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By Nathan Proctor, Director of the Right to Repair Campaign for U.S. PIRG and the Public Interest Network.

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Introduction

#ThrottleGate and the Barriers to Repair

Consumers should be able to repair what they own. Fixing what you own rather than buying something new can be a more affordable and more ecological choice. But for many products today, repair is made needlessly difficult, and sometimes impossible. As we consider how best to make sure technology benefits our quality of life and avoids needless harm to our environment, we should reduce barriers to repair.

The battery on your phone is one of the few parts of the phone that is guaranteed to wear out. You can carefully keep your screen, headphone and charging ports pristine, but your battery will lose a bit of life on every charge. According to Apple, their batteries are designed to retain 80% of their charge after 500 recharges, or about a year and 4 months of daily charging.ⁱ

Even though after a few years of regular use phones need a new battery to last the day, Apple does not sell their replacement batteries to customers or third parties. Only Apple authorized technicians are permitted to replace your iPhone's battery with the original part, which they offer for \$79 plus shipping.ⁱⁱ

In December of 2017, users began to complain about how a new software update to Apple iPhones appeared to slow down their device, while others noted it appeared to happen to those devices with older batteries, and was fixed by swapping the battery out.ⁱⁱⁱ This was confirmed by tests run by Primate Labs founder John Poole, reported on Dec. 18.^{iv} On Dec. 20, Apple issued a statement to TechCrunch^v addressing the issues identified by users:

Our goal is to deliver the best experience for customers, which includes overall performance and prolonging the life of their devices. Lithium-ion batteries become less capable of supplying peak current demands when in cold conditions, have a low battery charge ... as they age over time, which can result in the device unexpectedly shutting down to protect its electronic components.

Last year we released a feature for iPhone 6, iPhone 6s and iPhone SE to smooth out the instantaneous peaks only when needed to prevent the device from unexpectedly shutting down during these conditions. We've now extended that feature to iPhone 7 with iOS 11.2, and plan to add support for other products in the future.

After continued customer dissatisfaction and critical media coverage, Apple offered to replace batteries for the discounted rate \$29, a week later, on Dec. 28.^{vi}

Soon after this discount was offered, however, Apple began to struggle with the high demand for replaced batteries. Long waitlists formed within a few days and have continued to grow.^{vii} Apple recently informed some customers battery replacements won't be available until March or April.^{viii}

Given the option between waiting until April to have Apple perform repairs or getting a new phone, it seems reasonable to guess that many users will choose the latter. Ultimately, that means we produce more phones than we would otherwise need.

There are, of course, thousands of other service providers besides the relatively limited number of Apple authorized repair technicians, and many people would be willing to do the repairs themselves.

Through our survey and review of web traffic for self-repair instructions, we assessed the additional interest in repair alternatives as news of the battery issues with Apple phones surfaced.

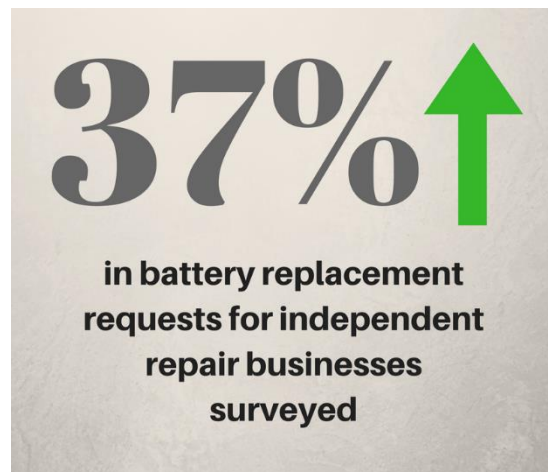
Findings

Interest in expanded options for repairing batteries spiked

Working with Repair.org and customers of iFixit, we surveyed businesses across the country to calculate increased battery replacement service requests. 164 businesses responded to our survey.

Collectively, these businesses reported a 37% increase in weekly battery replacement service requests since Dec. 20, when Apple confirmed they were throttling phones with older batteries.

Taken together, these businesses reported servicing nearly 6,000 devices per week,^{ix} of which battery service requests represent a significant percentage, roughly a fifth for participating survey respondents. Battery replacements went from 1,242 repairs per week in October and November to 1,706 repairs per week after Dec. 20.



In addition to this survey, we examined web traffic to iFixit online self-repair instructions for replacing iPhone batteries. Traffic to these pages went up significantly after Dec. 20, showing that many customers are interested in self-repair as an option for phone maintenance.

More than 180,000 American visitors accessed repair instructions between Dec. 20 and Jan. 22, more than 2.5 times the average traffic of the weeks prior (153% increase in traffic).

State	% increase in traffic	Visits Dec. 20 to Jan. 22	State	% increase in traffic	Visits Dec. 20 to Jan. 22
Alabama	144	1,680	Montana	148	450
Alaska	161	339	Nebraska	162	986
Arizona	157	3,376	Nevada	100	1,485
Arkansas	194	994	New Hampshire	146	750
California	139	28,923	New Jersey	151	5,341
Colorado	159	3,546	New Mexico	207	725
Connecticut	145	2,007	New York	139	11,943
Delaware	161	475	North Carolina	177	5,412
District of Columbia	141	2,169	North Dakota	161	335
Florida	144	9,985	Ohio	130	4,851
Georgia	159	6,009	Oklahoma	143	1,357
Hawaii	166	703	Oregon	176	3,048
Idaho	200	734	Pennsylvania	163	6,692
Illinois	163	8,553	Rhode Island	173	652
Indiana	138	2,812	South Carolina	206	1,836
Iowa	175	1,182	South Dakota	140	285
Kansas	216	1,480	Tennessee	152	3,184
Kentucky	138	1,649	Texas	141	14,297
Louisiana	115	1,505	Utah	102	1,611
Maine	152	566	Vermont	263	584
Maryland	226	3,997	Virginia	199	5,502
Massachusetts	152	4,969	Washington	174	5,942
Michigan	152	4,929	West Virginia	145	608
Minnesota	173	3,246	Wisconsin	215	2,711
Mississippi	151	830	Wyoming	78	208
Missouri	155	2,726			

Survey respondents also included comments and stories about their work. Here are some select responses:

"A customer brought in a phone that was dropped into a lake. He brought it to Apple who said there was nothing they could do for him. He then brought it to me and I took it apart and soaked the main logic board in anhydrous alcohol, cleaned it, and dried it out. I also put a new battery in, and then the phone was as good as new. Customer was ready to throw it away, but it's still working to this day."

-- David Hauf of ServiceMacs LLC, Connecticut

"Several customers have traveled to Apple an hour away, only to be told they would have to pay full price for their battery replacement since their battery did not test 'bad' enough to be covered by this new program."

-- William Jacob Bell of ByteForce, Kentucky

"We have had customers go to the Apple Store because their phone wouldn't charge and they begin selling them their newest phone. They left frustrated and came to our store when there was just lint crammed in their charging port preventing the port from charging. It took us five minutes to clean out the port appropriately. We didn't even charge the customer."

-- Casey Parish of Mobi Repair, Washington

"There is lack of service options. The closest Apple store is 120 miles away from our town, and even further from other rural communities in our area. People need and want repair alternatives to Apple's exorbitant repair rates and restrictive policies so they can keep their equipment in working order, rather than being forced to purchase a new unit that many people simply cannot afford."

-- Angele Florisi of Technology Medics, Arizona

"In most of the iPhone 6 battery replacements requests I see, Apple has told the customer the phone is too old or had a motherboard issue. In most cases, a simple battery swap, with an occasional OS reset, gets them working like new again."

-- Tom Gray of Laptop MD+, New Jersey

"I had a customer with important data and pictures on their device but Apple said 'oh well, nothing we can do.' We opened it up, replaced the battery which allowed the customer to get all the info off the phone."

-- Chad Johansen of NH iPhone Repair, New Hampshire

"If a product is being made by a company, the repair tools for it need to be made available as well. Repairing devices using tools created by and supplied from the device's manufacturer is just another way to ensure product reliability with considerably less environmental waste for a better tomorrow."

-- Ronny Hamida of Rontronix, Nebraska

"I restored an iPhone where the customer was getting a searching notification with no phone signal. Verizon told them the device was faulty and they needed a new one. We restored the device, saved the customers data and they were extremely happy."

-- Robert Slater of Advanced Cellular Repair, California

"Apple is a seller not a repair shop. It should concentrate on sales."

-- Syed Kazmi of Phontronics, Illinois

"One of our locations is two blocks from a busy Apple store. We routinely service water damaged devices refused by Apple as well as perform battery replacements on devices with evidence of water damage but no actual faults. People want more repair options, which is why Right to Repair is important."

-- Adam Fullerton of MEGA MOBILE Boston, Massachusetts

"One customer with an iPhone 7 took the trip up to the Mall of America to go to the Apple Store, waited over an hour just to be waited on. After the tech took almost 30 mins looking at the device in their backroom, they were told Apple could not fix the device and for approximately \$130 they could switch to a certified refurbished iPhone 7, and all of their info and settings would simply transfer over to the new device. We found out about the customer through a friend-of-a friend, ordered the new battery and had them back up and running in a few days."

-- Eric Freeberg of Eric's Computer Service, Minnesota

"I wish we could let customers know they are allowed to seek independent repair and don't have to jump through the Apple repair hoops or that Apple authorized repair shops aren't fixing their phone. They are sending it in and a refurb is sent back."

-- Mollie McAuley of Reboot Tech, Oregon

"We see a lot of customers who think their phone is useless because it won't charge. We are several hours from an Apple store so they aren't willing to travel there. We either clean out the charging port for free or replace the port or battery as needed in 30 minutes at \$50 for an iPhone 6. The customer is happy and willing to continue using their Apple device."

-- Brian Mills, CPR of Wichita Falls, Texas

"I run a repair business, and people need things repaired, it's often cheaper. Why can't Apple, who's nearest store is 1.5 hours away, let me run my repair business as they focus on new technology? People want things repaired quickly!"

-- Nathan Prodell of Fox Valley Mobile Repair, Wisconsin

"I see so many people want to just toss it and get a new phone, but then find out parts are cheaper."

-- James Rylek of Rylek Mobile Cell Repair, Illinois

America throws away 350,000 cell phones per day

We go through a massive number of phones in America. The EPA Office of Solid Waste and Emergency Response estimated that, in 2009, Americans threw away 141 million phones, approximately 350,000 per day.^x

Overall, electronic waste or e-waste is difficult to recycle, and this is particularly true of mobile phones. That same EPA estimate puts the percentage of discarded phones that are recycled at 8 percent, as opposed to desktop computers, of which 38 percent are recycled. Because cell phones contain toxic metals, that waste can pose dangers to public health if it is buried in a landfill or incinerated. It's estimated that 40% of the heavy metals in U.S. landfills come from discarded electronics, according to EPEAT, a green electronic rating system.^{xi}

Pew estimates that phone ownership grew from 83% to 95% from the end of 2009 to Nov. 2016, the most recent data available.^{xii} The U.S. population also grew by some 18 million people over that span, so it is likely that the number of phones thrown away has increased.^{xiii}

Assuming that each state throws out the same number of phones per capita, and using 2009 estimates to be conservative, we estimated each state's daily share of the phones thrown out nationally.

State	Estimated Phones Thrown Out Per Day	State	Estimated Phones Thrown Out Per Day
Alabama	5,800	Montana	1,200
Alaska	800	Nebraska	2,200
Arizona	8,200	Nevada	3,500
Arkansas	3,500	New Hampshire	1,500
California	46,900	New Jersey	10,600
Colorado	6,600	New Mexico	2,400
Connecticut	4,200	New York	23,600
Delaware	1,100	North Carolina	12,100
District of Columbia	800	North Dakota	900
Florida	24,600	Ohio	13,800
Georgia	12,300	Oklahoma	4,600
Hawaii	1,700	Oregon	4,800
Idaho	2,000	Pennsylvania	15,200
Illinois	15,300	Rhode Island	1,200
Indiana	7,900	South Carolina	5,900
Iowa	3,700	South Dakota	1,000
Kansas	3,400	Tennessee	7,900
Kentucky	5,300	Texas	33,300
Louisiana	5,500	Utah	3,600
Maine	1,500	Vermont	700
Maryland	7,100	Virginia	10,000
Massachusetts	8,100	Washington	8,700
Michigan	11,800	West Virginia	2,100
Minnesota	6,500	Wisconsin	6,900
Mississippi	3,500	Wyoming	600
Missouri	7,200		

Recommendations

Appetite for battery repair shows need for Right to Repair reforms

People should be free to fix what they own themselves. We should encourage repair of products and avoid encouraging disposing an entire product that could be repaired. Given the logistical challenges Apple faces in doing repairs themselves, and the clear interest demonstrated by consumers in independent or self-repair, we believe the findings in this report support the case for

Right to Repair reforms. Passing Right to Repair or Fair Repair laws would require access to replacement tools, parts, schematics and diagnostic software.

Currently, digital Right to Repair bills are filed and pending in 18 states.

State	Bill Number/s	Lead Sponsor/s
Hawaii	HB 1649	Rep. Scott Nishimoto
Illinois	HB 3030	Rep. David Harris
Iowa	SF 2028, HF 556	Sen. Mary Jochum, Rep. David Jacoby
Kansas	HB 2122	Rep. John Barker
Massachusetts	S 96, H 143	Sen. Michael Brady, Rep. Claire Cronin
Minnesota	SF 15, HF 287	Sens. David Osmek, Rep. Hertaus
Missouri	HB 2204	Rep. Tracy McCreery
Nebraska	LB 67	Sen. Lydia Brasch
New Hampshire	HB 1733 / LSR 2385	Reps. Virginia Irwin and David Luneau
New Jersey	A 4934	Asms. Paul D. Moriarty and Ralph R. Caputo
New York	S 618B, AB 8192	Sen. Phil Boyle, Asm. Joseph Morelle
North Carolina	HB 663	Rep. Bobbie Richardson
Oklahoma	HB 2551	Rep. Tommy Hardin
Tennessee	SB 888, HB 1382	Sen. Ferrell Haile, Rep. Darren Jernigan
Vermont	SB 180	Sen. Christopher Pearson
Virginia	HB 20	Del. Mark L. Cole
Washington	HB 2279	Rep. Jeff Morris
Wyoming	HB0199	Reps. Hunt, Blackburn, Halverson, Laursen and Northrup; Sens. Christensen and Meier

Repairing a throwaway culture

We have a stuff problem.

Our problem goes far beyond smartphones. We use more than we need to, and more than we can sustain. Every year we consume 1.7 times what the earth can replenish,^{xiv} and 99% of the items we consume is thrown out within 6 months of purchase.^{xv}

The basic model for making anything is linear. We mine or harvest materials, we manufacture something, we use it, we throw it away. But as that linear model is applied with increasing speed and volume, we are running into problems sourcing the materials and managing the waste. We need to move to a more circular system, in which we keep resources in circulation as long as possible, and then salvage, compost or recycle the rest.

Repair is a vital part of moving to a more circular economy -- from empowering more repair professionals to reducing barriers for people to repair things themselves. One common-sense way we can move in that direction is to grant access to replacement parts, tools and schematics. If we want to be more sustainable, companies need to stop blocking people from doing things for themselves.

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