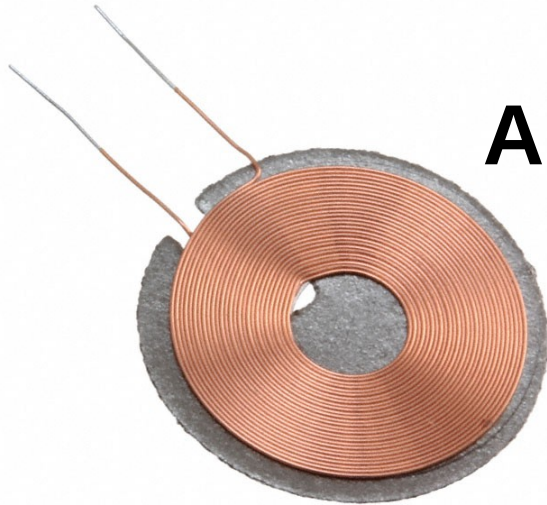


CHARGE YOUR PHONE WIRELESSLY

**and your smart watch,
wireless earbuds, and tablet**

**A Learn in 30 presentation
by John Krout
For PATACS+OPCUG
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AGENDA

- The inductor coil and its champion
- The wireless charging standard
- Phones and tablets compatible with wireless charging
- Wireless is a good alternative to charging via the USB port
- How to activate Fast wireless charging for your phone
- Combo wireless charger devices
- Wireless Power Sharing

The Induction Coil and its Champion

Tesla and induction coils

- Wireless charging uses a power transfer method developed originally by Nikolai Tesla, based on inductor coils, over 100 years ago.
- Tesla understood the publicity power of photos, and liked to show off his coils and their spectacular, wasteful power discharges into the air.
- Electrical power transmission and reception requires an **inductor coil** at each end, transmitter and receiver.



The wireless charging standard

- A wireless charging standard called **Qi** has been adopted by many phone and accessory makers.
- Qi is ***not*** an acronym.
- 'Qi', pronounced '**chee**', is a Chinese word that means 'energy flow'.

What phone brands offer Qi charging?

- **Apple, Samsung, LG, Google, Sony, Motorola, Nokia, Blackberry, HTC, Huawei.** There are others too, though not generally sold in the US.
- Not every phone model from these makers includes an induction coil.
- Samsung has been especially aggressive both in adopting Qi in their phone models and making innovative use of the phone inductor coil.

Qi charging specifics

- The Qi approach for phones is limited to ***VERY short distances***: the power transmitter and receiver should physically contact each other.
- Qi chargers also feature a flat inductor coil.
- The most efficient charging happens when the charger coil and the phone coil are centered on each other.
- A glass back and the coil itself provides multiple risks of phone damage for anyone trying to replace a phone battery.

If your phone or tablet is not Qi compatible

- Amazon sells Qi adapters.
- These connect to your phone's charging port.
- These also work for tablets.
- Make sure you select a Qi adapter that works with your phone's charging port type (Lightning, USB-C, microUSB, etc).



Qi is a good alternative

- USB sockets on phones and tablets can collect lint and become unreliable.
- USB sockets on phones can be damaged by attempts to connect or disconnect at an angle or, in case of micro-USB, connect upside down.
- If the phone supports Qi, then Qi can be a good alternative when the USB socket fails.

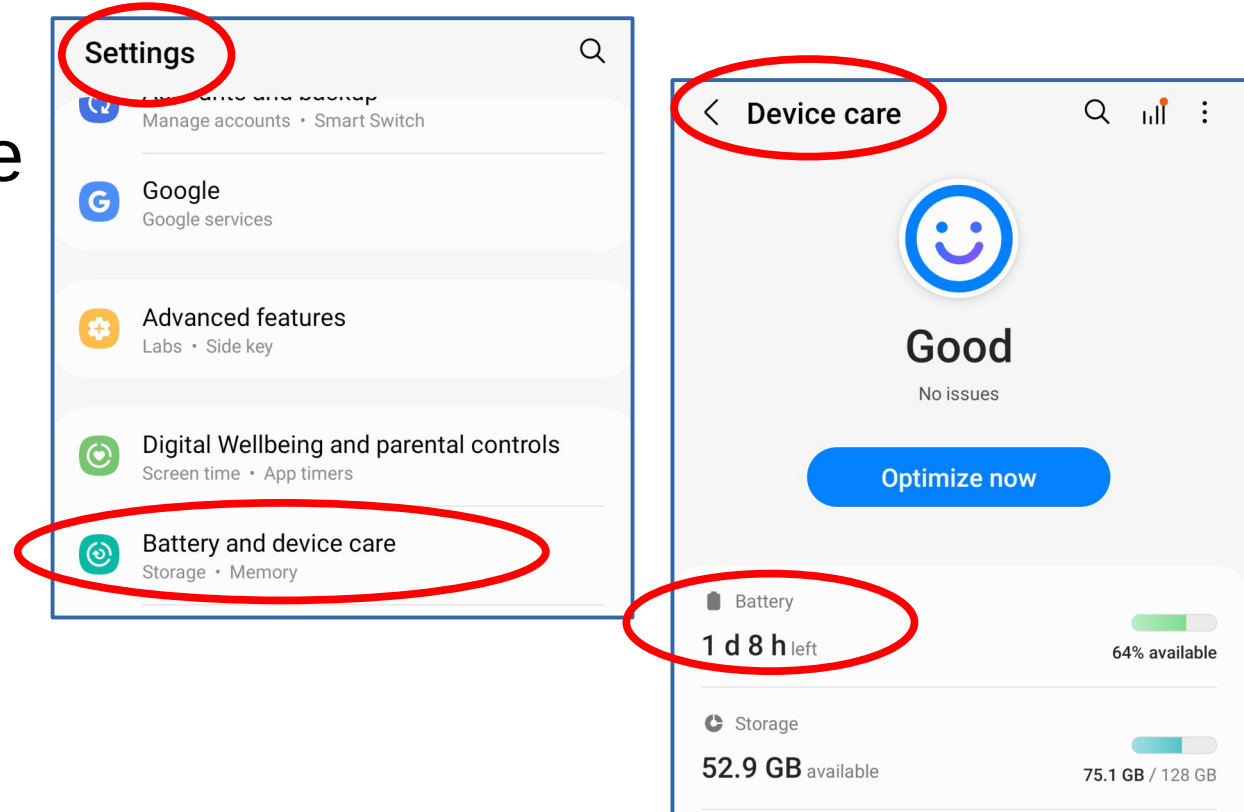
How to enable Fast Qi charging on your Qi-compatible smart phone

Standard and Fast Qi Charging

- **No phone setup is needed** for charging using a Qi charger, at least on my iPhone 10 and my Samsung Galaxy S7 and later Android phones.
- A standard Qi charger delivers five watts of power, the same as that available when the phone is connected to a standard 1 amp powered USB socket.
- **Fast Qi chargers** with higher power levels are available for as little as \$10. Those now dominate the market.
- Your phone may not be capable of receiving more than 5 watts via Qi. In that case, fear not, your phone will not be harmed when charged by a Fast Qi charger.

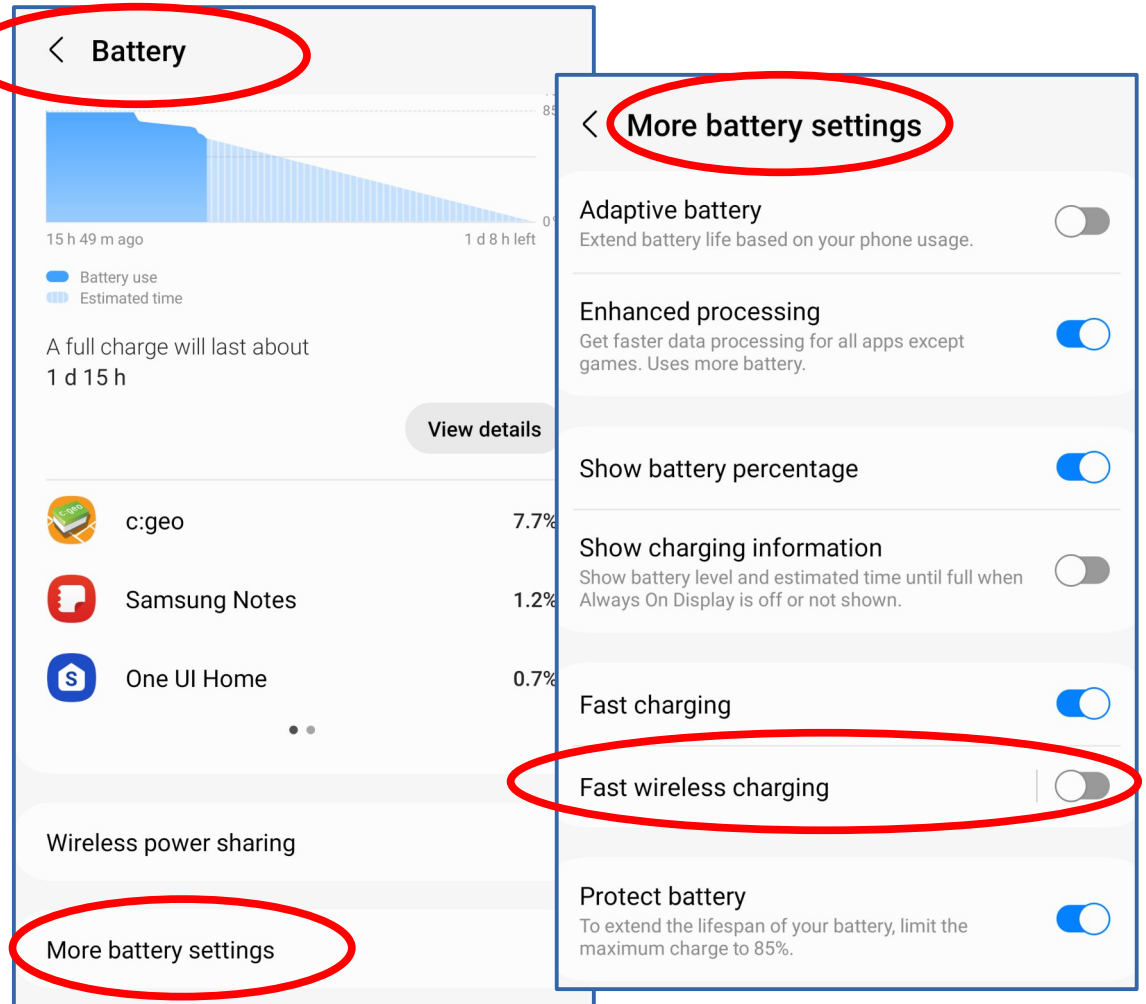
Android Fast Qi Charging switch

- How to find the Fast Wireless Charging switch:
Android 13 on Samsung Galaxy S20 FE phone
- Open **Settings** and scroll down (or tap the magnifying glass icon and type Battery)
- Tap **Battery and Device care**
- In the **Device Care** screen, tap **Battery**



Android Fast Qi Charging

- In the **Battery** screen, scroll down to and tap **More Battery Settings**.
- In the **More battery settings** screen, tap the **Fast wireless charging switch** to turn on the switch.



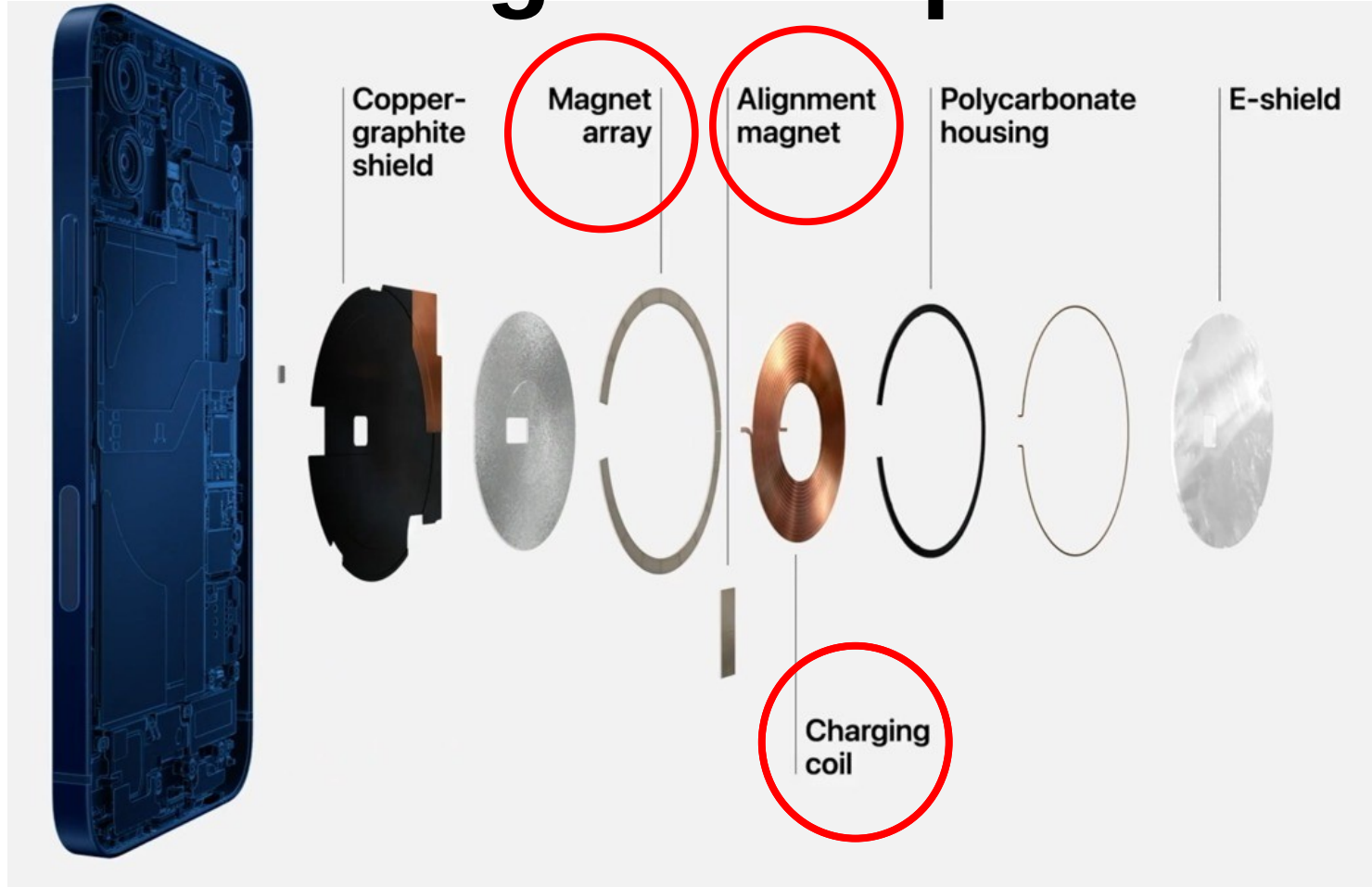
iPhone Fast Qi Charging

- iPhone 10 running iOS 16.7.1.
- I searched Settings for **fast**, for **battery**, and for **Qi**.
- I found nothing. **Fast Qi charging must be active all the time.**
- Web search says iPhone Qi charging will work at 7.5 watts for “normal” charging.
- Apple provides a 15 watt **Magsafe** Qi charger. For iPhone 12 and later models.
- Some accessory makers provide Magsafe Qi chargers too.

What is Magsafe?

- In iPhones, Magsafe for Qi is a set of magnets surrounding the receiving inductor coil. Similar magnets surround each Magsafe Qi charger transmitting inductor coil. The two magnet rings are the same diameter.
- The magnets surrounding both coils keep the iPhone coil and charger coil closely aligned for maximum charging efficiency.
- Apple says that Magsafe enables iPhone 12 and later models to be charged at Fast Qi 15 watts. Use a 3+ amp USB power socket for Magsafe maximum power delivery to iPhone.

AppleInsider web site iPhone MagSafe exploded view



Combo Qi Charging Devices

Combo Qi charging: Cars

- Some **cars** have built-in Qi charging capability, beginning with the 2013 **Toyota Avalon**.
- This photo shows a Qi charging **slot** in use in a **2024 Prius Prime**, to the right of the gearshift.
- Some earlier Prius Prime models had a large Qi charging **tray** in front of the gearshift.



Combo Qi charging: phone holders

- Many phone holders for cars have Qi chargers built in.
- The one shown here includes Magsafe and attaches to an air vent.
- Requires USB power from a car USB port or a USB power adapter for the car's 12v port (formerly cigarette lighter)



Combo Qi charging: portables

- Some **portable power bank batteries** can charge your phone using Qi. Some even include Magsafe.
- Some **portable speaker** models have a Qi charger built into the top surface, powered by the speaker battery.



Wireless Power Sharing

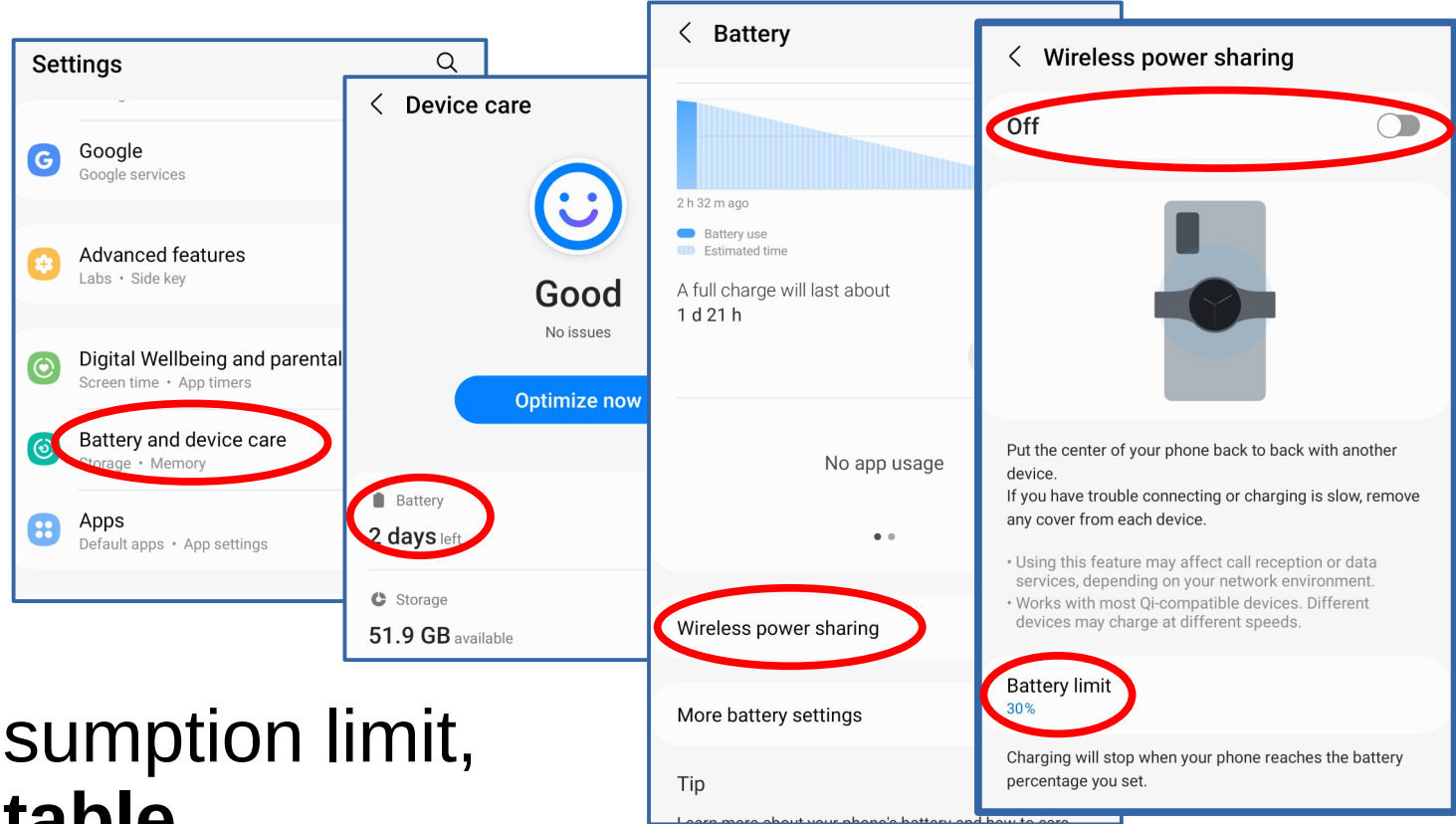
- **Samsung and Google Android phones** containing an induction coil can *charge phone accessories*, and even *charge another phone*.
- Two requirements: (1) turn on **Wireless power sharing** in the transmitting phone, and (2) place accessory **in contact** with the back of the phone.
- To enable my Galaxy Watch 4 to recognize that it was receiving power from my Samsung Galaxy S10 phone, I had to *remove the phone case*.
- The Galaxy Watch 4 is not Qi compatible! The phone is smart enough to detect the charging type and supply that.

Turn on Wireless power sharing

- On Samsung Galaxy phones running Android 12 or 13:
Settings → Battery and Device Care → Battery → Wireless Power Sharing

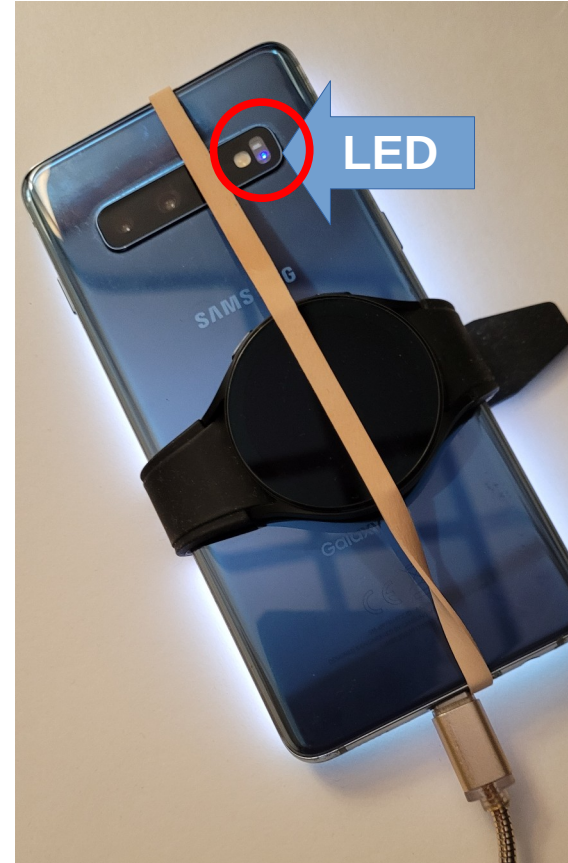
- The Wireless Power Sharing screen includes an **On/Off switch**. The default setting is Off.

- The Battery consumption limit, circled, is **adjustable**.



Galaxy S10 Phone charging Galaxy 4 smart watch

- When the watch is positioned to receive induction charging from phone, an LED on the phone back blinks blue.
- If the watch slips, then the LED stops blinking and the phone's Wireless Power Sharing switch **turns off automatically**.
- Phone also turns off the LED and the Wireless Power Sharing switch automatically **when the screen times out**.



Power Sharing is NOT Practical

- Due to longest available screen timeout setting of 10 minutes, phone must be unlocked and Wireless Power Sharing switch must be turned on ***again every 10 minutes***.
- Alternative: buy a power bank battery with Qi-charging built in. Leave your phone free to receive calls etc.
- The power bank battery Qi will not charge the Samsung Watch 4 because the watch is not Qi-compatible.
- Use a power bank battery USB socket to power the original mini charger pad shipped with the Samsung watch.

THE END