Huawei P20 Pro Teardown

Teardown of the Huawei P20 Pro in April 2018.

Written By: Tobias Isakeit
INTRODUCTION

Huawei is angling for the high end segment with its three-eyed raven P20 Pro. They packed a ton of tech in here, what with three cameras, plus a 24 MP selfie cam—all topped off by a notched display. Hate it or love it, we're tearing it down..

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TOOLS:

- iOpener (1)
- Phillips #00 Screwdriver (1)
- iFixit Opening Tools (1)
- iFixit Opening Picks set of 6 (1)
- Spudger (1)
- Halberd Spudger (1)
- Suction Handle (1)
- Tweezers (1)
- iFixit Adhesive Remover (for Battery, Screen, and Glass Adhesive) (1)
Winter spring is coming and so is the new flagship from Huawei. Let's have a quick look at those flourishing specs:

- 6.1-inch OLED touchscreen with 2240 × 1080 resolution and an aspect ratio of 18.7:9
- Octa-core Kirin 970 with Mali-G72 MP12 GPU and a dedicated NPU
- Triple camera 40 MP + 8 MP + 20 MP, f/1.6 and f/2.4 main camera unit by Leica
- 24 megapixel (no that's not a typo) f/2.0 selfie camera
- 128 GB storage and 6 GB RAM
Step 2

Unlike Samsung, Huawei has opted to notch their display around its camera and earpiece speaker.

That said, the P20 Pro seems a little lukewarm on the notch front—the EMUI offers its user the option to "hide the notch."

The notch isn't the only thing Huawei borrowed from Apple, it sports an iPhone X-style 1.4 mm mesa with two cameras and a more modest iPhone 6-style "button" for the monochrome sensor.
Step 3

- Stacked against (under) the P10, this new Huawei comes with some beefed up dimensions: 155 × 73.9 × 7.8 mm (6.10 × 2.91 × 0.31 in) and 180 g in weight.

- Flipped over, we see evolution in action: Two cameras bad, three cameras good!

- The 40 MP and 8 MP cameras work together to get a 3x optical zoom. The 20 MP monochrome camera brings more details and extra sharpness.

- Since the P20 Pro's "extra" cameras live on the back, and it doesn't need Face ID hardware, its notch takes up a bit less real estate than the iPhone X it takes after (on the right).

  Sizing aside, there's also some interesting notch geometry to consider.
But enough about the outsides—in teardown land, it's what's _inside_ that counts.

Eliminating pesky pentalobes was a welcome move, but no screws at all? Time to try our luck with the trusty iSclack.

To our surprise the P20 Pro opens almost as easily as a flower in the spring sun. Almost. We've never had to use an opening pick on a flower...

This teardown is really starting to bloom, look at all that techy nectar—er, is this metaphor getting away from us?
Step 5

- We go to remove the back cover and are foiled! No fingerprint scanner back here and there’s *still* a cable primed to be ripped during opening.

  Looks like Huawei opted to mount the laser autofocus sensor on the rear case to stack it over the cameras.

- We finally get our hands on some screws and make quick work of the NFC antenna and motherboard shield.

- That's an NFC antenna, *not* a wireless charging coil—that crackable glass back is just for show, and for getting broken...
Step 6

- Finally, we come to the brains of this operation—the motherboard—and wrestle it free from its various connectors.

- Huawei once again sticks to its usual motherboard design, opting for a wider battery and a smaller board than some other Android phones.

- The trio of cameras comes along for the ride, holding fast to the board, with the rear flash module in tow.

- So many options, which to investigate first—cameras, or motherboard? We opt for the peepers and take the front-facing camera along for the ride.
The three rear cameras get by with just two connectors—the main camera and the monochrome camera share one port, while the telephoto camera gets the other all to itself.

From the side we can compare the relative elevations:

- Left: 20 MP (monochrome f/1.6). Middle: 40 MP (main camera f/1.8). Right: 8 MP (telephoto f/2.4)

Lastly, we've got all four eyes lined up for inspection, including the P20 Pro's selfie cam with only 24 MP.

Samsung’s time atop the smartphone camera rankings leaderboard lasted less than a month. Incredibly, the Pixel 2 is still holding its own in the top 5 with just a single main camera.
Step 8

- The P20 Pro may not have a fancy dual-aperture lens, but it can laser focus. And deep focus. And phase focus. And contrast focus. Basically, it does a lot of fast focusing.

- Officially, only the little 8 MP telephoto cam gets hardware OIS—the others, saith Huawei, rely on Kirin's Neural Processing Unit for things like predictive focus, settings for over 19 different scenes, and filter effects like bokeh.

- That said, this sure looks like OIS hardware to us—three OIS hardwares, to be exact. Are you holding out on us, Huawei?

- The primary RGB camera uses a 1/1.7 inch sensor (for reference: iPhone X 1/2.9 inch, Samsung Galaxy S9+ 1/2.55 inch) and has a maximum ISO of 102,400—ready for nightly skyline shots and party pix.
Oh what the heck. We're as curious as you are, so here are the triplets completely dissected. You won't get more teardown for your money—wait, this is free.

And while we're at it, let's also take a closer look at the sensors.

In the middle is the 1/1.7 inch RGB sensor, with the 1/2.7 inch monochrome sensor cozying up to its left. On the right we see the telephoto with a 1/4 inch sensor.

Probably some sort of memory near the image sensors for the first two cameras from the left.
Step 10

What kind of fancy chips did Huawei pack in the phone? Let's see:

- Micron MT53D768M64D8WF-053 WT:D 6 GB LPDDR4 SDRAM with the Kirin 970 SoC underneath
- Samsung KLUDG4U1EA-B0C1 128 GB V-NAND flash memory
- HiSilicon Hi6403-GWCV110 audio IC
- Texas Instruments BQ25895 I2C battery charger controller
- NXP 55102 PN548 NFC controller
- ON Semiconductor NLAS2750 dual SPDT analog switch
- ON Semiconductor FSA644UCX 1.5 Gbps 4-data lane switch
Step 11

- Let's flip it with a spatula and check the back:
  - HiSilicon Hi6363-GFCV100 RF transceiver
  - Skyworks SKY78113-14, SKY78114-61, and SKY78117-4A Skyone Front End LTE modules
  - HiSilicon Hi6421-GFCV810 power management IC
  - Cypress BCM43596 Wi-Fi and Bluetooth module
  - HiSilicon Hi6423-GWCV100 power management IC
  - Broadcom BCM4774 GNSS receiver w/ sensor hub
  - HiSilicon Hi6H01S and Hi6H02S RF Switch/LNA
IC Identification, continued:

- Texas Instruments DRV2605 haptic driver
- Texas Instruments LM3642 boost LED flash driver
- Skyworks SKY13351-378LF GaAs SPDT switch
- STMicroelectronics LSM6DSM 3-axis accelerometer/gyroscope
- AKM Semiconductor AK09918C 3-axis electronic compass
- Richtek RT8095GQW 2 A synchronous step-down converter
- Probably RF switches
Step 13

- We usually don't like barriers between us and battery replacements, but we might make an exception for this modular charging port. That'll be a painless replacement!

- Since we got this far without heat, we stay cool and attack the battery glue with some drops of magic. Wait just a tick—then, opening pick.

- As smartphone batteries go, this one's a heavyweight—4,000 mAh at 3.82V, or 15.28 Wh.
  - That beats the Samsung Galaxy S9+ (13.48 Wh) and the iPhone X (10.35 Wh) by far and is on par with its kinsman the Mate 10 Pro. To be fair software has a big effect on power efficiency.
Step 14

We turn our focus to the bottom of the frame and find a tiny daughterboard, hiding amongst a loudspeaker and vibrator motor.

Compared to the battery extraction, the glue securing this collection of parts is a breeze—albeit a sticky one.

But where's the headphone jack!? 

ℹ️ Only the P20 Lite comes equipped with an aux port, whereas the vanilla and the Pro are a little more "courageous".

Good thing that charging port is modular, because it'll be doing double duty with headphones and charging cables!
Step 15

- Time for one last iOpener/pick song and dance—for this refrain: display removal!

- We make the display assembly like a *banana and "split."*

- The display lifts out of the body, but only after the display cable makes a harrowing journey through a hole in the mid frame.

ℹ️ Luckily this repair will probably only happen to a broken screen—unluckily this common repair requires tunneling through a well-adhered glass back and the battery.
Step 16

- Display separated, we're left with not much intel. However, one item does remain.
- Some gentle prying and the home button is freed!
  - Lacking Face ID hardware or iris scanning, this phone still uses the "archaic" physical button. No word on whether it's locked to its motherboard.
- In an unusual twist, the proximity and brightness sensor is buried under the display in the midframe—making for a rather anticlimactic end to our teardown.

Step 17

- Time to move on! Throw a last glance at the insides of the three-eyed phone from Huawei and look forward to more teardown fun from iFixit!
- Want to see inside your own P20 Pro without taking it apart? Check out this layered wallpaper and download it on your phone!

Wanna be the first to break the teardown news? Sign up for our press list and get the inside scoop!
Step 18 — Final Thoughts

The Huawei P20 Pro earns a 4 out of 10 on our repairability scale (10 is the easiest to repair):

- Many components are modular and can be replaced independently.
- Replacing the battery is possible but at the expense of some time and effort.
- Double the risk for breakage with glass front and back.
- Replacing the screen requires going through at least two layers of adhesive and some disassembly.