

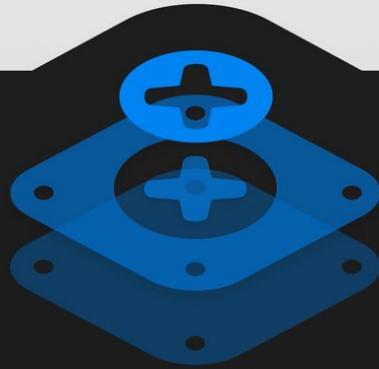


OnHub Teardown

Google OnHub teardown on September 15, 2015.

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Google OnHub



TEARDOWN

INTRODUCTION

Google is on a mission to reinvent the router, and we got our hands on their first foray into the home-networking market—the Google OnHub. With a sleek design, hefty price tag, and a whole host of unique features, we're excited to see what this router is rockin'. It's teardown time!

Want to stay connected to the repair world? Follow us on [Facebook](#), [Instagram](#), or [Twitter](#) to stay up to date with the latest teardown news!

TOOLS:

- [Jimmy](#) (1)
- [iFixit Opening Tools](#) (1)
- [Spudger](#) (1)
- [Phillips #1 Screwdriver](#) (1)

Step 1 — OnHub Teardown



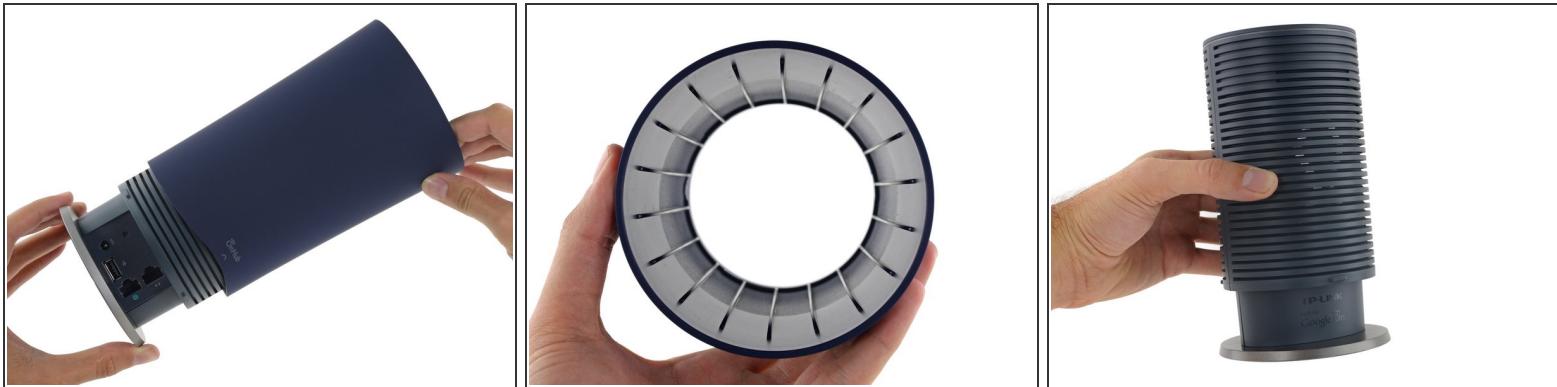
- Google has promised that the OnHub router will give you a new way to Wi-Fi, and with these specs, it looks like they might be onto something:
 - Dual-core 1.4 GHz CPU
 - 4 GB e-MMC flash storage
 - IEEE 802.11 b/g/n/ac
 - Dual band 2.4 GHz and 5 GHz 12-antenna array
 - Congestion-sensing radio and antenna
 - USB 3.0 port + Bluetooth 4.0
 - 1 GB DDR3L RAM

Step 2



- No blinking router lights here; let's hope the constant status light isn't blinding in the dark (it's not).
- *(i)* This LED ring will change colors based on what state the OnHub is in. Blue means you're ready to begin setup. Orange is for, "Oh snap, something is wrong." Teal means you're good to go!
- This mysterious anomaly in the speaker grille is probably an ambient light sensor enabling dimming.
- We also spy a small cutaway on the bottom of the cowling for the cabling.
- A novel idea for cable management, but not great for ease-of-access. You've got to twist the cowling off to plug anything in.

Step 3



- Luckily the outer cowling comes off with a simple twist. You can't plug any cables in without shucking that shield, it better be simple.
- The rifling fins along the inside of the barrel cowling are perhaps there to encourage air circulation, as this tower has no fan to cool itself.
- Under the hood we see the real branding on this guy. Google has contracted with TP-Link for the first iteration of the OnHub.
-  Smug [TP-Link guy](#) approves of this product. Let's see how he feels once the ASUS OnHub is on the table, "[later this year](#)."
- We also get a peek at some components. Is that an antenna we see? We're itching with anticipation.

Step 4



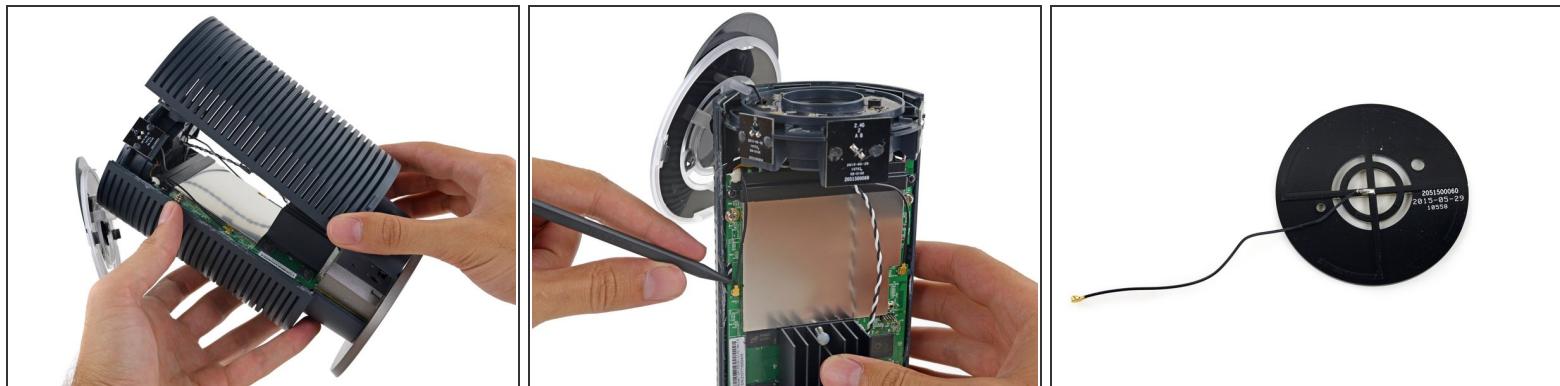
- The rubbery foot seems like a great candidate for hiding screws. Sure enough, we remove a couple. Did that actually accomplish anything? Nope.
- Having been screwed (pun intended), we aim for the tempting seam along the sides of the tower.
(i) Unfortunately, this doesn't seem to be the intended point of entry either. We wound up breaking some clips in the process.
- This thing still won't open...

Step 5



- We turn our attention back to what we thought was a solid top, it turns out this was the way in all along.
(i) We really wish this thing came with a repair manual—this cap *should* have been the first to go.
- We finally pop the top off this can of worms, and the first component we spy is the famed congestion-sensing antenna.
- We can't quite remove it yet, so leaving that to dangle gently to the side exposes the LED board with some control hardware:
 - National Semiconductor [LP5523](#) programmable 9-output LED driver
 - Ambient light sensor

Step 6



- With the top panel neutralized, some screws are revealed.
- Finally the two halves of the casing are ready to come quietly, revealing the first glimpse of the OnHub's shiny, antenna-filled insides.
- That crazy disk antenna up top, responsible for sniffing out network congestion in the air, is finally free to leave the OnHub.
- Looks like the OnHub intends to keep unbroken Wi-Fi [on target](#) with this bullseye shaped antenna.

Step 7



- There are 12 cables across the top of the device (six 2.4GHz antennas and six 5GHz), plus the congestion antenna along the side, and a final coax cable along the other side.
- Google seems to have some kind of color coding system, which might help for repair, but the board markings don't give us any hints just yet.
- Peeling off the second half of the outer shell, we find an interesting antenna arrayed in a double diamond. More on this guy later.
- The OnHub's antenna array is revealed in all its Lovecraftian glory, the antenna leads looking spookily like tentacles.

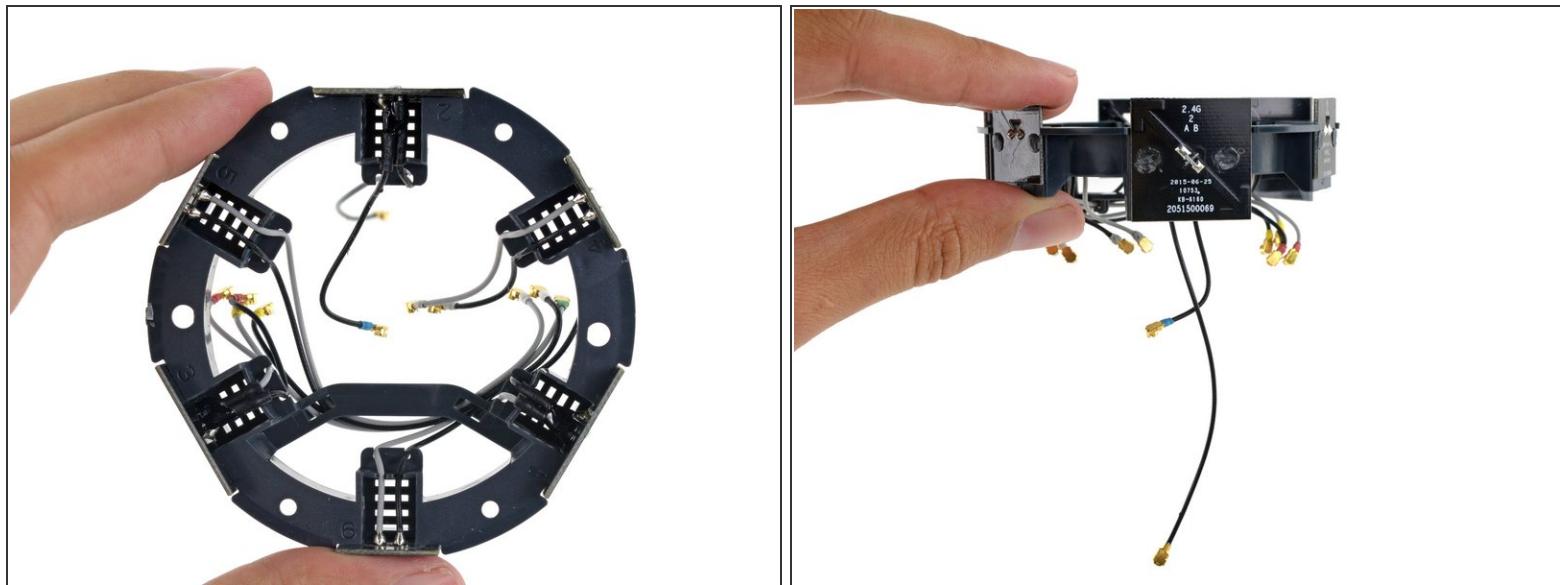
Step 8



- With a dozen connectors dispatched, we can finally separate the antenna assembly from the motherboard.
- Look at that enormous speaker. [Alexa](#), why does Google's router need a 3-watt speaker?
(i) Turns out, OnHub uses a loud tone to pair with [ultrasonic tones](#) to ~~configure~~ Android devices running Google's companion app—but will it feature sick beats in the future?

 The hexagonal speaker enclosure has disturbing similarities to the [Galactic Empire's logo](#).

Step 9



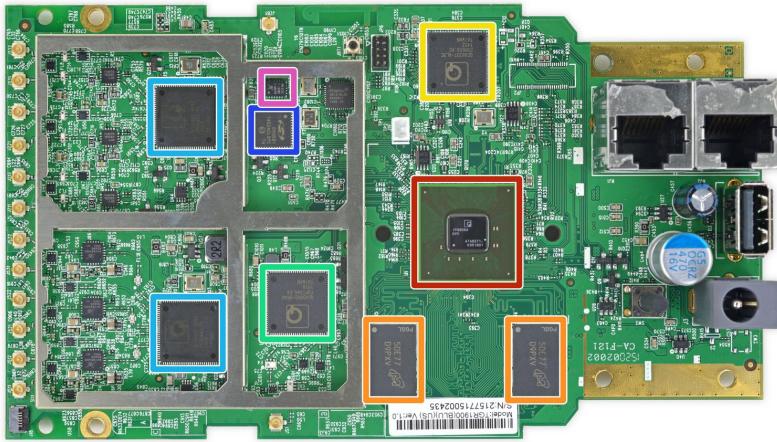
- With a flick of the spudger, the remaining antenna connectors come free—releasing what we theorize to be a miniature Stargate. That, or the omnidirectional antenna array.
- (i)* Each of the six PCBs is a pair of antennas. The smaller boards are 5 GHz, and the larger are 2.4 GHz, alternating around so that each antenna pair is 120° offset from the other two pairs of the same frequency.
- Some engineer was probably pretty excited to design antennas in an arrow shape. Looking snazzy!
- That one extra-long cable runs a bit lower on the motherboard, where it connects next to a ZigBee network co-processor—hello [802.15.4](#) (coming soon).

Step 10



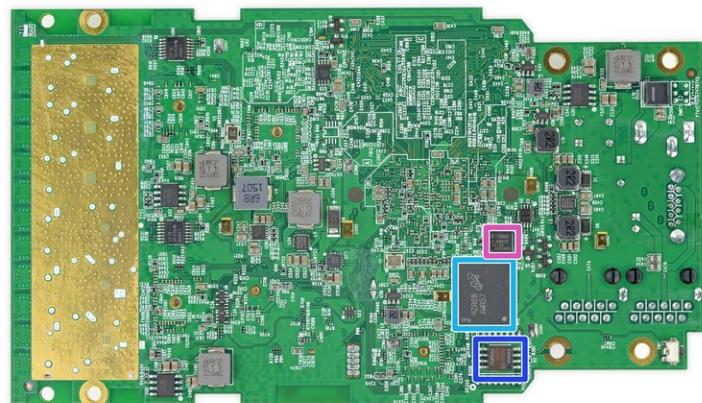
- Remember that diamond shaped antenna a few steps back? Turns out that's the directional antenna, for boosting the signal in a specific direction.
- The heatsink serves as a reflector dish, pushing that extra bit of Wi-Fi to the far corner of your house where you need it most.
- The components in this thing have been pretty big so far, and the heat sink is no different. Prying up the metal mass reveals some equally hefty thermal pads.
- It looks like the heat sink actually draws heat *through* the motherboard—we spy the real heavy hitters heaters on the reverse.
- The plastic base and port cover slides off and the motherboard is free!

Step 11



- With the heat sink off and the chips deshielded, we can get to the meat of the matter:
 - Qualcomm Atheros [IPQ8064](#) Internet Processor with 2 Krait 300 CPUs clocked at 1.4 GHz
 - Micron [MT41K256M16HA](#) 4 Gb DDR3L SDRAM
 - Qualcomm Atheros QCA8337
 - Qualcomm Atheros QCA9882
 - Qualcomm Atheros QCA9880
 - Silicon Labs [EM3581](#) SOC network co-processor for ZigBee
 - Skyworks [66109](#) 2.4 GHz ZigBee/Smart Energy front-end module

Step 12



- But wait, there's more!
 - Skyworks SKY2623L 2.4 GHz WLAN power amplifier
 - Skyworks [SKY85405](#) 802.11ac 5 GHz WLAN power amplifier
 - Atheros [3012-BL3D](#) Bluetooth radio
 - Bluetooth antenna
 - Micron [MTFC4GACAAAM](#) 4 GB NAND flash
 - Micron [25Q064A](#) 64 Mb SPI flash
 - Infineon [SLB9615](#) Trusted Platform Module

Step 13



- OnHub Repairability Score: **4 out of 10** (10 is easiest to repair)
 - The speaker is replaceable.
 - The device is mostly assembled with clips, which are better than adhesive but can break during disassembly.
- With all ports on a single board, fixing a loose USB port means a soldering repair.
- Tiny antenna connectors are fragile and prone to breaking during disassembly.
- This is a fairly complex device—and with no repair documentation available, disassembly and reassembly are especially difficult.