

# FROM TO APE APP

## Technological and commercial advancements



Jonathan Carter co-founded Glimworm IT BV in 2001 with partners Paul Manwaring, Marten Hoekstra and Colin Williams. At 15 his professional career began as a game programmer. After more than 10 years of innovative experience Jonathan was asked to join CMG's prestigious Advanced Technology Department consulting for blue chip companies. Eventually, he shifted his attention to new media and created Glimworm, bringing his talents to the world of web development. With nearly 30 years in the industry his list of accomplishments is huge including everything from project management to robot building and he continues to keep on top of new developments by constantly evaluating emerging technologies.

The "App" is the technology of the moment but did you ever ask yourself why this revolution is happening now? I have been an avid user of new mobile technology for nearly 20 years and in this paper I want to explain the technological and commercial advancements that have happened over the last 10 years that have culminated in today's App revolution.



10 years ago I desperately wanted to have a phone that I could use to connect to my company's web servers in case of an emergency and on which I could write my own programs. I got myself a Windows Mobile smartphone from T-Mobile. It had a fairly small colour screen, a touch screen using a stylus and a data contract. I purchased a windows mobile version of putty which is software that allows you to manage a remote server using a command line and then I proceeded to write my own programs using Microsoft C#.

It just about worked and was useful, to the point of life saving, in an emergency, and I even tried to write my own software aimed at independent package couriers so that they could co-ordinate their route and let the HQ know their current status. But in 2003 there were too many drawbacks to make it a serious prospect.

### I list the barriers to App development in 2003 as:

- The speed was too slow and the connection was un-reliable
- Coverage was very bad outside the city centers.
- There was no integrated GPS, although you could connect to a Bluetooth GPS it was un-reliable and had to have its own separate power supply.
- There was no camera
- There was no accelerometer
- The battery drained very quickly
- To start an App you had to use the Windows start menu
- You had to use the stylus where nowadays you can use the touchscreen with your fingers.
- The backlight was unusable in bright daylight.
- As an App developer there were very few users, so potential clients would have to buy a subscription to a smartphone especially to use your App.
- The handsets were expensive even with a subscription.



You will be aware that none of these barriers exist today, especially with Apple's iPhone and the Android handsets. In this series of white papers I will attempt to give you a brief history of the most important innovations which have made the App the #1 hot property of 2010,2011 and 2012.

**I will cover this subject in 4 parts:**

Part 1 - Connection speed, coverage and data bundles

Part 2 - GPS and the accelerometer

Part 3 - Battery life and the Operating system

Part 4 - The birth of the AppStore

## Frequently used acronyms

APP:	Mobile application
API:	Application programming interface
G1,2,3,,::	Generation 1,2,3
GUI:	Graphical user interface
MBPS:	Megabits per second
PUTTY:	Software used by system administrators to manage servers remotely
UI:	User interface

# Part 1 - Connection speed + coverage + data bundles

## A brief history of mobile speed

With a smartphone it is all about being connected to the outside world, and by the outside world I mean the Internet. I don't have to specify at this point precisely what person or service you want to communicate with because once you are online it gives you the possibility to pick and choose. But in the context of a smartphone I want to discuss the speed of the connection, essentially how fast does your connection need to be to make the online experience entertaining

The speed of the information you get over the internet is determined initially by your own data connection speed and specifically the data connection speed of your smartphone as it connects to the telephone company you have your contract with. Unlike your connection speed at home which is constant, the connection speed of your smartphone varies from location to location. This is because your phone is constantly switching between different cell phone towers to maintain both your telephone and your data connection. Each tower has a fairly limited range and the further you are away from a tower the lower your speed will get and the speed will also even vary from cell to cell depending on how modern each tower is. As you can imagine in urban areas where there is a high concentration of people and towers the speed is uniformly good and the reliability of the connection is also stable but as soon as you leave the city limits most users will observe a dramatic drop in both speed and stability.

## What is "fast"?

Connection speed is measured in Mega bits per second (Mbps) where Mega translates to 1 000 000 bits therefore 2Mbps is the same as 2 million bits per second. To understand this I may have to explain what a "bit" is. In computer science a "bit" is a single binary digit, that is a value of 1 or 0, these are the building blocks of all digital data and are combined to create text, images, movies, sounds and even Apps themselves. In more practical terms the following is true:

- The line of text "the quick brown fox jumps over the lazy dog" takes up about 45 chars of 40 bits therefore to download the text in one second takes a speed of about 0.00045mpbs.



- An image used by people for their twitter or Facebook image is about 250KB this is about 2 500 000 bits and therefore to download it in 1 sec takes a speed of 2.5Mbps
- A photographic image as a jpeg of about 1000 x 800 is around 1.5MB (this is especially confusing as MB is not "megabit" but "megabyte" when we talk about disk storage a byte being 8 bits) therefore this is about 1 500 000 bytes which is 15 000 000 bits. To download this in 1 sec would take a speed of 15Mbps

There is a generally accepted lowest acceptable limit for a connection of 0.5Mbps below this level a small Twitter bio image will take more than 5 seconds to download. Text will also be frustratingly slow. It is possible to make specialist application to use connections lower than this, for instance the sensors measuring weather data in remote locations are probably using very low speed connections, but for a human being to open a mobile website and get mainly the text of a news article to come up I would suggest that 0.5Mbps is the lower limit. In order to view movies in HD at home we probably need 10Mbps or above.

In the remainder of the article I will use this as my range. In principle the following range is true, at 2012 standard:

- 0.5 is just about acceptable but pretty slow
- 1-2 is acceptable but a bit slow
- 2-4 is fine for most mobile use
- 4-10 is fast..

*■■ In 2001 loading a Google page in 30s seconds on your phone was "fast", so fast that you would show all your friends and they would be utterly amazed. ■■*

#### **How speed has increased from 2001 to 2008**

In 2001 the fastest you could get via a mobile connection was around 0.114MB, but most operated at 0.057mb that means that to load the Google homepage would take around 56s. Therefore in 2001 loading a Google page in 30s seconds on your phone was "fast", so fast that you would show all your friends and they would be utterly amazed. As you can imagine the only people who bought these phones and paid for the expensive contract were either 'early adopters' or people who needed it for their job.

In 2011 things are rather different. My own connection with T-mobile runs about 2Mbit in the city, this means Google loads in 1s. 10 years later and 50x faster. The reason that this dramatic increase is possible is because technology has been implemented by the telephone networks in waves which, although they have more technical names, have been labelled "Gs" where G stands for Generation.

In 2001 we were a few years into 2G or 2nd Generation mobile technology it is 2G which gave us the speed of up to 0.114mb, but already in 2001 we were talking about the future which was going to be 3G or 3rd Generation. Many European governments auctioned off the 3G airwaves for billions of Euros but the practical implementation of the 3G network was still a few years away, this was mainly due to the large investment required by the telephone companies to replace all their mobile masts made worse by some technical difficulties.



While we were waiting the telephone companies tried to give us upgrades in speed calling them 2.5G and 2.75G until around 2006 3G had national coverage in most European countries. 3G gave us an initial speed of 0.384mb and then very quickly they got my magic 0.5mb working until today we run at about 2mb in city areas. The effect that 3G had was massive.

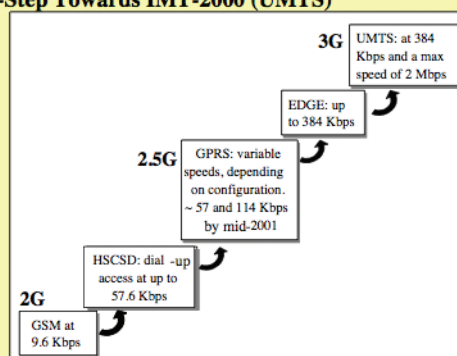
/// The effect that 3G had was massive. ///

There was a tipping point at which the speed was acceptable to browse the web at, this was the magic 0.5 Mbps that I mentioned earlier. At this speed google started opening in a few seconds, you could chat and Twitter and Facebook, you could even email without large attachments. From my experience time tipping point happened around 2007/2008. This coincided with the launch of the most famous smartphone, of course this is Apple's iPhone which was launched in 2007. Early adopters mainly hooked their iPhone to their WIFI at home and put up with slow internet speeds when out and about but for the first wave of iPhone users 3G happened just at the right time; probably within 6 months they were enjoying mobile data speeds of 1Mbps and then the whole thing made sense. You can consider whether the iPhone would have been so popular if not for 3G but I like to think of it as the 'chicken and the egg' conundrum. Personally I wonder if Apple would have held back the iPhone another year if 3G was not so advanced. I also wonder if the number of 3G contracts would have increased so quickly if the iPhone has not have ignited the consumer's interest in such a fantastic way. We We will never know the answer to this question it is now history.

#### Speed and data bundles from 2008 to present

From 2008 until present day speed has not really increased but instead coverage and reliability have. More significantly the way in which we are charged has changed completely. In 2008 we were being charged by the call and by the minute, data was used so seldom and by so few people that it was either charged at an outlandishly high price per MB or it was given away almost for free in unlimited package deals. At some point the telephone companies decided that they wanted a more predictable revenue stream so they started making bundles of minutes.

Figure 3.1: A Step-by-Step Towards IMT-2000 (UMTS)



Note: This is an illustrative figure only. Please note that a shift toward additional spectrum occurs after the EDGE component, upon the 'leap' to UMTS. There is some debate about the status of 'EDGE' as potential equivalent of UMTS / IMT-2000, given that its data transmission capacity is close to expected 3G rates (UWC-136 or EDGE is recognized under the ITU's IMT-2000 umbrella); on the other hand, it appears that there may be diminishing scope for the deployment of EDGE in future.

Source: International Telecommunication Union

This means that we could call for 100 or 200 or 500 minutes for what seemed a pretty low price. Of course the telephone companies were not being fools, on their part during the implementation of 3G they had digitalized the voice communication and therefore it mattered less and less to them how many actual calls were made and it suited them not to have to count all the calls and make complicated bills, in fact for the telephone companies realised they could collect the same amount of money from a customer whether they used their phone at all, hence the bundles were born.

This arrangement suited the smartphone used. As more people got smartphones they were able to incorporate the same pricing structure into data, so instead of paying for actual MB's downloaded you could get a package with unlimited internet for a fixed monthly fee. As the speed went up the internet prices stayed the same. In 2003 I started paying €9.99 monthly for unlimited internet at a very slow speed; today I still pay the same and I get 2Mbits. In real terms my value for money has increased by many times. It is only now that telephone companies see so many customers communicating via their internet connection with applications such as 'WhatsApp' that they are starting to limit the MBs. This will most probably herald the next change in the market.

*/// It is important for an App to be responsive at all times and therefore we will need to design the App to work at lower than ideal data speeds. ///*

So lets have a short recap:

#### 2001

My mobile connection at €9.99 per month, slow internet, maybe good enough for a mobile webpage, limited phone, no GPS, no maps, no accelerometer, short battery life, small screen.

#### 2007

3G a reality for everyone, iPhone launched by Apple, Android released by Google.

#### 2012

Still paying €9.99 per month, iPhone, Apps, movies, GPS, maps, accelerometer, Skype, FaceTime.



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Schrijf je in voor de nieuwsbrief