The Impact of the Internet going on the Mobile Phone

The Birth of the Mobile Industry

The strength of the Mobile Industry grew up in the Scandinavian countries out of necessity. All the mountains and the inability to dig down into rocks or put cable over mountains the Mobile industry grew out of the obstacles of the geography of the Nordic Terrain. The protocol for the mobile standard at that stage, in 1981, was NMT-450. A year later, the GSM Protocol was established to grow the European Mobile connectivity all the way until 1995 when its reach green beyond Europe sponsored by European Telecommunications Standards Institute (ETSI) to countries beyond the European continent around the world offering itself as a global standard.

The Birth of the Internet Industry

The communications Industry was eager to connect more and more data to get wider and wider Information Sources. ARPANET (Advanced Research Projects Agency) realised the connectivity of University Computers in 1989. At the end of that same year, in November, Tim Berners-Lee implemented the HTTP (Hypertext Transfer Protocol). The Internet Service Providers (ISPs) exploded with Telenet, The World, CompuServe and AOL building the commercial services and public awareness of the possibilities of the “Network of Networks” a.k.a. the “Internet”.

Both Industries start going Global

For a short period during the 1990’s, the two industries of Mobile and Internet Industries grew exponentially but independently. Both Mobile and Internet Communication Channels were spreading and their convergence became imminent. The Industry Standards Bodies For the Internet (W3 etc), and for Telecoms (ETSI, ITU etc.) driven by the Mobile Telecom Operators Commercial drive for potential profits by interconnecting the Telecoms Protocols (the SS7 Signalling World supported by infrastructure of of MS, BS, BCS and MCS layered protocols directed by the HLRs and VLRs) and the Internet Protocols (HTTP & TCP/IP, directed by W3, IANA and ICANN).

The Gap to Bridge the 2 Industries: The Technical Ones

In order for this convergence to happen, two fundamental technical setups were required:

1. A Gateway between the Internet Protocols and the Telecoms Protocols

    1. Internet Protocols - HTTP over TCP/IP & UDP Protocols
    2. Telecoms Protocols - The GSM Stack
2. The parts of the Telecoms Protocols GSM Stack that could and would support that data flow. The 3 key candidates for the job were
    1. USSD (Unstructured Supplementary Service Data)
    2. GSM Data (GSM Global System for Mobile Communications) : and
    3. SMS (Short messaging Service) on MAP (Mobile Application Part, a part of the SS7 Signalling Protocol).

The Gap to Bridge the 2 Industries: The Commercial “Drivers”

And in addition, people and companies driving and supporting the delivery of the convergence. These companies in 3 forms:

1. Telecom Operators, operators like Telenor (Norway) who were a leading force in telecom adoption
2. Innovation Companies like Unwired Planet which later became Openwave, and other companies to develop the gateways between 2 giant industries
3. Standards Bodies like WAP Wireless Access Protocol to define the Interconnecting protocols between the Internet and the Telecoms Industry.

Jonathan McGuinness, the Impact he had on the evolution

Timing is a funny thing, Jonathan McGuinness, joined Telenor in 1997 as it started up in Ireland to support the Norwegian mother company and as an experimental consulting group that supported the internet support for client at the strategic level. Being initial being brought to Norway to support for the growth of the development of the Telenor ISP in Norway to grow is distributed network POPs (Points of Presence) and then with the bleeding edge Technology Group in Oslo to:

1. Test the usage of data over USSD, GSM Data and SMS on MAP for feasibility and
2. Analyse the 7 leading Innovation companies that were building WAP Gateways to join the two industry lead by Unwired Planet
    a. The Analysis, Testing, Tools, Practices and Piloting were instrumental in the success of the project going forward.

3. Analyse and test the mobile phone prototypes of which Alcatel and Ericsson, Nokia and other Terminal manufacturers were developing in alignment.

The Analysis:

The classic approach of Build or Buy for Technical Solutions was taken as an initial premise for the Group that Jonathan lead. And as a precursor to making that decision, the execution of an RFI and RFP Process was used for information gathering and requirements building. The purpose of the RFX processes were to elicit the detailed requirements which were leveraged from the base requirements of the ISPs, Telecoms Systems and the Gateway requirements as well as the additional features developed by each of the providers. The analysis was focused on the different Integration points as key and the functional capabilities as secondary as long as they were within or extensions to the WAP Protocol that was in the proposal stage.

The Testing:

Thanks to phase one of the requirements, a set of 594 tests was established for each platform covering the ISP, Gateway and Telecoms communication protocols. The Testing Framework was maintained as the Platforms were written in different languages, the protocols had proprietary fields in addition to the standardised ones and the tests were executed in different environments so that they could be run in parallel for the purpose of time efficiency. The impact of this generic framework meant that the recording of use cases, test scenarios and test scripts were stored in Mercury Interactive's Test Director Tool as the were numerous to be tailored to each of the platforms capabilities, sdk's and languages (from Perl, C, C++, Java etc.). The documentation and management of testing facilitated clear decision making.

The Tools:

The tools from an engineering perspective ranged to cover across:

- MS (Mobile Station) programmed with Hexadecimal coding for 2 purposes;
    - the integrated browsers as application embedded systems were in their infancy.
    - the telecoms protocols to be messaged e.g. USSD, SMS on Map, GSM Data
- BS (Base Stations) monitoring of the networking packets
- BSC and MSC monitoring.

- HLR and VLR recognition of the permission to use protocols
- WAP Gateways to convert the TCP/IP & UDP Packets to
- Routers to manage the Internet Traffic
- APNs and POPs to access the Internet

The Practices:

The key practices were 2:

1. Requirements and Test Driven Development
2. Clean Code

1. Requirements and Test Driven Development

As the attempt to drive new Internet protocols over existing Telecoms protocols was in principal a logical one. The existing standards were albeit in continuous draft / work in progress, the bridge was a mathematical / logical one. Therefore the specifications were feasible prior to the implementations. Where Software Engineering played a role was the efficient management of the bridging and additional protocols and the exploitation of the potential features that were discovered in the development, testing phases.

2. End to End Logical Path Mapping

The Dataflow of the Architectural Design was the key component of the success of the project. Rational Rose (a UML Design Tool) was a useful mapping tool to consolidate the logical flow. The creation of the Dataflows.

The Pilots:

As part of the piloting of the protocols the

- Telenor Telecom Homepage
- Secure Online Banking Service

Were built by Jonathan to prove the useability of the protocol. These services worked but were not adopted fully due to the limited additional features and unappealing text nature of the browsers.

The Analysis and Testing in all three areas decisive were both successful and lead to complete implementations of the WAP Protocol and the decisions made proffered to the 26 countries

where Telenor had major or minor shareholding in and feedback to the wider forums of other operators, ISPs and Industry Bodies.

New legal boundaries were set-up and agreed:

- Where did the ISP stop and Mobile Operator begin?
- Who was responsible for what with this new infrastructure?

The issues of the WAP Protocol adoption were the infrastructure, the capabilities of the handsets and the lack of bandwidth on the network. But even with all these constraints this lay the groundwork the connectivity of the planet.

The impact of Jonathan leading the trial and eventual adoption of a new protocol 21 years ago propagated the Internet on the mobile which now in 2019 is considered an integral part of our everyday lives. He then went around the world to support & consult to other operators made similar decisions and now continues in supporting companies adopting leading and bleeding edge technologies!