The technology behind COVID-19 tracing apps

Different apps for tracing proximity have been using different technologies, namely Bluetooth and geolocation. As these vary in terms of their width and breadth, each will bring its own challenges both in terms of efficiency and possible regulatory constraints

Contact tracing has been a priority for app developers over the past few weeks. Local teams, corporations and governments have put efforts into developing apps that trace proximity between smartphones users, which in this case are potential hubs for contagion. The utility of these apps is that once a member of a community is diagnosed with the virus, the chain of transmission may easily be traced back.

These apps pose questions on how data collected is treated (you can read more on this here) and how efficient the technologies used are. The technologies used by tracing apps range from Bluetooth to geolocation, to newer technologies such as DP-3T (Decentralized Privacy-Preserving Proximity Tracing).

All of these technologies have their perks and challenges. Tracing via Bluetooth, for example, will rely on the power of frequencies transmitted from each smartphone to determine proximity: the closer the smartphone is, the higher should be its signal. In theory, that is, because different models and manufacturers build mobile devices that will measure signal strength differently. The measurement is RSSI (Received Signal Strength Indicator). In case different smartphones receive different RSSI measurements, then the measuring accuracy is compromised.

Not only the measurement of signal strength is a weak link, but for measuring to occur, the Bluetooth-running apps must run permanently, which shortens smartphones' battery life and will most likely be disabled by manufacturers and/or consumers.

Geolocation, also used by some of these apps, shares a certain level of inaccuracy with Bluetooth technology (BLE). As safe distances between people go, people should distance themselves from others at least two meters, but the most common geolocation technologies used are not accurate enough.

On one hand, GPS, which is the most accurate of all (able to determine location of up to five meters, which is still short), will only be able to track people outdoors, will be troubled by weather-related events and is very energy-consuming.

BLE geolocation, on the other, requires infrastructure for the emitting devices nearby to be precisely located by third parties which is an issue that is also shared by Wi-Fi. Network providers could use network triangulation to locate devices, but this technique lacks accuracy as the number of base stations for triangulation varies.

DP-3T, in its turn, is not different technology-wise. Rather, DP-3T is a response to privacy concerns as it is a decentralized alternative to manual tracing of citizens: it is a privacy-by-design type of tracing, rather than a whole different way of locating devices. DP-3T uses Bluetooth and it reverts the process: if a smartphone has stored a record of any of a diagnosed patient's ephemeral identifier (EphID), then the app knows that the user has been in contact with an infected user.

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