



Beginners:

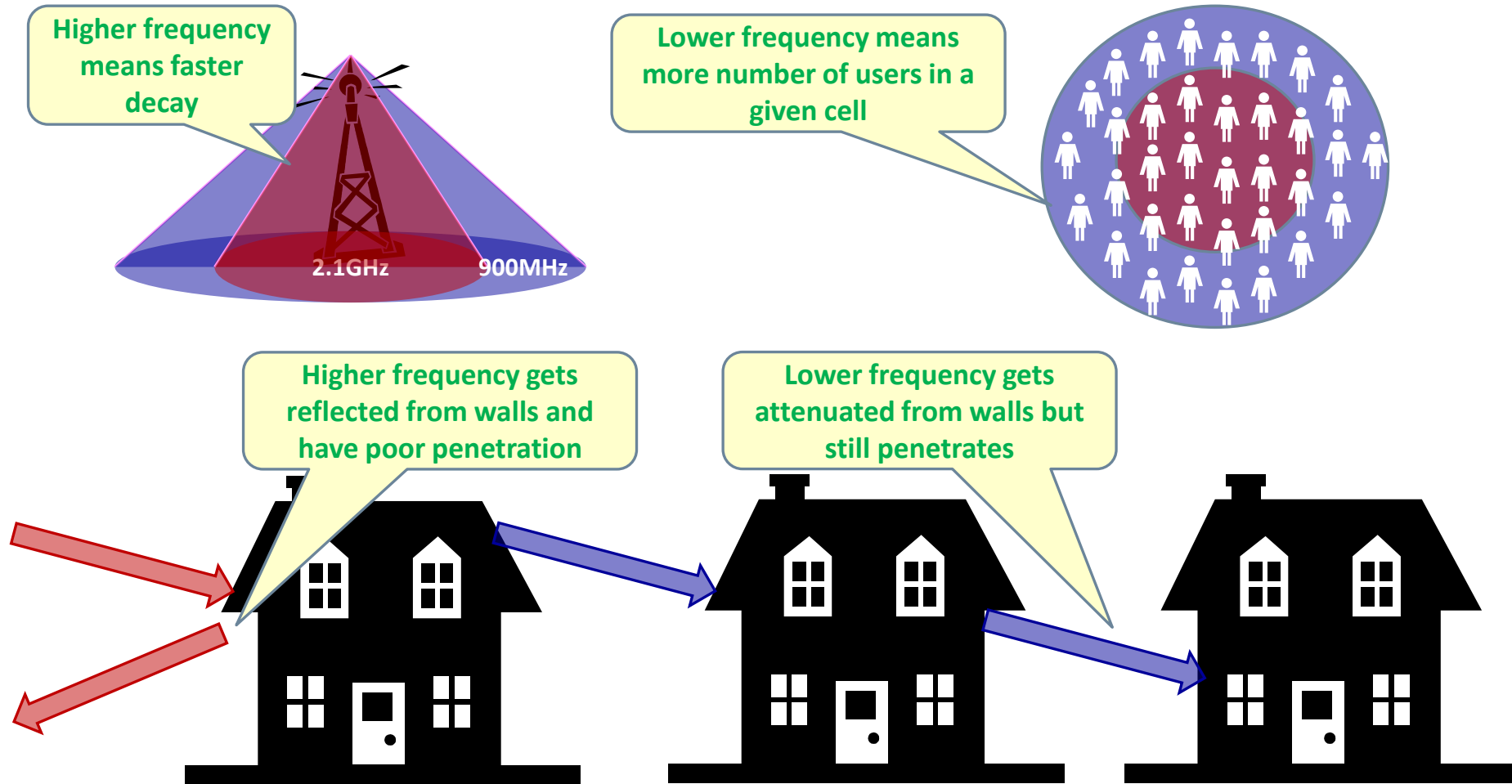
Connecting Underground Railway Network

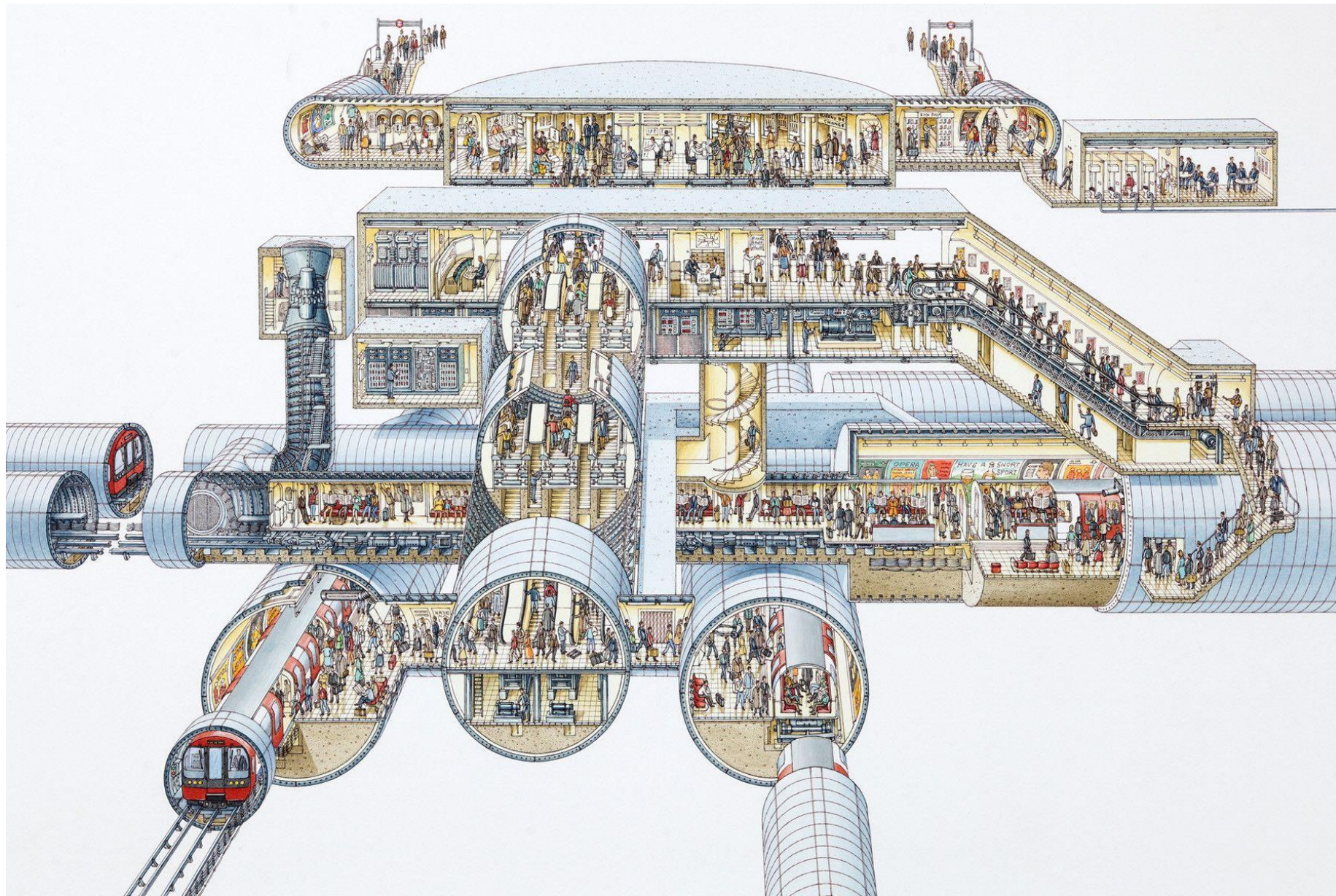
(a.k.a. Subway, Metro, Tube)



@3g4gUK

Importance of Frequency selection





Source: [imgur](https://imgur.com/)



Source: [Londonist](https://www.londonist.com)

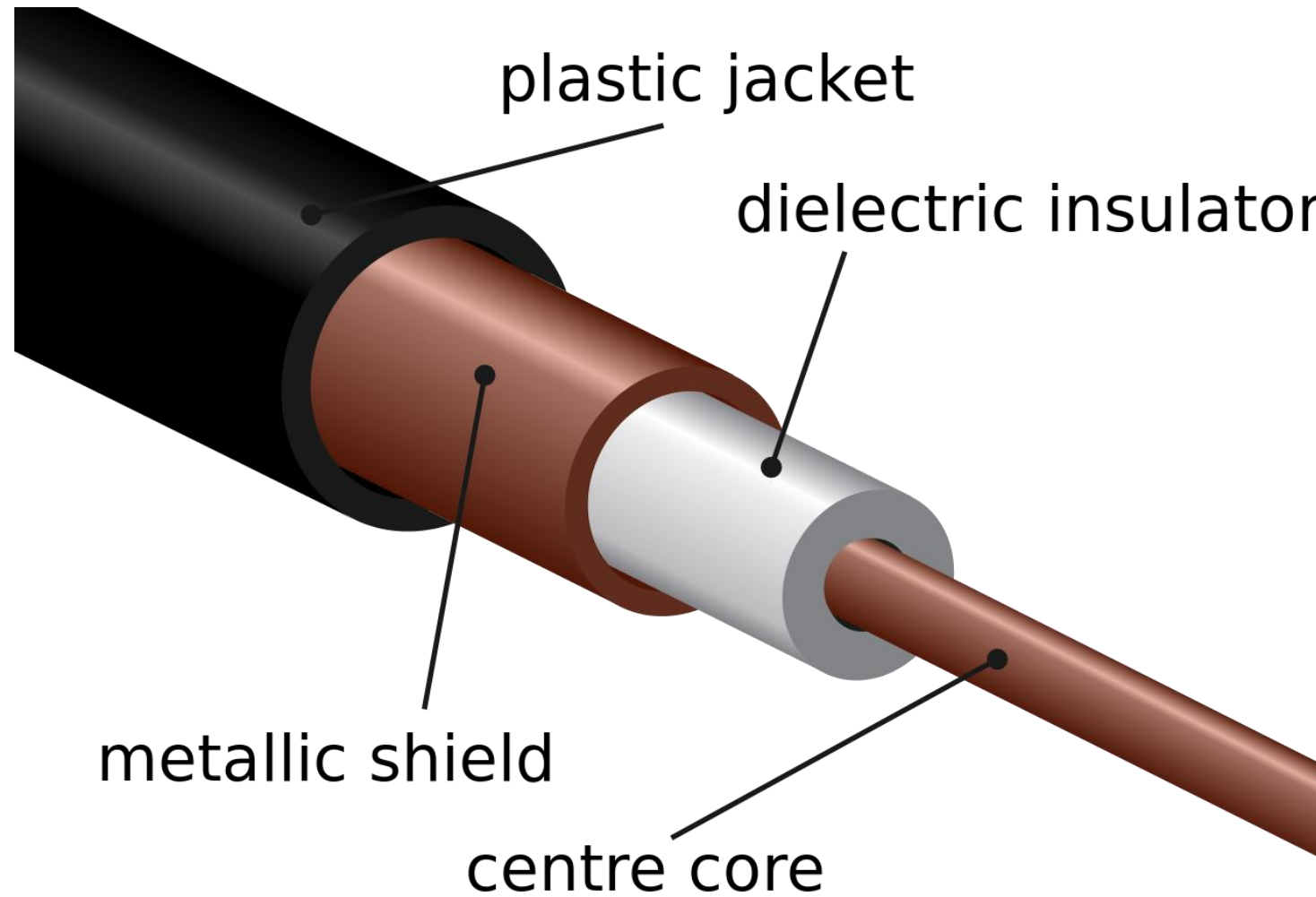
Underground Base Station Example from Japan

Source: @denpa893 on [Twitter](#)



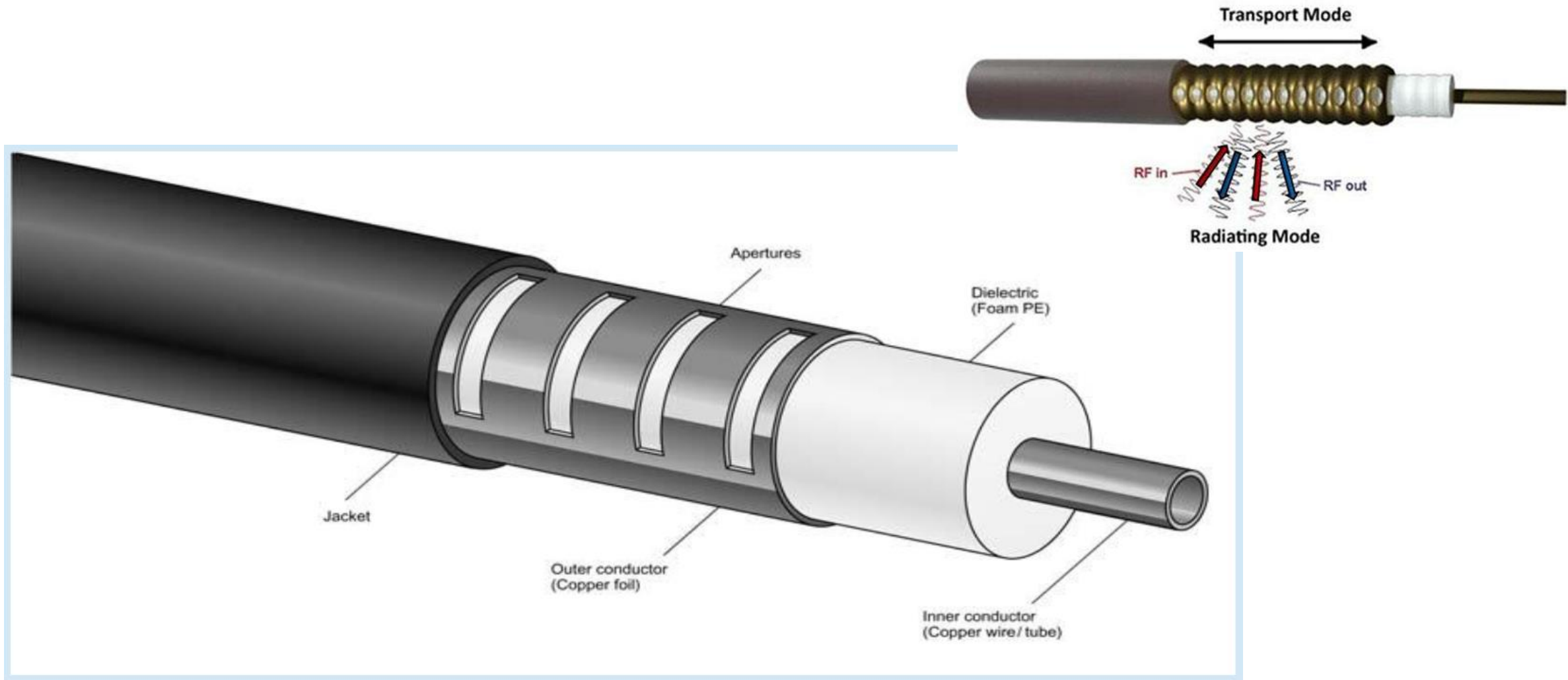
OO HUAWEI P30 Pro
LEICA QUAD CAMERA

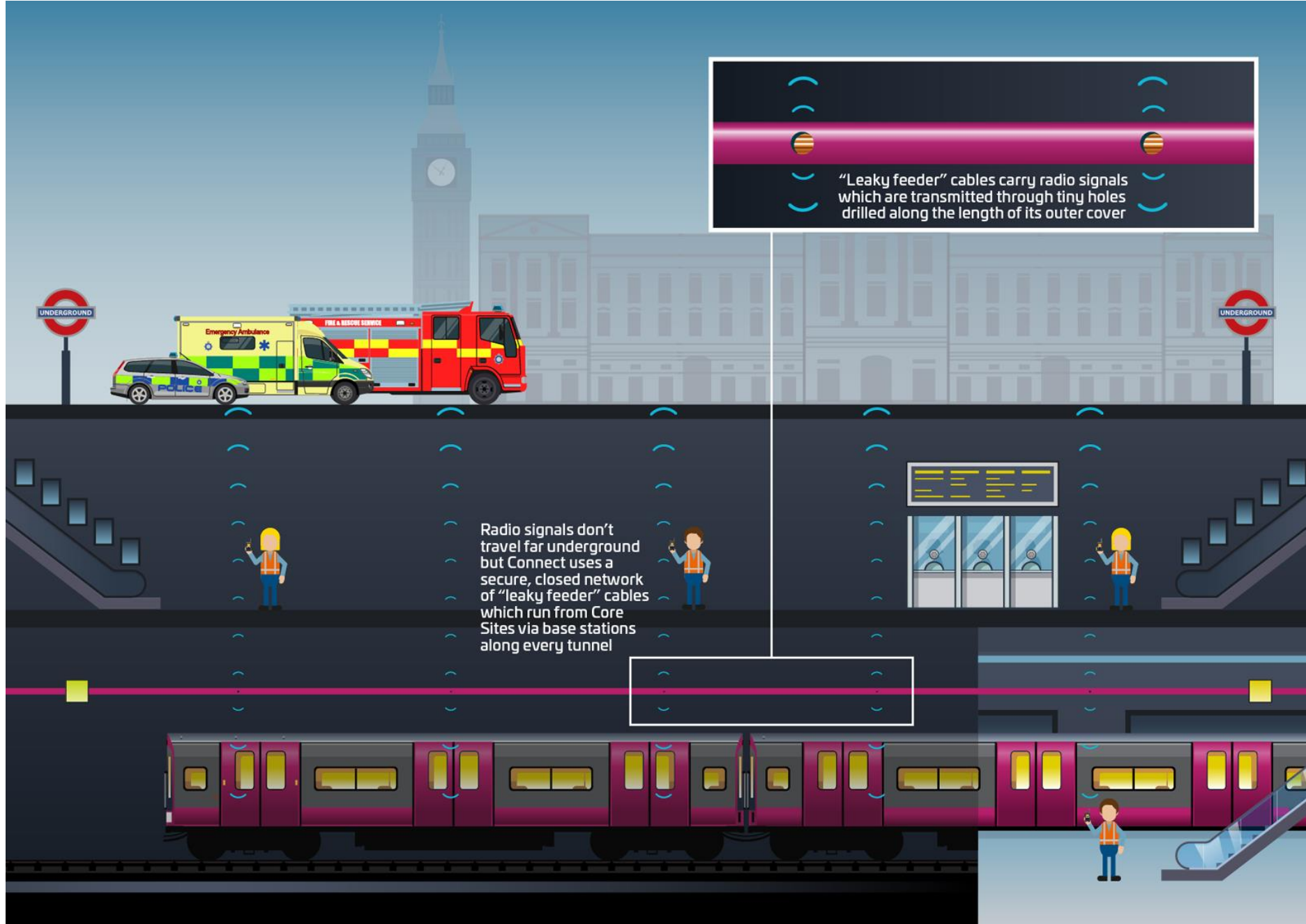
'Coaxial cable'



By Tkgd2007 - Own work, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=4138900>

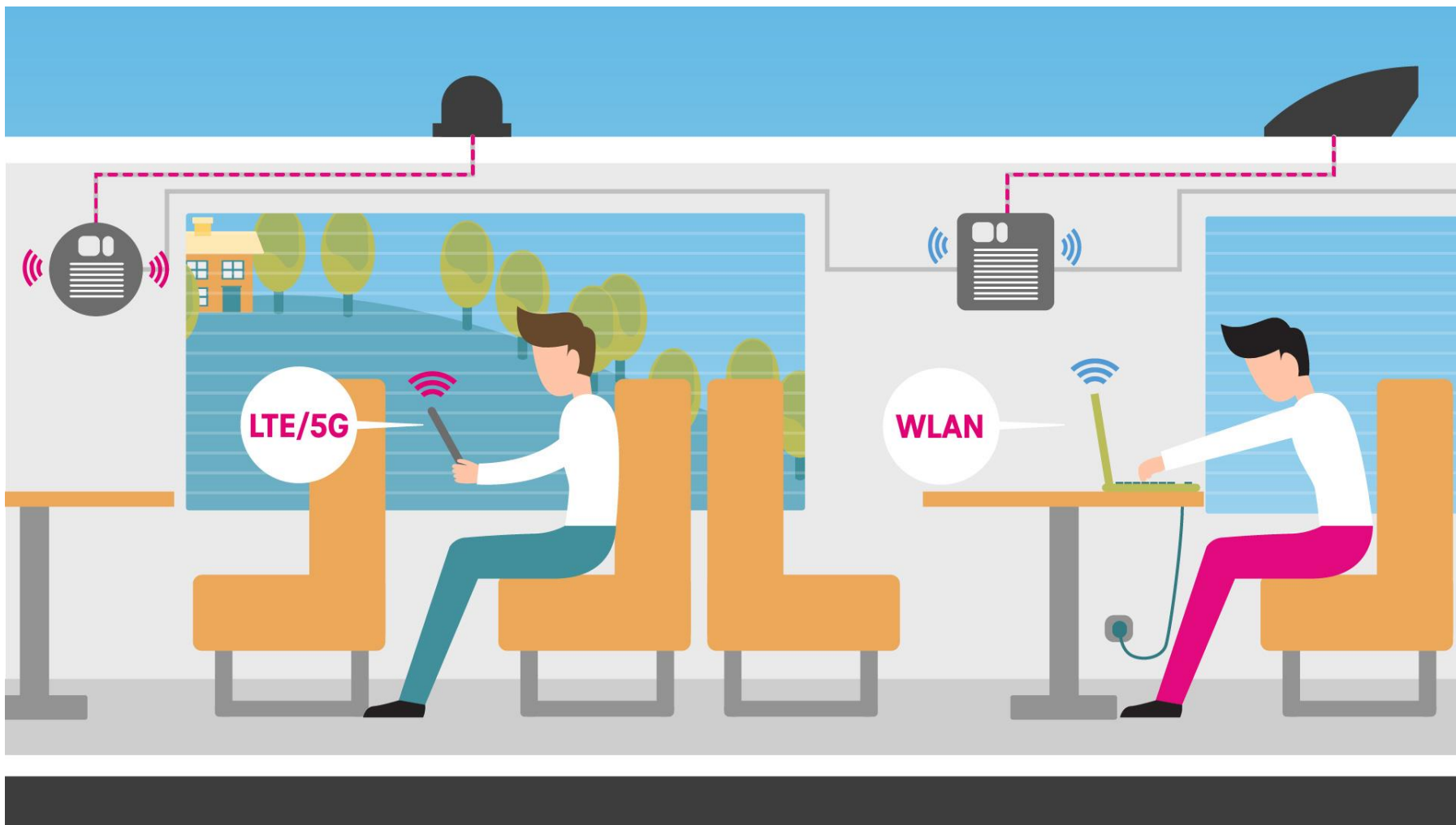
'Leaky Feeder' or 'Radiating Cable'





Source: [Thales](#)

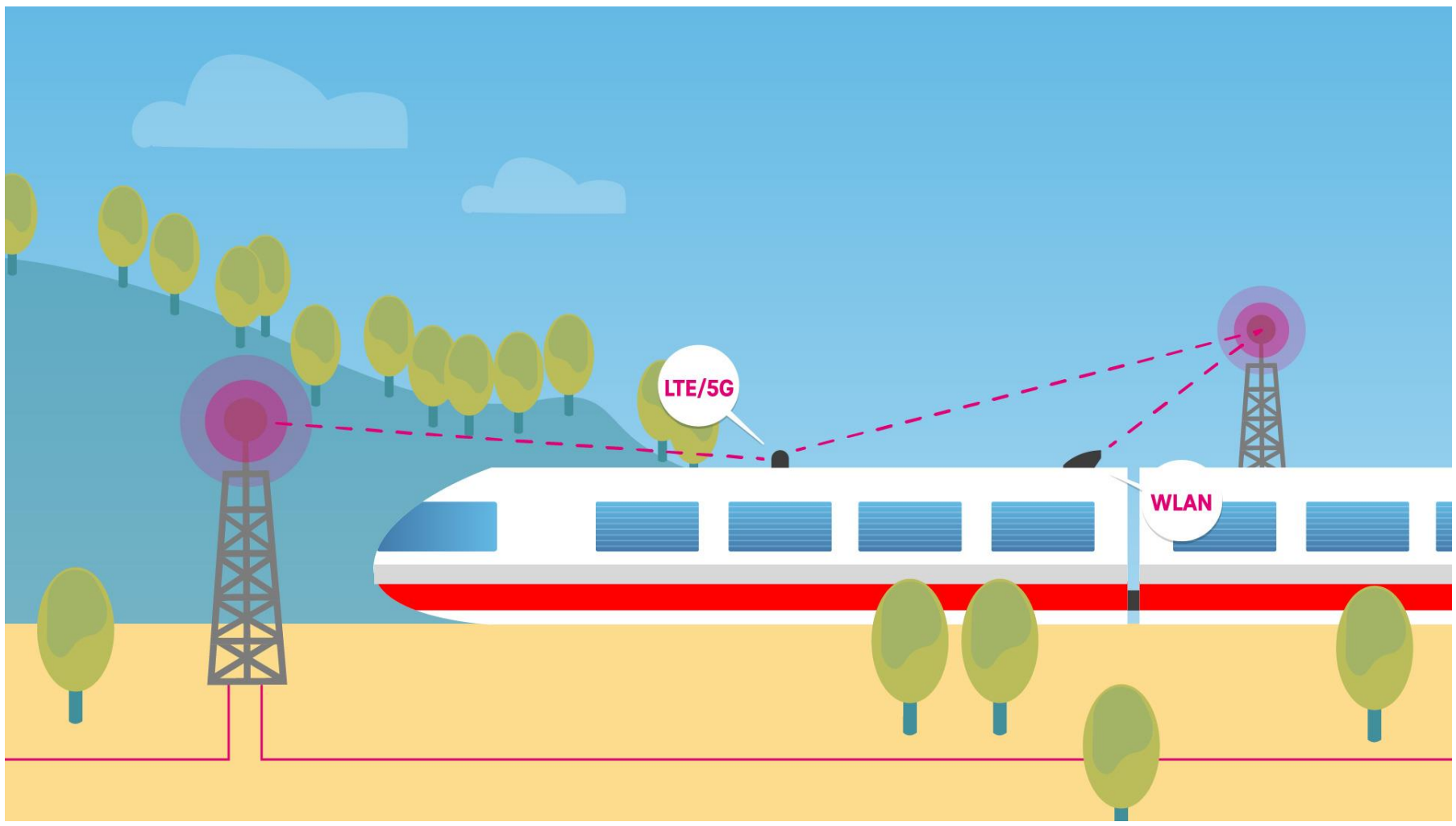
Deutsche Bahn and Deutsche Telekom plan seamless mobile network along all tracks



Source: [Deutsche Telekom](https://www.telekom.de)



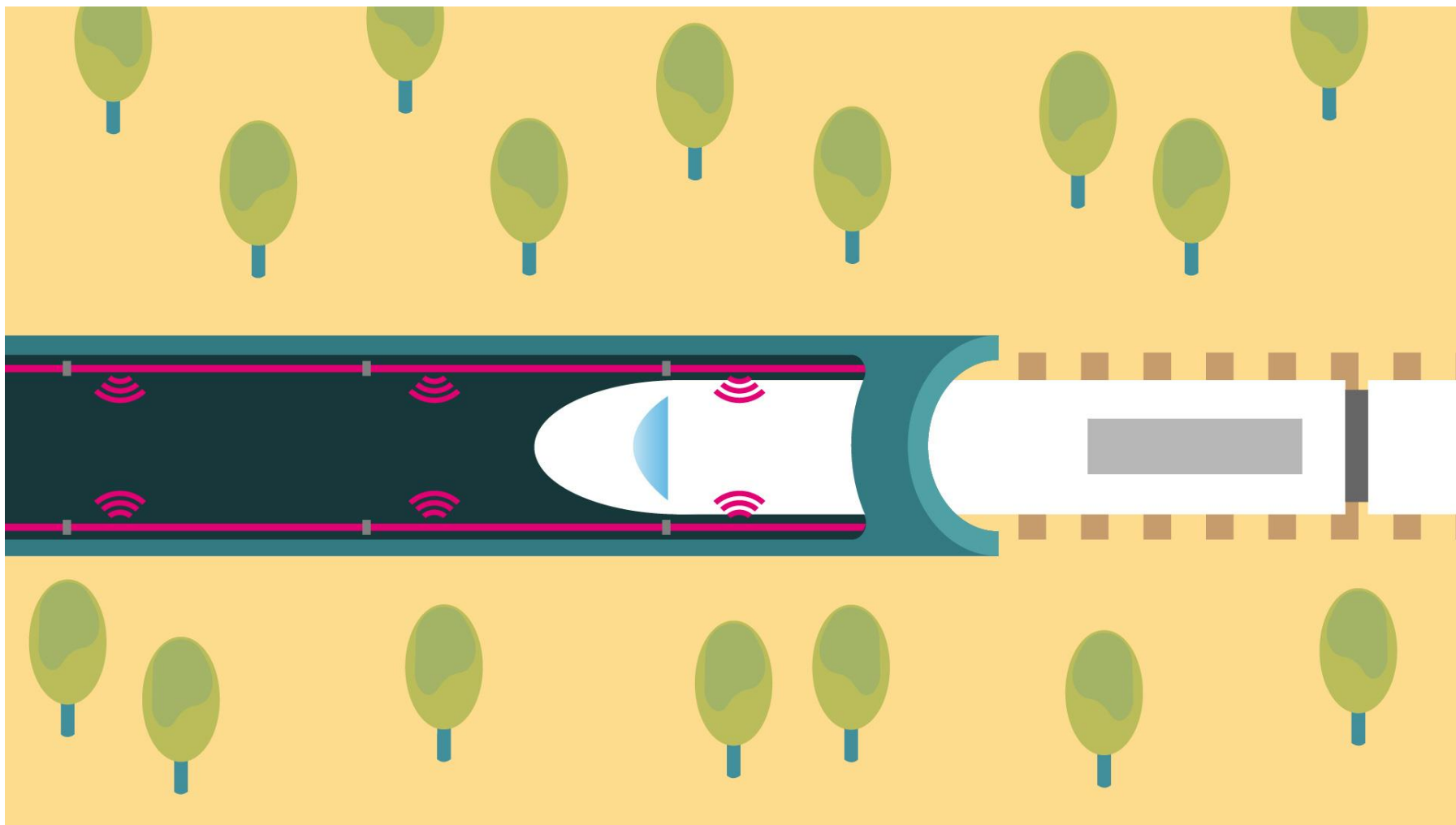
Deutsche Bahn and Deutsche Telekom plan seamless mobile network along all tracks



Source: [Deutsche Telekom](#)



Deutsche Bahn and Deutsche Telekom plan seamless mobile network along all tracks



Source: [Deutsche Telekom](https://www.telekom.de)

China Unicom Brings 5G Connectivity to Nanjing Metro



and edge computing nodes



These are 5G leaky cables



These leaky cables carry 5G signals



which supports real-time data backup.



Source: [Hansen Cables](#)

Connected London: TFL Tube Connectivity Trials



Connected London: TFL Tube Connectivity Trials



Connected London: TFL Tube Connectivity Trials



Connected London: TFL Tube Connectivity Trials



Source: [Wired](#)

Jubilee Line Trials: The eight stations in the trial are served by a "base station hotel" — a mini data centre for each of the four main 4G operators to keep their own separate equipment — at Canada Water station.

What G's are
required for
underground
connectivity?



What G's are required for underground connectivity?

- 4G is the most popular and efficient technology, so 4G for sure.
- 5G is the newest technology but you can get away without 5G for the next few years.
- 2G or 3G for devices that:
 - Do not support VoLTE/4G calling.
 - Roaming users are sometimes unable to use VoLTE/4G calling.
 - The only option for the users above is 2G/3G CS Fallback.
- 3G is being switched off by many operators worldwide, so it wouldn't be an issue if 3G wasn't deployed and only 2G was.
 - All 3G devices support 2G so they can fall back to 2G and do voice and 2G data (GPRS/Edge).

References & Further Reading

- Wikipedia: Coaxial cable ([link](#))
- Wikipedia: Leaky feeder ([link](#))
- Wikipedia: History of the London Underground ([link](#))
- Wall to wall Comms: Leaky Feeder- The Ultimate Guide ([link](#))
- Thales – Connect: keeping London moving under, and over, ground for 20 years ([link](#))
- TFL: Connected London ([link](#))
- TFL: Waterloo & City Cellular Network Trial Report ([link](#))
- TFL: 4G on Jubilee line tunnel section from March 2020 ([link](#))
- Mayor of London - Mission 3: World-class connectivity and smarter streets ([link](#))
- Wired: Inside the messy mission to bring 4G to the London Underground ([link](#))
- IanVisits: Mobile phone coverage coming to London Underground tunnels ([link](#))
- Connectivity Technology Blog: Paris Metro is now 100% covered with LTE ([link](#))
- Connectivity Technology Blog: China Unicom Brings 5G Connectivity to Nanjing Metro ([link](#))
- Deutsche Bahn and Deutsche Telekom plan seamless mobile network along all tracks ([link](#))
- Czech Telecommunication Office (CTU): Internet on the train? It also depends on the coverage and the type of wagon ([link](#))
- 3G4G: Voice in 4G: CSFB, VoIP & VoLTE ([link](#))
- Ericsson: 5G & mining technology ([link](#))
- Twitter: Almost 500Mbps 4G on the new London Underground solution on EE? ([link](#))

Thank You

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Telecoms Infrastructure Blog – <https://www.telecomsinfrastructure.com/>

Operator Watch Blog – <https://www.operatorwatch.com/>

Connectivity Technology Blog – <https://www.connectivity.technology/>

Free 5G Training – <https://www.free5gtraining.com/>

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