#WWDC19

Delivering Intuitive Media Playback with AVKit

Jed Lewison, AVKit Engineer
Dan Wright, AVKit Engineer

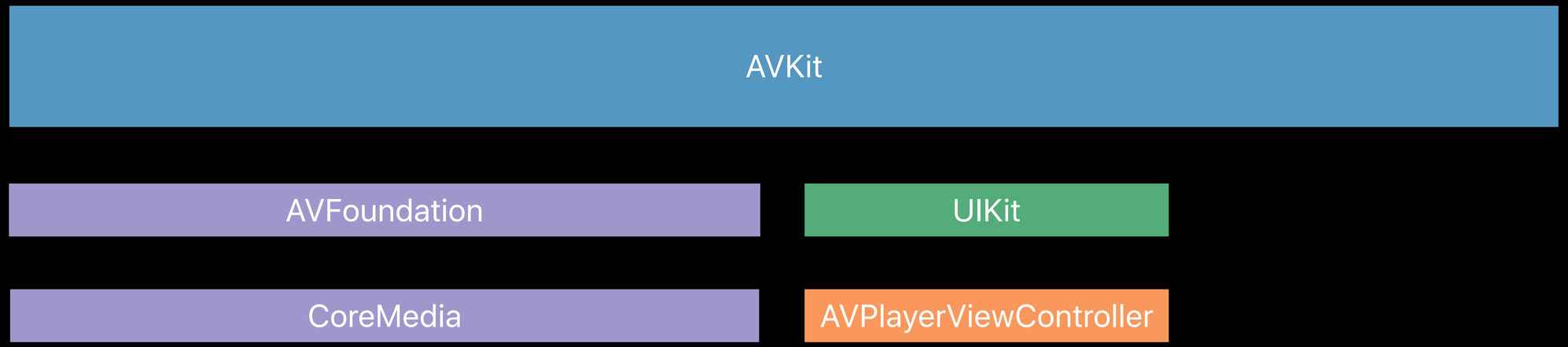
Media playback with AVKit

What’s new

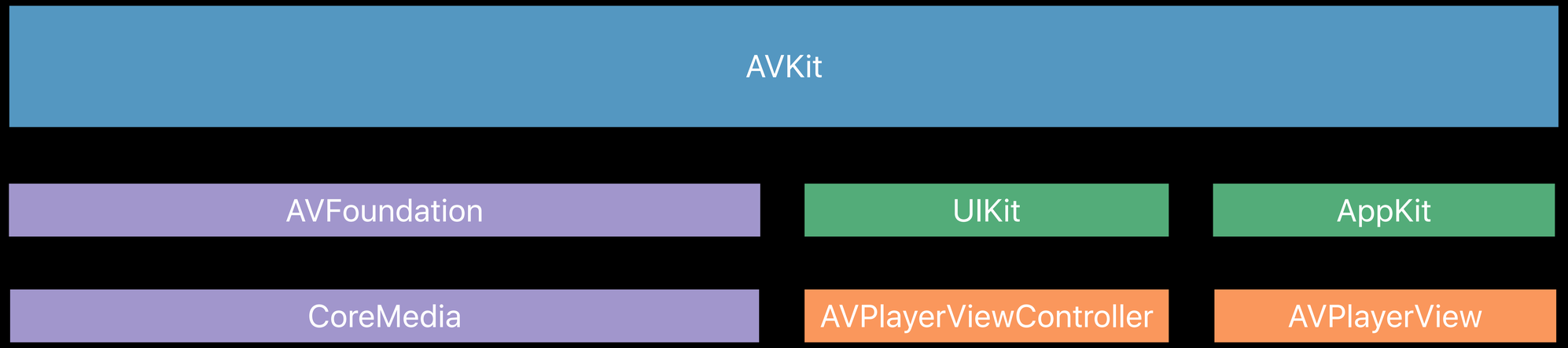
Best practices

AVKit in the Stack

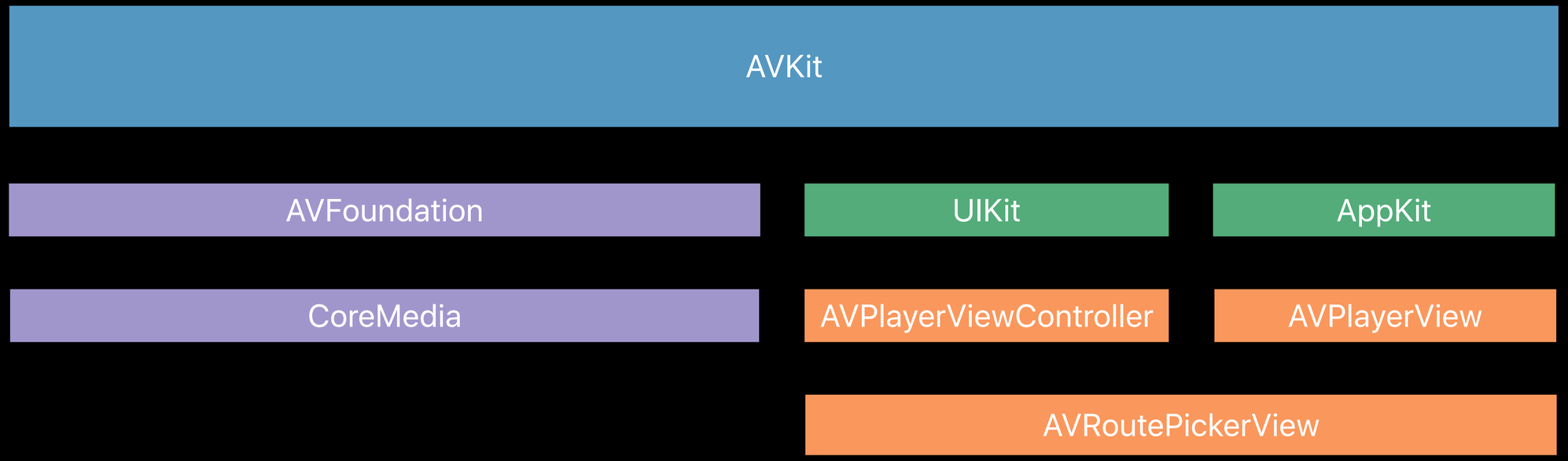
AVKit in the Stack



AVKit in the Stack



AVKit in the Stack



```
// Media Playback with AVPlayerViewController on iOS and tvOS

import AVKit

// 1) Create an AVPlayer
let player = AVPlayer(url: “https://my.example/video.m3u8”)

// 2) Create an AVPlayerViewController
let playerViewController = AVPlayerViewController()
playerViewController.player = player

// 3) Show it
present(playerViewController, animated: true)
```

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Media Playback with AVKit

AVPlayerViewController on iOS

What’s new for iOS 13

AVPlayerViewController

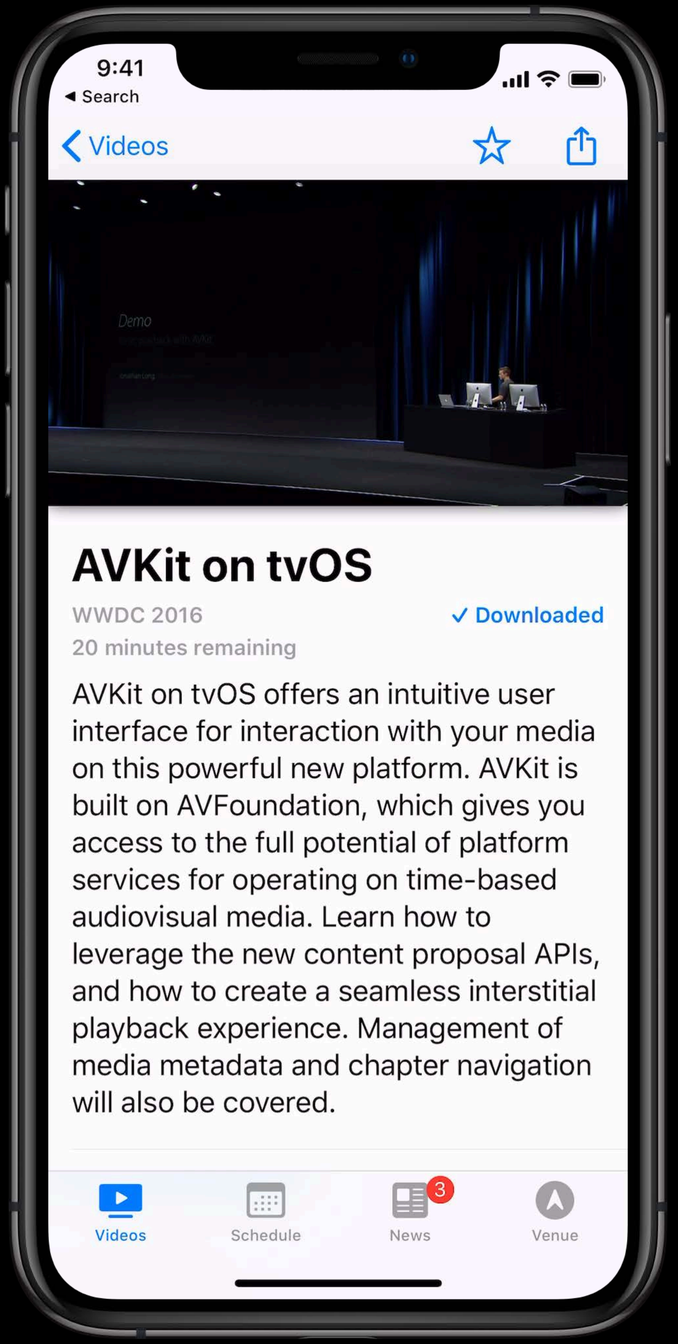
What's new for iOS 13

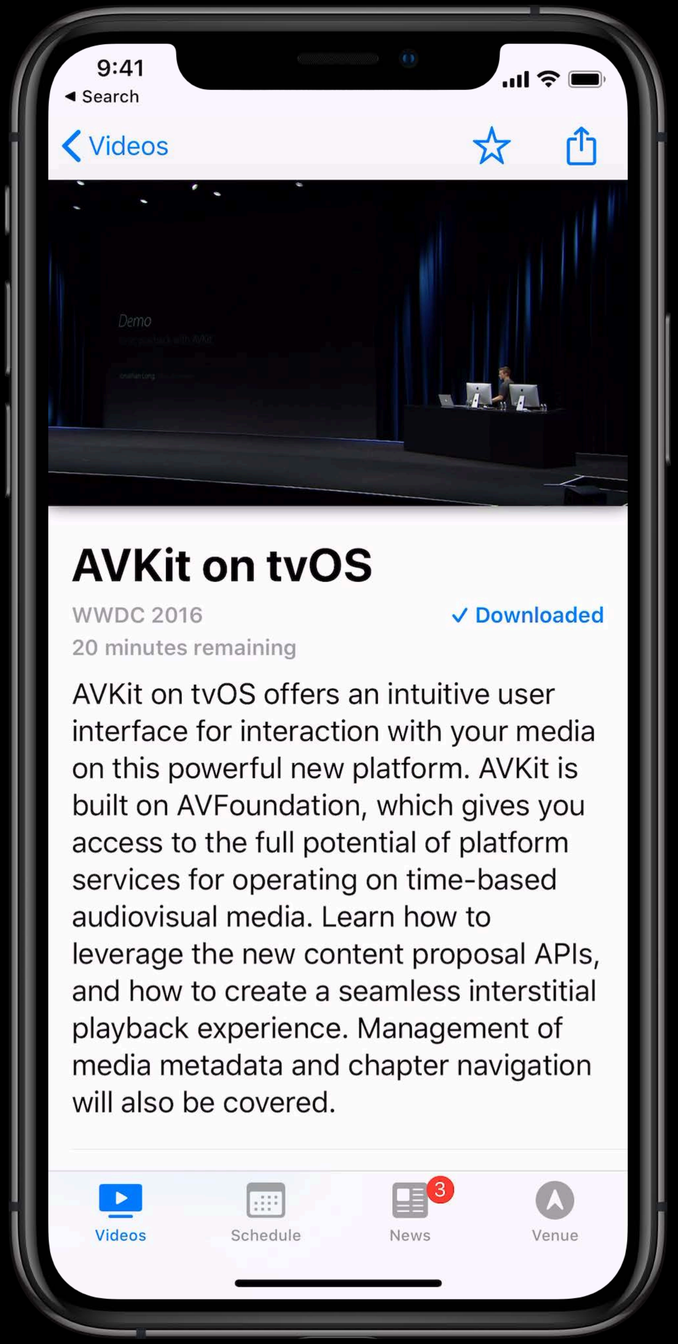
Full screen callbacks

AVPlayerViewController in iPad apps on the Mac

External metadata

Improved support for custom controls


9:41
Search
Videos
Demo
AVKit on tvOS
WWDC 2016
✓ Downloaded
20 minutes remaining
AVKit on tvOS offers an intuitive user interface for interaction with your media on this powerful new platform. AVKit is built on AVFoundation, which gives you access to the full potential of platform services for operating on time-based audiovisual media. Learn how to leverage the new content proposal APIs, and how to create a seamless interstitial playback experience. Management of media metadata and chapter navigation will also be covered.
Videos
Schedule
News
3
Venue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Schedule
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Venue

Full Screen Callbacks

NEW

Extends `AVPlayerViewControllerDelegate`

Full Screen Callbacks

NEW

Extends `AVPlayerViewControllerDelegate`

Notifies delegate when beginning or ending full screen presentation

Full Screen Callbacks

NEW

Extends `AVPlayerViewControllerDelegate`

Notifies delegate when beginning or ending full screen presentation

```
@available(iOS 12.0, *)

func playerViewController(_ playerViewController: AVPlayerViewController,
        willBeginFullScreenPresentationWithAnimationCoordinator coordinator:
        UIViewControllerTransitionCoordinator)

func playerViewController(_ playerViewController: AVPlayerViewController,
        willEndFullScreenPresentationWithAnimationCoordinator coordinator:
        UIViewControllerTransitionCoordinator)
```

Full Screen Callbacks

NEW

Extends `AVPlayerViewControllerDelegate`

Notifies delegate when beginning or ending full screen presentation

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func playerViewController(_ playerViewController: AVPlayerViewController,
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        UIViewControllerTransitionCoordinator)
```

NEW

```
// Implementing AVPlayerViewControllerDelegate's full screen callbacks

func playerViewController(
        _ playerViewController: AVPlayerViewController,
        willBeginFullScreenPresentationWithAnimationCoordinator coordinator:
UIViewControllerTransitionCoordinator
        ) {
        coordinator.animate(alongsideTransition: { (context) in
            // Add coordinated animations
        }) { (context) in
            if context.isCancelled {
                // Still embedded inline
            } else {
                // Presented full screen
                // Take strong reference to playerViewController if needed
            }
        }
`
```

NEW

```
// Implementing AVPlayerViewControllerDelegate's full screen callbacks

func playerViewController(
        _ playerViewController: AVPlayerViewController,
        willBeginFullScreenPresentationWithAnimationCoordinator coordinator:
UIViewControllerTransitionCoordinator
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        coordinator.animate(alongsideTransition: { (context) in
            // Add coordinated animations
        }) { (context) in
            if context.isCancelled {
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            } else {
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```

Full Screen Callbacks

Retargeting dismissal animation

NEW

Full Screen Callbacks

Retargeting dismissal animation

NEW

Keep embedded player view controller alive when full screen

- Deallocating will stop full screen playback
- Okay to be offscreen or removed from superview / parent

Full Screen Callbacks

Retargeting dismissal animation

NEW

Keep embedded player view controller alive when full screen

- Deallocating will stop full screen playback
- Okay to be offscreen or removed from superview / parent

Use delegate to restore playerViewController or retarget animation

```
func playerViewController(
        _ playerViewController: AVPlayerViewController,
        willEndFullScreenPresentationWithAnimationCoordinator coordinator:
UIViewControllerTransitionCoordinator
        ) {
            // If scrolled away, update playerViewController's layout here
}
```

Full Screen Callbacks

Track full screen presentation state with `AVPlayerViewControllerDelegate`

- Do not rely on `viewWillAppear(_:)` and friends

Works for both embedded and full screen presentations

Keep embedded player view controller alive when full screen

Can retarget dismissal animation when embedding inline

AVPlayerViewController in iPad Apps on the Mac

NEW


0:52:38
-1:23:43
MacBook Pro


0:52:38
-1:23:43
MacBook Pro


Touch Bar
esc
00:52:07
−01:24:14
MacBook Pro


Using AVPlayerViewController on iOS
File
Edit
View
Window
Help
Wed 9:41AM
developer.apple.com
Developer
PATHLESS
Apple Entrepreneur Camp
For organizations founded and led by women.
Subscriptions
Offer a seamless experience for auto-renewable subscriptions in your apps on the App Store.
Ocean Journal
All Access Package
$4.99 / Month
$29.88 / Year
ARKit 2
Machine Learning
MacBook Pro

How many new lines of code?

0

AVPlayerViewController in iPad Apps on the Mac

NEW

Exact same API as on iOS

Picture-in-picture support

- Includes AVPictureInPictureController (also for AppKit)
- And AVPlayerView, for AppKit-based apps

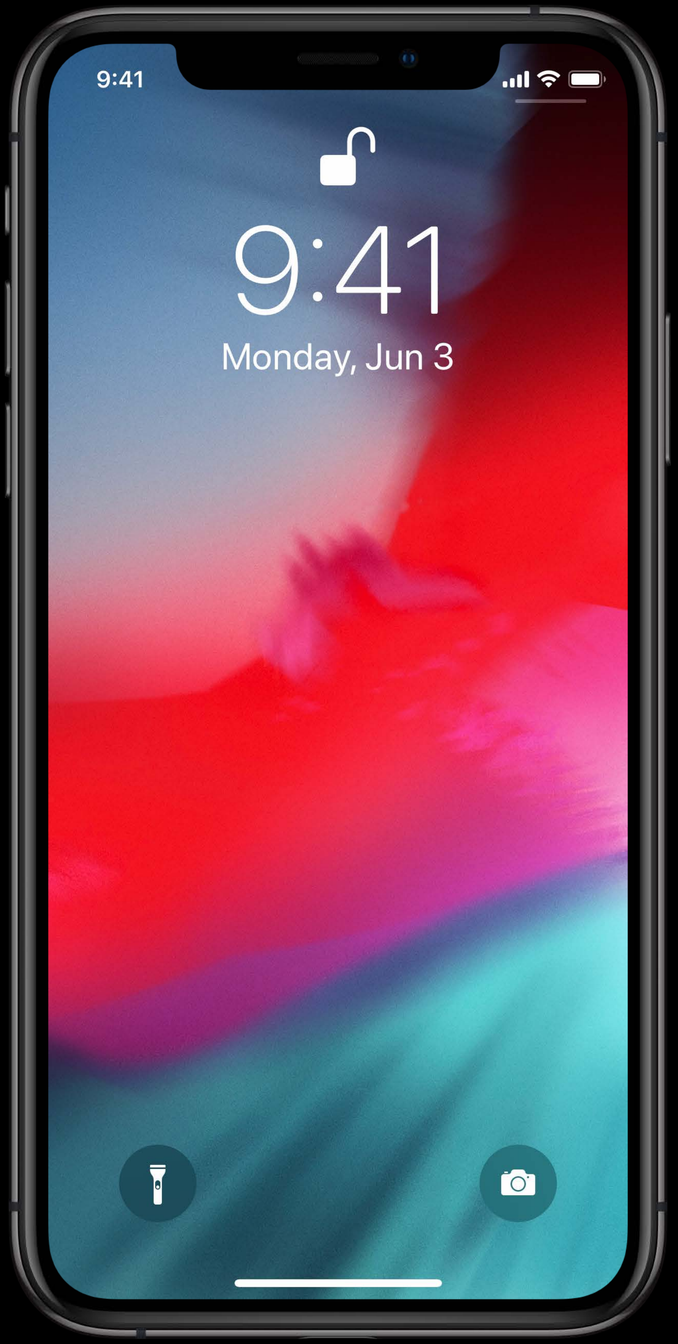
Touch Bar, keyboard, and Now Playing support

Audio and AirPlay routing

Available in macOS 10.15

External Metadata

NEW


9:41
9:41
Monday, Jun 3


9:41
9:41
Monday, Jun 3
iPhone
AVKit on tvOS
0:51
-38:15
10
10

External Metadata

Supplement missing metadata

- Title, artwork, and more

Same API as tvOS:

```
@available(iOS 12.0, *)
extension AVPlayerItem {
    open var externalMetadata: [AVMetadataItem]
}
```

Improved Support for Custom Controls

NEW

Interactive dismissals

Landscape support for portrait-only apps

Keyboard and Touch Bar support

Now Playing management

Automatic video zoom

Custom Playback Controls

The basics

NEW

Set `showsPlaybackControls` to `false`

Custom Playback Controls

The basics

NEW

Set `showsPlaybackControls` to `false`

Present modally

Custom Playback Controls

The basics

NEW

Set `showsPlaybackControls` to `false`

Present modally

Add controls to `contentOverlayView`

Custom Playback Controls

The basics

NEW

Set `showsPlaybackControls` to `false`

Present modally

Add controls to `contentOverlayView`

For the best user experience, you should:

- Override UIViewController methods for status bar, home indicator
- Pass unhandled touches through your view
- Let AVKit handle double-tap for video zoom

What’s New

NEW

Full screen callbacks

AVPlayerViewController in iPad apps for the Mac

- Plus picture-in-picture support for AppKit-based apps

External metadata

Improved support for custom controls

AVPlayerViewController on iOS

Best practices

AVPlayerViewController on iOS: Best Practices

Showing full screen

Embedding inline

Picture-in-picture

Showing Full Screen

Covers `UIWindowScene` coordinate space

Showing Full Screen

Covers `UIWindowScene` coordinate space

Use cases:

- Splash screen
- Full screen playback

Splash Screen

Requirements

Underneath your UI

No interactive playback controls

No need to hide status bar or home indicator

Possibly looping

Video should always fill screen

For video with alpha, custom background color

Audio is secondary

Splash Screen

UIViewController containment API

Add as child:

```
parent.addChild(playerViewController)
parent.view.addSubview(playerViewController.view) // Or other UIView insertion API
// Enable auto layout and set up constraints
playerViewController.didMove(toParent: parent)
```

Remove from parent:

```
playerViewController.willMove(toParent: nil)
playerViewController.view.removeFromSuperview()
playerViewController.removeFromParent()
```

Splash Screen

Configure AVPlayerViewController

Disable playback controls:

```
playerViewController.showsPlaybackControls = false
```

Make video fill entire screen:

```
playerViewController.videoGravity = .resizeAspectFill
```

Set background color (if needed):

```
playerViewController.view.backgroundColor = .clear // Or any other UIColor
```

Splash Screen

AVFoundation best practices

Disable `AVPlayer.allowsExternalPlayback`

Splash Screen

AVFoundation best practices

Disable `AVPlayer.allowsExternalPlayback`

Configure `AVAudioSession` for secondary media playback

- Use `.ambient` category

Splash Screen

AVFoundation best practices

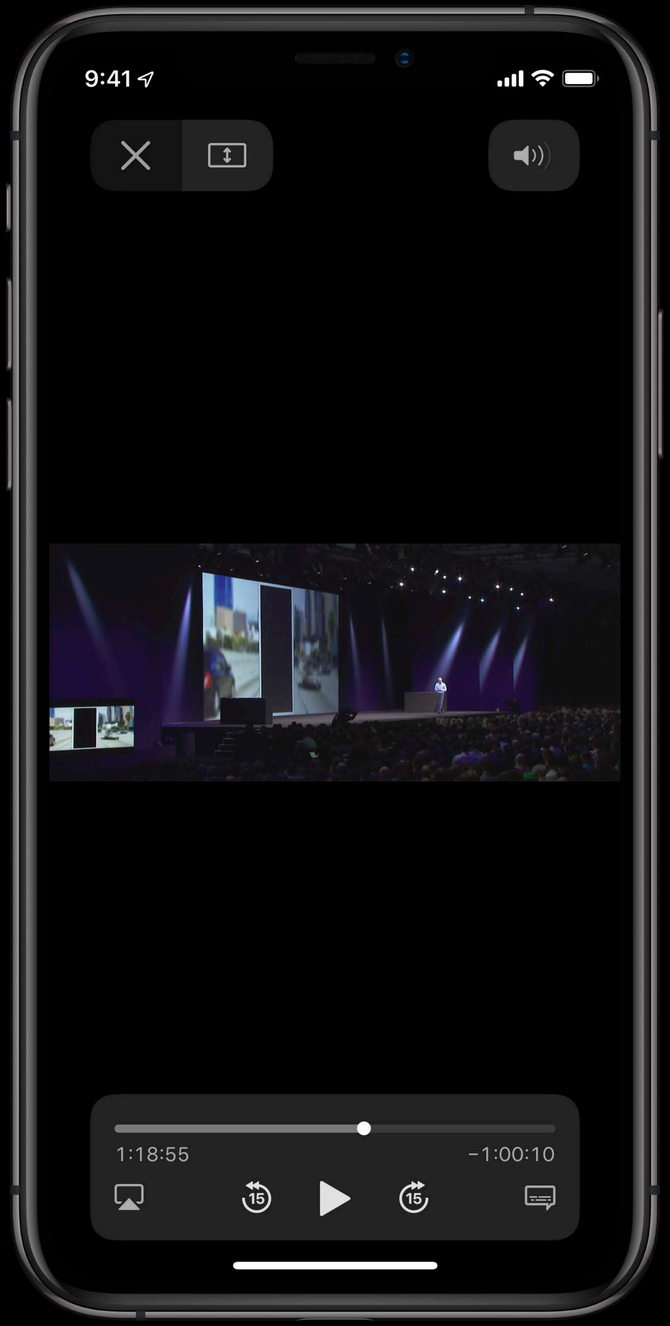
Disable `AVPlayer.allowsExternalPlayback`

Configure `AVAudioSession` for secondary media playback

- Use `.ambient` category

Observe `AVAudioSession.silenceSecondaryAudioHintNotification`

- Honor `AVAudioSession.secondaryAudioShouldBeSilencedHint`


9:41
1:18:55
-1:00:10


15
1:18:55
-1:00:10
15

Full Screen Playback

AVPlayerViewController best practices

Captions
Hide Status Bar White Point
Landscape Home Indicator Device-aware video zoom
Dark Mode Touch Bar Adaptive Accessibility
Wireless Routing Now Playing Animated Mute
External Playback Keyboard Interactive dismissals
Subtitles Full Screen Control Center Picture-in-picture
Volume Rotate Loading Indicator
Media Selection

```
// Media Playback with AVPlayerViewController on iOS and tvOS

import AVKit

// 1a) Create an AVPlayer
let player = AVPlayer(url: “https://my.example/video.m3u8”)

// 1b) Add external metadata if needed
player.currentItem?.externalMetadata = // Array of [AVMetadataItem]

// 2) Create an AVPlayerViewController
let playerViewController = AVPlayerViewController()
playerViewController.player = player

// 3) Show it
present(playerViewController, animated: true)
```

Full Screen Playback

AVPlayerViewController best practices

Present modally

Full Screen Playback

AVPlayerViewController best practices

Present modally

Use the default `modalPresentationStyle`

Full Screen Playback

AVPlayerViewController best practices

Present modally

Use the default `modalPresentationStyle`

Do not set `AVPlayerViewController.videoGravity`

Full Screen Playback

AVPlayerViewController best practices

Present modally

Use the default `modalPresentationStyle`

Do not set `AVPlayerViewController.videoGravity`

Use `AVPlayerViewControllerDelegate` to track full screen presentation state

- Do not rely on `viewWillAppear(_:)` and friends

Full Screen Playback

AVFoundation best practices

Set up `AVPlayerItem` before buffering

- Set `AVPlayer.rate` for setting item

Full Screen Playback

AVFoundation best practices

Set up `AVPlayerItem` before buffering

- Set `AVPlayer.rate` for setting item

Observe `AVPlayer.status` and `AVPlayerItem.status`

- Don’t begin playback until status is `.readyToPlay`
- Check `error` property when status is `.failed`
  - Rebuild AVFoundation objects if `.mediaServicesWereReset`

Full Screen Playback

AVFoundation best practices

Set up `AVPlayerItem` before buffering

- Set `AVPlayer.rate` for setting item

Observe `AVPlayer.status` and `AVPlayerItem.status`

- Don’t begin playback until status is `.readyToPlay`
- Check `error` property when status is `.failed`
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Enable `AVPlayer.usesExternalPlaybackWhileExternalScreenIsActive`

Full Screen Playback

AVFoundation best practices

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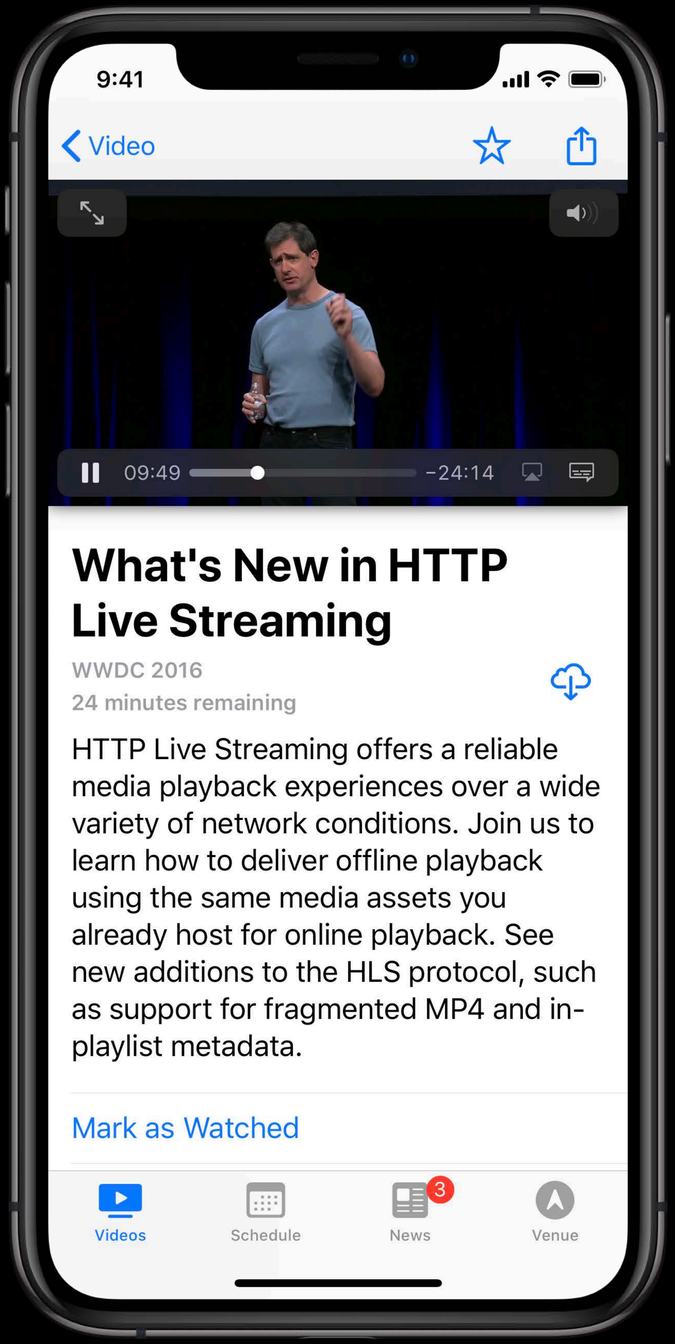
Enable `AVPlayer.usesExternalPlaybackWhileExternalScreenIsActive`

Configure `AVAudioSession` for `.playback`


9:41
Video
09:49
-24:14
What's New in HTTP Live Streaming
WWDC 2016
24 minutes remaining
HTTP Live Streaming offers a reliable media playback experiences over a wide variety of network conditions. Join us to learn how to deliver offline playback using the same media assets you already host for online playback. See new additions to the HLS protocol, such as support for fragmented MP4 and in-playlist metadata.
Mark as Watched
Videos
Schedule
News
3
Venue

Embedding AVPlayerViewController Inline

Best practices

Be prepared to begin and end full screen playback

- Track state using `AVPlayerViewControllerDelegate`
- Keep strong reference to embedded `AVPlayerViewController` when full screen
- Retarget dismissal animations when ending full screen presentation

Embedding AVPlayerViewController Inline

Best practices

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Leave `modalPresentationStyle` as `.fullScreen`

Embedding AVPlayerViewController Inline

Best practices

Can style embedded content without impacting full screen:

`videoGravity`

`view.layer.cornerRadius`, `cornerCurve`, and `maskedCorners`

`view.backgroundColor`

Embedding AVPlayerViewController Inline

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Can style embedded content without impacting full screen:

`videoGravity`

`view.layer.cornerRadius`, `cornerCurve`, and `maskedCorners`

`view.backgroundColor`

For automatically entering and exiting full screen:

`entersFullScreenWhenPlaybackBegins`

`exitsFullScreenWhenPlaybackEnds`

Embedding AVPlayerViewController Inline

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Adopt UIViewController containment API

Embedding AVPlayerViewController Inline

UIViewController containment API

Add as child:

```
parent.addChild(playerViewController)
containerView.addSubview(playerViewController.view) // Don't put views on top
// Enable auto layout and set up constraints
playerViewController.didMove(toParent: parent)
```

Remove from parent:

```
playerViewController.willMove(toParent: nil)
playerViewController.view.removeFromSuperview()
playerViewController.removeFromParent()
```

Embedding AVPlayerViewController Inline

Showing poster images

Use `.contentOverlayView`

- Okay to use before setting player or player item

Embedding AVPlayerViewController Inline

Showing poster images

Use `.contentOverlayView`

- Okay to use before setting player or player item

Observe `.isReadyForDisplay`

- Returns `true` when first frame is ready

Embedding AVPlayerViewController Inline

Showing poster images

Use `.contentOverlayView`

- Okay to use before setting player or player item

Observe `.isReadyForDisplay`

- Returns `true` when first frame is ready

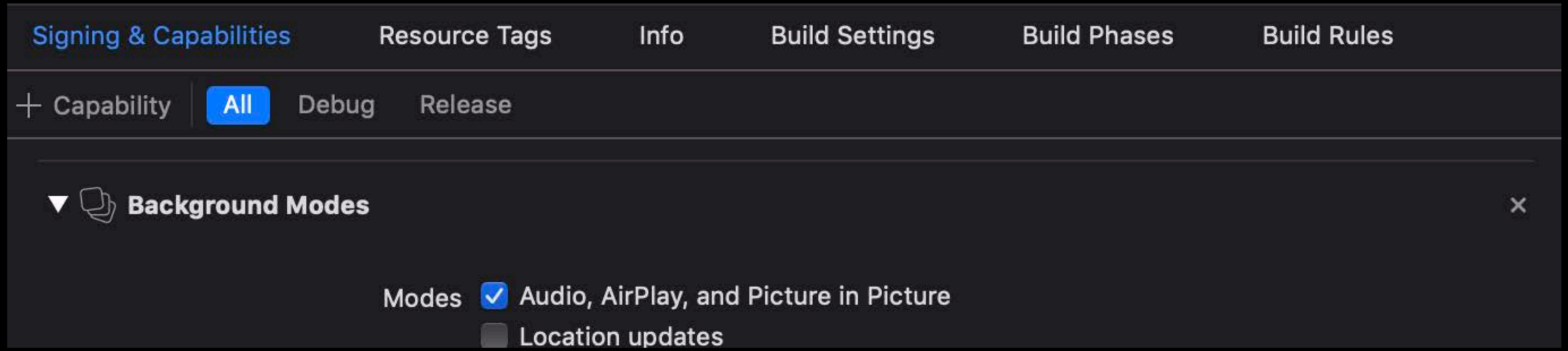
```
let token = pvc.observe(\.isReadyForDisplay, options: [.initial]) {
                [weak self] observed, _ in
                if observed.isReadyForDisplay {
                    // Hide any poster frame or placeholder
                }
            }
```

Picture-in-picture

Configuring your app

Configure AVAudioSession for `.playback`

Add background audio mode entitlement in Xcode



Picture-in-picture

Continue playing when entering background

Don’t pause playback when entering background

- Picture-in-picture may be starting!

Picture-in-picture

Continue playing when entering background

Don’t pause playback when entering background

- Picture-in-picture may be starting!

If you must pause, wait until in background

- Only if picture-in-picture hasn’t started
- Pre-iOS 13: `UIApplicationStateBackground`
- iOS 13 and later: `UISceneActivationStateBackground`

Picture-in-picture

AVPlayerViewController best practices

Track state using `AVPlayerViewControllerDelegate`

Picture-in-picture

AVPlayerViewController best practices

Track state using `AVPlayerViewControllerDelegate`

Application can stop picture-in-picture

- Toggle `AVPlayerViewController.allowsPictureInPicturePlayback`

Picture-in-picture

AVPlayerViewController best practices

Track state using `AVPlayerViewControllerDelegate`

Application can stop picture-in-picture

- Toggle `AVPlayerViewController.allowsPictureInPicturePlayback`

Be prepared for dismissal when starting

- AVKit prevents deallocation while active

Picture-in-picture

AVPlayerViewController best practices

Track state using `AVPlayerViewControllerDelegate`

Application can stop picture-in-picture

- Toggle `AVPlayerViewController.allowsPictureInPicturePlayback`

Be prepared for dismissal when starting

- AVKit prevents deallocation while active

Always restore user interface when requested by user

```
// Restoring from picture-in-picture using AVPlayerViewControllerDelegate

func playerViewController(
    _ playerViewController: AVPlayerViewController,
    restoreUserInterfaceForPictureInPictureStopWithCompletionHandler completionHandler:
@escaping (Bool) -> Void
    ) {
    presentingViewController.present(playerViewController, animated: true) {
        // Must invoke completionHandler
        completionHandler(true)
    }
}
```

AVPlayerViewController on iOS

Best practices

Sample code

- developer.apple.com/wwdc19/503

AVPlayerViewController: What's New for tvOS

Dan Wright, AVKit Engineer

What AVPlayerViewController Provides on tvOS

Full screen interactive playback

Provides standard controls for navigation

Supports a wide variety of remote controllers

Updates Now Playing information

Interstitials

Content proposals

What's New in AVKit for tvOS 13

Updated appearance and fine-precision scrubbing (12.3)

Custom interactive overlays

Live broadcast channel-flipping

Parental content restriction enforcement

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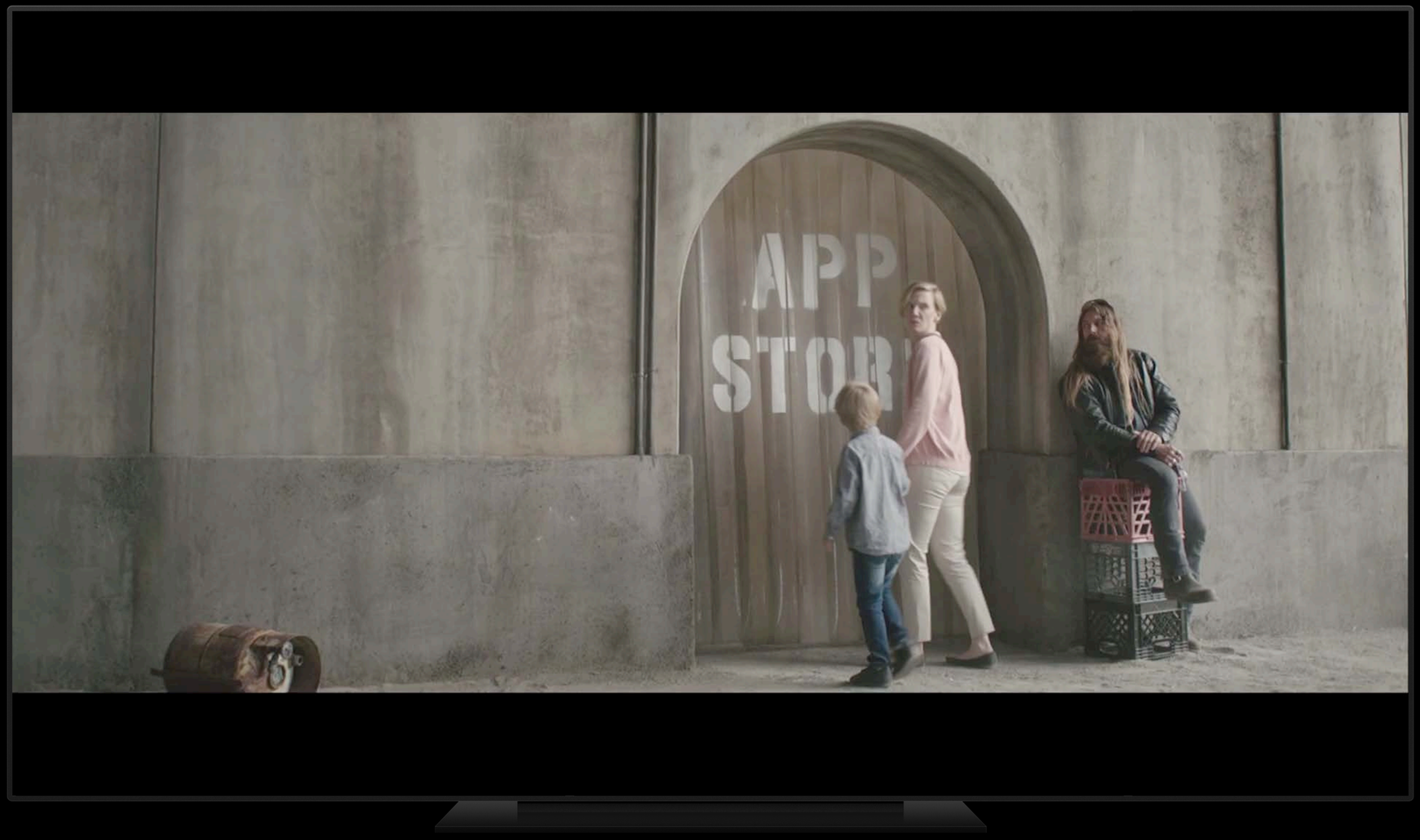
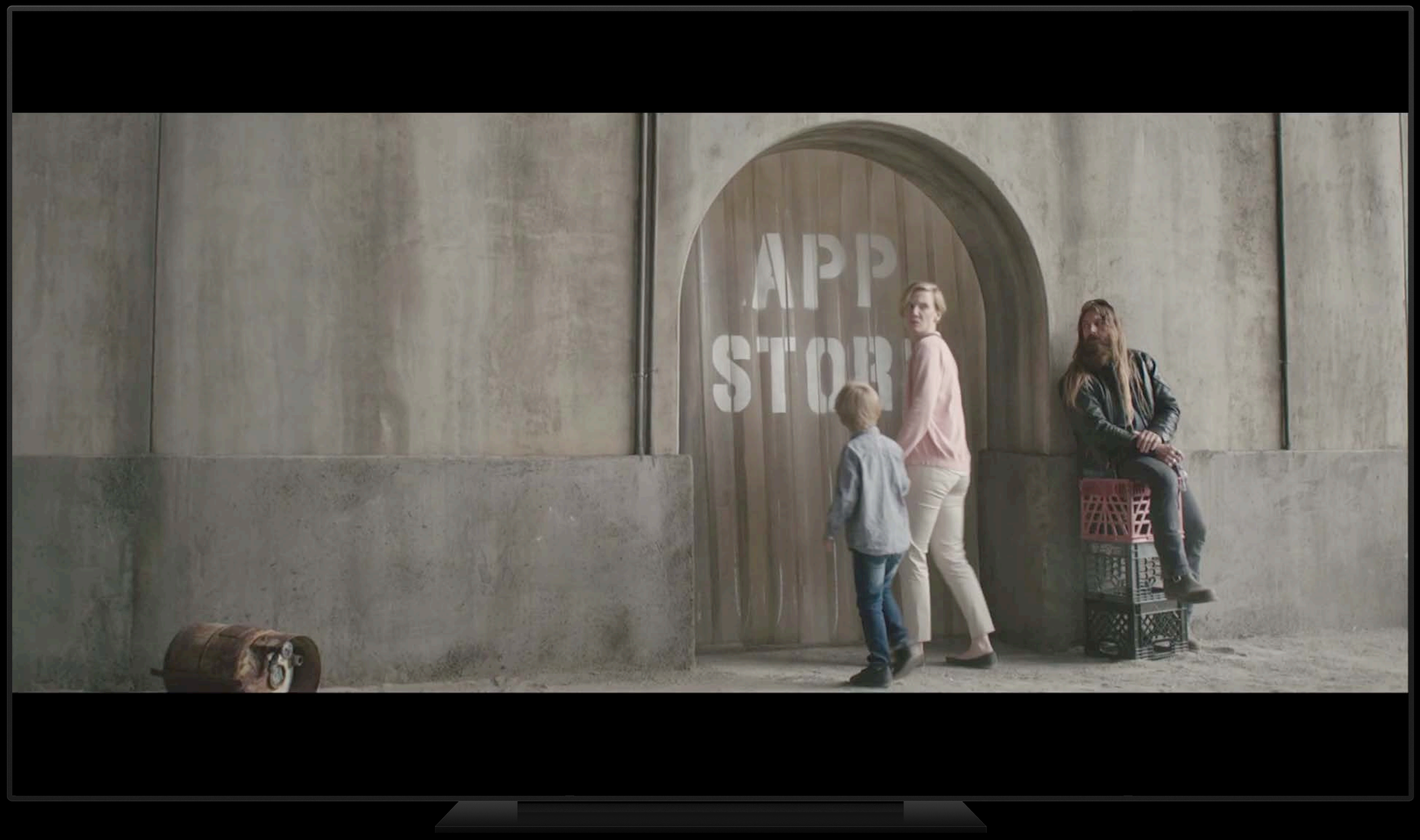

APP
STOR


APP
STOR

What's New in AVKit for tvOS 13

Updated appearance and fine-precision scrubbing (12.3)

Custom interactive overlays

Live broadcast channel-flipping

Parental content restriction enforcement

Custom Overlays

NEW

Normally hidden

Custom Overlays

NEW

Normally hidden

On-screen hint guides the user

Custom Overlays

NEW

Normally hidden

On-screen hint guides the user

Revealed when the user swipes up

Custom Overlays

NEW

Normally hidden

On-screen hint guides the user

Revealed when the user swipes up

Fully interactive

Custom Overlays

NEW

Normally hidden

On-screen hint guides the user

Revealed when the user swipes up

Fully interactive

Defined by your view controller

Custom Overlays

NEW

Normally hidden

On-screen hint guides the user

Revealed when the user swipes up

Fully interactive

Defined by your view controller

Use `contentOverlayView` for persistent, non-interactive elements


0:08.16
000496
PG
Bib Bop
Theatrical Version
0:08.16
000496
PG-13
Bip Bop
Director's Cut
MENU


0:08.16
000496
PG
Bib Bop
Theatrical Version
0:08.16
000496
PG-13
Bip Bop
Director's Cut
MENU

Custom Interactive Overlay

NEW

Set the `customOverlayViewController` property of the player view controller

```
let customInteractiveVideoOverlay = UIViewController(nibName: "CustomInteractiveVideoOverlay",
                                                     bundle: nil)

newPlayerViewController.customOverlayViewController = customInteractiveVideoOverlay
```

What's New in AVKit for tvOS 13

Updated appearance and fine-precision scrubbing (12.3)

Custom interactive overlays

Live broadcast channel-flipping

Parental content restriction enforcement

Channel Flipping

NEW

For live streams

Channel Flipping

NEW

For live streams

Swipe horizontally for next/previous channels

Channel Flipping

NEW

For live streams

Swipe horizontally for next/previous channels

Channel interstitial screen describes a channel while it loads


#WWDC16
AVKit for tvOS
Interactive video playback
Dan Wright
MENU


#WWDC16
AVKit for tvOS
Interactive video playback
Dan Wright
MENU

NEW

```
// Extending the delegate to supporting channel-flipping:

    func playerViewController(_ playerViewController: AVPlayerViewController,
skipToNextChannel completion: @escaping (Bool) -> Void) {
        // Load content for the new channel, and update the playerViewController.
        if let url = URL(string: “https://example.com/videos/a_channel/master.m3u8”) {
            let playerItem = AVPlayerItem(url: url)
            playerViewController.player?.replaceCurrentItem(with: playerItem)
            completion(true) // Indicate successful completion.
        } else {
            completion(false) // Indicate failure.
        }
    }

    func playerViewController(_ playerViewController: AVPlayerViewController,
skipToPreviousChannel completion: @escaping (Bool) -> Void) { }
```

NEW

```
// Extending the delegate to supporting channel-flipping:

func nextChannelInterstitialViewController(for playerViewController: AVPlayerViewController) -
> UIViewController {
    let channelInterstice = MyChannelInterstitialViewController()
    // Update channelInterstice with information about next channel before returning!
    return channelInterstice
}

func previousChannelInterstitialViewController(for playerViewController:
AVPlayerViewController) -> UIViewController {
    // Similar to above, except for previous channel.
}
```

What's New in AVKit for tvOS 13

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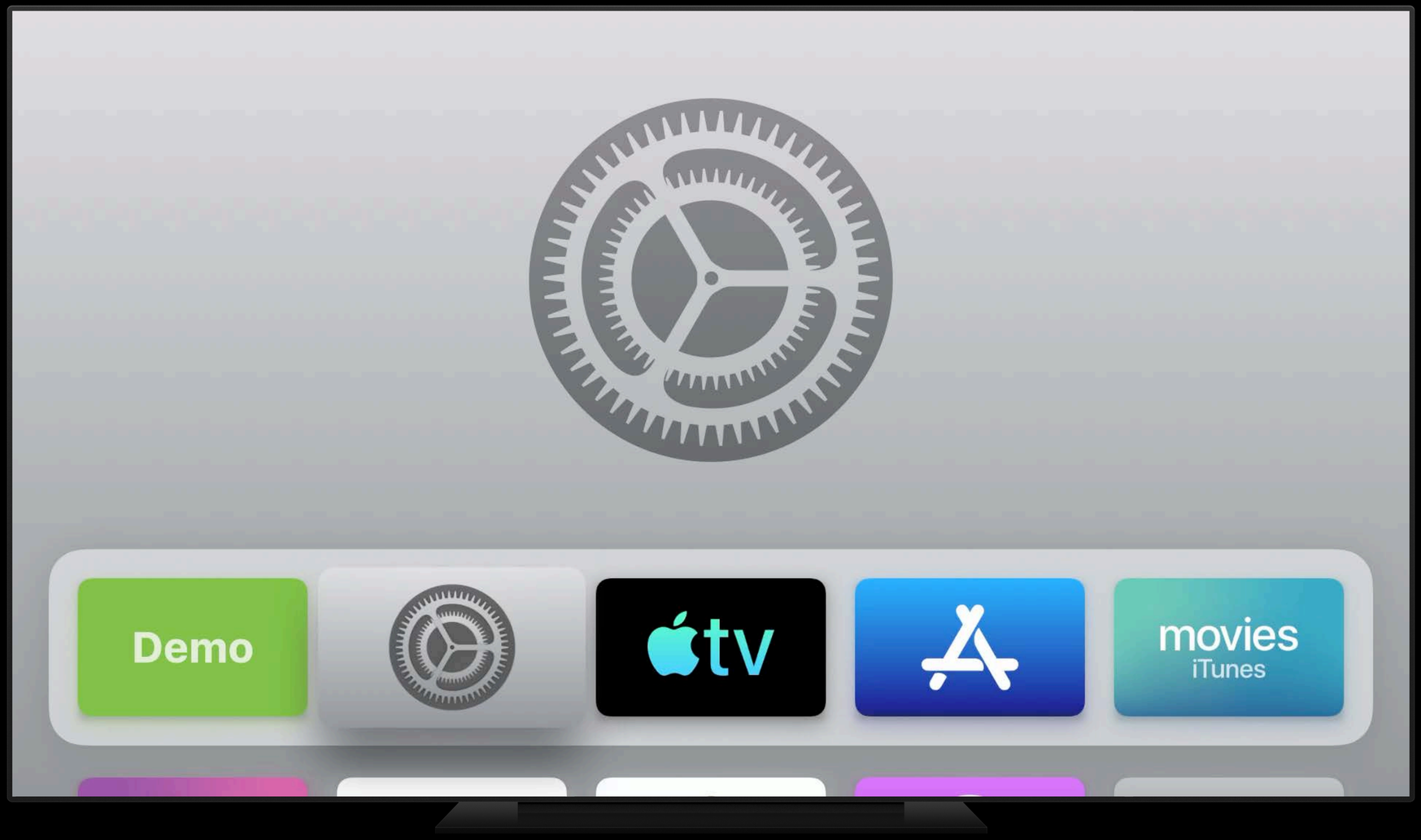
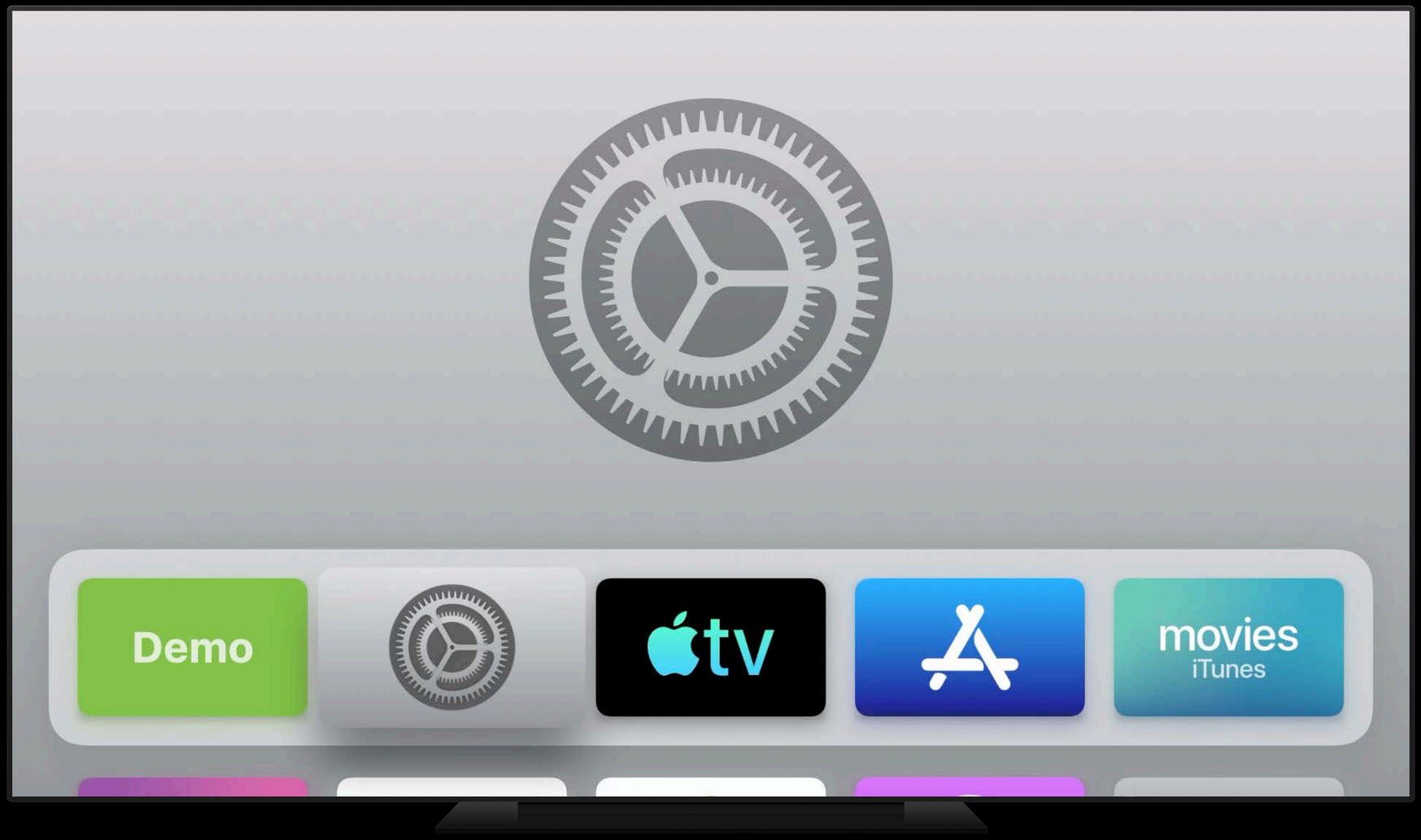
Live broadcast channel-flipping

Parental content restriction enforcement


Demo
tv
movies
iTunes


Demo
tv
movies
iTunes

Parental Content Restrictions

NEW

Specify the media content rating

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Provide the rating at the start

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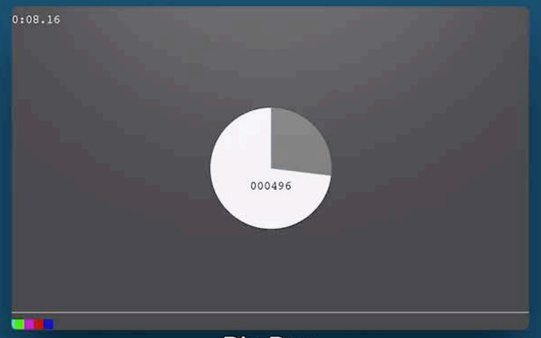
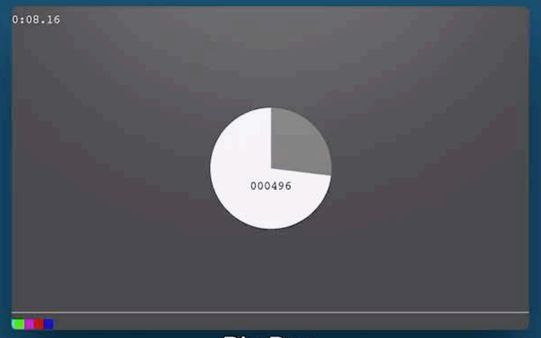
Custom playback user interfaces can also request access to restricted content

AVKit for tvOS
WWDC 2016



Bip Bop
HLS Sample

AVKit for tvOS
WWDC 2016



Bip Bop
HLS Sample

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```
// Providing media content rating metadata

func metadataItemForMediaContentRating(_ rating: String) -> AVMetadataItem {
    let metadataItem = AVMutableMetadataItem()
    metadataItem.value = value as NSString
    metadataItem.extendedLanguageTag = “und"
    metadataItem.identifier = .iTunesMetadataContentRating
    return metadataItem
}

let playerItem = AVPlayerItem(url: url)
// World-wide content ratings may be used; the user’s rating region will be preferred.
playerItem.externalMetadata = [metadataItemForMediaContentRating(“PG-13”), ...]
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NEW

```
// Using requestPlaybackRestrictionsAuthorization

    playerItem?.requestPlaybackRestrictionsAuthorization({ (success, error) in
        if success {
            // If the request succeeded, hand over the player and start playback.
            // (You may wish to wait to do this until the player status is .ReadyToPlay)
            playerViewController?.player = player
            player?.rate = 1.0
        } else {
            // If the request failed, immediately dismiss our view controller.
        }
    })
```

Demo

Best Practices on tvOS

Controls revealed by swipe-up? Use a custom overlay instead

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Use the delegate dismissal notifications rather than a `UITapGestureRecognizer`

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Test with parental content restrictions enabled

Summary

Adopt `AVPlayerViewController`

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Support parental content restrictions

More Information

developer.apple.com/wwdc19/503

AVKit Lab	Thursday, 2:00
AVFoundation Lab	Thursday, 4:00


WWDC19