BRIEFING MEMO

ORIGINS OF CLOUD COMPUTING

Corporate use of *cloud* services in Europe is on the rise. We get the imagery, but there is nothing celestial about it, in reality it means using very much terrestrial hardware and software of *remote* third parties versus your own *local* infrastructure. The trend is one-way only, more cloud. It's a significant endeavour for any corporation to undertake and there are many compelling reasons to do so. But let us first put your up-coming migration into context. We'll go back in time for you to realise how quickly technology has evolved, and how companies & households have embraced it.

> *"I don't need a hard disk in my computer if I can get to the server faster... carrying around these non-connected computers is byzantine by comparison." – Steve Jobs*

Cloud services are actually the logical conclusion of a 20th Century telecommunication revolution. It all started with early **wire-based** telegraphs & telephones when science turned sound into electronic form. Telephony followed an evolution that remained wire-based all the way until the commercialisation of mobile phones. On the other hand, **wireless** audio (radio) and visual (TV) communication followed a separate but parallel evolutionary tale, as follows.

While science was turning both sound & images into electronic signal form, the magic happened when converting these signals into electro-magnetic radiation which travels through air and not terrestrial wires. The electronic signal is thrown from an emitter instrument. When it travels in one direction, it does so in a wave format. The word **radiation** comes from the Latin word **radius** or beam. Electro-magnetic radiation soon was commonly called a **radio wave**.

The radio wave is caught by a receiver instrument, turning it back into an electronic signal. In reality, there are a family of electro-magnetic waves. They are radio-, micro-, infrared-, and light-waves.

This radio wave for transmitting both audio & visual content comes in two forms: the **analogue** radio wave allows sound and images in electronic signal form to be *analogous* meaning to be the same as the original. This radio wave is characterised by **infinite** variations and its shape reflects the minutiae of decibels and colours.

Digital sounds & images, on the other hand, we know are nothing other than a string of "0"s and "1"s as an electronic signal. The binary system and computing enable sounds & images to be reflected by "absolute" (not infinite) though very large numbers comprised of "0"s and "1"s. The shape of the digital radio wave is therefore strict. A string of a combination of "0"s and "1"s are billions and billions of numbers.

Today, broadcasting in analogue has gradually been replaced by digital, why? When waves travel, they can be disturbed. The crackling of sound and distortion of images in analogue does not happen with digital, as the radio wave is simply corrected by the receiver. Any part of the wave that is not represented by "0"s and "1"s is extracted. This explains the clarity and permanence of digital recordings. Broadcasting infrastructure is similar whether analogue or digital. It requires emitters on the one hand and receiving towers & aerials on the other. This is **terrestrial** radio & tv broadcasting. We also have satellites through which radio & tv is broadcasted and received by dishes on Earth. This is **satellite** radio & tv.

For both systems, terrestrial and satellite, wherever the reception was difficult due to terrain constraints, cables leading from highly placed and large receivers were laid directly to the end-users. As soon as the infrastructure became economically feasible to lay, **cable** radio & tv evolved to become a **pay for** feature, delivering specific content in the shape of exclusive sports & movie channels.

While available to urban households with otherwise perfectly good direct aerial reception, the difference is that the analogue or digital signals were **scrambled**. In addition to getting a cable connection, the consumers pay for the box which basically unscrambles the transmission.

The lines between telephony and radio & tv used to be quite defined by supplier. We had very large telephone operator companies versus cable operators. Today we have even larger telecommunication groups doing both. The word **tele** is Greek for **distant** or **far off**, and **communicare** is Latin for **sharing**.

Telephone companies have massive landline systems feeding into corporations & households. You will recall being able to use your landline to "dial-up" and connect to the internet. What changed, is that the basic telephone networks started adapting their wire-based infrastructure to deliver internet access via ADSL.

Asymmetric Digital Subscriber Lines allow the users to at once speak on a telephone and connect their computers through traditional phone lines. This meant that you can both speak on your landline telephone and simultaneously use your computer on the internet.

What is driving this progress even further is the type of cable being used. Coaxial (copper) and increasingly the fibre optic cables are called "broadband" (versus the "narrow band" original dial-up phone lines), and they allow for the transmission of audio and visual signals, at speed. Consumers can get both their telephone landline and digital radio & TV services, in addition to their internet service provider (ISP) in one bundle, from your cable broadband provider.

Remember the advent of telegraphs and telephone being wire-based, end to end. A landline is still telephony through central switchboards i.e. end to end physical connections. The old telephone wires have steadily been replaced by coaxial & fibre optic cables. Your radio & TV and ISP is cabled only up to the receiver equipment. The receiver equipment receives digital radio waves from transmitters.

Meanwhile landline phone connections are being outpaced by mobile phone devices. Mobile phones are increasingly incorporating features of computers. Smartphones or tablets wirelessly connect to a broadband internet connection. This can be done in two ways, either directly, depending on the data package purchased with the mobile subscription, or through a Wi-Fi (wireless fidelity) radio connection to a public/private broadband hub.

In sum, spoken word telephony and data transmission are merging via the broadband network. Computers are becoming fully-fledged telephone systems using Internet Protocol (IP). Even the reception of TV programmes can be implemented over the IP network. Both consumers and providers only need a single infrastructure over which all services can operate.

This infrastructure is everything that constitutes the internet. The internet is a global network of computers, **the cloud**. You now may better understand where we are going technologically. Cloud services are actually the logical conclusion of a 20th Century telecommunication revolution. By extension, it is inevitable that companies of all sizes will be migrating to cloud platforms.

For further insights on this topic, please contact us via our homepage (www.kloudwerk.com)