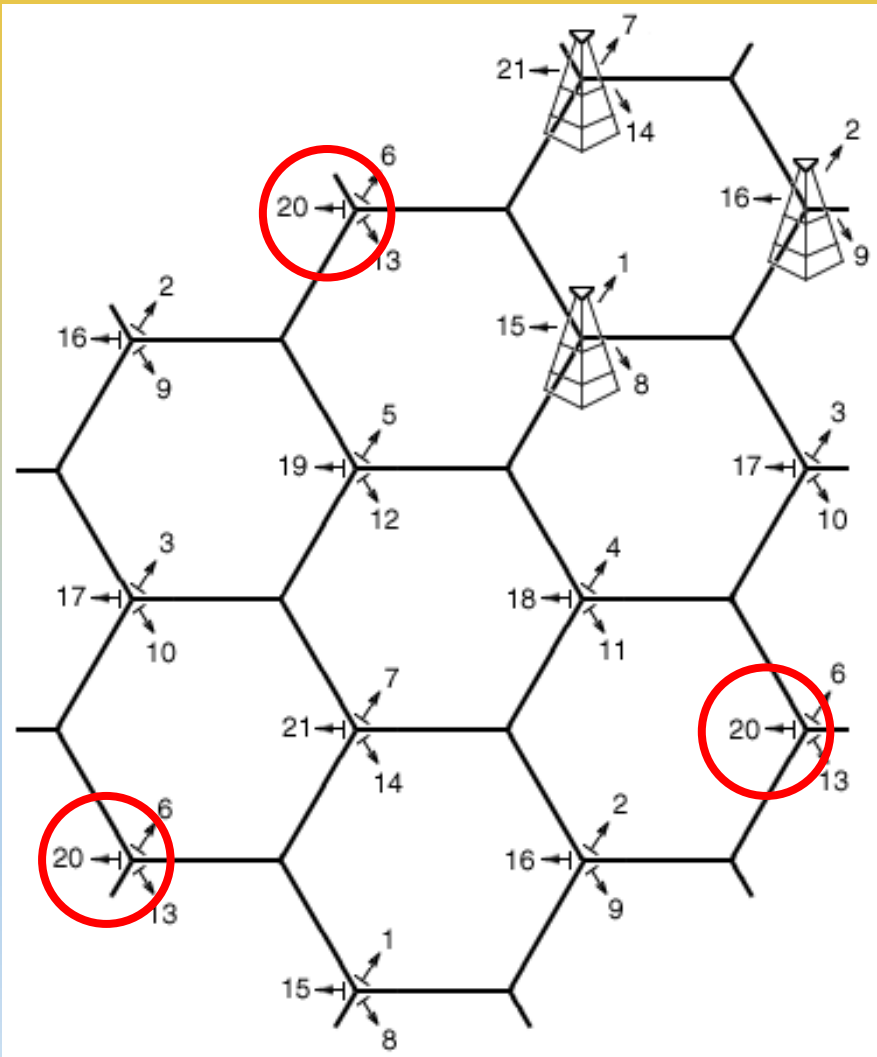


**PART TWO**  
**The MOBILE phone**

**An introduction to  
Cellular Communications**

# The Basic Cellular Concept



- Each base station antenna points in three directions
- In the matrix opposite there are 20 frequencies on which the cell can communicate
- Any one frequency can be reused without interference if two adjacent cells do not use the same frequency
- Macrocells - up to 30km range
- Small cells - 10m to 1km
- Subdivided into femtocells, picocells and microcells

# The Basic Cellular Concept

It becomes very much more complex and I do not propose to go into the concepts associated with things such as:

- ❖ Antenna beam forming
- ❖ Packet switching
- ❖ Channel capacity
- ❖ Uplink
- ❖ Downlink
- ❖ Handover
- ❖ Backhaul
- ❖ Modulation techniques such as Time Division or Frequency Division Multiplex

Suffice it to say the cellular communication works.

Although a significant proportion of the UK is unable to use the latest 4G technology

# Examples of cellular antennae



# And how to disguise them



# Even in the desert



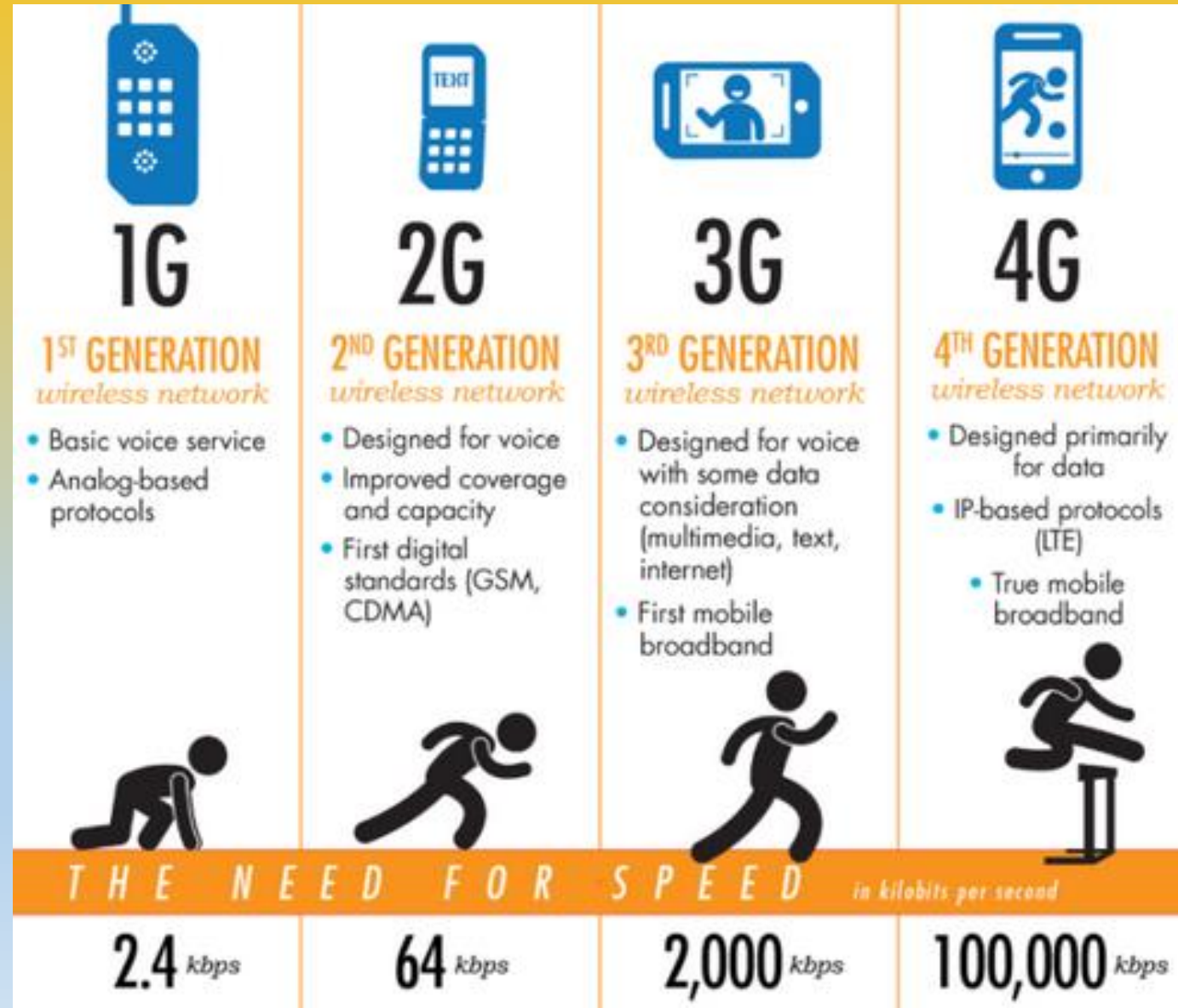
There is even a disguised antenna  
in Tilgate forest!

Visible from the M23 south of Crawley

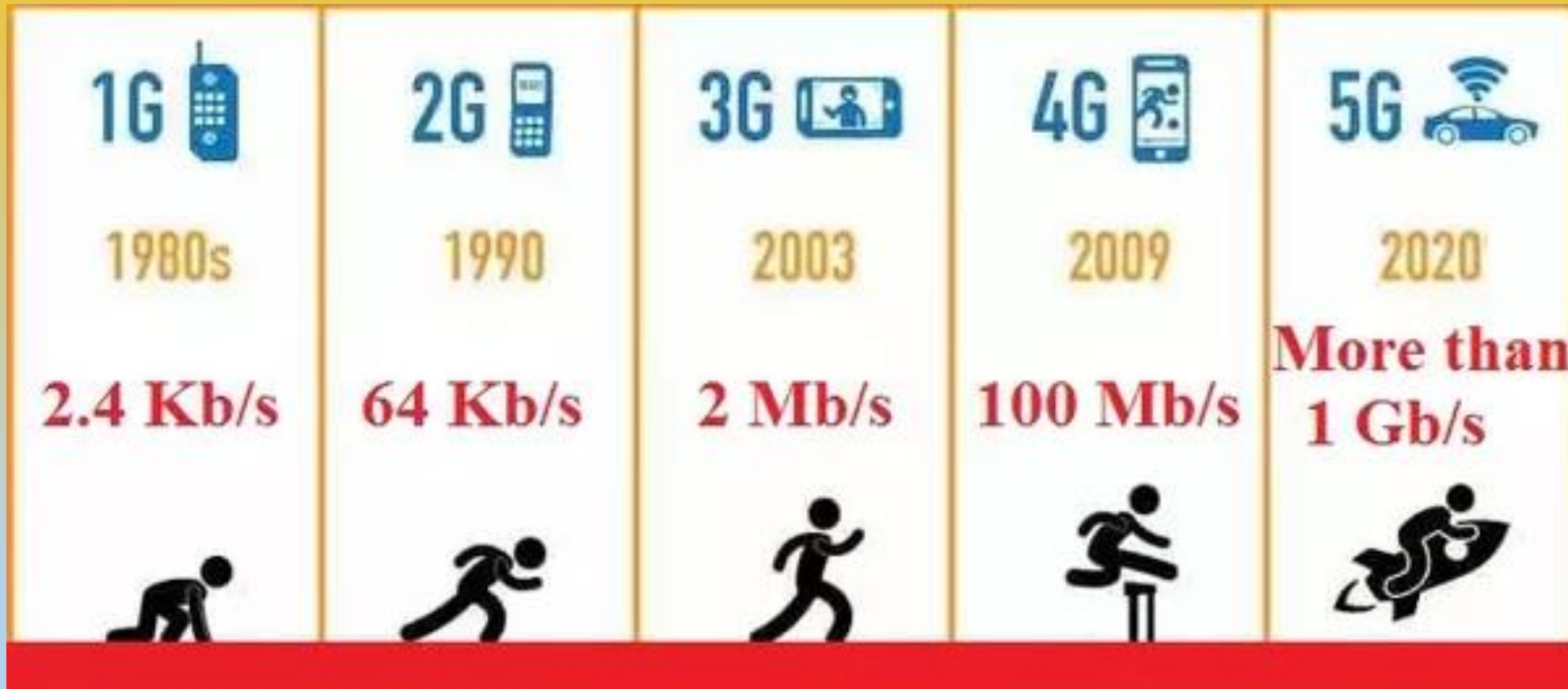
It looks like a very stilted pine tree.

The give-away is the set of climbing rungs!

# What are 1G, 2G, 3G and 4G?



# What are 2G, 3G, 4G and 5G?



# Evolution of the mobile phone



Motorola  
8900X-2



Nokia  
2146



Nokia  
3210



Nokia  
6210



Ericsson  
T39



Alcatel  
OT511



Samsung  
E250



Apple  
iPhone



BlackBerry  
Curve 8900



Samsung  
Galaxy S2



Samsung  
Galaxy S4



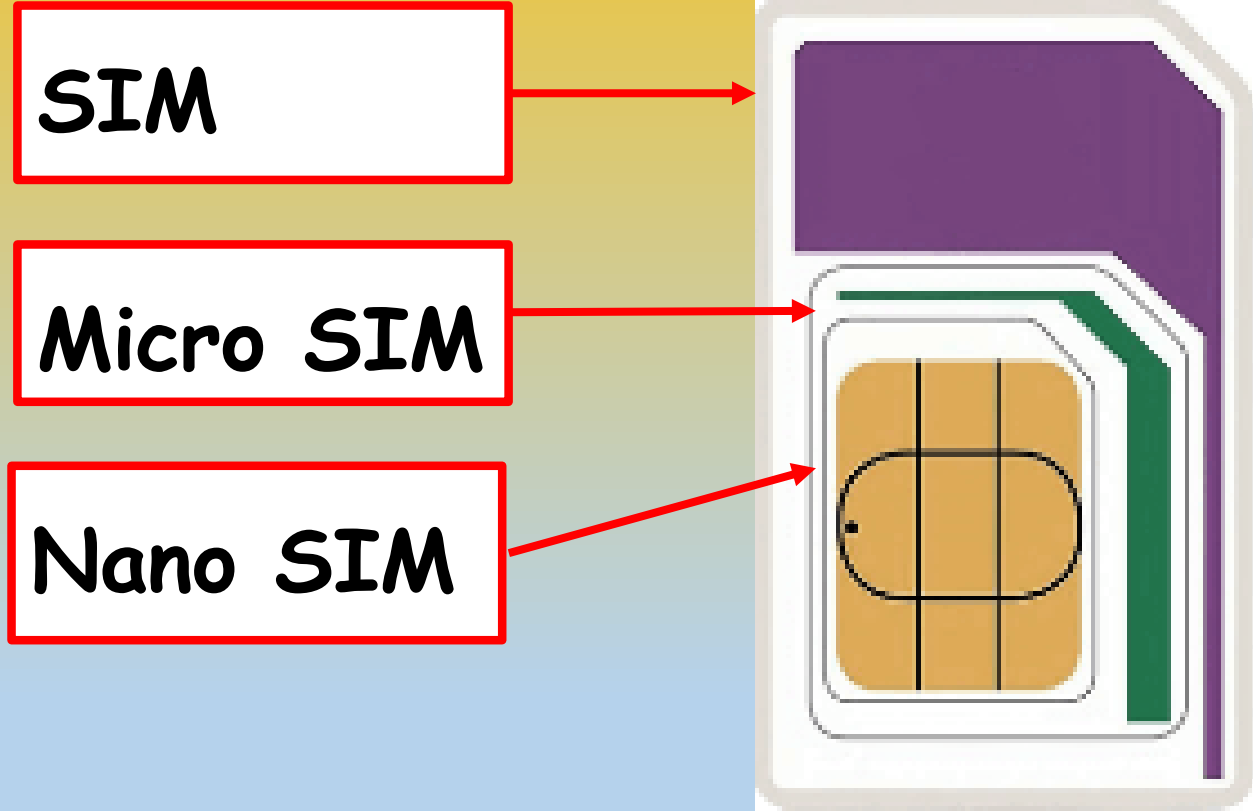
Sony Xperia  
Z Ultra

# You're never alone with a phone

With apologies to the  
Backfiring Strand cigarette  
advert of the 60s!



# What's a SIM card?

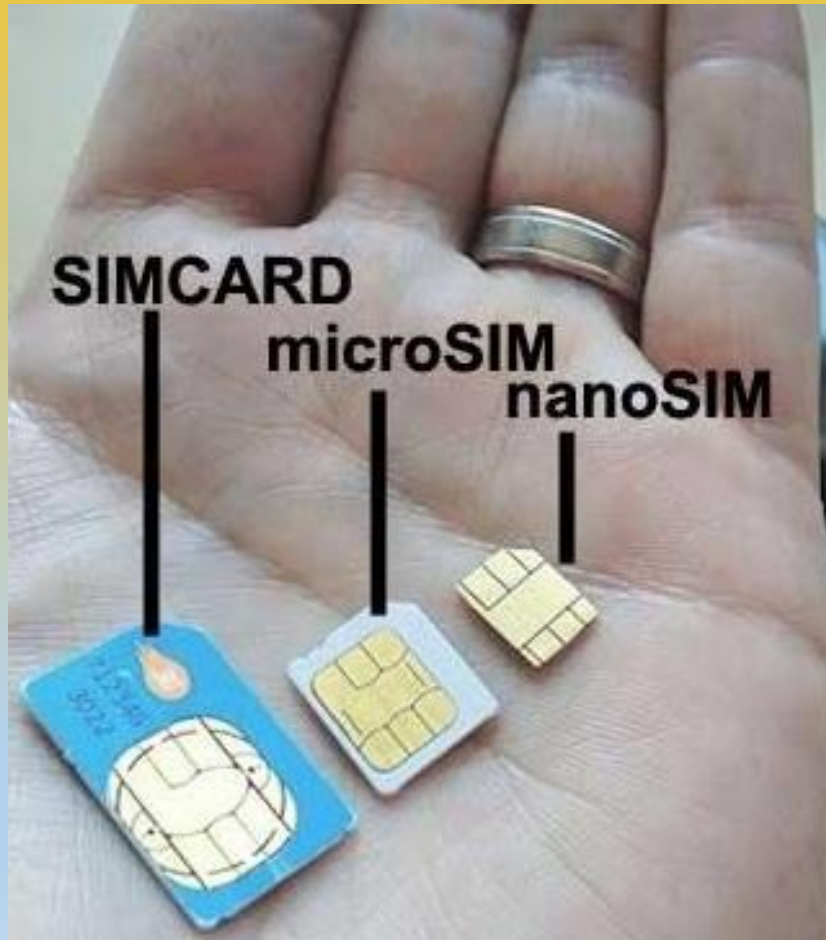


The SIM card is a Subscriber Identity Module  
Your phone won't work without one

There are three sizes of SIM card, as shown left  
SIM, Micro SIM and Nano SIM.

But they all do the same task

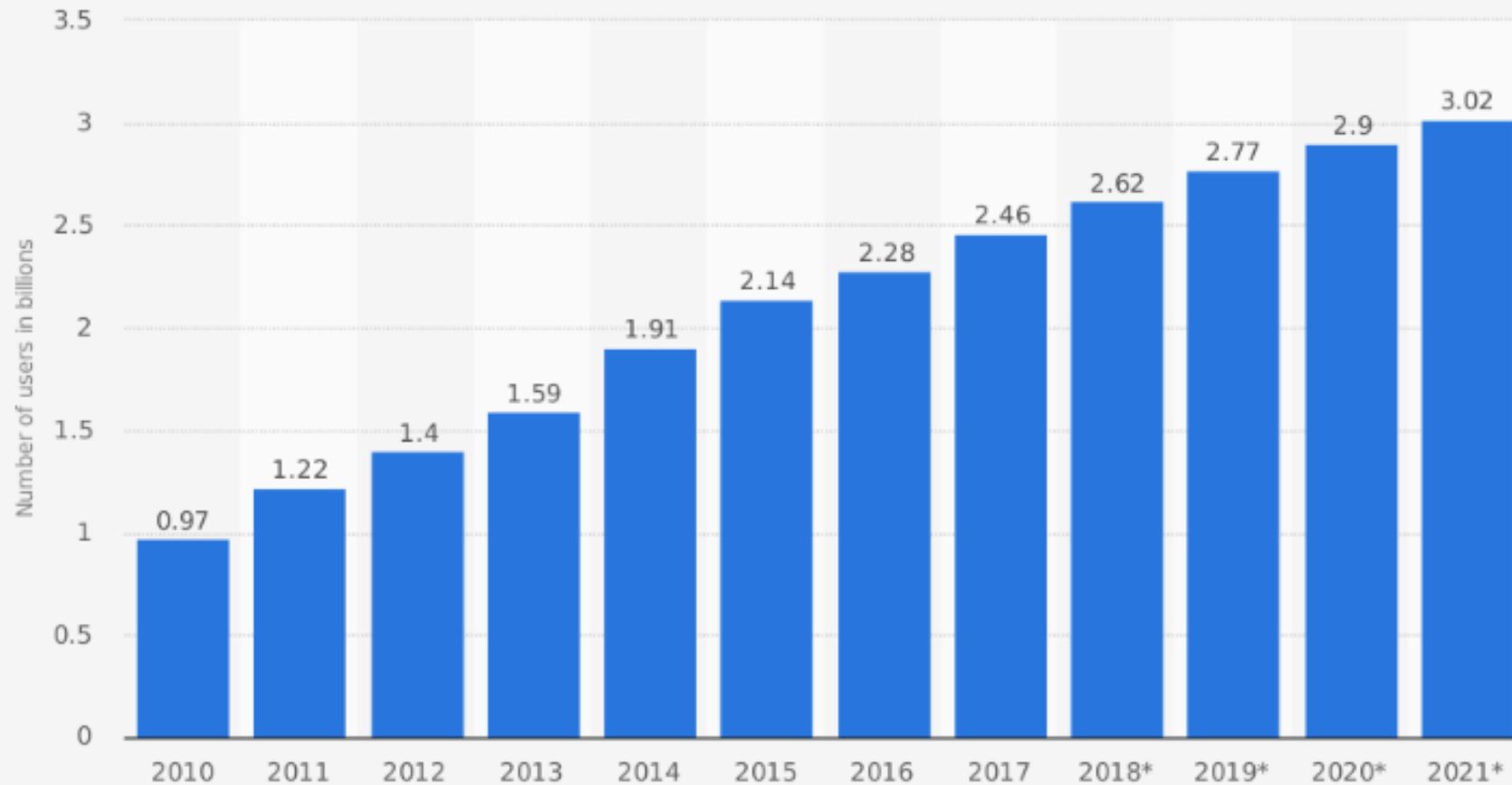
# How large is a SIM card?



# Beam me up Scottie! - Almost



## Number of social network users worldwide from 2010 to 2021 (in billions)

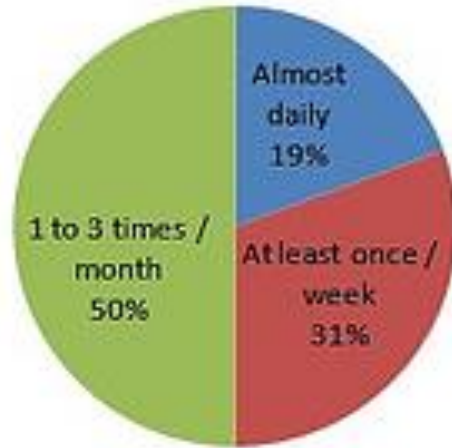


Source  
eMarketer  
© Statista 2017

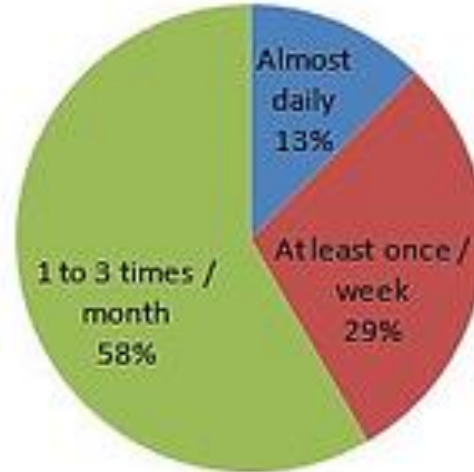
Additional Information:  
Worldwide; eMarketer; 2010 to 2017

# Mobile internet usage

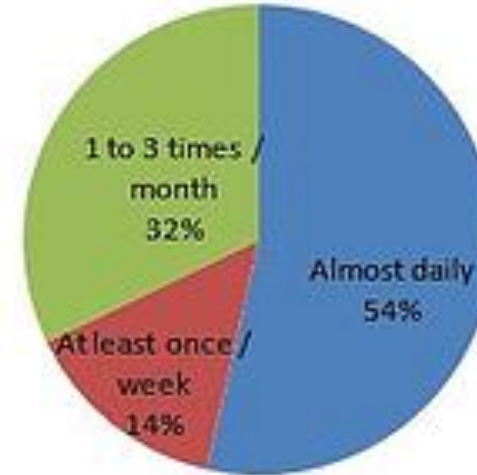
US



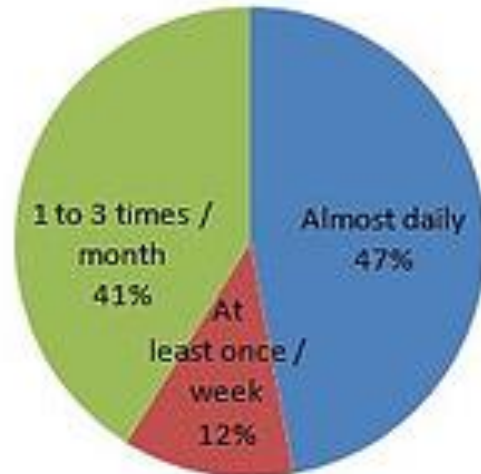
UK



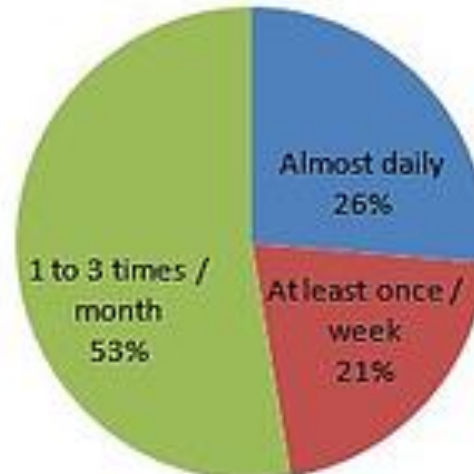
Italy



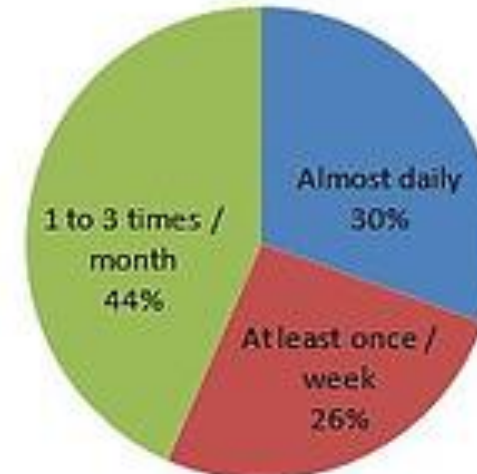
France



Germany



Spain



# Here's what we are missing out on (Due to the tree problem)

- Short range communications - Bluetooth
- Full A-V communications - SKYPE
- Facetime - Apple's version of SKYPE
- Satellite communications
- The growth of the optical fibre infrastructure that lies behind Worldwide mobile communications
- Smart phone growth patterns
- Social networks