

iOS Forensics

12th February 2020

In this lecture

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Acquisition Methods

Lockdown Files



Reading: elcomsoft blog, Mattia Epifani

Mobile Forensics - Advanced Investigative Strategies, Afonin & Katalov

Introduction

Legend [edit]

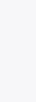
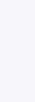
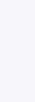
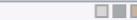
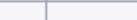
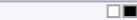
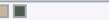
Obsolete	Products that were discontinued more than 7 years ago. Obsolete products are not eligible for product service from Apple worldwide.
Vintage	Products that were discontinued at least 5 years ago. Vintage products are eligible for service from Apple in the United States and Turkey only. Considered obsolete outside of the United States and Turkey.
Discontinued and unsupported	Products that were discontinued less than 5 years ago and do not support the latest iOS version.
Discontinued but still supported	Products that were discontinued less than 5 years ago but support the latest iOS version.
Current	Products that are currently sold and in production.
Upcoming	Products that have been announced but not released yet.

Source:^[3]

iPhone [edit]

Gen. [hide]	Model	Announced	Released	Discontinued	Unsupported	Months supported to date
1	iPhone	January 9, 2007	June 29, 2007; 12 years ago	July 11, 2008; 11 years ago	June 21, 2010; 9 years ago	35 months
2	iPhone 3G	June 9, 2008	July 11, 2008; 11 years ago	June 7, 2010; 9 years ago	March 9, 2011; 8 years ago	31 months
3	iPhone 3GS	June 8, 2009	June 19, 2009; 10 years ago	September 12, 2012; 7 years ago	February 21, 2014; 5 years ago	56 months
4	iPhone 4 ^[4]	June 7, 2010	June 24, 2010; 9 years ago	September 10, 2013; 6 years ago	September 17, 2014; 5 years ago	50 months
5	iPhone 4S ^[4]	October 4, 2011	October 14, 2011; 8 years ago	September 9, 2014; 5 years ago	July 22, 2019; 6 months ago	93 months
6	iPhone 5	September 12, 2012	September 21, 2012; 7 years ago	September 10, 2013; 6 years ago	July 22, 2019; 6 months ago	82 months
7	iPhone 5C	September 10, 2013	September 20, 2013; 6 years ago	September 9, 2015; 4 years ago	September 19, 2017; 2 years ago	47 months
7	iPhone 5S	September 10, 2013	September 20, 2013; 6 years ago	March 21, 2016; 3 years ago	January 28, 2020; 13 days ago	76 months
8	iPhone 6 / 6 Plus	September 9, 2014	September 19, 2014; 5 years ago	September 7, 2016; 3 years ago	January 28, 2020; 13 days ago	64 months
9	iPhone 6S / 6S Plus	September 9, 2015	September 25, 2015; 4 years ago	September 12, 2018; 16 months ago	Supported	52 months
9	iPhone SE	March 21, 2016	March 31, 2016; 3 years ago	September 12, 2018; 16 months ago	Supported	46 months
10	iPhone 7 / 7 Plus	September 7, 2016	September 16, 2016; 3 years ago	September 10, 2019; 5 months ago	Supported	40 months
11	iPhone 8 / 8 Plus	September 12, 2017	September 22, 2017; 2 years ago	In production		28 months
11	iPhone X	September 12, 2017	November 3, 2017; 2 years ago	September 12, 2018; 16 months ago	Supported	27 months
12	iPhone XS / XS Max	September 12, 2018	September 21, 2018; 16 months ago	September 10, 2019; 5 months ago	Supported	16 months
12	iPhone XR	September 12, 2018	October 26, 2018; 15 months ago	In production		15 months
13	iPhone 11	September 10, 2019	September 20, 2019; 4 months ago	In production		4 months
13	iPhone 11 Pro / 11 Pro Max	September 10, 2019	September 20, 2019; 4 months ago	In production		4 months

Introduction

Model	[hide]	iPhone 8	iPhone 8 Plus	iPhone XR	iPhone 11	iPhone 11 Pro	iPhone 11 Pro Max
Picture (not to scale)							
Initial release operating system		iOS 11.0		iOS 12.0		iOS 13.0	
Latest release operating system				iOS 13.3.1			
Display		4.7 in (120 mm), 4.1 by 2.3 in (104 by 58 mm), 16:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,334 × 750 px screen resolution at 326 ppi, 1400:1 contrast ratio, 625 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating, True Tone Display	5.5 in (140 mm), 4.8 by 2.7 in (122 by 69 mm), 16:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,920 × 1,080 px (Full HD) screen resolution at 401 ppi, 1300:1 contrast ratio, 625 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating, True Tone Display	6.06 in (154 mm), 5.54 by 2.56 in (141 by 65 mm), ~19.5:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,792 × 828 px screen resolution at 326 ppi, 1,400:1 contrast ratio, 625 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating, True Tone display	5.85 in (149 mm), 5.31 by 2.45 in (135 by 62 mm), ~19.5:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), AMOLED screen, 2,436 × 1,125 px screen resolution at 458 ppi, 2,000,000:1 contrast ratio, 800 cd/m² max brightness, fingerprint-resistant oleophobic coating, True Tone display, Dolby Vision and HDR10 support	6.46 in (164 mm), 5.9 by 2.73 in (150 by 69 mm), ~19.5:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), AMOLED screen, 2,688 × 1,242 px screen resolution at 458 ppi, 2,000,000:1 contrast ratio, 800 cd/m² max brightness, fingerprint-resistant oleophobic coating, True Tone display, Dolby Vision and HDR10 support	
Storage		64, 128 and 256 GB NAND flash driven by NVMe Express controller				64, 256 and 512 GB NAND flash driven by NVMe Express controller	
Processor		2.39 GHz hexa-core Apple-designed 64-bit Apple A11 Bionic (6-cores: 2 Monsoon high-performance, 4 Mistral high-efficiency) with embedded M11 motion coprocessor and dual-core Neural Engine	2.49 GHz hexa-core Apple-designed 64-bit Apple A12 Bionic (6-cores: 2 Vortex high-performance, 4 Tempest high-efficiency) with embedded M12 motion coprocessor and octa-core Neural Engine	2.65 GHz hexa-core Apple-designed 64-bit Apple A13 Bionic (6-cores: 2 Lightning high-performance, 4 Thunder high-efficiency) with embedded M13 motion coprocessor and octa-core Neural Engine			
Bus width				64-bit ^[5]			
Graphics		Apple designed tri-core GPU	Apple designed (1.1 GHz, quad-core) "G11P" GPU ^[6]				
RAM		2 GB LPDDR4X DRAM	3 GB LPDDR4X DRAM			4 GB LPDDR4X DRAM	
Connector				8-pin Lightning connector			
Connectivity		Wi-Fi (802.11 a/b/g/n/ac) with two spatial stream MIMO			Wi-Fi (802.11 a/b/g/n/ac/ax) with two spatial stream MIMO		
SIM card form-factor		Nano-SIM			Nano-SIM and eSIM ^[7]	Dual Nano-SIM in China mainland, Hong Kong and Macau ^[8]	
Touch ID		Yes			No		
Face ID		No			Yes		
3D Touch		Yes			No		
GPS				Yes			
GLONASS				Yes			
Galileo				Yes			
QZSS				Yes			
Digital compass				Yes			
Barometer				Yes			
Bluetooth				Bluetooth 5.0 ^[9]			
Baseband / RF Transceiver		Qualcomm MDM9645M / Qualcomm WTR3925 / Qualcomm WTR4905 ^[10] or Intel XMM7360 / Intel PMB5750 ^[11]		Intel XMM7560 Modem ^[6]			
Additional features		In addition to 7/7 Plus: Fast charging (50% in 30 minutes), Qi wireless charging		IP67 dust and water-resistant Fast charging (50% in 30 minutes), Qi wireless charging		IP68 dust and water-resistant, Fast charging, Qi wireless charging	
Cameras	I Sight	12 MP, quad-LED flash, autofocus, IR filter, Burst mode, f/1.8 aperture, 6-element lens, 4K video recording at 30 or 60 fps or 1080p at 30 or 60 fps, slow-motion video (1080p) at 120 or 240 fps, timelapse with stabilization, panorama (up to 63 megapixels), facial recognition, digital image stabilization, optical image stabilization	Dual-camera 12 MP, quad-LED flash, f/1.8 aperture, optical image stabilization (wide-angle) 12 MP, quad-LED flash, autofocus, IR filter, Burst mode, 6-element lens, 4K video recording at 30 or 60 fps or 1080p at 30 or 60 fps, slow-motion video (1080p) at 120 fps or 240 fps, timelapse with stabilization, panorama (up to 63 megapixels), Portrait Mode, Portrait Lighting, facial recognition, digital image stabilization	12 MP, quad-LED flash, f/1.8 aperture, optical image stabilization (wide-angle) 12 MP, f/2.4 aperture (ultra wide angle 0.5X), quad-LED flash, autofocus, IR filter, Burst mode, 6-element lens, 4K video recording at 30 or 60 fps or 1080p at 30 or 60 fps, slow-motion video (1080p) at 120 fps or 240 fps, timelapse with stabilization, panorama (up to 63 megapixels), Portrait Mode, Portrait Lighting, facial recognition, digital image stabilization	Dual-camera 12 MP, f/1.8 aperture, optical image stabilization (wide-angle) 12 MP, f/2.0 aperture (telephoto 2X), 12 MP, f/2.4 aperture (ultra wide angle 0.5X), quad-LED flash, autofocus, IR filter, Burst mode, 6-element lens, 4K video recording at 30 or 60 fps or 1080p at 30 or 60 fps, slow-motion video (1080p) at 120 fps or 240 fps, timelapse with stabilization, panorama (up to 63 megapixels), Portrait Mode, Portrait Lighting, facial recognition, digital image stabilization, dual-optical image stabilization		
	FaceTime	7 MP FaceTime HD camera with deep trench isolation and auto image stabilization video recording at 1080p ^[12] 1080p HD video recording, Wide color capture for photos and Live Photos ^{[13][14]}		7 MP TrueDepth camera with deep trench isolation, auto image stabilization, Portrait Mode and Portrait Lighting video recording at 1080p		12 MP TrueDepth camera with deep trench isolation, auto image stabilization, Portrait Mode and Portrait Lighting video recording at 4K at 60 fps or 1080p at 120 fps	
HAC Rating				M3, T4 ^[15]			
Compatible with Made for iPhone Hearing Aids				Yes ^[15]			
Live Listen				Yes ^[16]			
Materials		Silver (white front with "Silver" glass back), Space Gray (black front with "Space Gray" glass back), Gold (white front with "Gold" glass back), (PRODUCT)RED (black front with "(PRODUCT)RED" glass back)		All models have black front White: White anodized aluminum sides with White glass back; Black: Black anodized aluminum sides with Black glass back; Blue: Blue anodized aluminum sides with Blue glass back; Yellow: Yellow anodized aluminum sides with Yellow glass back; Coral: Coral anodized aluminum sides with Coral glass back; (PRODUCT)RED: (PRODUCT)RED anodized aluminum sides with (PRODUCT)RED glass back	All models have black front White: White anodized aluminum sides with White glass back; Black: Black anodized aluminum sides with Black glass back; Purple: Purple anodized aluminum sides with Purple glass back; Yellow: Yellow anodized aluminum sides with Yellow glass back; Green: Green anodized aluminum sides with Green glass back; (PRODUCT)RED: (PRODUCT)RED anodized aluminum sides with (PRODUCT)RED glass back	All models have black front Midnight green: Midnight Green stainless steel sides with Midnight Green glass back; Silver: Silver stainless steel sides with Silver glass back; Space Gray: Space Gray steel sides with Black glass back; Gold: Gold steel sides with Gold glass back	
Colors							
Power		3.82 V 6.96 W·h (1,821 mAh) ^[17]	3.82 V 10.28 W·h (2,691 mAh) ^[18]	3.82 V 11.24 W·h (2,942 mAh) ^[19]	3.83 V 11.91 W·h (3,110 mAh) ^[20]	3.83 V 11.67 W·h (3,046 mAh) ^[21]	3.79 V 15.04 W·h (3,969 mAh) ^[22]
Rated battery life (hours)		audio: 40 video: 13 Talk over 3G: 14 Browsing internet: 12 Standby:	audio: 60 video: 14 Talk over 3G: 21 Browsing internet: 13 Standby:	audio: 65 video: 16 Talk over 3G: 25 Browsing internet: 15 Standby:	audio: 65 video: 17 Streaming: 10	audio: 65 video: 18 Streaming: 11	audio: 80 video: 20 Streaming: 12
Dimensions		138.4 mm (5.45 in) H 67.3 mm (2.65 in) W 7.3 mm (0.29 in) D	158.4 mm (6.24 in) H 78.1 mm (3.07 in) W 7.5 mm (0.30 in) D	150.9 mm (5.94 in) H 75.7 mm (2.98 in) W 8.3 mm (0.33 in) D		144 mm (5.7 in) H 71.4 mm (2.81 in) W 8.1 mm (0.32 in) D	158 mm (6.2 in) H 77.8 mm (3.06 in) W 8.1 mm (0.32 in) D
Weight		148 g (5.2 oz)	202 g (7.1 oz)		194 g (6.8 oz)	188 g (6.6 oz)	228 g (8.0 oz)
Greenhouse gas emissions		57 kg CO ₂ e ^[23]	68 kg CO ₂ e ^[24]	62 kg CO ₂ e ^[25]	72 kg CO ₂ e ^[26]	80 kg CO ₂ e ^[27]	86 kg CO ₂ e ^[28]
Hardware strings		iPhone10,1 iPhone10,4	iPhone10,2 iPhone10,5	iPhone11,8	iPhone12,1	iPhone12,3	iPhone12,5
Model number ^[29]		A1863 A1905 A1906 A1907	A1864 A1897 A1898 A1899	A1984 A2105 A2106 A2107 A2108	A2111 A2221 A2223	A2160 A2215 A2217	A2161 A2218 A2220
Announced		September 12, 2017		September 12, 2018		September 10, 2019	
Released		September 22, 2017 (PRODUCT)RED: April 13, 2018 128 GB: September 10, 2019		October 26, 2018		September 20, 2019	

Introduction

Discontinued but still supported [edit]										
Model	[hide]	iPhone 6S	iPhone 6S Plus	iPhone SE	iPhone 7	iPhone 7 Plus	iPhone X	iPhone XS	iPhone XS Max	
Picture										
Initial release operating system		iOS 9.0		iOS 9.3		iOS 10.0		iOS 11.0.1		iOS 12.0
Latest release operating system						iOS 13.3.1				
Display		4.7 in (120 mm), 4.1 by 2.3 in (104 by 58 mm), 16:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,334 × 750 px screen resolution at 326 ppi, 1400:1 contrast ratio, 500 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating	5.5 in (140 mm), 4.8 by 2.7 in (122 by 69 mm), 16:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,920 × 1,080 px (Full HD) screen resolution at 401 ppi, 1300:1 contrast ratio, 500 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating	4 in (100 mm), 3.5 by 1.9 in (89 by 48 mm), 71:40 (~16:9) aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,334 × 750 px screen resolution at 326 ppi, 1400:1 contrast ratio, 500 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating	4.7 in (120 mm), 4.1 by 2.3 in (104 by 58 mm), 16:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,334 × 750 px screen resolution at 326 ppi, 1400:1 contrast ratio, 625 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating	5.5 in (140 mm), 4.8 by 2.7 in (122 by 69 mm), 16:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,920 × 1,080 px (Full HD) screen resolution at 401 ppi, 1300:1 contrast ratio, 625 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating	5.85 in (149 mm), 5.31 by 2.45 in (135 by 62 mm), ~19.5:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), AMOLED screen, 2,436 × 1,125 px screen resolution at 458 ppi, 1,000,000:1 contrast ratio, 625 cd/m² max brightness, fingerprint-resistant oleophobic coating, True Tone display, Dolby Vision and HDR10 support	6.46 in (164 mm), 5.9 by 2.73 in (150 by 69 mm), ~19.5:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), AMOLED screen, 2,688 × 1,242 px screen resolution at 458 ppi, 1,000,000:1 contrast ratio, 625 cd/m² max brightness, fingerprint-resistant oleophobic coating, True Tone display, Dolby Vision and HDR10 support	6.46 in (164 mm), 5.9 by 2.73 in (150 by 69 mm), ~19.5:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), AMOLED screen, 2,688 × 1,242 px screen resolution at 458 ppi, 1,000,000:1 contrast ratio, 625 cd/m² max brightness, fingerprint-resistant oleophobic coating, True Tone display, Dolby Vision and HDR10 support	
Storage		16, 32, 64 and 128 GB NAND Flash driven by NVMe Express controller			32, 128 and 256 GB NAND flash driven by NVMe Express controller		64 and 256 GB NAND Flash driven by NVMe Express controller		64, 256 and 512 GB NAND flash driven by NVMe Express controller	
Processor		1.85 GHz dual-core Apple-designed A7 64-bit Apple A9 Twister with embedded M9 motion coprocessor			2.33 GHz quad-core Apple-designed 64-bit Apple A10 Fusion (4-cores: 2 Hurricane high-performance, 2 Zephyr high-efficiency) with embedded M10 motion coprocessor		2.39 GHz hexa-core Apple-designed 64-bit Apple A11 Bionic (6-cores: 2 Monsoon high-performance, 4 Mistral high-efficiency) with embedded M11 motion coprocessor and dual-core Neural Engine		2.49 GHz hexa-core Apple-designed 64-bit Apple A12 Bionic (6-cores: 2 Vortex high-performance, 4 Tempest high-efficiency) with embedded M12 motion coprocessor and octa-core Neural Engine	
Bus frequency and width		64-bit								
Graphics		PowerVR GT7600 (hexa-core, 450 MHz) GPU ^[30]		Custom Apple PowerVR GT7600 Plus (hexa-core) GPU ^[31]		Apple designed tri-core GPU		Apple designed (1.1 GHz, quad-core) "G11P" GPU ^[6]		
RAM		2 GB LPDDR4 DRAM		3 GB LPDDR4 DRAM		3 GB LPDDR4X DRAM		4 GB LPDDR4X DRAM		
Connector		8-pin Lightning connector								
Connectivity		Broadcom BCM4350 ^[32]	Broadcom BCM4345 ^[33]	Wi-Fi (802.11 a/b/g/n/ac) with two spatial stream MIMO Murata 339S00199 ^[10]						
SIM card form-factor		Nano-SIM								
Touch ID		Yes						No		
Face ID		No						Yes		
3D Touch		Yes	No				Yes			
GLONASS				Yes						
Galileo		No						Yes		
GPS				Yes						
Digital compass				Yes						
Barometer		Yes	No			Yes				
Bluetooth		Bluetooth 4.2 ^[34]		Murata 339S00199 ^[10]				Bluetooth 5.0		
Cellular		Broadcom BCM4350 ^[32] In addition to prior: LTE Advanced with dual-band carrier aggregation, LTE band 30 (WCS) (depending on model)	Broadcom BCM4345 ^[33]	Same as iPhone 6S/6S Plus	Same as iPhone 6S/6S Plus, except that all models support LTE band 30 (WCS), that models with Intel modems do not support CDMA, and all models support LTE Advanced with up to tri-band carrier aggregation					
Baseband / RF Transceiver		Qualcomm MDM9635M / Qualcomm WTR3925 ^{[35][36]}	Qualcomm MDM9625M / Qualcomm WTR1625L ^[33]	Qualcomm MDM9625M / Qualcomm WTR1625L ^[33]		Models A1865 and A1902: Qualcomm MDM9655 Model A1901: Intel XMM7480		Intel XMM7560 Modem ^[6]		
Additional Features		In addition to 6/6 Plus: "Hey Siri" always-on voice activation		In addition to 6S Plus: IP67 dust and water-resistant Analog Devices AD7149 Capacitance Sensor Controller ^[10]		In addition to 8/8 Plus: Face ID, Animoji		In addition to X: IP68 dust and water-resistant		
Cameras	ISight	12 MP (1.22 µm), dual-tone flash, autofocus, IR filter, Burst mode, f/2.2 aperture, 4K video recording at 30 fps or 1080p at 30 or 60 fps, slow-motion video (1080p at 120 fps and 720p at 240 fps), timelapse with stabilization, panorama (up to 63 megapixels), facial recognition, digital image stabilization, optical image stabilization (iPhone 6S Plus only) ^[37]	12 MP (1.4 µm), quad-LED flash, autofocus, IR filter, Burst mode, f/1.8 aperture, 6-element lens, 4K video recording at 30 fps or 1080p at 30 or 60 fps, slow-motion video (1080p at 120 fps and 720p at 240 fps), timelapse with stabilization, panorama (up to 63 megapixels), facial recognition, digital image stabilization, optical image stabilization ^[12]	Dual-camera 12 MP (1.4 µm), f/1.8 aperture, optical image stabilization (wide-angle) 12 MP (1 µm), quad-LED flash, f/2.8 aperture (telephoto 2X), quad-LED flash autofocus, IR filter, Burst mode, 6-element lens, 4K video recording at 30 or 60 fps or 1080p at 30 or 60 fps, slow-motion video (1080p at 120 or 240 fps), timelapse with stabilization, panorama (up to 63 megapixels), Portrait Mode, Portrait Lighting, facial recognition, digital image stabilization, optical image stabilization	Dual-camera 12 MP, quad-LED flash, f/1.8 aperture, optical image stabilization (wide-angle) 12 MP, quad-LED flash, f/2.4 aperture (telephoto 2X), autofocus, IR filter, Burst mode, 6-element lens, 4K video recording at 30 or 60 fps or 1080p at 30 or 60 fps, slow-motion video (1080p at 120 or 240 fps), timelapse with stabilization, panorama (up to 63 megapixels), Portrait Mode, Portrait Lighting, facial recognition, digital image stabilization, dual-optical image stabilization					
	FaceTime	5 MP, Burst mode, f/2.2 aperture, Exposure control, Face detection, Auto-HDR, 720p HD video recording, Retina flash	1.2 MP photos (1280 by 960), f/2.4 aperture, 720p HD video recording, auto HDR for photos, backside illumination sensor, face detection, exposure control, Retina flash ^[38]	7 MP FaceTime HD camera with deep trench isolation and auto image stabilization ^[12] 1080p HD video recording, Wide color capture for photos and Live Photos ^{[13][14]}	7 MP TrueDepth camera with deep trench isolation, auto image stabilization, Portrait Mode and Portrait Lighting					
Audio codec		Cirrus Logic 33851201 ^{[39][40][41]}								
HAC Rating				M3, T4 ^[15]						
Made for iPhone Hearing Aids Compatible				Yes ^[15]						
Live Listen				Yes ^[16]						
Materials		Silver (white front with "Silver" aluminum metal back), Space Gray (black front with anodized aluminum "Space Gray" metal back), Gold (white front with anodized aluminum "Gold" metal back), and Rose Gold (white front with anodized aluminum "Rose Gold" metal back)		Jet Black (black front with "Jet Black" aluminum metal back), Black (black front with anodized aluminum "Black" metal back), Silver (white front with "Silver" aluminum metal back), Gold (white front with anodized aluminum "Gold" metal back), and Rose Gold (white front with anodized aluminum "Rose Gold" metal back), (PRODUCT)RED (white front with "(PRODUCT)RED" aluminum metal back)		All models have black front Silver: Silver stainless steel sides with Silver glass back; Space Gray: Space Gray steel sides with Black glass back; Gold: Gold steel sides with Gold glass back				
Colors					From release to September 12, 2017: (128 and 256 GB only)					
Power		3.82 V 6.55 Wh (1,715 mAh) ^[42]	3.80 V 10.45 Wh (2,750 mAh) ^[43]	3.82 V 6.21 Wh (1,624 mAh) ^[44]	3.80 V 7.45 Wh (1,960 mAh) ^[45]	3.82 V 11.10 Wh (2,915 mAh) ^[46]	3.81 V 10.35 Wh (2,716 mAh) ^[47]	3.81 V 10.13 Wh (2,659 mAh) ^[48]	3.80 V 12.08 Wh (3,179 mAh) ^[48]	
Rated battery life (hours)		audio: 50 video: 11 Talk over 2G: 24 Talk over 3G: 14 Browsing over 3G: 10 Browsing over LTE: 10 Browsing over Wi-Fi: 11	audio: 80 video: 14 Talk over 2G: 42 Talk over 3G: 24 Browsing over 3G: 12 Browsing over LTE: 12 Browsing over Wi-Fi: 12	audio: 50 video: 13 Talk over 2G: 24 Talk over 3G: 14 Browsing over 3G: 12 Browsing over LTE: 13 Browsing over Wi-Fi: 13	audio: 40 video: 13 Talk over 3G: 14 Browsing over 3G: 12 Browsing over LTE: 12 Browsing over Wi-Fi: 14	audio: 60 video: 14 Talk over 3G: 21 Browsing over 3G: 13 Browsing over LTE: 13 Browsing over Wi-Fi: 15	audio: 60 video: 13 Talk over 3G: 21 Browsing internet: 12	audio: 60 video: 14 Talk over 3G: 20 Browsing internet: 12	audio: 65 video: 15 Talk over 3G: 25 Browsing internet: 13	

Introduction

Discontinued and unsupported (64-bit CPU) [edit]

Model	[hide]	iPhone 5S	iPhone 6	iPhone 6 Plus
Picture				
Initial release operating system		iOS 7.0		iOS 8.0
Latest release operating system			iOS 12.4.5	
Display		4 in (100 mm), 3.5 by 1.9 in (89 by 48 mm), 71:40 (~16:9) aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,136 × 640 px (WVGA) screen resolution at 326 ppi, pixel size 78 µm, 800:1 contrast ratio, 500 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating	4.7 in (120 mm), 4.1 by 2.3 in (104 by 58 mm), 16:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,334 × 750 px screen resolution at 326 ppi, 1400:1 contrast ratio, 500 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating	5.5 in (140 mm), 4.8 by 2.7 in (122 by 69 mm), 16:9 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,920 × 1,080 px (Full HD) screen resolution at 401 ppi, 1300:1 contrast ratio, 500 cd/m² max brightness, LED backlight and fingerprint-resistant oleophobic coating
Storage		16, 32 and 64 GB	16, 32, 64 and 128 GB NAND Flash	16, 64 and 128 GB NAND Flash
Processor		1.3 GHz dual-core Apple-designed ARMv8-A 64-bit Apple A7 Cyclone (128 KB L1 + 1 MB L2 + 4 MB L3) with M7 motion coprocessor ^{[60][61]}	1.4 GHz dual-core Apple-designed ARMv8-A 64-bit Apple A8 Typhoon (128 KB L1 + 1 MB L2 + 4 MB L3) with M8 motion coprocessor	
Bus frequency and width			64-bit	
Graphics		PowerVR G6430 (quad-core, 450 MHz) GPU ^[62]		PowerVR GX6450 (quad-core, 450 MHz) GPU ^[63]
RAM			1 GB LPDDR3 DRAM	
Connector			8-pin Lightning connector	
Connectivity		Wi-Fi (802.11 a/b/g/n) (802.11n on 2.4 GHz and 5 GHz) ^{[64][65][66]} Broadcom BCM4334 ^{[60][39][67][68][69][70]}		Wi-Fi (802.11 a/b/g/n/ac) Broadcom BCM4345 ^{[71][72]}
SIM card form-factor			Nano-SIM	
Touch ID			Yes	
Face ID			No	
3D Touch			No	
GLONASS			Yes	
Galileo			No	
GPS			Yes	
Digital compass			Yes	
Barometer		No		Yes
Bluetooth		Bluetooth 4.0 Broadcom BCM4334 ^{[60][39][73][68][69][70]}		Bluetooth 4.2 ^[34] Broadcom BCM4345 ^{[71][72]}
Cellular		In addition to prior: LTE bands 7/8/18/19/20/26, TD-LTE bands 38/39/40 (depending on model) ^{[65][66]}		In addition to prior: LTE bands 28/29, TD-LTE band 41 (depending on model)
Baseband / RF Transceiver		Qualcomm MDM9615M / Qualcomm WTR1605L ^[69]		Qualcomm MDM9625M / Qualcomm WTR1625L ^{[40][41]}
Additional Features		In addition to prior: Touch ID		In addition to prior: NFC
Cameras	iSight	8 MP photos with 1.5µ pixels, f/2.2 aperture, 1080p HD video (30 fps) or 720p HD video slo-mo video at 120 fps, improved video stabilization, True Tone flash, infrared cut-off filter, back-illuminated sensor, face detection, auto focus, panorama, ability to take photos while shooting videos and Burst mode	8 MP photos with 1.5µ pixels, f/2.2 aperture, optical image stabilization (iPhone 6 Plus only), five-element lens with sapphire crystal lens cover, 1080p HD video (30 fps or 60 fps) with 3x zoom, 720p slo-mo video at 120 fps or 240 fps, time-lapse video, cinematic video stabilization, auto image stabilization, auto HDR for photos, True Tone flash, hybrid IR filter, backside illumination sensor, improved face detection, exposure control, auto focus with Focus Pixels, Continuous autofocus video, panorama (up to 43 megapixels), can take still photos while recording video, burst mode, tap to focus, photo and video geotagging, timer mode ^[74]	
	FaceTime	1.2 MP photos, 720p HD video (30 fps), Back-illuminated sensor, f/2.4 aperture	1.2 MP photos (1280 by 960), f/2.2 aperture, 720p HD video recording, auto HDR for photos, backside illumination sensor, face detection, exposure control ^[74]	
Audio codec			Cirrus Logic 338S1201 ^{[39][40][41]}	
HAC Rating			M3, T4 ^[15]	
Made for iPhone Hearing Aids Compatible			Yes ^[15]	
Live Listen			Yes ^[16]	
Materials		Silver (white front with "Silver" aluminum metal back), Space Gray (black front with anodized aluminum "Space Gray" metal back) or Gold (white front with anodized aluminum "Gold" metal back)		
Color		From release to September 9, 2015:	From release to September 9, 2015 and since March 10, 2017:	From release to September 9, 2015:
Power		3.8 V 5.92 W-h (1,560 mAh) ^[70]	3.8 V 6.91 W-h (1,810 mAh) ^[40]	3.8 V 11.1 W-h (2,915 mAh) ^[41]
		audio: 40 video: 10 Talk over 2G: 14 Talk over 3G: 10 Browsing over 3G: 8 Browsing over LTE: 10 Browsing over Wi-Fi: 10 Standby: 250	audio: 50 video: 11 Talk over 2G: 24 Talk over 3G: 14 Browsing over 3G: 10 Browsing over LTE: 10 Browsing over Wi-Fi: 11 Standby: 250	audio: 80 video: 14 Talk over 2G: 42 Talk over 3G: 24 Browsing over 3G: 12 Browsing over LTE: 12 Browsing over Wi-Fi: 12 Standby: 384
Rated battery life (hours)				
Dimensions		123.8 mm (4.87 in) H 58.6 mm (2.31 in) W 7.6 mm (0.30 in) D	138.1 mm (5.44 in) H 67.0 mm (2.64 in) W 6.9 mm (0.27 in) D	158.1 mm (6.22 in) H 77.8 mm (3.06 in) W 7.1 mm (0.28 in) D
Weight		112 g (4.0 oz)	129 g (4.6 oz)	172 g (6.1 oz)
Greenhouse gas emissions		65 kg CO ₂ e ^[75]	95 kg CO ₂ e ^[76]	110 kg CO ₂ e ^[77]
Hardware strings		iPhone6,1 iPhone6,2	iPhone7,2	iPhone7,1
Model number ^[29]		A1533 (North America) A1453 (US and Japan) A1457 (Europe) A1530 (Asia and Oceania) A1518 (China) A1528 (China)	A1549 A1586 A1589	A1522 A1524 A1593
FCCID		BCG-E2642A ^[78] BCG-E2643A ^[79] BCG-E2643B ^[80]		
Announced		September 10, 2013		September 9, 2014
Released		September 20, 2013		September 19, 2014
Discontinued		64 GB: September 9, 2014 16 and 32 GB: March 21, 2016		128 GB: September 9, 2015 16 and 64 GB: September 7, 2016 32 GB (iPhone 6 ONLY): September 12, 2018
Unsupported			January 28, 2020	

Introduction

Discontinued and unsupported (32-bit CPU) [edit]

Model	[hide]	iPhone	iPhone 3G	iPhone 3GS	iPhone 4	iPhone 4S	iPhone 5	iPhone 5C
Picture								
Initial release operating system		iPhone OS 1.0	iPhone OS 2.0	iPhone OS 3.0	iOS 4.0 (GSM) iOS 4.2.5 (CDMA)	iOS 5.0	iOS 6.0	iOS 7.0
Latest release operating system		iPhone OS 3.1.3	iOS 4.2.1	iOS 6.1.6	iOS 7.1.2	iOS 9.3.6	iOS 10.3.4	iOS 10.3.3
Display		3.5 in (89 mm), 2.9 by 1.9 in (74 by 48 mm), 3:2 aspect ratio, scratch-resistant ^[81] glossy glass covered screen, 262,144-color (18-bit) TN LCD, 480 × 320 px (HVGA) at 163 ppi, pixel size 156 μm, 200:1 contrast ratio, LED backlight	In addition to prior, features a fingerprint-resistant oleophobic coating. ^[82] and 16,777,216-color (24-bit) IPS LCD with hardware spatial dithering. ^[83]	3.5 in (89 mm), 2.9 by 1.9 in (74 by 48 mm), 3:2 aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit) IPS LCD screen, 960 × 640 px (DVGA) at 326 ppi, pixel size 78 μm, 800:1 contrast ratio, 500 cd/m ² max brightness. ^[84] LED backlight and fingerprint-resistant oleophobic coating	4 in (100 mm), 3.5 by 1.9 in (89 by 48 mm), 71:40 (~16:9) aspect ratio, aluminosilicate glass covered 16,777,216-color (24-bit), IPS LCD screen, 1,136 × 640 px (WSVGA) screen resolution at 326 ppi, pixel size 78 μm, 800:1 contrast ratio, 500 cd/m ² max brightness, LED backlight and fingerprint-resistant oleophobic coating			
Storage		4, 8 and 16 GB	8 and 16 GB		8, 16 and 32 GB	8, 16, 32 and 64 GB	16, 32 and 64 GB	8, 16 and 32 GB
Processor		620 MHz (underclocked to 412 MHz) Samsung 32-bit RISC ARM 11 (32 KB L1) 1176J(F)-v1.0 ^{[85][86]}	833 MHz (underclocked to 800 MHz) ARM Cortex-A8 ^{[87][88]} Samsung S5PC100 ^{[87][89]} (64 KB L1 + 256 KB L2)	1 GHz (underclocked to 800 MHz) ARM Cortex-A8 Apple A4 (SoC) ^[90] (64 KB L1 + 512 KB L2)	1 GHz (underclocked to 800 MHz) dual-core ARM Cortex-A9 Apple A5 (SoC) ^[91] (64 KB L1 + 1 MB L2)		1.3 GHz dual-core Apple-designed ARMv7s Apple A6 Swift ^[92] (64 KB L1 + 1 MB L2)	
Bus frequency and width		103 MHz (16-bit)		100 MHz (32-bit)		250 MHz (32-bit)		32-bit
Graphics		PowerVR MBX Lite 3D GPU ^[93] (103 MHz)		PowerVR SGX535 GPU (150 MHz in 3GS and 200 MHz in iPhone 4) ^{[87][94]}	PowerVR SGX543MP2 (dual-core, 200 MHz) GPU		PowerVR SGX543MP3 (triple-core, 266 MHz) GPU	
RAM		128 MB LPDDR DRAM ^[95] (137 MHz)	256 MB LPDDR DRAM ^{[87][88]} (200 MHz)		512 MB LPDDR2 DRAM ^{[96][97][98][99][100]} (200 MHz)		1 GB LPDDR2 DRAM ^{[101][102]}	
Connector			30-pin connector				8-pin Lightning connector	
Connectivity		Wi-Fi (802.11 b/g) Marvell 88W8686 ^{[83][105]}			Wi-Fi (802.11 b/g/n) (802.11n on 2.4 GHz only) ^{[103][104]}		Wi-Fi (802.11 a/b/g/n) (802.11n on 2.4 GHz and 5 GHz) ^{[64][65][66]}	
SIM card form-factor		Mini-SIM			Micro-SIM		Broadcom BCM4334 ^{[60][39][73][68][69][70]}	Nano-SIM
Touch ID		No		No				
Face ID		No		No				
GLONASS		No					Yes	
GPS		No			Yes			
Digital compass		No			Yes			
Barometer				No				
Bluetooth		Bluetooth 2.0 + EDR Cambridge Bluecore 4 ^{[83][105][110]}	Bluetooth 2.1 + EDR Cambridge Bluecore 6 ^{[83][107]}	Broadcom 4325 ^[106]	Broadcom 4329 ^{[83][107][108]}	Broadcom BCM4330 ^[109]	Bluetooth 4.0 Broadcom BCM4334 ^{[60][39][73][68][69][70]}	
Cellular		Quad band GSM/GPRS/EDGE (850, 900, 1800, 1900 MHz) Tri-band 3.6 Mbps UMTS/HSDPA (850, 1900, 2100 MHz), ^[111]	In addition to prior: In addition to prior: 7.2 Mbit/s HSDPA	In addition to prior: 7.2 Mbit/s HSDPA	In addition to prior: Penta-band UMTS/HSDPA (800, 850, 900, 1900, 2100 MHz), 5.76 Mbit/s HSUPA CDMA model: Dual-band CDMA/EV-DO Rev. A (800, 1,900 MHz)	In addition to prior: 14.4 Mbit/s HSDPA, Dynamically switching dual antenna, ^[112] Combined GSM/CDMA World phone ability	In addition to prior: LTE (bands 1/2/3/4/5/13/17/25, depending on model), ^[64] HSPA+ and DC-HSDPA	In addition to prior: LTE bands 7/8/18/19/20/26, TD-LTE bands 38/39/40 (depending on model) ^{[65][66]}
Baseband / RF Transceiver		Infineon PMB8876 (S-Gold 2) / Infineon M1817A11 ^{[83][105][107][113]}	Infineon PMB8878 (X-Gold 608) / Infineon PMB6952 ^[114]		Infineon PMB9800 (X-Gold 618) / Infineon PMB5703 ^{[83][107][115][116]} CDMA model: Qualcomm MDM6600 (combined) ^{[107][117]}	Qualcomm MDM6610 / Qualcomm RTR8605 ^{[109][118]}	Qualcomm MDM9615M / Qualcomm RTR8600 ^{[73][68]}	Qualcomm MDM9615M / Qualcomm WTR1605L ^[69]
Additional Features		USB power adapter, custom dock, earphones with remote and mic	In addition to prior: Assisted GPS	In addition to prior: Voice control, digital compass, Nike+, volume controls on earphones	In addition to prior: 3-axis gyroscope, Dual-mic noise suppression	In addition to prior: Siri voice assistant	In addition to prior: Triple microphone noise suppression, revised Apple earbuds	In addition to prior: New FaceTime backside illumination sensor
Cameras	iSight	2 MP f/2.8		3 MP, VGA (480p) video at 30 fps, auto focus	5 MP, f/2.8, 720p HD video (30 fps), back-illuminated sensor, LED flash, auto focus	8 MP (1.4 μm), ^[119] f/2.4, 1080p video (30 fps), back-illuminated sensor, face detection, video stabilization, panorama, LED flash, auto focus		In addition to prior: infrared cut-off filter, ability to take photos while shooting videos
	FaceTime	N/A			VGA (0.3 MP) photos and videos (30 fps)		1.2 MP photos, f/2.4, 720p HD video (30 fps), back-illuminated sensor	
Audio codec		Wolfson Microelectronics WM8758BG ^[105]	Wolfson Microelectronics WM6180C ^[120]	Cirrus Logic CS42L61 (CLI1495B0; 338S0589) ^{[121][122]}		Cirrus Logic CLI1560B0 (338S0987) ^[123]		Cirrus Logic CLI1583B0/CS35L19 (338S1077) ^[124]
HAC Rating		N/A		3G: M4, T4 ^[15] 2G: M3, T3 ^[15]		N/A ^[15]		M3, T4 ^[15]
Made for iPhone Hearing Aids Compatible		No					Yes ^[15]	
Live Listen		No					Yes ^[16]	
Materials		Aluminum, glass, steel, and black plastic	Glass, plastic, and steel; black or white (white not available for 8 GB models)		Black or white aluminosilicate glass and stainless steel		Black with anodized aluminum "Slate" metal or white with "Silver" aluminum metal	White, pink, yellow, blue or green polycarbonate
Color			8 and 16 GB 16 GB only	8, 16, and 32 GB 16 and 32 GB only				
Power		3.7 V 5.18 W·h (1,400 mAh) ^[83]	3.7 V 4.12 W·h (1,150 mAh) ^{[125][126]}	3.7 V 4.51 W·h (1,219 mAh) ^[127]	3.7 V 5.25 W·h (1,420 mAh) ^[108]	3.7 V 5.3 W·h (1,432 mAh) ^[128]	3.8 V 5.45 W·h (1,440 mAh) ^[73]	3.8 V 5.73 W·h (1,510 mAh) ^[69]
Rated battery life (hours)		audio: 24 video: 7 Talk over 2G: 8 Browsing Internet: 6 Standby: 250	audio: 24 video: 7 Talk over 2G: 10 Talk over 3G: 5 Browsing over 3G: 5 Browsing over Wi-Fi: 6 Standby: 300	audio: 30 video: 10 Talk over 2G: 12 Talk over 3G: 5 Browsing over 3G: 5 Browsing over Wi-Fi: 9 Standby: 300	audio: 40 video: 10 Talk over 2G: 14 Talk over 3G: 8 Browsing over 3G: 6 Browsing over Wi-Fi: 10 Standby: 200	audio: 40 video: 10 Talk over 2G: 14 Talk over 3G: 8 Browsing over 3G: 8 Browsing over LTE: 8 Browsing over Wi-Fi: 10 Standby: 225	audio: 40 video: 10 Talk over 2G: 14 Talk over 3G: 10 Browsing over 3G: 8 Browsing over LTE: 10 Browsing over Wi-Fi: 10 Standby: 250	audio: 40 video: 10 Talk over 2G: 14 Talk over 3G: 10 Browsing over 3G: 8 Browsing over LTE: 10 Browsing over Wi-Fi: 10 Standby: 250
Dimensions		115 mm (4.5 in) H 61 mm (2.4 in) W 11.6 mm (0.46 in) D	115.5 mm (4.55 in) H 62.1 mm (2.44 in) W 12.3 mm (0.48 in) D		115.2 mm (4.54 in) H 58.6 mm (2.31 in) W 9.3 mm (0.37 in) D		123.8 mm (4.87 in) H 59.8 mm (2.38 in) W 7.6 mm (0.30 in) D	124.4 mm (4.90 in) H 59.2 mm (2.33 in) W 8.97 mm (0.353 in) D
Weight		135 g (4.8 oz)	133 g (4.7 oz)	135 g (4.8 oz)	137 g (4.8 oz)	140 g (4.9 oz)	112 g (4.0 oz)	132 g (4.7 oz)
Greenhouse gas emissions		N/A	55 kg CO ₂ e ^[130]	55 kg CO ₂ e ^[131]	45 kg CO ₂ e ^[132]	70 kg CO ₂ e ^[133] 55 kg CO ₂ e ^[134]	75 kg CO ₂ e ^[135]	60 kg CO ₂ e ^[136]
Hardware strings		iPhone1,1	iPhone1,2	iPhone2,1	iPhone3,1 iPhone3,2	iPhone4,1	iPhone5,1 iPhone5,2	iPhone5,3 iPhone5,4

Introduction

Supported iOS releases [edit]

This table indicates the highest supported versions of iOS or iPadOS available for each generation of iOS devices. Beta versions may be listed only if support is discontinued for some older devices.

OS release	iPhone																		iPod Touch									
	Obsolete			Vintage				Unsupported			Discontinued			Current	Discontinued		Current			Obsolete			Vintage	Unsupported	Current			
	1st	3G	3GS	4 (GSM)	4 (CDMA)	4S	5	5C	5S	6, 6 Plus	6S, 6S Plus	SE	7, 7 Plus	8, 8 Plus	X	XS, XS Max	XR	11	11 Pro, 11 Pro Max	1st	2nd	3rd	4th	5th	6th	7th		
iOS 13.3.1	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✓		
iOS 12.4.1/12.4.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	12.4.5	12.4.5	12.4.1	12.4.1	12.4.1	12.4.1	12.4.1	12.4.1	12.4.1	12.4.1	✗	✗	✗	✗	✗	✗	12.4.5	12.4.1	
iOS 11.4.1	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	
iOS 10.3.3/10.3.4 ^[376]	✗	✗	✗	✗	✗	✗	✗	10.3.4	10.3.3	10.3.3	10.3.3	10.3.3	10.3.3	10.3.3	10.3.3	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	10.3.3	✗
iOS 9.3.5/9.3.6	✗	✗	✗	✗	✗	✗	9.3.6	9.3.5	9.3.5	9.3.5	9.3.5	9.3.5	9.3.5	9.3.5	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	9.3.5	9.3.5	✗
iOS 8.4.1	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✗
iOS 7.1.2 ^[377]	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	
iOS 6.1.3/6.1.4/6.1.6 ^[378]	✗	✗	6.1.6	6.1.3	6.1.3	6.1.3	6.1.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	6.1.6	6.1.3	✗	
iOS 5.1.1 ^[379]	✗	✗	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗	
iOS 4.2.1/4.2.10/4.3.5 ^[380]	✗	4.2.1	4.3.5	4.3.5	4.2.10	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	4.2.1	4.3.5	4.3.5	✗	✗	✗	
iPhone OS 3.1.3	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✗	✗	✗	✗	✗	
iPhone OS 2.2.1	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	
iPhone OS 1.1.4/1.1.5	1.1.4	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	1.1.5	✗	✗	✗	✗	✗	✗	✗	

iOS Acquisition Methods

- Access to Phone?
- Access to a computer it has been connected to?
- Was that computer used to sync with iCloud?

iOS Acquisition Methods

- Over The Air (OTA)
- Logical Backups
- Physical Acquisition

iOS Acquisition Methods

- Over The Air (OTA) **Time? What do we need?**
 - Logical Backups **Current and Past Data**
 - Physical Acquisition **Easiest or Slowest, password protected?**
-
- Physical Acquisition **Best - deleted files and keychain**

iOS Acquisition Methods

Mobile Forensics - Advanced Investigative Strategies, Afonin & Katalov

To choose an acquisition method, refer to the following table:

I have...	Physical acquisition	Logical acquisition (backup analysis)	Cloud forensics
Physical device (iPhone, iPad, or iPod Touch)	YES*	MAYBE	MAYBE
Computer that was synced with (or trusted by) the phone/tablet	N/A	N/A	MAYBE
The iOS device and the computer that it was synced with (or trusted by)	N/A	MAYBE****	MAYBE
iTunes backup	N/A	YES**	MAYBE
Apple ID login and password	N/A	N/A	YES***
iCloud authentication token	N/A	N/A	YES****

*Physical acquisition is only available for certain devices. Refer to Chapter 6, *iOS Logical and Cloud Acquisition* for detailed compatibility matrix.

**Certain backups may be protected with long, complex passwords. There is no guaranteed recovery timeframe or successful password recovery guarantee on password-protected backups.

***Apple's two-factor authentication complicates things a little bit. If two-factor authentication is activated for a certain Apple ID, access to the secondary authentication unit (such as a trusted device, recovery key, or app-specific password) is required. Microsoft takes a similar approach to two-factor authentication. At this time, Elcomsoft products only support two-factor authentication for Apple devices.

****Authentication tokens may have an expiration (depending on the iOS version). Their exact lifespan is currently not known. While we experienced some tokens extracted with the ATEX tool from the **Control Panel** to expire in one hour (iOS 8.x, for cloud backups only), we did not have this experience in other cases. We are continuing extensive testing to find out. Notably, authentication tokens *live* longer for cloud files. iOS 9 moved cloud backups to iCloud Drive; its authentication tokens currently don't have an expiration date (or have a very long lifespan). Finally, authentication tokens are invalidated when the user changes their account password or explicitly logs out from the cloud on a given computer.

iOS Acquisition Methods

Mobile Forensics - Advanced Investigative Strategies, Afonin & Katalov

The following table summarizes the possible outcome of the various acquisition methods:

	Physical acquisition	Logical acquisition	Cloud forensics	Chip-off
Approximate timeframe	35-50 minutes (depending on device model)	<ul style="list-style-type: none">Instant (unprotected backups)Unknown (password-protected)	0-4 hours (depending on connection speed and data volume)	1-4 hours (depending on skill level)
Keychain recovery	Yes	<ul style="list-style-type: none">No (unprotected backups), unless securityd is availableYes (password-protected)	No (unless securityd is available)	No
Access to deleted files	No*	No	No	No
Access to deleted SQLite records	Yes	Yes	Yes	Yes
Up to 45 days of geolocation tracking data	Yes	No	No	Yes
Possible issues	Last-generation devices must be jailbroken (refer to <i>Compatibility matrix</i>)	Long and complex passwords may prevent the recovery	<ul style="list-style-type: none">Apple ID/password or authentication token required<ul style="list-style-type: none">Two-factor authenticationNotification e-mail	<ul style="list-style-type: none">Only for iOS 1 through 4Recent devices use complete hardware encryptionEncrypted data non-recoverable and non-decryptableChip-off acquisition is <i>not available</i> for recent iOS devices

*Accessing deleted files is possible for iOS 1.x through 3.x. However, the chances of encountering an iOS version that old are close to none.

Physical Acquisition

- Gives access to every bit of device
- Decrypts keychain items and extracts device keys
- Guaranteed timeframe 20-50 minutes for a 32Gb phone

Only method that can acquire:

- Cached/downloaded mail
- Geolocation data from cache_encryptedA.db
- System and crash logs
- Cached application data
- Keychain (not decrypted on 64 bit devices)
- Extended keychain (gives access to sensitive information stored in iCloud by devices that share the appleID)

Passcode

- User creates a passcode for access to the phone
- Phone contains a hardware key
- User passcode + Hardware Key create an encryption key
- Encryption key is used with AES to secure device data

Over The Air (OTA) Acquisition

- Cloud forensics possibly the most suited process for locked 64-bit iPhones running iOS 8+
- Cloud backups tend to contain the least amount of information
- Have to possess the user's authentication credentials
- Binary authentication tokens created by software on the user's computer (via Apple iCloud for Windows or its macOS counterpart) can be used in place of the login and password. The use of binary authentication tokens currently bypasses Apple's two-factor authentication. However, these authentication tokens may have limited lifespan (Apple tweaks token expirations all the time), and may have already expired
- iOS keychain extraction may be unavailable

Over The Air (OTA) Acquisition

2 options depending on whether 2FA is enabled or not

1. No 2FA:

- Apple ID and password
- iCloud Security Code

2. For accounts with 2FA:

- Apple ID and password
- access to trusted device (to receive or generate one-time code)
- passcode from a device registered on that Apple ID account

3. Software eg: Elcomsoft Phone Breaker or backup to a new iPhone

iCloud Authentication Tokens

Small binary files created by iCloud Control Panel to spare the user from entering their login and password every time they sync with the cloud

Token can be extracted from the user's computer if iCloud Control Panel (or iCloud for Windows) is installed and if the user was logged into the Panel on that computer at the time of token acquisition.

If the user logs out of iCloud Control Panel, the token is deleted and invalidated, meaning it can no longer be used to access iCloud data even if carved from the hard disk.

iCloud Data

iCloud

- Phone backup

iCloud Drive Data

- iWork documents (if configured to be stored in the cloud) such as Pages, Numbers, Keynote
- Third-party app data (for example, WhatsApp backups, 1Password password databases, and so on)
- Certain system files that are synced across devices (for example, user dictionaries that may contain words and phrases entered by users that are not part of a common dictionary)

Logical Acquisition (backup analysis)

- Password-protected iTunes backups (Apple iOS) are encrypted
- Offline backups created without a password will be unencrypted (but keychain will be encrypted with a hardware key)
- Backup passwords are a property of the actual iOS device rather than the backup itself, encryption takes place before data leaves device
- Might be able to access information in the device by using a so-called lockdown file, or pairing record. This record may be available on the suspect's home or work PC that was either used to sync the iOS device with iTunes or simply used for charging if the suspect ever tapped "OK" on the "Trust this PC" pop-up

Logical Acquisition (backup analysis)

- A pairing is a trusted relationship between the iOS device and a computer (Mac or PC). Once a pairing relationship is initially established (by unlocking the iOS device with Touch ID or passcode and confirming the “Trust this PC” prompt), the two devices exchange cryptographic keys, and the computer is granted trusted access to the iPhone even if the iPhone’s screen is locked
- iPhone must be unlocked with a passcode at least once after the reboot
- Pairing relationships survive passcode changes
- Since iOS 8 all existing pairing relationships will be lost upon factory reset
- iOS 11.3 introduces expiry timestamps (approx 1 week)
- iOS 7 and older trust would survive through reboots and factory resets. Can be unlocked with a pairing record immediately after it’s turned on (unlocking with passcode not required)

Logical Acquisition (backup analysis)

Lockdown records are saved in the following locations:

Windows Vista, 7, 8, 8.1, Windows 10:

%ProgramData%\Apple\Lockdown

Windows XP:

%AllUsersProfile%\Application Data\Apple\Lockdown

macOS:

/var/db/lockdown

Logical Acquisition (backup analysis)

iTunes backups are located at the following locations

Windows Vista, 7, 8, 8.1, Windows 10:

Users\(username)\AppData\Roaming\Apple Computer\MobileSyncBackup

Windows XP:

Documents and Settings\username\Application Data\Apple Computer\MobileSyncBackup

macOS:

~/Library/Application Support/MobileSync/Backup/

Logical Acquisition Data

Address Book and Address Book favourites	Microsoft Exchange account configurations
App Store Application data	Network settings (saved Wi-Fi hotspots, VPN settings, network preferences)
Application settings, preferences, and data Autofill for web pages	Nike + iPod saved workouts and settings
CalDAV and subscribed calendar accounts Calendar accounts	Notes
Calendar events	Offline web application cache/database
Call history	Paired Bluetooth devices (which can only be used if restored to the same phone that made the backup)
Camera Roll	Safari bookmarks, cookies, history, offline data, and currently open pages
In-app purchases	Saved suggested corrections (these are saved automatically as one rejects suggested corrections)
Keychain (encrypted with a strong hardware-dependent encryption key in non- password backups, but encrypted with a backup password if one is present)	SMS and MMS (pictures and video) messages
List of External Sync Sources (Mobile Me, Exchange, ActiveSync)	Trusted hosts that have certificates that cannot be verified
Location service preferences for apps and websites you have allowed to use your location	Voice memo
Mail accounts	Voicemail token
Managed Configurations/Profiles	Wallpapers
Map bookmarks, recent searches, and the current location displayed in Maps	Web clips
	YouTube bookmarks and history

Logical Acquisition (backup analysis)

EPIC JAILBREAK: Introducing checkm8 (read "checkmate"), a permanent unpatchable bootrom exploit for hundreds of millions of iOS devices.

Most generations of iPhones and iPads are vulnerable: from iPhone 4S (A5 chip) to iPhone 8 and iPhone X (A11 chip).

axi0mX/ipwndfu
open-source jailbreaking tool for many iOS devices -
axi0mX/ipwndfu
🔗 github.com

12:15 PM · Sep 27, 2019 · Twitter Web Client

7.3K Retweets 16.4K Likes

Comment icon, Retweet icon, Like icon, Share icon

[Meta] Latest Jailbreak and Exploit Release Posts and iOS 13 Jailbreak Development Megathread

Latest jailbreak Release Posts:

- Full-fledged Jailbreak iPhone/iPad/iPod
 - [checkra1n beta 0.9.8 release post](#) ← **Tool**
 - [Chimera v 1.3.9 release post](#)
 - [unc0ver v 3.8.0~b1 release post](#)
- Full-fledged Jailbreak Apple TV
 - [checkra1n beta 0.9.8 release post](#)
 - [EtasonATV RC1 \(Version 2\) release post](#)

You can find the full list of firmwares and devices supported [here](#).

Latest Exploit Release

- [oob_timestamp by Brandon Azad Post](#)

[Checkm8 Post](#) ← **Exploit**

r/jailbreak

iOS jailbreaking: tweaks, news, and more for jailbroken iPhones, iPads, iPod touches, and Apple TVs. Installed anything great recently? Got an idea for a tweak? Wrote a cool tutorial? Curious about how something works? Let us know!

476k jailbreakers 4.8k jailbroken users online

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Physical Acquisition

← ZENA FORENSICS



I want to publicly thank again all the genius and talents behind the checkra1n project.

My infinite respect for your competences and reversing and hacking skills.

I will be honoured to shake your hand if we'll meet somewhere in the world.

And here I actually thought: "yes, we are facing "the new golden age" for iOS Forensics!"

I took my 64 GB iPhone X with iOS 13, looked at in its Face-ID and said: "My friend: now I create an encrypted backup and then I try to jailbreak you with checkra1n If something goes wrong it was nice to work with you, we'll see you soon in your new life. "

I downloaded checkra1n on my Mac and connected my iPhone X.

Not knowing exactly where I was going to, I thought: let's start in the situation in which the iPhone is unlocked and paired with a PC. Execute checkra1n and see what happens.

I followed the instructions and after a few seconds I saw on my iPhone screen what I had seen tweeting in the previous days by checkra1n developers.

I anxiously waited the end of the process, I inserted my passcode and I tried to connect, via iproxy, to the phone as "root".

At the request of the password I had a jolt and I entered the magic word "alpine".

I got access.

At that point I thought: I'm root, I inserted the passcode, I have access to the "full file system"

acquisition. <https://blog.digital-forensics.it/2019/11/checkm8-checkra1n-and-new-golden-age.html>

Physical Acquisition

← ZENA FORENSICS



So I started thinking about what this jailbreak can open in terms of possibilities and risks.

I went back to read the FAQ on the checkra1n website and in particular

Q: I lost my passcode. Can checkra1n decrypt my data or get access to a locked device?
A: No.

The answer is simple: no 😊

And I perfectly understand (and agree) why this should be so.

Then, at that point, I made the trivial reasoning: we are in front of a "bootrom" exploit, I can try redoing the same procedure starting from the condition of a turned off phone (aka, "Before First Unlock").

I turned off the phone and restarted it, connecting "Before First Unlock" to the Mac. I re-ran the entire procedure and tried again to connect. And I had access.

The result was a 21 GB file.

Nome	Ultima modifica	Tipo	Dimensione
user_BFU.tar	26/11/2019 21:05	File TAR	21.628.940 KB

I then started processing both files with:

Physical Acquisition Data Locations

Location data (/private/var/root/Library/Caches/locationond)

Downloaded mail (/private/var/mobile/Library/Mail)

Health data (/private/var/mobile/Library/Health)

Music (/private/var/mobile/Media/iTunes_Control/Music)

Detailed battery usage (/private/var/mobile/Library/BatteryLife)

Application data and caches (/private/var/mobile/Containers/Data/Application/<application id>, /private/var/mobile/Library/Caches)

Mobile Safari cache—history, recent searches, and more (/private/var/mobile/Containers/Data/Application/4FF7BF97-4B3B-4964-ACD8-974AADB8D4F8/Library/Safari)

Lockdown certificate info (/private/var/root/Library/Lockdown)

CPU usage data (/private/var/mobile/Library/CoreDuet)

Push notifications (/private/var/mobile/Library/ApplePushService)

Battery usage (/private/var/mobile/Library/BatteryLife)

Configuration files (/private/var/mobile/Library/Preferences)

Network and data usage (/private/var/networkd, /private/var/wireless/Library/Databases)

Various log files (/private/var/log, /private/var/logs, /private/var/wireless/Library/Logs, /private/var/mobile/Library/Logs)

SHM and WAL files for all SQLite databases (delayed transactions)

Applications activity (/private/var/mobile/Library/AggregateDictionary)

Spotlight data (/private/var/mobile/Library/Spotlight) Keyboard cache (/private/var/mobile/Library/Keyboard)

Lots more in (/private/var/mobile/Library)