

## **THESIS REVIEW:**

### ***Elaboration of NMT and GSM Standards from idea to market***

**By Ari T. Manninen  
Dissertation for the Faculty of Humanities  
University of Jyväskylä, Finland, 2002**

**Reviewed by Ken Krechmer**

"Elaboration of NMT and GSM Standards from idea to market," by Ari T. Manninen, 2002, Dissertation for the Faculty of Humanities, University of Jyväskylä, Finland, is an extensive (334 pages), well researched work. Where it focuses on history and player interactions, it achieves a high level of competence and offers valuable information. Unfortunately the study of standardization covers many fields and Mr. Manninen is not as skilled in technical and standardization issues. In the area of policy, Mr. Manninen makes statements that are not acceptable to this reviewer (who was active in US cellular standardization in some of the periods discussed). Perhaps this is as much the bias of the reviewer, as the competence of the author.

The work is marred by numerous typographical errors; the English usage, especially for technical discussions, is sometimes difficult.

Section 1 provides the introduction and section 4 the conclusions. Section 3 (GSM) of this work is much superior to section 2 (NMT) in organization, detail and insight. This is certainly understandable in terms of detail as NMT standardization was further in the past. But it does appear that the author gained as much knowledge as the industry by accomplishing NMT first.

#### **History**

Section 3 offers a detailed history of the emergence of the EU, its impact on the telecommunications industry and the development of what became GSM. This section is organized chronologically up until section 3.2.2.2.3 and much easier to follow than section 2. Many interesting events are described, including Bellcore's attempts in 1984 to work together on GSM (rebuffed). The discussions on the early GSM patent procedures (3.2.2.3.4); sections 3.2.3.1.1 to 3.2.3.2.3 offer statistics on the service providers, manufacturers and early GSM penetration.

This thesis also provides an extensive history of the development and procurement of NMT systems. However, the NMT development (section 2) is not chronologically organized and therefore difficult to follow. Without a more detailed explanation of the specific technology (e.g., "...the French SFR. This was the NMT-900 system which, however, operated on the frequency of 450 MHz.") this reviewer could not gain much insight from this history.

## **Technology**

The lack of rigor in differentiating technologies, implementations and standards reduces the usefulness of this work. The technical aspects seem poorly understood (different frequency bands and different cellular technologies). The lack of explanation of the impact of back-haul to reduce the number of mobile switching centers (MSC), mobile and base station power control to reduce the cell size and thereby increase the system capacity, differentiation of function and location between base stations and mobile switching centers, the importance of inter-operable subscriber data bases and provider billing systems suggest a lack of understanding of these technical issues. Technical terms are not defined. For example, it is never clear if roaming (hand off) is between cells connected to one base station controller (BSC), between multiple BSC, between multiple MSC, or between service providers (inter-operable databases and billing agreements).

Technical discussions, e.g., GSM frequency allocation (sections 3.2.1.2.1), are difficult to make sense of; Section 3.2.1.2.4 "...supposed fact that digital speech encoding did not promise any improvements to spectrum efficiency. The performance in this respect was the same as for analogue speech." The issue the author seems to be addressing is the impact of multi-path fading on digital channels which was not well understood up until sometime in the early/mid 1980s.

## **Policy**

In parts, this work appears unnecessarily regionalistic (NMT versus the rest of the world) although the various administrations discussed are certainly nationalistic. The author develops an interesting thesis (not supported by some other studies, as the author notes) that national industrial policy did not interfere either with the NMT standardization process or the procurement process as NMT was a multi-national body. The author also notes how the NMT Group participated in both standard setting and implementation to make

NMT a success. However, after the NMT system was operational the NMT Group became a hindrance and the Nordic Radio committee intervened "in order to liberalize the philosophy of maintaining the standard." This reviewer would have liked to learn more about why the NMT Group was unsuccessful at NMT standards maintenance.

The idea that NMT was "socially-shaped mobile telephony" and that in the US, mobile telephony had "low status" due to "the total absence of the societal importance of mobile telephony," seems ridiculous to this US reviewer. Apparently NMT is considered "socially-shaped" because of the roaming feature. Yet the US system AMPS which is under development in the same time period as NMT also supports roaming (hand off).

### **Standardization**

The author's apparent lack of familiarity with other standardization projects makes it difficult to weigh some comments. The thesis notes: "Participating in the [NMT standards] development did not bring any major advantage to manufacturers." This comment places standardization in a poor light and seems at least somewhat incorrect in light of other comments made. Nokia and Ericsson (active NMT standardization participants) both went on to become major cellular equipment suppliers.

The "ITU turned out to be a useless partner for GSM." Considering that the ITU World Administrative Radio Conference in 1979 (as the author notes) created the frequency bands that GSM used, this seems a misguided generalization. But it is true that the ITU organization does not have a clear way of relating to multi-nation organizations such as CEPT or ETSI.

### **Social sciences**

A key player oriented review of GSM history begins in section 3.2.4. It reviews the role of governments, administrations, standardization committees, manufacturers and users. This is a very clear review of the roles of all the "participants" in the GSM standardization process, and offers tables showing committee participation of each group. An attempt is made in section 3.3 to identify the success factors of the GSM system but this reviewer, while agreeing with some of the ten rules proposed, finds it difficult to extrapolate "rules" from a single example. And other possible "rules" such as backward compatibility are missing, but addressed to some extent later in section 3.3.3.2.

Further analysis of the impacts of standardization on mobile telephony are offered in section 4 which is a well-written concluding review of the players and their impact on a very successful standardization project. However, to this reviewer, the strength of this work is not in the conclusions (which are not strengthened by review of many standardization projects) as much as it is in the collection and organization of the information, especially on GSM.

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