Designing Accessories for iOS and OS X

Session 700

Peter Langenfeld
Accessories Software Manager
Core OS

These are confidential sessions—please refrain from streaming, blogging, or taking pictures

Introduction

- New features in iOS 7
- New features in OS X 10.9
- Frameworks to interact with accessories
- Advances in Wi-Fi, AirPlay, Bluetooth, and Lightning connector

Health and Fitness

Health and Fitness

Home

Health and Fitness

Home

Fun

USB Audio

Core Bluetooth

Bluetooth 4.0 Low Energy

Lightning

Wi-Fi

AirPrint

Headphone and Remote Mic System

Core Location

External Accessory

Bluetooth

USB MIDI

Core Audio

PCIe

Game Controller

AirPlay

Thunderbolt

3.5 mm headphone jack

USB

iPod Accessory Protocol

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USB

iPod Accessory Protocol

Core MIDI

USB Audio

- Core Audio framework
  - iOS and OS X
- USB Audio 2.0 standard
  - Input and output
    - 16 bit linear PCM, 32 kHz, 44.1 kHz, and 48 kHz sampling rates required
    - Multichannel audio available
    - Volume synchronization available

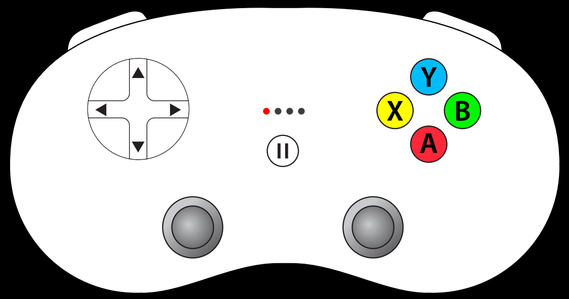
Game Controller

- Game Controller framework
  - iOS and OS X
- Standardized controls and layout

Standard
Gamepad

Game Controller

NEW



Extended
Gamepad

Standard
Gamepad

iPod Accessory Protocol (iAP)

- Media library access
- External Accessory protocol (EA)
  - Accessory app discovery and launch
- Location information
- Accessibility
  - VoiceOver
  - HID AssistiveTouch

MFi Licensing Program

MFi Licensing Program

MFi Licensing Program

Made for
iPod iPhone iPad

MFi Licensing Program

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MFi Licensing Program

- Technical information
- Components
- Tools
- Product certification
- Logos and compatibility icons

Menu of Choices

	Audio	Communication with apps
Wi-Fi	AirPlay	Sockets
Bluetooth	A2DP	External Accessory
Bluetooth 4.0 Low Energy	MFi hearing aids	Core Bluetooth
Thunderbolt	PCI Express	PCI Express
Lightning	USB audio	External Accessory
USB	USB audio	USB Device Interfaces

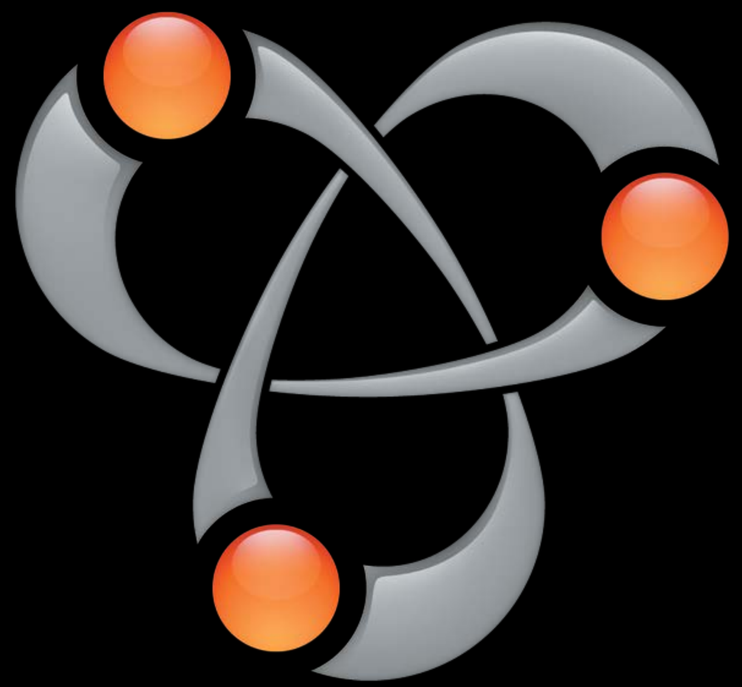
Wireless

Wi-Fi

- Software
  - Networking sockets and ports available to all apps
  - Bonjour services available to all apps
- Hardware
  - Wi-Fi Alliance certification
  - Dual-band operation
  - Quality of Service Wireless Multimedia (WMM)I
  - IPv6 vs IPv4

Bonjour

- Zero configuration networking protocol suite
- Friendly name
  - No IP address or URL needed for customer interaction
- Network service discovery
  - Show only the devices you care about based on the functions provided
- mDNSResponder project
  - http://www.macosforge.org/post/new-bonjour-releases/



Configuring Wi-Fi Accessories

- Wi-Fi information sharing

Configuring Wi-Fi Accessories

- Wi-Fi information sharing
- Wouldn’t it be nice if there was another way?
- A Wi-Fi only methodology

Configuring Wi-Fi Accessories

NEW

Configuring Wi-Fi Accessories

NEW

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NEW

Configuring Wi-Fi Accessories

NEW

Configuring Wi-Fi Accessories

Configuring Wi-Fi Accessories

View Go Window Help

Mon 9:41 AM

Wi-Fi: Looking for Networks...
Turn Wi-Fi Off

✓ WWDC2013
WWDC2013-2.4GHz

New Accessory
AirPort Express
Thermostat

Join Other Network...
Create Network...
Open Network Preferences...

View Go Window Help

Mon 9:41 AM

Configuring Wi-Fi Accessories

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NEW

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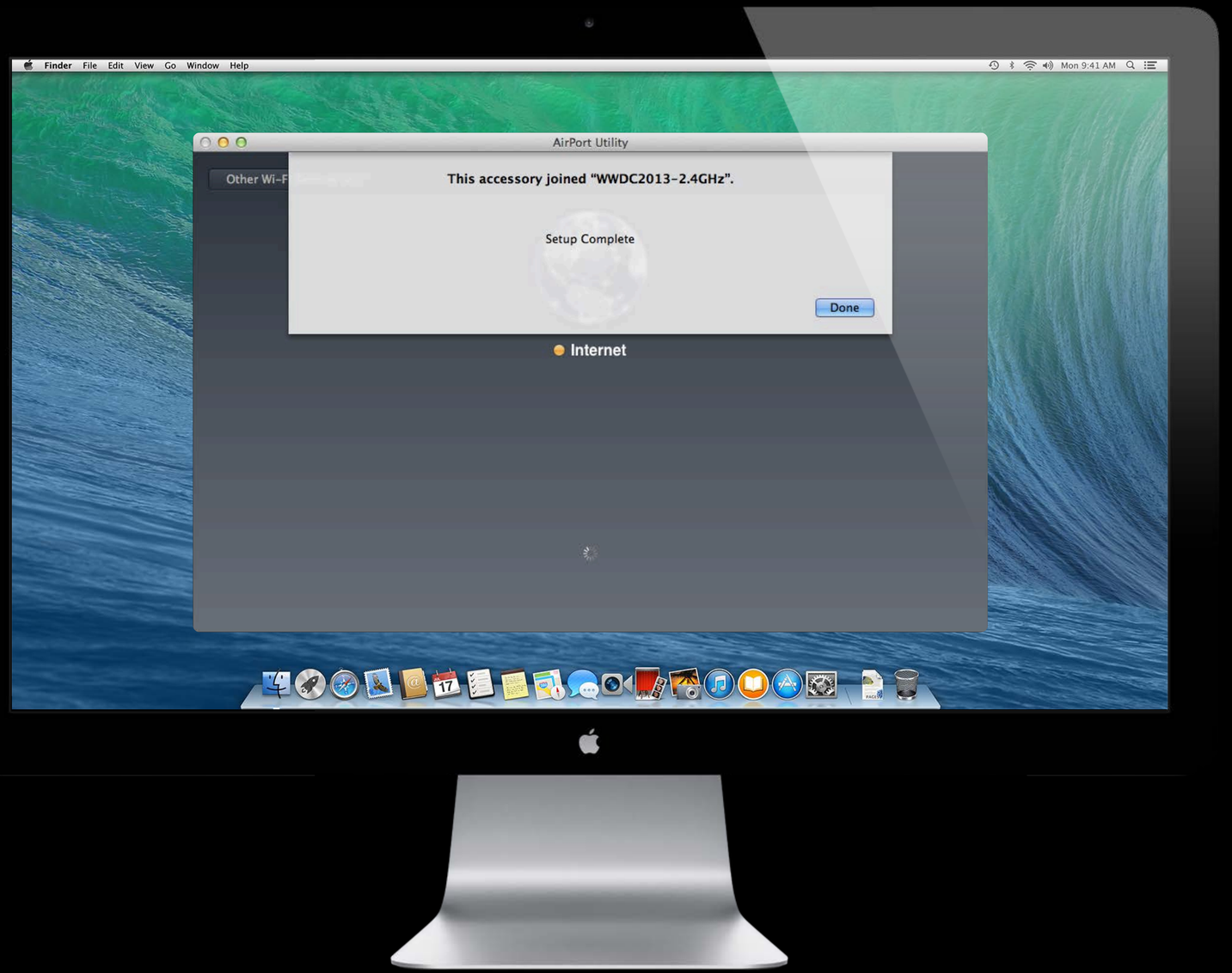
NEW



AirPlay Audio

AirPlay Audio

- Enable Wi-Fi accessories
  to accept AirPlay audio streams

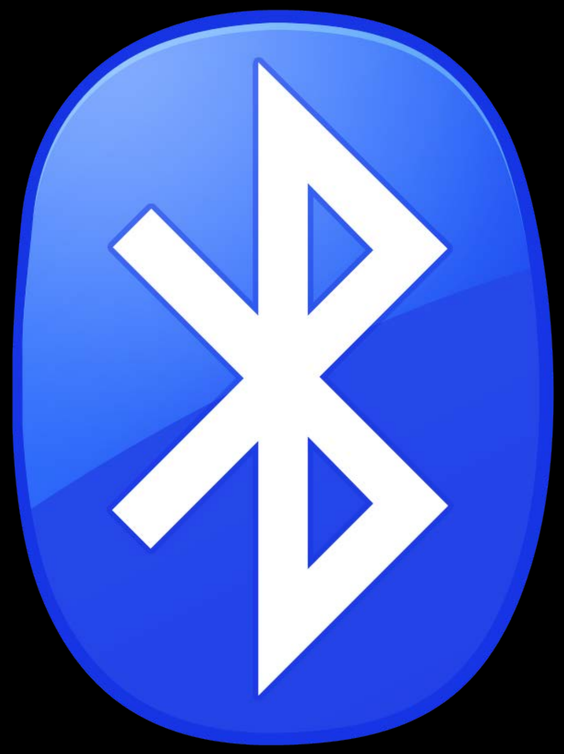
AirPlay Audio

- Enable Wi-Fi accessories to accept AirPlay audio streams
- AirPlay audio available for implementation on platform of choice
- AirPlay product definition, feature set, compliance, and certification programs all remain unchanged

Bluetooth Update

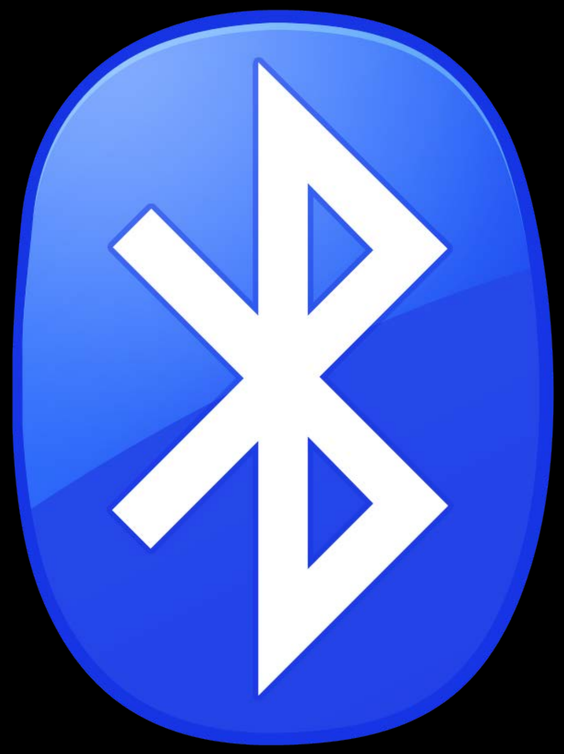
Brian Tucker
Manager, Wireless Software Engineering

451% increase in listed Bluetooth stereo speakers



451% increase in listed Bluetooth stereo speakers

Over 1 billion BLE total devices to ship by 2013



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Over 1 billion BLE total devices to ship by 2013

Every major mobile OS manufacturer now supports BLE

Healthcare

Sports and Fitness

Security

Automation

Entertainment

Toys

Pay Systems

Time Services

Proximity

Healthcare

Sports and Fitness

Security

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Proximity

Healthcare

Healthcare

- Huge growth seen in BLE based health care accessories
  - Quantified Self, i.e.: Blood Glucose, Heart Rate, etc.
  - Keeping Patient and Doctor connected

Healthcare

- Huge growth seen in BLE based health care accessories
  - Quantified Self, i.e.: Blood Glucose, Heart Rate, etc.
  - Keeping Patient and Doctor connected
- New Apple-designed Hearing Aid audio transport
  - Integrated into iOS 7
  - Used for both audio and data

Healthcare

- Improved CoreBluetooth Backgrounding to make even better accessories
  - App Preservation and Restoration

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Sports and Fitness

Sports and Fitness

Fitbit FLEX

Sports and Fitness

Fitbit FLEX

Adidas Smart Ball

Sports and Fitness

Fitbit FLEX

Adidas Smart Ball

94Fifty Basketball

Sports and Fitness

- Long term accessory interaction
- iOS 7 CoreBluetooth App Preservation and Restoration

Fitbit FLEX

Adidas Smart Ball

94Fifty Basketball

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Security

Kwikset Kevo

Security

Kwikset Kevo

Lockitron

Security

Kwikset Kevo

Lockitron

August Smart Lock

Security

- iOS 7 CoreBluetooth State Preservation and Restoration is a perfect match for security use cases

Kwikset Kevo

Lockitron

August Smart Lock

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Entertainment

Entertainment

- Game Controllers

Entertainment

- Game Controllers
- Keyboards

Entertainment

- Game Controllers
- Keyboards
- Remotes

Entertainment

- Game Controllers
- Keyboards
- Remotes
- iOS 7 now natively supports HID over BLE accessories in iOS 7

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Proximity

Proximity

Proximity

- Security

Proximity

- Security
- Advertising

Proximity

- Security
- Advertising
- Location Services

Proximity

- Security
- Advertising
- Location Services
- Points of Interest

Proximity

- Security
- Advertising
- Location Services
- Points of Interest
- Native iOS to iOS BLE-based proximity services in iOS 7 through CoreLocation

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Proximity

What's New in iOS 7

- CoreBluetooth App Preservation and Restoration
- BLE-based Proximity services
- iOS Hosted BLE profiles
  - HID over BLE
  - Alert notification
- Hearing Aid support

State of OS X Bluetooth

State of OS X Bluetooth

Classic Bluetooth	
Advanced Audio Distribution Profile	A2DP 1.2
Audio Video Remote Control Profile	AVRCP 1.2
Dial Up Networking	DUN 1.1
File Transfer Protocol	FTP 1.1
Object Push Profile	OPP 1.1
Human Interface Device Profile	HID 1.1
Headset Profile	HSP 1.0
Handsfree Profile	HFP 1.0
Personal Area Network Profile	PAN 1.0
Serial Port Profile	SPP 1.1

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Serial Port Profile	SPP 1.1

Bluetooth Low Energy	
Low Energy Central Role	BT 4.0
Low Energy Peripheral Role	BT 4.0
Low Energy Peripheral Role	1.0

State of iOS Bluetooth

State of iOS Bluetooth

Classic Bluetooth	
Hands-Free Profile	HFP 1.6
Phone Book Access Profile	PBAP 1.1
Advanced Audio Distribution Profile	A2DP 1.2
Audio Video Remote Control Profile	AVRCP 1.4
Human Interface Device Profile	HID 1.0
Personal Area Networking	PAN 1.0
Device ID Profile	DID 1.2
Message Access Profile	MAP 1.1

State of iOS Bluetooth

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Custom
iPod Accessory Protocol

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Custom

iPod Accessory Protocol

Bluetooth Low Energy

Low Energy Central Manager	BT 4.0
Low Energy Service Manager	BT 4.0
Low Energy Peripheral Role	BT 4.0
HID over GATT Profile	1.0
Alert Notification Service	1.0
Apple Notification Center Service	1.0
Current Time Service	1.0

Wired

Edwin Foo
iOS Accessories Engineering

Thunderbolt

- High speed data and high resolution video on one cable
- PCI Express and DisplayPort protocol
- Dual-channel, bi-directional 10 Gbps per port
- Up to 10 W for bus powered devices
- 20 times faster than USB 2.0 and up to 12 times faster than FireWire 800
- Daisy chain up to six devices per port

Thunderbolt

- Certification program ensures high quality devices
- Refer to Thunderbolt Device Driver Programming Guide on Apple website

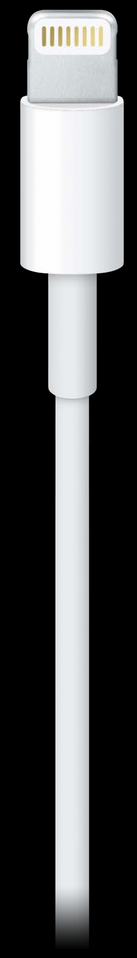
USB 3.0

- Most Macs ship with USB 3.0 ports
- 900 mA power per port for device power and charging
- Up to 5 Gb/s of data throughput
- High performance storage devices should use UAS
- USB-IF certification recommended

Lightning

NEW

- Digital
- Reversible
- Positive insertion/removal
- Bi-directional power
- Data
  - USB Host Mode (Audio/MIDI, HID, iAP)
  - USB Device Mode (Audio, iAP)
  - Serial (iAP)



Headphone Remote and Mic

- Apps can receive remote control events
- Standardized microphone

Game Controller

NEW

- Game Controller framework
- iOS 7 and OS X 10.9
- Consistent control layouts
- Transport agnostic
- Prototypes in lab
- Additional Information
  - MFi Accessory Interface Specification

More Information

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Desktop Technologies Evangelist
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More Information

Apple Developer Forums
http://devforums.apple.com

Developer Technical Support
http://developer.apple.com/support/technical/

Related Sessions

Core Bluetooth	Nob Hill Tuesday 2:00PM
Integrating with Game Controllers	Pacific Heights Tuesday 3:15PM
What’s New in Kext Development	Russian Hill Wednesday 10:15AM
What’s New in Core Location	Presidio Thursday 11:30AM
Advances in AirPrint	Nob Hill THursday 10:15AM

Labs

iOS and OS X Accessories Lab	Core OS Tuesday 11:30AM	
iOS and OS X Accessories Lab	Core OS Thursday 9:00AM	

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