on the map (pan, zoom, pitch, and rotate).
6. Immediately terminate route guidance when requested. For example, if the driver starts route guidance using the vehicle's built-in navigation system, your app delegate will receive a cancelation notification and must immediately stop route guidance.
7. Correctly handle audio. Voice prompts must work concurrently with the vehicle's audio system (such as listening to the car's FM radio) and your app should not needlessly activate audio sessions when there is no audio to play.
8. Ensure that your map is appropriate in each supported country.
9. Be open and responsive to feedback. Apple may contact you in the event that Apple or automakers have input to design or functionality.
10. Voice control must be limited to navigation features.

Additional guidelines for CarPlay quick food ordering apps

1. Quick food ordering apps must be Quick Service Restaurant (QSR) apps designed primarily for driving-oriented food orders (e.g. drive thru, pick up) when in CarPlay and are not intended to be general retail apps (e.g. supermarkets, curbside pickup).
2. Provide meaningful functionality relevant to driving (e.g. your app can't just be a list of store locations).
3. Simplified ordering only. Don't show a full menu. You can show a list of recent orders, or favorites limited to 12 items each.
4. When showing locations on a map, do not expose locations other than your Quick Service Restaurants.

Additional guidelines for CarPlay voice-based conversational apps

1. Voice-based conversational apps must have a primary modality of voice upon launch; and after launch, appropriately respond to questions or requests and perform actions.
2. Only hold an audio session open when voice features are actively being used.
3. Optimize for voice interaction in the driving environment (e.g. don't show text or imagery in response to queries).

CarPlay simulators

Apple provides two simulators to help you develop and test your widgets, Live Activities, and CarPlay apps. CarPlay Simulator is a Mac app that simulates a CarPlay environment and connects to iPhone, just like a car. Xcode Simulator includes a CarPlay window that lets you quickly run and debug your CarPlay UI.

It's recommended that you use CarPlay Simulator to most closely match the behavior of CarPlay in a car.

1. **CarPlay Simulator**

   CarPlay Simulator is a standalone Mac app that simulates a car environment. CarPlay Simulator is included in the **Additional Tools for Xcode** package which you can download from More Downloads.

   Locate **CarPlay Simulator** in the **Hardware** folder, run it, and connect iPhone using a USB cable. CarPlay starts on iPhone just as if you had it connected to a car.

2. **Xcode Simulator**

   Xcode Simulator lets you run and debug CarPlay apps in a second window. The window acts as the car's display and allows you to interact with your CarPlay app in a similar manner to when you are connected to a CarPlay system.

   To access CarPlay in Xcode Simulator, launch Simulator and select **I/O**, **External Displays**, and **CarPlay** to show a CarPlay screen.

   Xcode Simulator is useful for regular build and test cycles for your CarPlay UI, but you should not rely exclusively on Xcode Simulator for all CarPlay app development. Here are some scenarios that require CarPlay Simulator or an actual CarPlay environment, and cannot be tested using Xcode Simulator.

   - Testing while iPhone is locked. Most people interact with CarPlay while iPhone is locked so you need to ensure that your app works correctly even when iPhone is locked.
   - Testing runtime scenarios such as switching between CarPlay and the car's built-in UI, or connecting and disconnecting iPhone.
   - Testing scenarios where the car is playing audio. Remember that additional audio sources may be playing while CarPlay is active and your app must be a good audio citizen. For example, activating an audio session in your app has the side effect of immediately stopping the car's FM radio so you must only activate your audio session when you are ready to play audio.
   - Testing Siri features with your app.
   - Testing your navigation app with instrument cluster displays.

Testing using a vehicle or aftermarket head unit

You can also test your CarPlay app using an actual vehicle or an aftermarket head unit with a power supply. If you use an aftermarket head unit, choose one that supports wireless CarPlay so you can simultaneously connect iPhone to the head unit and to Xcode on your Mac using a cable.

Widgets in CarPlay

Provide drivers with glanceable information via widgets. Widgets appear to the left of CarPlay Dashboard (right of CarPlay dashboard in right-hand drive vehicles) and support interaction on touchscreen vehicles. Your app does not need to be a CarPlay app to support widgets.

Widgets are supported in CarPlay Ultra, and with iOS 26 in CarPlay.

People can customize which widgets they want to see in CarPlay by going to Settings → General → CarPlay on iPhone, and selecting their vehicle.

To enable your widget in CarPlay, support the system small accessory widget family.

```
.supportedFamilies([.systemSmall])
```

If your widget is not functional or suitable for use in the car, use the `disfavoredLocations` modifier to specify `carPlay`. If you specify CarPlay as a disfavored location, your widget will be grouped in Settings with an indication that your widget is not optimized for CarPlay. People can still choose to show your widget but interaction will be disabled.

```
.disfavoredLocations([.carPlay], for: [.systemSmall])
```

For details on when to set CarPlay as a disfavored location, see Guidelines for widgets in CarPlay.

Your widget can only launch your app in CarPlay if your app is also a CarPlay app. Use the standard `widgetURL` or `Link` mechanisms to launch your app in CarPlay.

Widgets in CarPlay are optimized for each vehicle, including content margins, and if you mark your background as removable, your widget's background will not be shown. For best practices on designing widgets, see Human Interface Guidelines: Widgets.

Live Activities in CarPlay

Provide drivers with timely updates through Live Activities. Live Activities are shown in CarPlay Dashboard, or as a notification. Your app does not need to be a CarPlay app to support Live Activities in CarPlay.

Live Activities are supported with iOS 26 in CarPlay and CarPlay Ultra.

To enable your Live Activity in CarPlay, support the small activity family. This is the same size used for Live Activities in the Apple Watch Smart Stack. If you already support Apple Watch, the same Live Activity will work in CarPlay.

```
.supplementalActivityFamilies([.small])
```

If you don't support the small activity family, CarPlay will show the compact leading and compact trailing views from your Dynamic Island configuration instead.

For best practices on designing widgets, see Human Interface Guidelines: Live Activities.

CarPlay apps

People download CarPlay apps from the App Store and use them on iPhone like any other app. When connected to a CarPlay vehicle, your app icon appears on the CarPlay home screen. CarPlay apps are not separate apps—you add CarPlay support to your existing app.

CarPlay apps are designed to look and feel like your app on iPhone, but with UI elements that are similar to built-in CarPlay apps.

Your app uses the CarPlay framework to present UI elements. iOS manages the display of UI elements and handles the interface with the car. Your app does not need to manage the layout of UI elements for different screen resolutions, or support different input hardware such as touchscreens, knobs, or touch pads.

CarPlay apps must meet the basic requirements defined in the *CarPlay Entitlement Addendum*, and must follow the Guidelines.

For general design guidance, see Human Interface Guidelines for CarPlay.

Entitlements

All CarPlay apps require a CarPlay app entitlement specific to your app category.

To request a CarPlay app entitlement, go to http://developer.apple.com/carplay and provide information about your app, including the category of entitlement that you are requesting. You also need to agree to the CarPlay Entitlement Addendum.

Apple will review your request. If your app meets the criteria for the CarPlay app category, Apple will assign a CarPlay app entitlement to your Apple Developer account and notify you.

Once you have received a CarPlay app entitlement, create a new Provisioning Profile that includes the CarPlay app capability.

1. Log in to your Apple Developer Account https://developer.apple.com/account/.
2. Under **Certificates, IDs & Profiles**, select **Identifiers**.
3. Select the App ID associated with your app, or create a new App ID.
4. Enable all necessary CarPlay app entitlements for your app.
5. Click Save on the top right.
6. Continue to **Provisioning Profiles** and create a new provisioning profile for your App ID.

For additional information, see Developer Account Help.

After you have created a new Provisioning Profile, import it into Xcode. Xcode and Simulator require a Provisioning Profile that supports CarPlay.

In Xcode, create an `Entitlements.plist` file in your project, if you don't have one already. Add your CarPlay app entitlement keys as a boolean key. The following example is for a CarPlay audio app.

```
<key>com.apple.developer.carplay-audio</key>
<true/>
```

In Xcode, under *Signing & Capabilities* turn off *Automatically manage signing*, and under *Build Settings* ensure that *Code Signing Entitlements* is set to the path of your `Entitlements.plist` file.

Once a CarPlay app entitlement is added to your app, your app icon will appear on the CarPlay home screen. You cannot selectively show or hide CarPlay for certain people. Only publish your app with CarPlay support when you are ready for everyone to see it.

See Sample Code for project examples.

Use the entitlement key(s) that match your selected provisioning profile.

Entitlement	Key	Minimum iOS version
CarPlay audio app (CarPlay framework)	`com.apple.developer.carplay-audio`	iOS 14
CarPlay communication app	`com.apple.developer.carplay-communication`	iOS 14
CarPlay driving task app	`com.apple.developer.carplay-driving-task`	iOS 16
CarPlay EV charging app [*1]	`com.apple.developer.carplay-charging`	iOS 14
CarPlay fueling app [*1]	`com.apple.developer.carplay-fueling`	iOS 16
CarPlay navigation app	`com.apple.developer.carplay-maps`	iOS 12
CarPlay parking app	`com.apple.developer.carplay-parking`	iOS 14
CarPlay public safety app	`com.apple.developer.carplay-public-safety`	iOS 14
CarPlay quick food ordering app	`com.apple.developer.carplay-quick-ordering`	iOS 14
CarPlay voice-based conversational app	`com.apple.developer.carplay-voice-based-conversation`	iOS 26.4

[*1] CarPlay EV charging app and CarPlay fueling app entitlements may be combined in a single app.

Some CarPlay entitlements are deprecated. For details, see Appendix: Deprecated entitlements.

Templates

CarPlay apps are built from a fixed set of UI templates that iOS renders on the CarPlay screen.

CarPlay apps are responsible for selecting which template to show on the screen (the controller), and providing data to be shown inside the template (the model). iOS is responsible for rendering the information in CarPlay (the view).

The CarPlay framework includes general purpose templates for UI such as alerts, lists, and tab bars. It also provides templates designed for specific tasks such as locating points of interest, and showing now playing information.

Each CarPlay app category supports specific templates and this is governed by the app entitlement. Attempting to use an unsupported template triggers an exception at runtime.

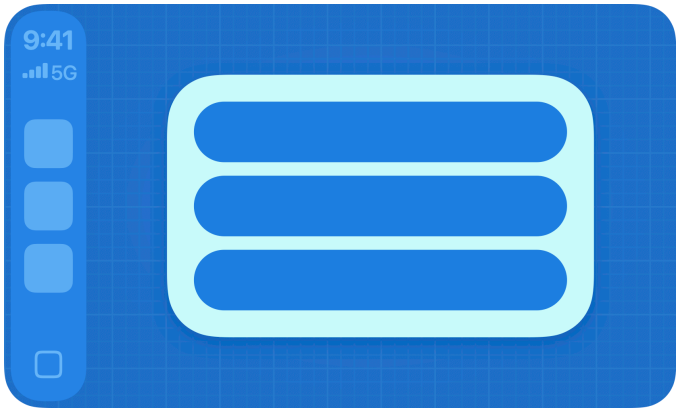
Template	Audio	Communication	Driving task, voice-based conversational	EV charging, fueling, parking, and quick food ordering	Public safety	Navigation
Action sheet	● [*3]	●	●	●	●	●
Alert	●	●	●	●	●	●
Grid	●	●	●	●	●	●
List	●	●	●	●	●	●
Tab bar	●	●	●	●	●	●
Information		●	●	●	●	●
Point of interest			●	●	●	
Now playing	●	● [*3]			●	
Contact		●			●	●
Map						●
Search						●
Voice control			● [*4]			●

[*3] iOS 17 or later
[*4] iOS 26.4 or later

There is a limit to the number of templates (depth of hierarchy) that you can push onto the screen. Audio, communication, EV charging, parking, public safety, and navigation apps are limited to a depth of 5 templates. Fueling and voice-based conversational apps are limited to a depth of 3 templates. Driving task and quick food ordering apps are limited to a depth of 2 templates (iOS 26.3 or earlier) or 3 templates (iOS 26.4 or later). These include the root template.

Action sheet template

An action sheet is a specific style of modal alert that appears in response to a control or action, and presents a set of two or more choices related to the current context. An action sheet can consist of a title, message, and buttons. Use action sheets to let people initiate tasks, or to request confirmation before performing a potentially destructive operation.



Action sheet template

Alert template

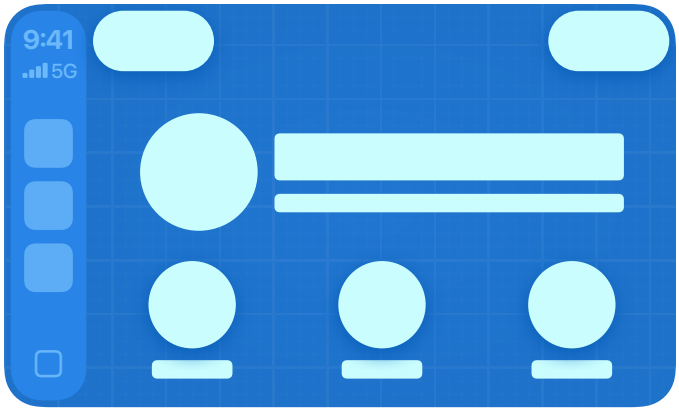
Modal alerts convey important information related to the state of your app. An alert consists of a title and one or more buttons. You can provide titles of varying lengths and let CarPlay choose the title that best fits the available screen space.

Alert template

Contact template

Contacts allow you to present information about a person or business. A contact consists of an image, title, subtitle, and action buttons. Use action buttons to let people perform tasks related to the current contact, such as making a phone call or sending a message.

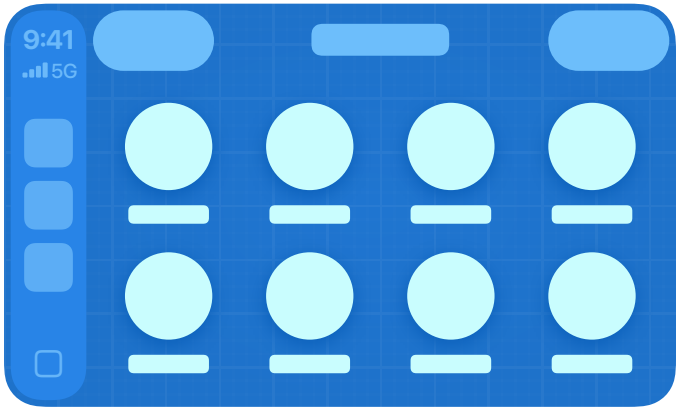
You can optionally provide a bar button to activate Siri and initiate the compose message flow.



Contact template

Grid template

A grid is a specific style of menu that presents up to eight choices represented by an icon and a title. Use the grid template to let people select from a fixed list of items. The grid also includes a navigation bar with a title, leading buttons, and trailing buttons which can be shown as icons or text.



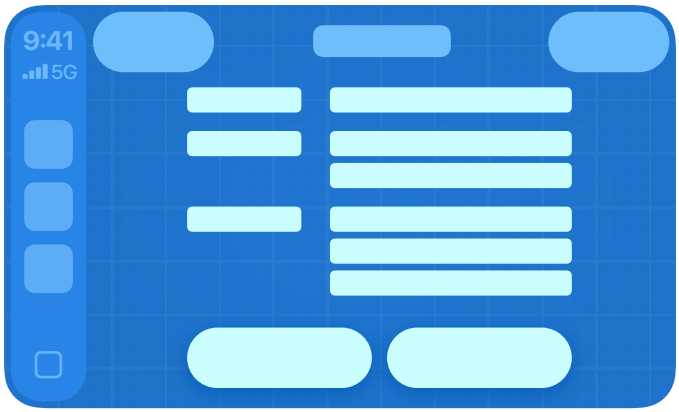
Grid template

Information template

An information screen is a specific style of list that presents a limited number of static labels with optional footer buttons. Labels can appear in a single column or in two columns. The information template can also include leading and trailing navigation bar buttons (iOS 16 or later).

Use the information template to show important information. For example, an EV charging app may display information about a charging station such as availability, while a quick food ordering app may display an order summary such as pick-up location and time.

Since the number of labels is limited, show only the most important summary information needed to complete a task.



Information template

List template

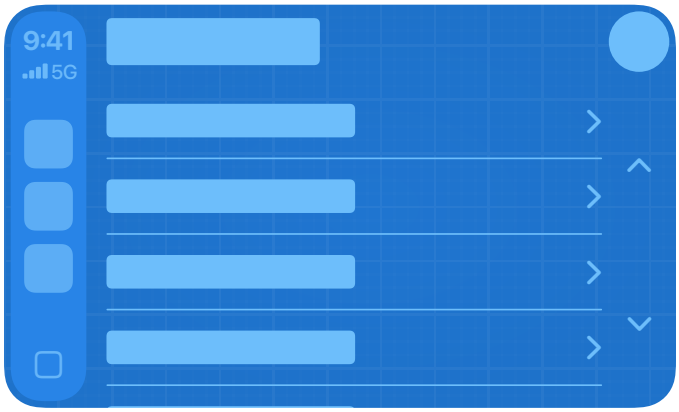
A list presents data as a scrolling, single-column table of items that can be divided into sections. Lists are ideal for presenting text or images, and can be used as a means of navigation for hierarchical information.

Each item can include attributes such as an icon, title, subtitle, disclosure indicator, progress indicator, status indicator, and images. You can also choose from several configurations for each item.

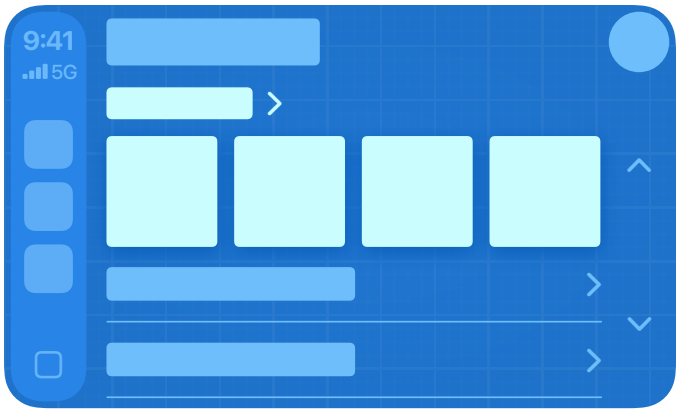
- **Item.** Shows a standard list item, such as an icon and text.
- **Image row item.** Shows a series of images, such as album artwork. You can also choose from 5 additional element styles (iOS 26 or later).
    - Row element style
    - Card element style
    - Condensed element style
    - Grid element style
    - Image grid element style
- **Message item.** Shows a contact or conversation, for communication apps (iOS 26 or later).
- **Assistant cell.** Shows a Siri prompt for the user to start media playback or place a call. An assistant cell is a special item that can be shown at the top or bottom of the list. If your app supports SiriKit, you can incorporate an assistant cell to provide a direct way for people to activate Siri.

The list template also supports pinned elements that always appear at the top of the list (iOS 26 or later). Pinned elements consist of a set of grid elements with an image and title. Communication apps can further support a message configuration for pinned elements which allows you to indicate whether to show an unread indicator.

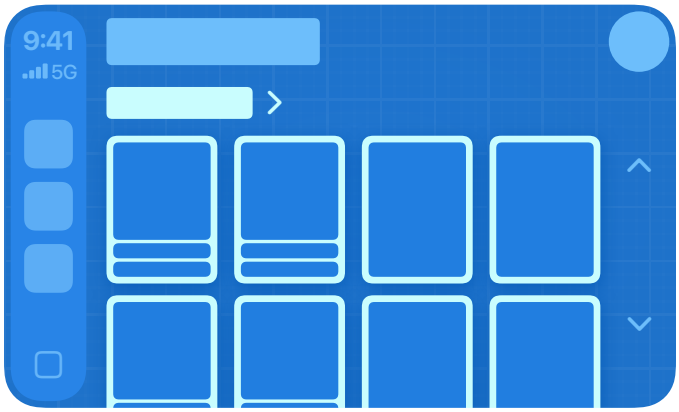
Some cars dynamically limit lists to 12 list items. You can check for the maximum number of list items, but you always need to be prepared to handle the case where only 12 list items are shown.



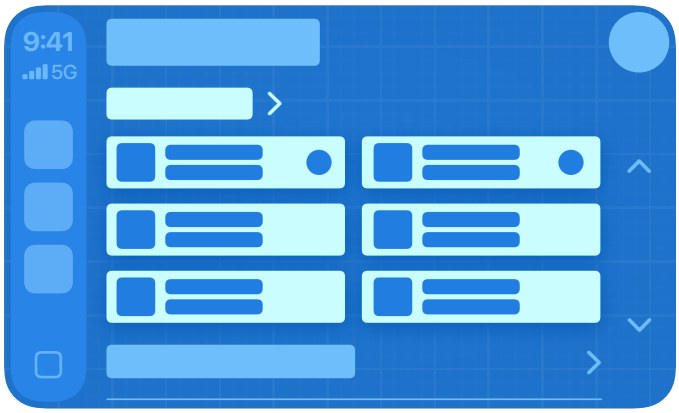
List template with standard list items



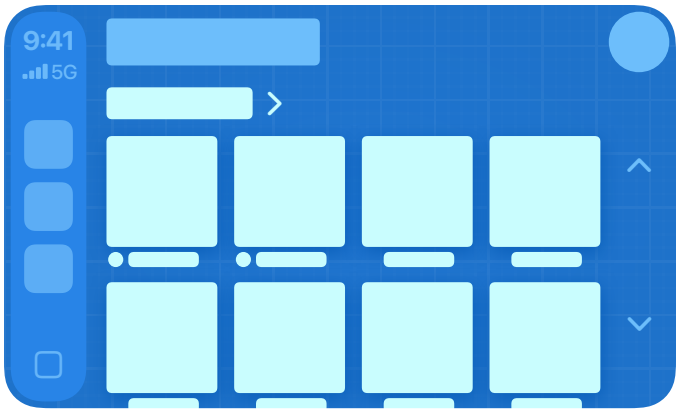
List template with the first item configured as an image row item using the row element style



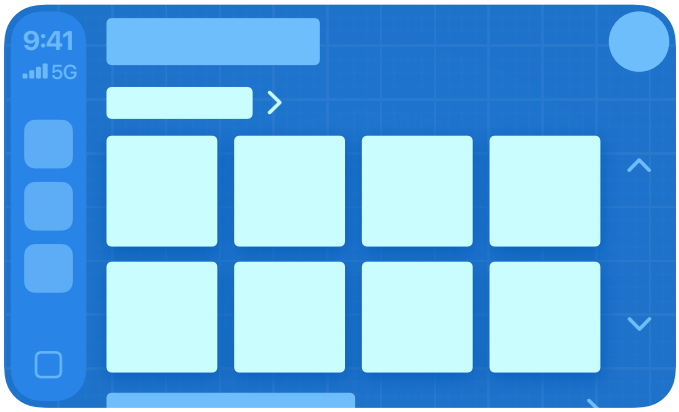
List template with the first item configured as an image row item using the card element style



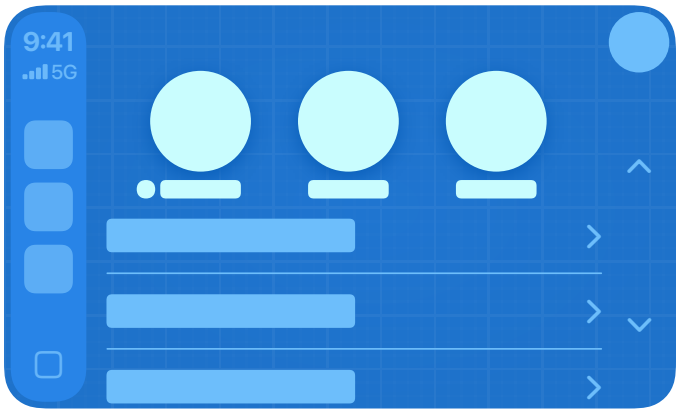
List template with the first item configured as an image row item using the condensed element style



List template with the first item configured as an image row item using the grid element style



List template with the first item configured as an image row item using the image grid element style



List template with pinned elements

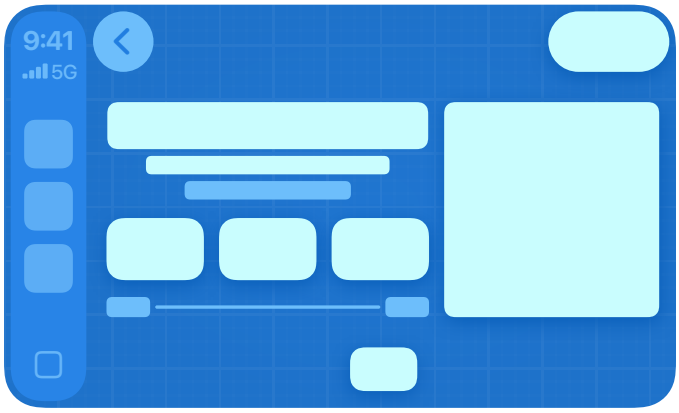
Now playing template

The now playing screen presents information about the currently playing audio, such as title, artist, elapsed time, and album artwork. It also lets people control your app using playback control buttons.

The now playing screen is customizable and you should adapt it to your needs. For example, you can provide a link to upcoming tracks, the playback control buttons can be customized with your own icons, and the elapsed time indicator can be configured for fixed-length audio or for open ended audio such as a live stream.

The now playing template has some special features.

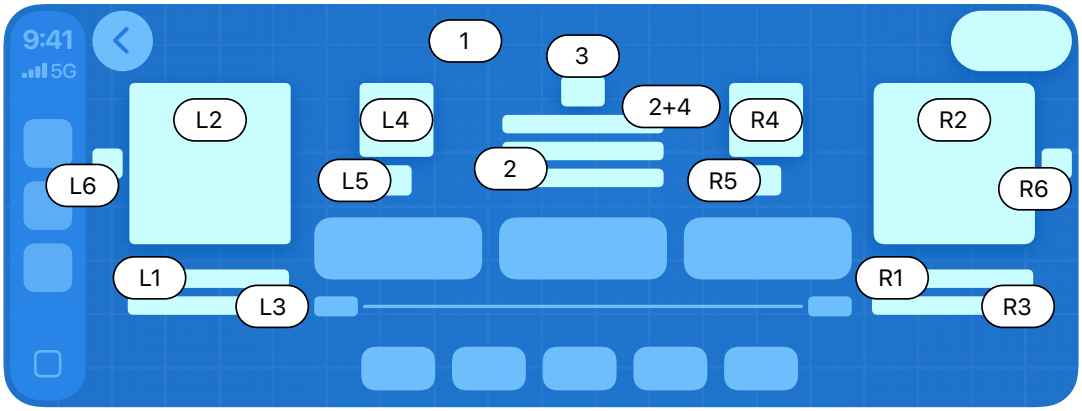
- People can directly access it from the CarPlay home screen, or through the now playing button in your app's navigation bar. You must be prepared to populate the now playing template at all times.
- Only the list template may be pushed on top of the now playing template. For example, if your app enables the "Playing Next" button in the now playing template, you can respond by showing a list template containing the upcoming playback queue.



Now playing template

The now playing template also supports sports mode (iOS 18.4 or later). The sports mode presentation includes regular now playing information (playback controls, playback state, elapsed time, etc.) and sports information (team images, scores, countdown clock, etc.). If your app is capable of showing sports scores, you can populate your app's existing now playing template with additional text and images to represent scores for any sport that involves 2 teams.

When your app streams audio from a live or pre-recorded sporting event, you can transition your now playing template into sports mode, including the elapsed, or remaining time in the event clock. CarPlay automatically counts up or down from the point provided in the event clock on your behalf. At any point, your app can provide a new set of sports mode metadata to adjust scores, possession indicators, standings, and more.



Now playing template with sports mode

Item	Content
1	Background artwork (image)
2	Sports event status text (array of text)
3	Sports event status image (image)
4	Sports event clock configured as count up, count down, or paused (time)
L1, R1	Team name (text)
L2, R2	Team logo (image or text)
L3, R3	Team standings (text)
L4, R4	Team score (text)
L5, R5	Possession indicator (image)
L6, R6	Favorite indicator (boolean)

Point of interest template

The point of interest screen lets people browse nearby locations on a map and choose one for further action.

The point of interest template includes a map provided by MapKit, and an overlay containing a list of up to 12 locations with customizable pin images.

Starting in iOS 16, you may optionally provide a larger pin image for the currently selected location. The list of locations should be limited to those that are most relevant or nearby.

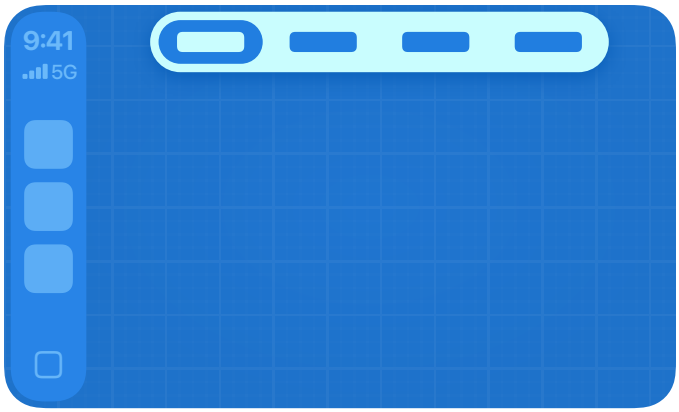
Point of interest template

Tab bar template

The tab bar is a versatile container for Grid, Information, List, and Point of interest templates, where each template occupies one tab in the tab bar. People can use the tab bar to rapidly switch between templates. The tabs can include text or an image, such as a symbol. You are encouraged to take advantage of the SF Symbols library for seamless integration with the system font. You can optionally mark tabs with a small red indicator to show that they require action, or are displaying ephemeral information.

Your app should observe the maximum tab count returned by iOS to determine the number of tabs to display. In current versions of iOS, the tab bar allows up to 4 tabs for audio apps and up to 5 tabs for all other app categories. This may change in the future so avoid relying on these fixed values.

When your app is playing audio, CarPlay displays a now playing button in the top right corner of the tab bar for easy access to playback controls. The now playing button may not appear if your tab bar has more than 4 tabs.



Tab bar template

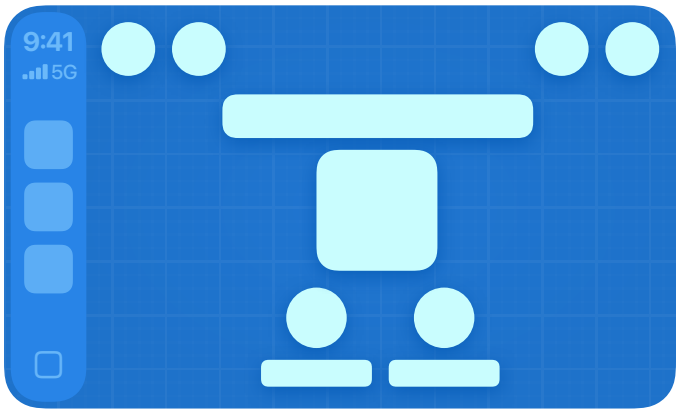
Voice control template

The voice control screen allows you to provide visual feedback for voice-based services in CarPlay navigation and voice-based conversational apps. CarPlay navigation apps must limit voice-based services to navigation functions.

Your app must display the voice control screen while voice-based services are active. In order to work well with other audio sources in the car, activate your audio session only when voice-based services are in use. For details, see Audio handling.

Starting in iOS 26.4, your app can add up to 2 action buttons, and also include leading and trailing navigation bar buttons.

All other categories of CarPlay app must use SiriKit or Siri Shortcuts to provide voice control features.



Voice control

Notifications

Notifications are supported in CarPlay communication, EV Charging, parking, and public safety apps. Starting in iOS 18.4, notifications are also supported in CarPlay driving task apps.

Notifications should be used sparingly in CarPlay and must be reserved for important tasks required while driving. Do not use notifications in CarPlay for features that are only relevant when using your app on iPhone. In general, notifications are not read aloud in CarPlay.

Note that route guidance notifications in CarPlay navigation apps are handled by the CarPlay framework itself and are not part of the standard app notification mechanism.

Request authorization to show notifications

In order to show notifications in CarPlay, include the `carPlay` option when requesting authorization for notifications.

Users can use Settings to show or hide your app's notifications in CarPlay. Gracefully disable notification-related features if the driver declines to show notifications in CarPlay.

```
let authorizationOptions : UNAuthorizationOptions = [.badge, .sound, .alert, .carPlay]

let notificationCenter = UNUserNotificationCenter.current()
notificationCenter.requestAuthorization(options: authorizationOptions) {
    (granted, error) in
    // Enable or disable app features based on authorization
}
```

Create a notification category with the CarPlay option

In addition to requesting authorization, your app must enable CarPlay for the notification categories you want displayed. To enable CarPlay, create a notification category with the `allowInCarPlay` option. Assign an identifier to the category, and make sure that any local or remote notifications for messages have the same category identifier.

If you are developing a CarPlay communication app, also see Implementing communication notifications for more details on messaging notifications. In CarPlay, notifications must only include information such as the sender and group name in the title and subtitle. The contents of the message must never be shown in CarPlay.

Assets

Prepare CarPlay assets for images used in templates such as icons and buttons. Note that CarPlay supports multiple scales and both light and dark interfaces so you should take this into account when creating assets. Create versions that are suitable for 2x and 3x scale factors, and for light and dark styles. You can turn on CarPlay assets in Xcode to populate CarPlay 2x and 3x image wells.

Use the following size guidance when creating images.

	Maximum size in points	Maximum size in pixels (3x)	Maximum size in pixels (2x)
Contact action button	50pt x 50pt	150px x 150px	100px x 100px
Grid icon	40pt x 40pt	120px x 120px	80px x 80px
Now playing action button	20pt x 20pt	60px x 60px	40px x 40px
Tab bar icon	24pt x 24pt	72px x 72px	48px x 48px
Voice control image	150pt x 150pt	450px x 450px	300px x 300px

For elements such as tab bar icons, you are encouraged to take advantage of the SF Symbols library for seamless integration with the system font.

If you create assets programmatically, use `UIImageAsset` to combine `UIImage` instances into single image with both light and dark trait collections.

If you need to know the CarPlay screen scale at runtime, use the trait collection `carTraitCollection` to obtain the display scale. Don't use other parameters in the `carTraitCollection` and be sure to get the scale for the car's screen (not the scale for the iPhone screen).

To determine the sizes of images used in lists, use `maximumImageSize` in `CPListItem` and `CPListImageRowItem` to obtain the maximum image size and provide images with matching resolution.

Use CarPlay Simulator to test your app and see how it appears under different conditions, including screen resolutions, scale factors, and light/dark styles.

Audio handling

Playback

If your app plays audio, ensure that it works well with audio sources in the car.

Only activate your audio session the moment you are ready to play audio. When you activate your audio session, other audio sources in the car will stop. For example, if someone is listening to the car's FM radio and you activate your audio session too soon, the FM radio will stop. People expect FM radio to continue to play until they explicitly choose to play an audio stream in your app. Don't simply activate your audio session at the time your app launches. Instead, wait until you actually need to play audio.

If you are developing a CarPlay navigation app, see Voice prompts for details on playing voice prompts for upcoming route maneuvers.

Recording

In general, recording is not supported while in CarPlay. If your app has recording features, don't enable them when CarPlay is active. If you activate an audio session with recording enabled, it can affect audio playback from other sources and impact audio input for the car's own functions such as voice assistants and phone calls. While in CarPlay, configure audio sessions without recording features.

An exception is for CarPlay navigation and voice-based conversational apps which use recording features for voice input. In these apps, recording features may be used, but only in conjunction with the voice control template.

Accessing data while iPhone is locked

CarPlay is frequently used while iPhone is in a locked state. Test your app throughly to ensure it works as expected when iPhone is locked.

You won't be able to access the following while iPhone is locked.

- Files saved with `NSFileProtectionComplete` or `NSFileProtectionCompleteUnlessOpen`.
- Keychain items with a `kSecAttrAccessible` attribute of `kSecAttrAccessibleWhenPasscodeSetThisDeviceOnly`, `kSecAttrAccessibleWhenUnlocked` or `kSecAttrAccessibleWhenUnlockedThisDeviceOnly`.

Launching other apps in CarPlay

If your app launches other apps in CarPlay, such as to get directions or make a phone call, use the `CPTemplateApplicationScene` method `open(_:options:completionHandler:)` method to launch the other app using a URL to ensure it launches on the CarPlay screen.

Build a CarPlay app

Startup

All CarPlay apps must adopt scenes and declare a CarPlay scene to use the CarPlay framework. You can declare scenes dynamically, or you can include an application scene manifest in your `Info.plist` file.

The following is an example of an application scene manifest that declares a CarPlay scene. You can add this to the top level of your `Info.plist` file.

```
<key>UIApplicationSceneManifest</key>
<dict>
    <key>UISceneConfigurations</key>
    <dict>
        <!-- Declare device scene. -->
        <key>UIWindowSceneSessionRoleApplication</key>
        <array>
            <dict>
                <key>UISceneClassName</key>
                <string>UIWindowScene</string>
                <key>UISceneConfigurationName</key>
                <string>MyDeviceSceneConfiguration</string>
                <!-- Specify the name of your scene delegate class. -->
                <key>UISceneDelegateClassName</key>
                <string>MyAppWindowSceneDelegate</string>
            </dict>
        </array>
        <!-- Declare CarPlay scene -->
        <key>CPTemplateApplicationSceneSessionRoleApplication</key>
        <array>
            <dict>
                <key>UISceneClassName</key>
                <string>CPTemplateApplicationScene</string>
                <key>UISceneConfigurationName</key>
                <string>MyCarPlaySceneConfiguration</string>
                <!-- Specify the name of your scene delegate class. -->
                <key>UISceneDelegateClassName</key>
                <string>MyCarPlaySceneDelegate</string>
            </dict>
        </array>
    </dict>
</dict>
```

In the above example, the app declares 2 scenes—one for the iPhone screen, and one for the CarPlay screen.

The name of the class that serves as the scene delegate is defined in the manifest by `UISceneDelegateClassName`. Your delegate must conform to `CPTemplateApplicationSceneDelegate`. Listen for `didConnect` and `didDisconnect` to know when your app has been launched on the CarPlay screen.

Your app may be launched *only* on the CarPlay screen so be sure to handle this use case.

At launch, you may also receive URLs if your app registers to support them. Listen for URLs in each scene delegate your app supports by conforming to the `UISceneDelegate` methods `willConnectTo` and `openURLContexts`. URLs may exist in `UIOpenURLContext` objects, both as properties of the `UIScene.ConnectionOptions` object in `willConnectTo`, your app delegate's `configurationForConnectingSceneSession` method, and as an object of `openURLContexts`.

When your app is launched, you will receive a `CPInterfaceController` that manages all the templates on the CarPlay screen. Hold on to the controller since you'll need it to manage templates, such as showing a list or a now playing screen.

On launch, you must also specify a root template. In the example below, the app specifies a CPListTemplate as the root template.

```
import CarPlay

class CarPlaySceneDelegate: UIResponder, CPTemplateApplicationSceneDelegate {
    var interfaceController: CPInterfaceController?

    // CarPlay connected

    func templateApplicationScene(_ templateApplicationScene: CPTemplateApplicationScene,
                                  didConnect interfaceController: CPInterfaceController) {
        self.interfaceController = interfaceController
        let listTemplate: CPListTemplate = ...
        interfaceController.setRootTemplate(listTemplate, animated: true)
    }

    // CarPlay disconnected

    func templateApplicationScene(_ templateApplicationScene: CPTemplateApplicationScene,
                                  didDisconnect interfaceController: CPInterfaceController) {
        self.interfaceController = nil
    }
}
```

Create a list template

The following example shows how to create a list containing a single list item with a title and a subtitle.

When a list item is selected, your list item handler will be called. You should take appropriate action here, such as starting audio playback in the case of an audio app. If you initiate asynchronous work and don't immediately call the completion block, CarPlay will display a spinner to indicate that your app is busy. When you're ready to continue, call the completion block to tell CarPlay to remove the spinner.

```
import CarPlay

let item = CPListItem(text: “My title", detailText: “My subtitle")
item.handler = { [weak self] item, completion, in

    // Start playback asynchronously…

    self.interfaceController.pushTemplate(CPNowPlayingTemplate.shared(), animated: true)
    completion()
}

let section = CPListSection(items: [item])
let listTemplate = CPListTemplate(title: "Albums", sections: [section])
self.interfaceController.pushTemplate(listTemplate, animated: true)
```

Create a now playing template

The now playing template is a shared instance so you need to obtain it and configure its properties.

Do this when the interface controller connects to your app because iOS can display the shared now playing template on your behalf. For example, when the “Now Playing” button on the CarPlay home screen, or in your app’s navigation bar is tapped, iOS will immediately present the shared now playing template.

This example shows an app configuring the playback rate button on the now playing template.

```
import CarPlay

class CarPlaySceneDelegate: UIResponder, CPTemplateApplicationSceneDelegate {

    func templateApplicationScene(_ templateApplicationScene: CPTemplateApplicationScene,
                                  didConnect interfaceController: CPInterfaceController) {

        let nowPlayingTemplate = CPNowPlayingTemplate.shared()

        let rateButton = CPNowPlayingPlaybackRateButton() {
            // Change the playback rate!
        }
        nowPlayingTemplate.updateNowPlayingButtons([rateButton])
    }
}
```

Build a CarPlay navigation app

The following section describes how to create a CarPlay navigation app.

CarPlay navigation apps have additional UI elements and capabilities that are different from other CarPlay app categories. Skip this section if you are not creating a navigation app.

Supported displays and features

CarPlay navigation apps appear in the center display and can show a secondary map in the CarPlay Dashboard or the instrument cluster display in supported vehicles. In addition, CarPlay navigation apps can share navigation metadata with the vehicle. Upcoming maneuvers are displayed in the vehicle's instrument cluster or HUD (head-up display). Vehicles with advanced driver assistance systems work best when your app shares destination and route information. People can use touch gestures in supported vehicles to zoom, pitch, and rotate your map. Support these capabilities for a seamless experience in all vehicle configurations.

	Minimum iOS version
Show map in center display	iOS 12
Show second map in CarPlay dashboard	iOS 13.4
Show second map in instrument cluster display	iOS 16.4
Share upcoming maneuvers with vehicle	iOS 17.4
Share destination with vehicle	iOS 26.4
Share route with vehicle	iOS 26.4
Touch gestures	iOS 26

Additional templates for navigation apps

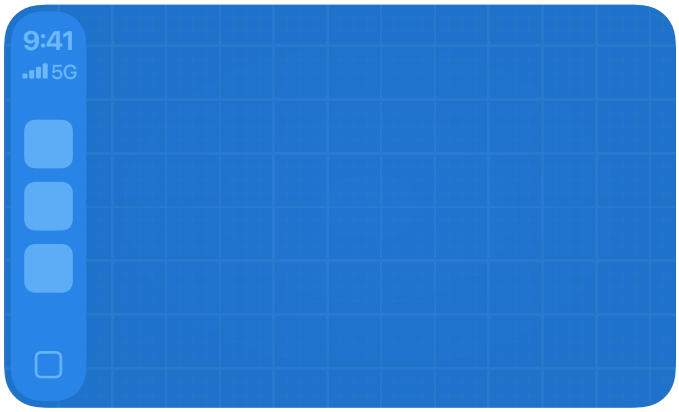
CarPlay navigation apps use additional templates to display maps, route guidance, and keyboard-based search.

Base view

All CarPlay navigation apps start with a base view. The base view is where you draw your map. Create the base view and attach it to the provided window when CarPlay starts.

The base view must be used exclusively to draw a map, and cannot be used to draw alerts, overlays, or other UI elements. All UI elements that appear on the screen, including the navigation bar and map buttons, must be implemented using other templates. Your app won't receive direct tap or drag events in the base view.

Your app will be required to draw your map on a variety of screens with different aspect ratios, resolutions, and in light or dark mode. Get the current mode using `contentStyle` in your CarPlay template application scene and receive `contentStyleDidChange` notifications in your scene delegate. You also need to consider the safe area (the portion of the map not obscured by buttons). See Simulator for more information on testing with different display configurations, including testing light and dark mode.



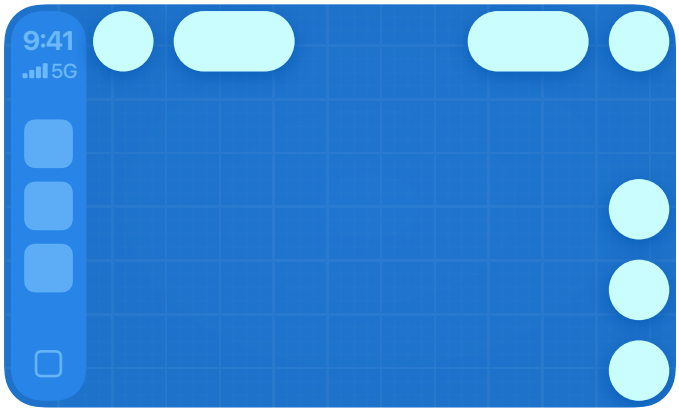
Base view

Map template

The map template is a control layer that appears as an overlay over the base view and allows people to manipulate the map. It consists of a navigation bar and map buttons drawn as individual overlays. By default, the navigation bar appears when the driver interacts with the app, and disappears after a period of inactivity. You can customize this behavior, including whether to hide the map buttons.

The navigation bar includes up to two leading buttons and two trailing buttons that can be specified with icons or text.

You can also specify up to four map buttons which are shown as icons. Use the map buttons to provide zooming and panning features. Although many cars support panning through direct manipulation of the car's touchscreen, there are cars that only support panning through knob or touch pad events. CarPlay supports these cars with a "panning mode." If your app supports any panning features, you must allocate one of the map buttons to be a pan button that allows people to enter panning mode, and you must respond to the panning functions in `CPMapTemplate`.

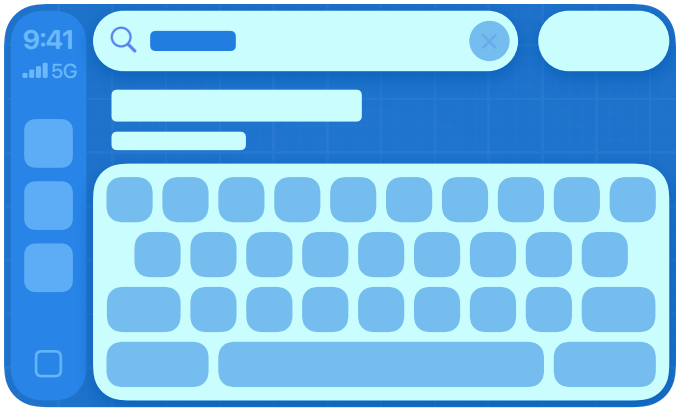


Map template

Search template

The search template displays a text entry field, a list of search results, and a keyboard. Your app parses the text by responding to `updatedSearchText` and updating the list of search results with an array of `CPListItem` elements. You must also take action when an item is selected from the list by responding to `selectedResult`.

Note that many cars limit when the keyboard may be shown. See Keyboard and list restrictions for details.



Search template

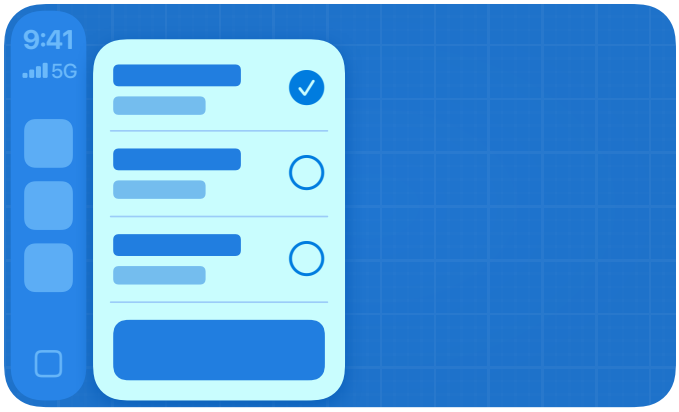
Panels

CarPlay navigation apps use panels to overlay information on the map. This includes trip previews, route selection, route guidance, and navigation alerts. You don't create panels directly. Instead, use the provided APIs to trigger them.

Trip preview panel. Displays up to 12 potential destinations and allows people to select one. The trip preview panel is typically the result of a destination search. When a trip is previewed, show a visual representation of that trip in your base view.

Trip preview panel

Route choice panel. Displays potential routes for a trip and allows people to select one. Each route should have a clear description so people can choose their preferred route. For example, a summary and optional description for a route could be "Via I-280 South" and "Traffic is light." When a route is previewed, show a visual representation of that route in your base view.

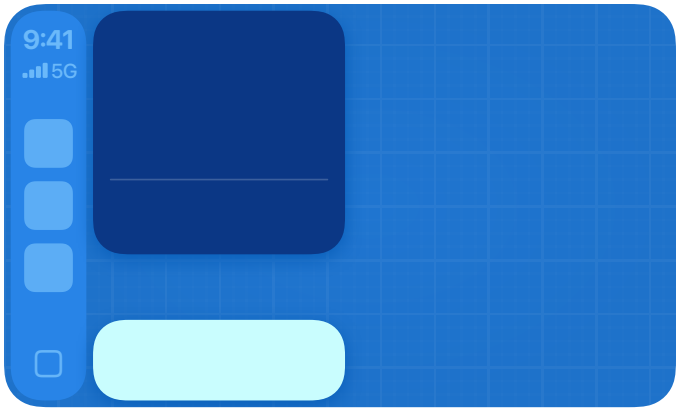


Route choice panel

Guidance and trip estimate panels. Display upcoming maneuvers and trip estimates.

Maneuvers are normally shown one at a time, but in cases where maneuvers appear in rapid succession, two maneuvers may be shown. The second maneuver may be repurposed to show lane guidance or a junction image for the first maneuver.

In addition to providing upcoming maneuvers, you should continuously update overall trip estimates.



Guidance and trip estimate panels

Each maneuver can include a symbol, instruction text, estimated remaining distance, and time.

You may optionally specify multiple variants for your images and instruction text so they appear differently in your app and the CarPlay Dashboard. This includes maneuver symbols, junction images, notification symbols, instruction text and notification text. To specify something different, use the dashboard variants of the properties—for example, by default `symbolImage` defines what appears in your app and the CarPlay Dashboard, but if you also specify a `dashboardSymbolImage` property, then it will be used in the CarPlay Dashboard.

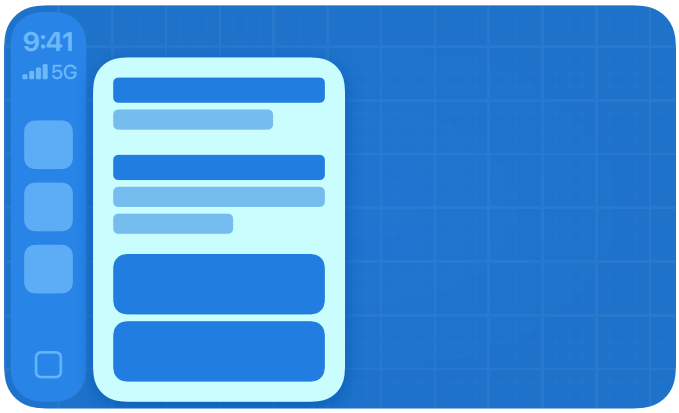
Your app also provides metadata for maneuvers and lane guidance information that are displayed in the instrument cluster or HUD in supported vehicles. For details, see Show metadata in the instrument cluster or HUD.

Use the following guide when preparing maneuver symbol assets. Be sure to provide variants for light and dark interfaces.

	Maximum size in points	Maximum size in pixels (3x)	Maximum size in pixels (2x)
First maneuver symbol (symbol and instruction on one line)	50pt x 50pt	150px x 150px	100px x 100px
First maneuver symbol (symbol and instruction on two lines)	120pt x 50pt	360px x 150px	240px x 100px
Second maneuver symbol (symbol and instructions)	18pt x 18pt	54px x 54px	36px x 36px
Second symbol (symbol only)	120pt x 18pt	360px x 54px	240px x 36px
CarPlay Dashboard junction image	140pt x 100pt	420px x 300px	280px x 200px

Navigation alert panel. Displays important, real time feedback and optionally gives the driver a chance to make a decision that will affect the current route. For example, you should show an alert if there is unexpected traffic ahead and you are recommending that the driver take an alternate route. Navigation alerts result in a notification if your app is running in the background.

Navigation alerts can consist of an image, title, subtitle, duration for which the alert is visible before it's automatically dismissed, and up to 2 action buttons. For example, the action buttons could provide options to either maintain the current route, or take an alternate route. Starting in iOS 16 you can specify a navigation alert with longer subtitle text (in prior versions of iOS the subtitle is limited to 3 lines), no action buttons (in which case the alert will have a simple close button), or action buttons with custom colors.



Navigation alert panel

Startup

CarPlay navigation apps declare two CarPlay scenes, one for the main app window in CarPlay, and one for the CarPlay Dashboard. For details on how to set up a scene manifest that supports CarPlay, see Application scene manifest example.

Provide delegates for the CarPlay scene and the CarPlay Dashboard scene. Listen for the `didConnect(to:)` and `didDisconnect(from:)` methods to know when your app has been launched in each scene. In the main app window, your `CPTemplateApplicationSceneDelegate` will be called using the `didConnect` and `didDisconnect` methods that receive an interface controller and a window. `CPInterfaceController` and a `CPWindow` object.

For the main app view, retain references to both the interface controller and the map content window for the duration of the CarPlay session.

```
self.interfaceController = interfaceController
self.carWindow = window
```

Next, create a new view controller and assign it to the window's root view controller. Use the view controller to manage your map content as the base view in the window.

```
let rootViewController = MyRootViewController()
window.rootViewController = rootViewController
```

Finally, create a map template and assign it as the root template.

```
let rootTemplate: CPMapTemplate = createRootTemplate()
self.interfaceController?.setRootTemplate(rootTemplate, animated: false)
```

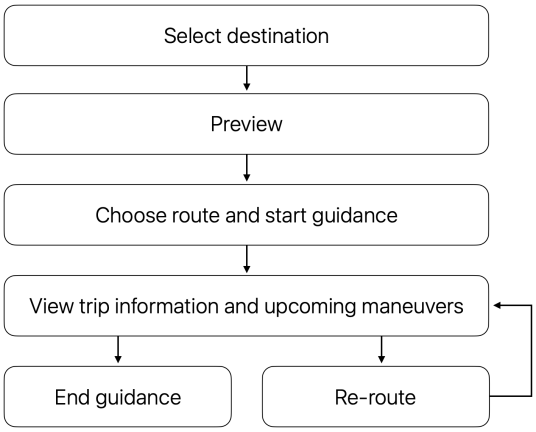
Create a default set of navigation bar buttons and map buttons and assign them to the root map template. Specify navigation bar buttons by setting up the `leadingNavigationBarButtons` and `trailingNavigationBarButtons` arrays. Specify map buttons by setting up the `mapButtons` array.

If your CarPlay navigation app supports panning, one of the buttons you create must be a pan button that lets people enter panning mode. The pan button is essential in vehicles that don't support panning via the touch screen.

You can update the navigation bar buttons and map buttons dynamically based on the state of the app. For example, during active route guidance, you may choose to replace the default navigation bar buttons with an option to end route guidance.

Route guidance

All CarPlay navigation apps follow a standard flow for selecting a destination and providing route guidance.



Select destination. All route guidance starts with selecting a destination, whether that is the result of an on-screen search, voice command, or picking a category or destination from a list.

Preview. When a destination is selected, a trip preview is shown. At the same time, your map in the base view typically shows a visual representation of the trip. The preview also supports disambiguation when there are multiple matching destinations. For example, if the driver chooses to navigate to a nearby park, the preview may show several parks to choose from.

Choose route and start guidance. Once the driver has confirmed the destination, they may start route guidance. If there are multiple possible routes, your app can present the routes as options to choose from.

View trip information and upcoming maneuvers. When the driver starts route guidance, show real time information including upcoming maneuvers, and travel estimates (distance and time remaining) for the trip.

End guidance. Route guidance continues until the driver arrives at the destination, or chooses to end route guidance.

Re-route. Your app can optionally return to an active guidance state with a new route.

Select destination

Use `CPInterfaceController` to present templates that allow people to specify a destination. To present a new template, use `pushTemplate` with a supported `CPTemplate` class such as `CPGridTemplate`, `CPListTemplate`, `CPSearchTemplate`, or `CPVoiceControlTemplate`.

When an item selection or cancelation occurs, your delegate will be called with information about the action that was taken.

You may present multiple templates in succession to support hierarchical selection. For example, you can show a list template that includes list items which lead to additional sublists when selected. Be sure to set `showsDisclosureIndicator` to `true` for list items that support hierarchical browsing, and push a new list template when the list item is selected. Hierarchical selections must never exceed five levels of depth.

Preview

After the driver has selected a destination and you are ready to show trip previews, use `CPMapTemplate showTripPreviews` to provide an array of up to 12 `CPTrip` objects.

Each `CPTrip` object represents a journey consisting of an origin, a destination, up to 3 route choices, and estimates for remaining time and distance. Starting with iOS 26.4, CPTrip supports the `CPNavigationWaypoint` properties `originWaypoint` and `destinationWaypoint`. The `MKMapItem` properties `origin` and `destination` are deprecated.

Use `CPRouteChoice` to define each route choice. Your descriptions for each route are provided as arrays of variable length strings in descending order of length (longest string first). CarPlay will display the longest string that fits in the available space on the screen.

For each `CPTrip`, be sure to provide travel estimates using `CPMapTemplate updateEstimates:` and update the estimates if the remaining time or distance change.

You may also customize the names of the start, overview, and additional routes buttons shown in the trip preview panel.

Choose route and start guidance

When the driver selects a different route to preview, the delegate `selectedPreviewFor:` will be called. Respond by updating your map base view.

If the driver decides to start a trip, the delegate `startedTrip:` will be called. Respond by starting route guidance. At this time, use `CPMapTemplate` `hideTripPreviews` to dismiss the trip preview panel.

```
mapTemplate.hideTripPreviews()
```

Next use `CPMapTemplate` `startNavigationSession` to start a navigation session for the selected trip and obtain a `CPNavigationSession` object that represents the active navigation session.

```
let session = mapTemplate.startNavigationSession(for: trip)
```

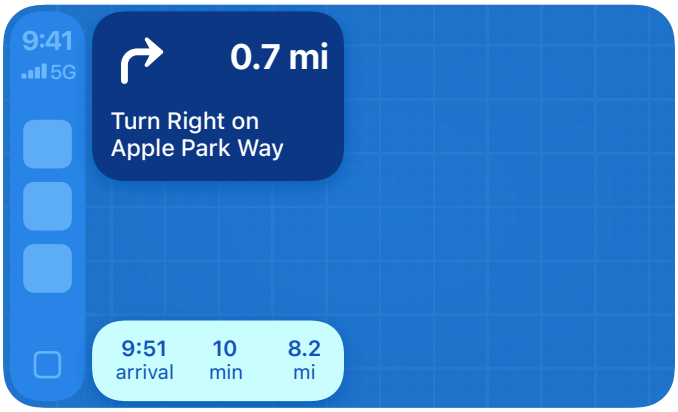
While you are calculating initial maneuvers, set the navigation session pause state to `CPTripPauseReasonLoading` so that CarPlay can display the correct state.

```
session.pauseTrip(for: .CPTripPauseReasonLoading)
```

At this time, update the navigation bar buttons and map buttons to provide appropriate actions for the driver to manage their route.

View trip information and upcoming maneuvers

During turn by turn guidance, show route guidance information by updating `upcomingManeuvers` with information on upcoming turns. Each `CPManeuver` represents a single maneuver and may include a symbol, an instruction, metadata, and estimates for remaining time and distance.



Show a maneuver in the route guidance panel

Symbol. If the maneuver has an associated symbol, such as a turn right arrow, provide an image using `symbolSet`. The symbol will be shown in the route guidance card and any related notifications. You must provide two image variants using `CPImageSet`—one is used for rendering the symbol on light backgrounds, the other is used for rendering the symbol on dark backgrounds.

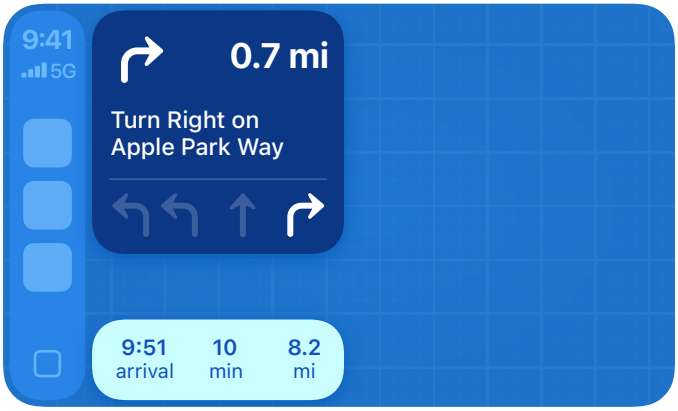
Instruction. Provide an instruction using `instructionVariants` which is an array of strings. Use the array to provide variants of different lengths so that CarPlay can display the instruction that best fits in the available space on the screen. For example, if the maneuver requires you to turn right on the street named "Solar Circle" you may choose to provide 3 instruction variants "Turn Right on Solar Circle," "Turn Right on Solar Cir.", and "Turn Right". CarPlay will display the instruction with the longest string length that fits in the available space. The array of instructions must be provided in descending order of length (longest string first). You may optionally provide `attributedInstructionVariants` to include embedded images in the instruction. This is useful if you need to display special symbols, such as a highway symbol, as part of the instruction. Note that other text attributes including text size and fonts will be ignored. If you provide `attributedInstructionVariants`, always provide text-only `instructionVariants` since CarPlay vehicles may not always support attributed strings.

Metadata. Provide maneuver type, maneuver state, junction type, traffic side, and lane guidance information for display in the instrument cluster or HUD of supported vehicles. For details, see Show metadata in the instrument cluster or HUD.

Add as many maneuvers as possible to `upcomingManeuvers`. At minimum, your app must maintain at least one upcoming turn in the `maneuvers` array at all times, and in cases where there are two maneuvers in quick succession, provide a second maneuver which may be shown on the screen simultaneously.

If you provide a second maneuver, you can customize its appearance by specifying a symbol style. In `CPMapTemplateDelegate`, return a `CPManeuverDisplayStyle` for the maneuver when requested. The display style only applies to the second maneuver.

If your app provides lane guidance information, you must use the second maneuver to show lane guidance. Create a second maneuver containing `symbolSet` with dark and light images that occupy the full width of the guidance panel (maximum size 120pt x 18pt), provide an empty array for `instructionVariants`, and in the `CPMapTemplateDelegate`, return a symbol style of `CPManeuverDisplayStyleSymbolOnly` for the maneuver.



Show a maneuver with lane guidance information

Your app is responsible for continuously updating estimates for remaining time and distance for each maneuver, and for the overall trip. Use `CPNavigationSession updateEstimates(for:)` to update estimates for each maneuver, and `CPMapTemplate updateEstimates(for:)` to update overall estimates for the trip. Only update estimates when significant changes occur, such as when the number of remaining minutes changes.

If you need to display an alert related to the map or navigation, create a `CPNavigationAlert` and use the `CPMapTemplate` method `present(navigationAlert:animated:)` to show it. Navigation alerts can be configured to automatically disappear after a fixed interval. They may also be shown as a notification, even when your app is not in the foreground.

For each maneuver and navigation alert, specify whether it should be shown as a CarPlay notification when your app is running in the background. Respond to the `shouldShowNotificationFor()` delegate call to specify the maneuver or navigation alert behavior. In the case of a maneuver, you can optionally include updating travel estimates as part of the notification.

In addition to the route guidance panel, maneuvers may also be shown in notifications, or sent to vehicles that support the display of CarPlay metadata in their instrument cluster or heads up display.

End guidance

When route guidance is paused, canceled, or finished, call the appropriate method in `CPNavigationSession`. In some cases, CarPlay route guidance may be canceled by the system. For example, if the car's native navigation system starts route guidance, CarPlay route guidance automatically terminates. In this case, your delegate will receive `mapTemplateDidCancelNavigation` and you should end route guidance immediately.

Re-route

When route guidance is paused you can return to an active guidance state by using the `CPNavigationSession` method `resumeTrip(updatedRouteSegments:currentSegment:rerouteReason:)`.

Touch gestures

Many vehicles support touch gestures to zoom, pitch, and rotate maps. If a vehicle supports touch gestures in CarPlay, drivers can also interact with your navigation app.

Your `CPMapTemplate` receives callbacks that allow you to react to touch gestures (iOS 26 or later).

- **Zoom.** Supported gestures include pinch to zoom, double tap (zoom in), and two-finger double tap (zoom out).
- **Pitch.** Supported gestures include two-finger slide up, and two-finger slide down.
- **Rotate.** Supported gestures include two-finger clockwise rotate, and two-finger counterclockwise rotate.

Keyboard and list restrictions

Some cars limit keyboard use and the lengths of lists while driving. iOS automatically disables the keyboard and reduces list lengths when the car indicates it should do so. However, if your app needs to adjust other user interface elements in response to these changes, you can receive notifications when the limits change. For example, you may want to disable a keyboard icon or adjust list items when list lengths are shorter. Use `CPSessionConfiguration` to observe `limitedUserInterfaces`.

Voice prompts

Voice prompts are essential for a route guidance experience, but you must ensure that your app is a good audio citizen and works well with other audio sources on iPhone and in the car.

Audio session configuration

CarPlay navigation apps must use the following audio session configuration when playing voice prompts for upcoming maneuvers.

1. Set the audio session category to `AVAudioSessionCategoryPlayback`.
2. Set the audio session mode to `AVAudioSessionModeVoicePrompt`.
3. Set the audio session category options to `AVAudioSessionCategoryOptionInterruptSpokenAudioAndMixWithOthers` and `AVAudioSessionCategoryOptionDuckOthers`.

Voice prompts are played over a separate audio channel and mixed with audio sources in the car, including the car's own audio sources such as FM radio.

`AVAudioSessionCategoryOptionInterruptSpokenAudioAndMixWithOthers` allows voice prompts to pause certain apps with spoken audio (such as podcasts or audio books) and mix with other apps such as music.

`AVAudioSessionCategoryOptionDuckOthers` allows voice prompts to duck (lower the volume) for other apps such as music while your audio is played.

Activate and deactivate the audio session

Keep your audio session deactivated until you are ready to play a voice prompt. Call `setActive` with `true` only when a voice prompt is ready to play. You may keep the audio session active for short durations if you know that multiple audio prompts are going to be played in rapid succession. However, while your `AVAudioSession` is active, music apps will remain ducked, and apps with spoken audio will remain paused. Don't hold on to the active state for more than few seconds if audio prompts are not playing.

When you are done playing a voice prompt, call `setActive` with `false` to allow other audio to resume.

Prompt style

In some cases it doesn't make sense to play a voice prompt. For example, the driver may be on a phone call or in the middle of using Siri.

Just before playing each voice prompt, check the audio session's `promptStyle`. If necessary, it will return a hint to alter the type of prompt you should play in response to other system audio.

Prompt style	Action
`None`	Don't play any sound
`Short`	Play a tone
`Normal`	Play a full spoken prompt

Show second map in CarPlay Dashboard or instrument cluster display

People using your navigation app want to see important information, even when your app is not the foreground app in CarPlay.

Support for CarPlay Dashboard. Starting with iOS 13.4, you can add support for CarPlay Dashboard. Display your map, upcoming maneuvers, and dashboard buttons so they are available at a glance inside CarPlay Dashboard.

Support for the instrument cluster. Starting with iOS 15.4, you can add support for instrument cluster displays in supported vehicles. Display your map and upcoming maneuvers, so they are visible at a glance in the car's instrument cluster display.

It's easy to support both CarPlay Dashboard and instrument cluster displays since they work in the same way.

`CPTemplateApplicationDashboardScene` and `CPTemplateApplicationInstrumentClusterScene` are new `UIScene` subclasses that CarPlay creates when it determines that your app should appear in CarPlay Dashboard or the instrument cluster.

`CPDashboardController` and `CPDashboardButton` let you manage the CarPlay Dashboard and the buttons that appear inside it. `CPInstrumentClusterController` lets you manage instrument cluster displays.

Indicate support for the CarPlay dashboard and instrument cluster

In your application scene manifest, set `CPSupportsDashboardNavigationScene` and `CPSupportsInstrumentClusterNavigationScene` to `true` and provide corresponding keys for your scenes and delegates. Also see Application scene manifest example.

Create scene delegates

Define delegates for CarPlay Dashboard and instrument cluster scenes just like you would for the main template application scene. These delegates conform to `CPTemplateApplicationDashboardSceneDelegate` and `CPTemplateApplicationInstrumentClusterSceneDelegate` and will be called with instances of `CPDashboardController` or `CPInstrumentClusterController`.

Draw your content

Use the provided windows to draw map content for display in the CarPlay Dashboard or instrument cluster.

When drawing maps in the instrument cluster, you must follow these guidelines:

- Draw a minimal version of your map with minimal clutter
- Show a detailed view of the upcoming route, not an overview
- Ensure the current heading is facing up (the top of the screen)

Also, as with all maps rendered in CarPlay, be sure to observe safe areas, and light and dark mode settings (similar to your base view, use the `contentMode` in `CPTemplateApplicationDashboardScene` or `CPTemplateApplicationInstrumentClusterScene`).

When navigation begins in your app using `CPMapTemplate` and `CPNavigationSession`, CarPlay automatically displays maneuver information.

For the CarPlay Dashboard, you can also provide two instances of `CPDashboardButton` to `CPDashboardController`. These buttons appear in the guidance card area when your app is not actively navigating. People can interact with your app through the dashboard buttons as well as within your main app interface.

For instrument cluster displays, some cars may allow the driver to zoom the map in and out. It's your responsibility to respond to these events in your delegate. Similarly, if your app includes a compass or speed limit, the corresponding delegates will tell your app whether it's appropriate to draw them or not. Depending on the shape of the car's instrument cluster, your view area may be partially obscured by other elements in the car. Override `viewSafeAreaInsetsDidChange` on your view controller to know when the safe area changes, and use the `safeAreaLayoutGuide` on your cluster view to ensure that important content in the area of the view is always visible.

Share upcoming maneuvers with vehicle

People using your navigation app want to see important information in the instrument cluster or HUD (Head-Up Display) in supported vehicles. Many vehicles, even those without a full digital instrument cluster display, are capable of receiving metadata from your app and displaying that information in their instrument cluster or HUD. Metadata can include maneuver state, maneuver type (e.g. “turn right”, “make a U-turn”), junction type, and lane guidance information. Maneuver sharing works with iOS 17.4 or later.

If your app supports maneuver sharing, indicate this by responding to the `CPMapTemplate` delegate `mapTemplateShouldProvideNavigationMetadata()` with `true`.

When route guidance starts, supply information about upcoming maneuvers, including maneuver type and lane guidance information. Use the `CPNavigationSession` methods `add(maneuvers:)` and `add(laneGuidances:)` to add arrays of `CPManeuver` and `CPLaneGuidance`.

Provide as many maneuvers as possible to support vehicles that display multiple maneuvers in the instrument cluster or HUD, and to improve performance. Additional maneuvers can be added during route guidance.

Your app should also set the current road name, and update the maneuver state which indicates progress within a maneuver. When approaching a maneuver, the maneuver state should transition from `continue` → `initial` → `prepare` → `execute` → `continue`.

Maneuver state	Description
`continue`	Continue along this route until next maneuver
`initial`	Maneuver is in the near future
`prepare`	Maneuver is in the immediate future
`execute`	In maneuver

Required maneuver properties include `maneuverType`, `junctionType` and `trafficSide`. Note that maneuver metadata supplements the `symbol` and `instruction` which is used on the CarPlay screen.

For lane guidance, use `CPLaneGuidance` and `CPLane` to provide lane guidance metadata for the vehicle. Again, lane guidance metadata supplements showing lane guidance using `symbolSet` on the CarPlay screen.

Manuever types

For the maneuver type, select from one of the following predefined values.

Maneuver type	Description
`arriveAtDestination`	Destination has been reached, navigation will end
`arriveAtDestinationLeft`	Destination has been reached; it is on the left and navigation will end
`arriveAtDestinationRight`	Destination has been reached; it is on the right and navigation will end
`arriveEndOfDirections`	Navigation complete, but rest of journey requires another transport method
`arriveEndOfNavigation`	Navigation complete, but rest of journey requires another transport method
`changeFerry`	Change to a different ferry
`changeHighway`	Highway to highway change with implied or unknown side of the road
`changeHighwayLeft`	Highway to highway change from the left side of the road
`changeHighwayRight`	Highway to highway change from the right side of the road
`enterRoundabout`	Enter roundabout
`enter_Ferry`	Enter ferry
`exitFerry`	Exit ferry
`exitRoundabout`	Exit roundabout
`followRoad`	Continue to follow the road the vehicle is currently on
`highwayOffRampLeft`	Exit highway on left
`highwayOffRampRight`	Exit highway on right
`keepLeft`	Bifurcation or other smooth maneuver (compare to `slightLeftTurn`)
`keepRight`	Bifurcation or other smooth maneuver (compare to `slightRightTurn`)
`leftTurn`	Angle is between -45° and -135°
`leftTurnAtEnd`	At the end of the road, turn left
`noTurn`	No turn (default value)
`offRamp`	Take ramp to leave highway
`onRamp`	Take ramp to merge onto highway
`rightTurn`	Angle is between 45° and 135°
`rightTurnAtEnd`	At the end of the road, turn right
`roundaboutExit1`	Exit roundabout at the 1st street
`roundaboutExit2`	Exit roundabout at the 2nd street
`roundaboutExit3`	Exit roundabout at the 3rd street

`roundaboutExit4`	Exit roundabout at the 4th street
`roundaboutExit5`	Exit roundabout at the 5th street
`roundaboutExit6`	Exit roundabout at the 6th street
`roundaboutExit7`	Exit roundabout at the 7th street
`roundaboutExit8`	Exit roundabout at the 8th street
`roundaboutExit9`	Exit roundabout at the 9th street
`roundaboutExit10`	Exit roundabout at the 10th street
`roundaboutExit11`	Exit roundabout at the 11th street
`roundaboutExit12`	Exit roundabout at the 12th street
`roundaboutExit13`	Exit roundabout at the 13th street
`roundaboutExit14`	Exit roundabout at the 14th street
`roundaboutExit15`	Exit roundabout at the 15th street
`roundaboutExit16`	Exit roundabout at the 16th street
`roundaboutExit17`	Exit roundabout at the 17th street
`roundaboutExit18`	Exit roundabout at the 18th street
`roundaboutExit19`	Exit roundabout at the 19th street
`sharpLeftTurn`	Angle is between -135° and -180°
`sharpRightTurn`	Angle is between 135° and 180°
`slightLeftTurn`	Turn onto a different road (compare to `keepLeft`)
`slightRightTurn`	Turn onto a different road (compare to `keepRight`)
`startRoute`	Proceed to the beginning of the route
`startRouteWithUTurn`	Make a U-turn and proceed to the route
`straightAhead`	Continue straight through the intersection (implies road name will change)
`uTurn`	Make a U-turn and proceed to the route
`uTurnAtRoundabout`	Use roundabout to make a U-turn
`uTurnWhenPossible`	Make a U-turn when possible

Junction types

For the junction type, select from one of the following predefined values.

`intersection`	Single intersection with junction elements representing roads coming to a common point
`roundabout`	Roundabout with junction elements representing roads exiting the roundabout

Traffic side

For the traffic side, select from one of the following predefined values.

`right`	Right (or anti-clockwise for roundabouts)
`left`	Left (or clockwise for roundabouts)

Lane angles and lane status

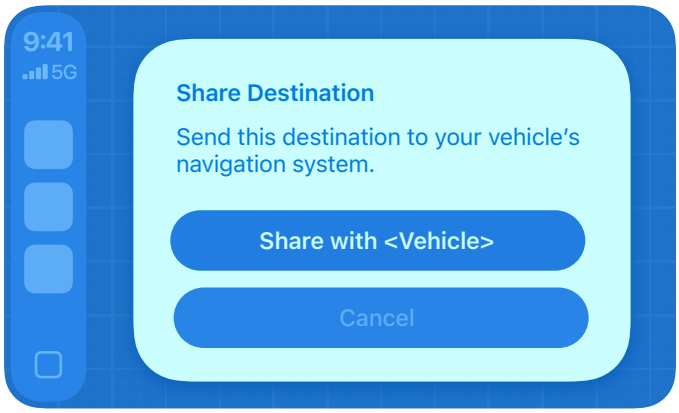
Lane angles specify angles (or a single angle) between -180° and +180°. For the lane status, select from one of the following predefined values.

`notGood`	The vehicle should not take this lane
`good`	The vehicle can take this lane, but may need to move lanes again before upcoming maneuvers
`preferred`	The vehicle should take this lane to be in the best position for upcoming maneuvers

Share destination with vehicle

Support destination sharing to allow people to share your app's destination information with the vehicle so they can continue navigation using the vehicle's built-in navigation system. Destination sharing works with iOS 26.4 or later.

If your app supports destination sharing for a trip, indicate this by setting `hasShareableDestination` on `CPTrip` to `true`. If the vehicle is capable of accepting a destination, a share button appears during route selection. When the button is tapped, the user is presented with an alert to inform them that the destination can be shared with the vehicle.



Destination sharing confirmation

When the Share button is tapped, destination information for the `CPTrip` specified in the `destinationWaypoint` property (including name, address, and coordinates) is sent to the vehicle. Note that `destinationWaypoint` is different from the `destination` property which is now deprecated. A convenience `init` function is provided to convert from `MKMapItem` to `CPNavigationWaypoint`.

When a trip destination is about to be shared with the vehicle, your app will be notified via the `CPMapTemplate` delegate `willShareDestinationFor()`. After the destination has been shared with the vehicle your app will also receive a notification on whether the destination was accepted by the vehicle `didShareDestinationFor()` or was unable to be used by the vehicle `didFailToShareDestinationFor(error:)`.

Share route with vehicle

Some vehicles with advanced driver assistance systems work best when the route is known, even when people are viewing your CarPlay navigation app to get directions. For example, vehicles with advanced routing features may provide enhanced functionality such as lane guidance, or even adjust their driving route to more closely match the route shown in your app. Electric vehicles may be able to provide feedback based on the vehicle's charging state and the route chosen in your app. Route sharing works with iOS 26.4 or later.

If your app supports route sharing, indicate this by responding to the `CPMapTemplate` delegate `mapTemplateShouldProvideRouteSharing()` with `true`. You can also indicate whether route sharing is supported for each trip via the property `routeSegmentsAvailableForRegion` in `CPTrip`. The property is set to `true` by default, but you can set it to `false` if route sharing is not available, such as in an unsupported region.

For route information to be sent to the vehicle, your app must use the method `addRouteSegments()` to populate the `CPNavigationSession` array `routeSegments` in chronological order, and ensure that `currentSegment` is always kept up to date as the trip progresses. The class `CPRouteSegment` fully describes an individual leg of a route including origin, destination, and arrays of coordinates, maneuvers, and lane guidance information. If your app needs to change the route, be sure to pause the trip using `pauseTrip(for:description:)`, then use `resumeTrip(updatedRouteSegments:Segment:rerouteReason:)` to repopulate route segments and resume the trip.

Your app can optionally monitor `didReceiveUpdatedRouteSource()` to learn how the destination and route are being used by the vehicle.

Vehicle-initiated waypoints

When sharing a route, vehicles may request to add a new waypoint. For example, electric vehicles may need to add a charging stop so the vehicle can reach the destination.

If actively navigating, your app receives vehicle requests via the `CPMapTemplate` delegate `didRequestToInsert(into:completion:)` where waypoint information is contained in `CPNavigationWaypoint`.

If your app receives a request, you can use the default UI or provide your own UI for adding a waypoint.

1. **Use the default UI.** To use the default UI, invoke the completion handler with updated travel estimates of type `CPTravelEstimates`. Observe the delegate `waypoint(accepted:forSegment:)` which is called when the user accepts the new waypoint.

2. **Provide your own UI.** If you don't require the default UI, do not invoke the completion handler for `didRequestToInsert(into:completion:)`.

When the user accepts the new waypoint, pause the trip using `pauseTrip(for:description:)`, then use `resumeTrip(updatedRouteSegments:Segment:rerouteReason:)` to provide a new array of segments that includes the new waypoint.

If not actively navigating, your app may receive vehicle requests via the `CPMapTemplate` delegate `didReceiveRequestForDestination()`. If your app receives this request, show a trip preview for this destination and prepare to start a new route.

Test your navigation app

If you are developing a navigation app, it's important to test different display configurations to ensure your map draws correctly across all CarPlay vehicles. You can also test features such as sharing upcoming maneuvers, destinations, and routes with the vehicle.

Test showing map in center display

CarPlay supports both landscape and portrait displays and can scale from 2x at low resolutions to 3x at high resolutions. The following are recommended screen sizes to test (available as presets in CarPlay Simulator).

	Width and height	Scale
Minimum (smallest possible CarPlay screen)	748px x 456px	2.0
Standard (default resolution typical of many CarPlay screens)	800px x 480px	2.0
Widescreen (typical of larger CarPlay screens)	1920px x 720px	3.0
Portrait (example of a vertical CarPlay screen)	900px x 1200px	3.0

Test showing second map in instrument cluster display

If your app supports showing a second map in the instrument cluster display, test using the presets "Standard Instrument Cluster" or "Widescreen Instrument Cluster" in CarPlay Simulator.

The following are additional recommendations for instrument cluster screen configurations to test. Select the current vehicle configuration, "Manage…" to edit a configuration, and specify the instrument cluster physical dimensions, view area, safe area, and safe area origin.

	Scale factor	View area	Safe area	Safe area origin
Minimum	3x	300 x 200	300 x 200	0, 0
Basic	2x	640 x 480	640 x 480	0, 0
Widescreen (wide safe area)	3x	1920 x 720	1080 x 720	420, 0
Widescreen (small safe area)	2x	1920 x 720	640 x 480	640, 120

Test sharing upcoming maneuvers with vehicle

Use CarPlay Simulator to observe the maneuver metadata that your app is sharing with the vehicle for display in the instrument cluster or HUD where supported.

1. Launch CarPlay Simulator.
2. In your app, perform the actions to start navigation.
3. Click “Navigation” in the main window to view the upcoming maneuver that the vehicle received from your app.
4. Click “Show More” to view the full sequence of maneuvers provided by your app. Click the table icons to view detailed information for “Route Guidance Updates,” “Maneuvers,” or “Lane Guidances.”

Test sharing destination with vehicle

Use CarPlay Simulator to simulate a vehicle that supports destination sharing, and observe the destination information that is being sent from your app to the vehicle.

1. Launch CarPlay Simulator.
2. Select the current vehicle configuration and “Manage…” to edit a configuration.
3. Turn on “Share Route Destination Information” to simulate a vehicle that supports destination sharing.
4. In your app, perform the actions to share a destination with the vehicle.
5. Click “Destination Information” in the main window to view destination information that the vehicle received from your app.

Test sharing route with vehicle

Use CarPlay Simulator to simulate a vehicle that supports route sharing, and observe the route information that is being sent from your app to the vehicle.

1. Launch CarPlay Simulator.
2. Choose “Standard Navigation” or “Widescreen Navigation” which are preset configurations that simulate a vehicle with support for route sharing.
3. In your app, perform the actions to start navigation.
4. Click “Route Sharing” in the main window to view route information that the vehicle received from your app.
5. You can also create and send a waypoint from the vehicle to your app, or export the route for testing purposes.

Application scene manifest

The following is an example of an application scene manifest that supports both the CarPlay Dashboard and instrument cluster displays.

```
<key>UIApplicationSceneManifest</key>
<dict>
    <!-- Declare support for CarPlay Dashboard. -->
    <key>CPSupportsDashboardNavigationScene</key>
    <true/>
    <!-- Declare support for instrument cluster displays. -->
    <key>CPSupportsInstrumentClusterNavigationScene</key>
    <true/>
    <!-- Declare support for multiple scenes. -->
    <key>UIApplicationSupportsMultipleScenes</key>
    <true/>
    <key>UISceneConfigurations</key>
    <dict>
        <!-- For device scenes -->
        <key>UIWindowSceneSessionRoleApplication</key>
        <array>
            <dict>
                <key>UISceneClassName</key>
                <string>UIWindowScene</string>
                <key>UISceneConfigurationName</key>
                <string>Phone</string>
                <key>UISceneDelegateClassName</key>
                <string>MyAppWindowSceneDelegate</string>
            </dict>
        </array>
       <!-- For the main CarPlay scene -->
        <key>CPTemplateApplicationSceneSessionRoleApplication</key>
        <array>
            <dict>
                <key>UISceneClassName</key>
                <string>CPTemplateApplicationScene</string>
                <key>UISceneConfigurationName</key>
                <string>CarPlay</string>
                <key>UISceneDelegateClassName</key>
                <string>MyAppCarPlaySceneDelegate</string>
            </dict>
        </array>
        <!-- For the CarPlay Dashboard scene -->
        <key>CPTemplateApplicationDashboardSceneSessionRoleApplication</key>
        <array>
            <dict>
                <key>UISceneClassName</key>
                <string>CPTemplateApplicationDashboardScene</string>
                <key>UISceneConfigurationName</key>
                <string>CarPlay-Dashboard</string>
                <key>UISceneDelegateClassName</key>
                <string>MyAppCarPlayDashboardSceneDelegate</string>
            </dict>
```

```
        </array>
        <!-- For the CarPlay instrument cluster scene -->
        <key>CPTemplateApplicationInstrumentClusterSceneSessionRoleApplication</key>
        <array>
            <dict>
                <key>UISceneClassName</key>
                <string>CPTemplateApplicationInstrumentClusterScene</string>
                <key>UISceneConfigurationName</key>
                <string>CarPlay-Instrument-Cluster</string>
                <key>UISceneDelegateClassName</key>
                <string>MyAppCarPlayInstrumentClusterSceneDelegate</string>
            </dict>
        </array>
    </dict>
</dict>
```

Sample code

The following sample code is available to help you get started developing your CarPlay app.

Integrating CarPlay with your music app

CarPlay Music is a sample music app that demonstrates how to display a custom UI from a CarPlay–enabled vehicle. CarPlay Music integrates with the CarPlay framework by implementing the `CPNowPlayingTemplate` and `CPListTemplate`. This sample's iOS app component provides a logging interface to help you understand the life cycle of a CarPlay app, as well as a music controller.

Download

Integrating CarPlay with your quick food ordering app

CarPlay Quick-Ordering is a sample quick food ordering app that demonstrates how to display custom ordering options in a vehicle that has CarPlay enabled. The sample app integrates with the CarPlay framework by implementing `CPTemplate` subclasses, such as `CPPointOfInterestTemplate` and `CPListTemplate`. This sample's iOS app component provides a logging interface to help you understand the life cycle of a CarPlay app.

Download

Integrating CarPlay with your navigation app

Coastal Roads is a sample navigation app that demonstrates how to display a custom map and navigation instructions in a CarPlay–enabled vehicle. Coastal Roads integrates with the CarPlay framework by implementing the map and additional `CPTemplate` subclasses, such as `CPGridTemplate` and `CPListTemplate`. This sample's iOS app component provides a logging interface to help you understand the life cycle of a CarPlay app.

Download

Publish your CarPlay app

When you are ready to publish your CarPlay app on the App Store, follow the same process as for any iOS app and use App Store Connect to submit your app.

Ensure that your app follows the CarPlay Guidelines.

Appendix

Deprecated entitlements

Audio apps

Audio apps support CarPlay by using the CarPlay framework, but can also use the Media Player framework (deprecated for CarPlay). Be sure to include the correct entitlement(s) to match the framework(s) your app actually supports. On iOS 14 and later, the CarPlay framework will be used if your app supports both frameworks.

If your app needs to work on iOS 13 and earlier, support the Media Player framework and include the `com.apple.developer.playable-content` entitlement. Apps that only support the Media Player framework will work on later versions of iOS, but your user interface is not customizable.

Entitlement	Key
CarPlay Audio App (Media Player framework) (Deprecated)	`com.apple.developer.playable-content`

Communication apps

Communication apps work in CarPlay by using SiriKit and CallKit, and implement a user interface by supporting the CarPlay framework.

If your app needs to work on iOS 13 and earlier, also include the `com.apple.developer.carplay-messaging` and/or `com.apple.developer.carplay-calling` entitlements to match your app features. Apps that don't support the CarPlay framework will still work on later versions of iOS, but your user interface is not customizable.

Entitlement	Key
CarPlay Messaging App (Deprecated)	`com.apple.developer.carplay-messaging`
CarPlay VoIP Calling App (Deprecated)	`com.apple.developer.carplay-calling`

Apple Inc.
One Apple Park Way
Cupertino, CA 95014
408-996-1010