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# UNIVERSAL MOBILE TELECOMMUNICATION SYSTEM (UMTS) IN EUROPE: FAILURE OF PUBLIC POLICY, BOTH AT THE EUROPEAN UNION AND MEMBER STATES LEVELS?

## Abstract

Various aspects of modern crisis are considered and attempts to estimate development expediency of the second and third mobile Internet generations of the European telecommunication market are undertaken. In details there are investigated problems of the Third Generation of Mobile Internet (UMTS) network management, in particular of medium-term Internet strategies, reasons of the European telecommunication crisis, features of the UMTS network investment, influences on other industrial branches, and characteristics of standards' selection and license cost.

## Key words:

Crisis, debt, financial markets, high technology, infrastructure, investments, licenses, management, mobile connection operators, mobile Internet, network, new standard, services.



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In Europe and in the United States criticisms were expressed to question the profitability and the relevancy of the developments of the Second Generation of Mobile Internet (GPRS) and the third generation (UMTS). Many arguments were listed and put forward at the same time towards:

- The European Union setting this new standard.
- The equipment suppliers in telecommunications who underestimated the technical difficulties.
- The financial markets which were driven by the American financial bubble of the Internet.
- The member states of the European Union that also did their share of responsibility; and ranking first is France which did not manage efficiently: on the one hand, the allocation of UMTS licenses which are rare public goods, and, on the other hand, France has taken this opportunity to raise «a new tax» on technological innovation, mostly to finance many deficits (financing of retirement, decrease in public debt, etc.).

More generally, this tax debate all over Europe reveals the incapacity of member states to move towards a reform of public management (E. Cohen, 2000).

The objectives of our communication will be firstly to assess the development of the UMTS technology in Europe: issue of allocation of licenses, risk and uncertainty of telecommunication sector. Secondly, we will focus on the importance of taking into account the role of services and the adoption of these technologies by consumers.

## I. The challenge of UMTS standards: uncertainties and risks

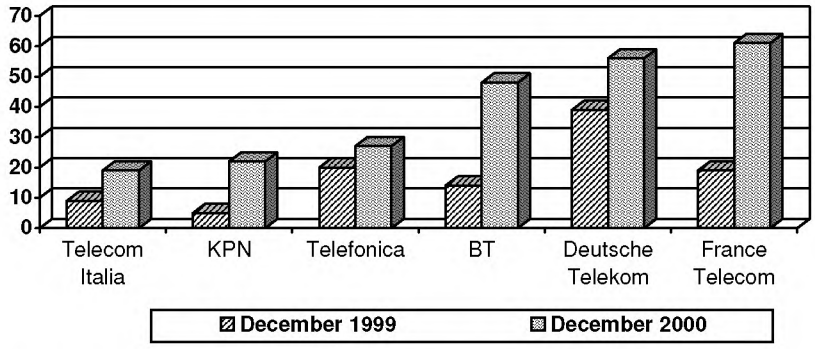
In Europe today, telecommunication operators and telecom equipment suppliers are experiencing a major crisis. In September 2001, the France Telecom trading rate reached its rate of stock market introduction (*Le Monde*, 7.09.2001). Cumulated debt of all European historical telecommunication operators rose to *euro* 251 billion at the end of 2000 equaling the BIP of Belgium (*Les Echos*, 11.04.2001, p. 57 quoting a study of UBS Warburg; *Connectis*, 2001, p.14; see following graph). In one year, this total debt multiplied by two because, first, of external takeovers in the field of telecom technology[1] (in 2000, the six main operators spent *euro* 70 billion in cash for external takeovers); and, secondly, because of the necessity to pay UMTS licenses: in January 2000, European operators had already paid between *euro* 120

[1] Some studies indicate that the price to pay for taking over one mobile phone subscriber was, in 2000, between € 10 000 and € 20 000 (*Connectis*, 2001, p. 15).

and 150 billion, that is to say the equivalent of 10 Channel tunnels (*Les Echos*, 30.05.2001, quoting a study of Solomon-Smith Barney). At the end of 2000, for the major European telecom operators the debt was between 4.5 and 6.5 times their proceeds before Interest Tax Depreciation Amortization (*Connectis*, 2001, p. 14). Ratings of these operators by Standard&Poor's and Moody's&Fitch fell. Small operators were facing insolvency.

*Figure 1:*

**Evolution of debt of major European Telecom Operators** (in billion *euro*)



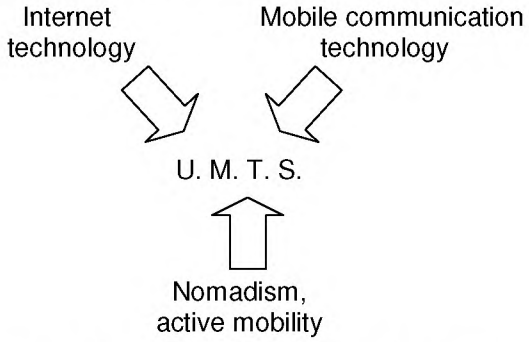

Source: Connectis, 2001, p. 14

The total spending in investments for the setup of UMTS networks should reach approximately *euro* 260–340 billion; from 2001 to 2006: *euro* 120–140 billion for the licenses, and approximately *euro* 140–200 billion for the construction of the planned network within 2000–2006. France Telecom[2] ranks first among the most indebted telecom companies with a record debt of *euro* 61 billion, that is to say nearly six times its gross operating profit. Moreover, this financial situation occurs at a time when the revenues of European historical telecommunication operators are under pressure facing a more acute competition and an increase in interest charges. This will lead many operators to sell assets and profitable subsidiaries. Everywhere in Europe, uncertainty rises as to future and as to strategies to be implemented facing the challenge of UMTS. In France, two senate representatives, Pierre Laffite and René Trégouet, declared that UMTS could well be transformed into «an industrial disaster and a threat for the whole economy» (*Les Echos*, 06.06.2001, quoting the Laffite-Trégouet report, 2001, p. 16).

[2] Deutsche Telecom is third and British Telecom fifth.

## 1. The challenges of UMTS: mobile, wireless, and digital communication

Analysis of the debate on setting up UMTS networks has to be understood in the framework of the rise of GSM mobile telephone in Europe, the first consumer mobile telecommunication standard in Europe[3]. From a technical point of view, this new UMTS standard should strongly increase the flow of information circulating on the mobile telephone network: as opposed to the 4 minutes necessary to load a 3 minute song (GSM, 10 Kbps), UMTS standards make it possible to spend only 12 seconds connected to the network (from 384 Kbps to 2Mbps). New uses (mobile Internet, Television, Movies on the go, «nomads» activities, personal digital assistant tools) are being likely to emerge. UMTS appears to be at the convergence of three promising technological innovation trends, which mainly explain the «speculative bubble effect» we are faced with today. UMTS can be considered as a vector of convergence of these technologies:




The European Union is focusing its medium-term Internet strategy on success and development of the UMTS standard (Commission Européenne, 2001). To begin with, it is estimated that transfers of data will replace flows of voices, as it is already the case in the Nippon's operator NTT DoCoMo, one of most successful telecom operators of third generation Mobile Internet Telephone[4]. Thus today, most telecom operators try to promote «Short Message Service», (SMS) compatible with the GSM standard with the objective to pave the way for a data use of mobile telephone. Indeed, if today's rate of market penetration of mobile telephones in Europe amounts to 63%, access to Internet from home fixed telephone reaches 28% of European households[5]. It is clear that the European Union Internet strategy will rely on the third generation of mobile telecommunication. The forecasts are ambiguous: success of I-mode in Ja-

[3] Adopted also in many countries all over the world.
[4] According to NTT DoCoMo, between March 2000 and March 2001, on the basis of average income by user, data flows were multiplied by 5 while voice flows were reduced by 10% (NTT DoCoMo, UBS Warburg; *Les Echos*, 30.05.2001).
[5] With great disparities: 54% in the Netherlands and 11% in Greece.

pan is undeniable (NTT DoCoMo); growth of messages SMS (*Short Message Service)* in Europe is strong[6] and should continue with the UMTS.

However, many analyses are more pessimistic: the severe failure of the *WAP*[7], which prefigured UMTS standards, had a deep impact on consumers who will now look with caution at the arrival of a new standard; some contributions highlight reluctance to use Internet with mobile telephones due to the cost of use, the lack of speed, the privacy issue and the issue, of security of information transmission (AT Kearny). Operators and equipment suppliers are also facing technical problems: it appears that the development of this new UMTS technology is not so easy. Already the GPRS technology, which was likely to increase data flow on the GSM network, experiences some technical difficulties, especially in the follow up of communication. Thus UMTS network requires increasing concentration of radio relays to cover the population at a time when the inhabitants are anxious on the impact of radio frequencies on their health, and are more and more in opposition to the setting up of new relays and antennas. Nevertheless, innovations in terms of mobile telephones are rising very quickly, both in the field of «*software*» and of «*hardware*»: personal digital assistants and mobile telephones will be merged, fast processors will allow to watch movies on mini laptop screens, high wireless bandwidth technology will enable wireless high flow transfers, multi-media converging technologies and platforms (TV, DVD, Music). The rise of UMTS technologies is based on a long-term logic of investment and not on the short term perspective as was first considered by the financial markets in an excess of optimism.

## 2. Assessment of the mobile telephone sector in Europe

For France, the first mobile telephone license allocated to a non-historical operator in mobile telephony was given to SFR (Cegetel, Vivendi Universal) in 1991. Then a new operator entered the sector in 1994 (Bouygues Telecom). Between 1994 and 2000, the amount of mobile subscribers experienced an exceptional average annual growth of more than 80% jumping from 800 000 to nearly 30 million subscribers. This boom was associated with a significant fall of prices as shown on the next graph, based on the decrease in the monthly average sales turnover by subscriber. At a European level, the development of GSM is similar: very strong adoption of the technology by consumers, strong competitive pressure both on the level of services provided as on the level of equipment (telephones and the network infrastructure).

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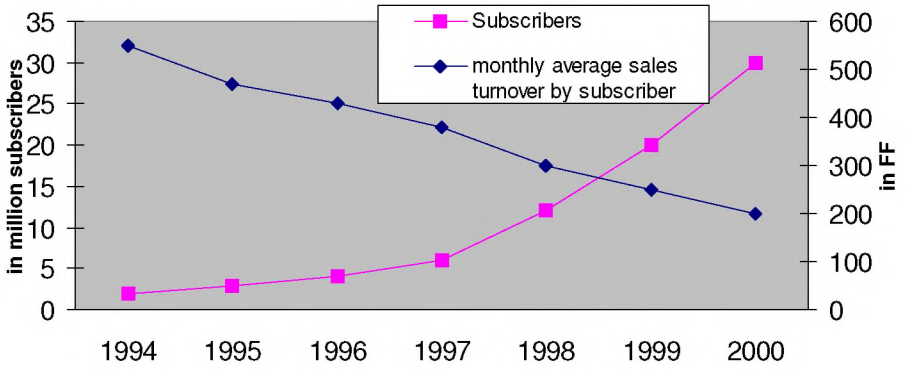
[6] SMS data flows account for approximately 10% of their revenues (Commission Européenne, 2001).

[7] Wireless Application Protocol: a data protocol which allows «surfing» with a mobile phone on optimized Internet sites (low data files): the adoption of this technology by the users was limited and the conclusion could have critical consequence for the UMTS: it was too expensive, too slow, not very ergonomic, in short, useless and «gadget» oriented.

*Figure 2:*

**Development of mobile telephone owners (in million) and of monthly average sales turnover by subscriber (in FF before taxes) – France**




Source: ART, Telecom Operators, Newsletter from the Ministry of Economy, Finances and Industry, n. 141, March 2001

In Europe, between 1997 and 2000, the amount of mobile telephone subscribers was multiplied by 4, rising from 50 million in 1997 to 200 million in 2000 (*Le Monde*, 14.10.2001). Nevertheless, this growth strongly slowed down in 2001[8] intensifying the financial difficulties of telecom operators while they were involved in huge investment programs for GPRS and UMTS networks. In Europe, the slowdown appears to be stronger than in the rest of the world (*Les Echos*, 11.05.2001, p. 59). Thus, for the first time, in 2001, the number of replacement telephones sold (estimated 245 million units) will be higher than that of new subscribers (estimated 230 million). Today, the telecommunications sector represents 5% of the French GDP (from 5 to 10% on average in Europe, the sector of the «new economy» in the broad sense accounting for approximately 8% of the GDP in the United States). At the beginning of 2001, 63% of the European Union citizens owned a mobile telephone and a vast majority of them (235 million) used the GSM standard (Commission Européenne, 2001). Mobile communication in Europe is booming: approximately +38% in 2000 (Commission Européenne, 2001). The market of telecommunication represents €200 million, a growth by 12.5% a year (Commission Européenne, 2001). Mobile telephone revenues represent 30% of the total revenue of the telecommunication sector

[8] The Consulting Company Morgan Stanley Dean Witter estimated that this growth will amount to 26.4% in 2001, 21.2% in 2002 against 52.6% in 1997, 55.9% in 1999 and 49.6% in 2000 (*Le Monde*, 1.06.2001).

(Commission Européenne, 2001). Since 1996, the GSM sector has generated 445,000 jobs in Europe and the cumulated amount of investment reached *euro* 70 billion (Commission Européenne, 2001).

## 3. Crisis of the UMTS, crisis of the state, both at the European Union and member-states level

What are the aspects of the crisis that European telecommunications experience today?

First of all, this crisis is a classical expression of technological change and spreading of innovation and «shows that short-term effects are always overestimated and that long term effects are always underestimated» (Curien, 2001, p. 63). UMTS, like industrial revolution based on car and electricity which took more than 40 years to stand out (Paul David), should undergo strong cycles, with rises and falls, characteristic of a process of the birth of new technology. Optimism should prevail: the UMTS should come out.

Thus, this crisis is institutional. It is originally a crisis of management of the European Union: the decision to rapidly change to the UMTS standard, the competency of the European Union was accompanied by a refusal by the European Union to interfere in the harmonization of the procedures of license allocation. In granting member states the competency to organize allocation of licenses, at a time when this technology was not operational, the European Union paved the way for mismanagement of this project, likely to compromise the whole UMTS issue. We are faced with crisis of «the fiscal state which considers the sale of licenses as easy and politically cheap means to raise new tax revenues, to achieve debt-clearing or to finance retirement funds» (France): this «rapacity of government» (Curien, 2001, p. 64) is a risk for the balance of the whole UMTS system, because it slows down the implementation process by telecommunication operators of UMTS networks, by financially weakening these operators through an unbearable level of debt and by transferring the network's total cost to future consumers. Public management of the UMTS issue thus largely failed because public authorities did not resist to active lobbying of industrialists and telecom equipment suppliers. The European Union thus forced all member states to allocate UMTS licenses before 1 of January 2002, i. e. very quickly. However, the European Union let all countries determine the number of licenses to be allocated, the way to attribute them (comparative bidding or auction) which lead to great disparities between European countries : free licenses in some Scandinavian countries, speculation in some others (Germany, the United Kingdom). The balance between the operators was severely disrupted as well as the financial stability of European Telecom operators as they will now be subjected to major restructuring and concentration under the control of the European Commission which is in charge of regulating competition! Some specialists even see in the UMTS the «tulipomanie» of «modern times» (Curien, 2001, p. 63).

Debates about this new technology would be in fact only the consequences of a simple speculative bubble which should deflate in the coming months, without the technology even appearing as an issue[9].

It is clear that in the future debates will emerge to avoid such misleading management as in the UMTS episode. The European Commissioner in charge of this competency, Erkki Liikanen, argues that we must give way to more pragmatism by providing all actors, regulators, governments, operators and equipment suppliers with incentives to modify the rules of the game during the process, as opposed to what happened with the allocation of UMTS licenses.

The debate on UMTS also highlights the innovation crisis in the context of both a volatile financial market and speculative stock exchange, both very short term oriented. It is then essential to list evidences of difficult implementation of new network infrastructures and also to force public authorities to face reality as to its responsibility in dealing with allocation of such rare public goods like UTMS frequencies.

The setting up of **a new telecommunications network** for the high speed mobile Internet – GPRS and UMTS deal with such an infrastructure – is the product of a typical European logic (at least as far as continental Europe is concerned) based on the creation *ex nihilo* of a new infrastructure, with investments in the more or less longer term, and profitability which is not immediate[10]. With investments in GPRS and UTMS infrastructure, the logic of short term profit return cannot operate: every criticism towards the development of the UMTS network should initially point out this fundamental point. To sum up, main criticisms are due to the lack of short term financial return on investments.

Then, it is interesting **to highlight the lack of responsibility of public authorities,** a traditional actor when it comes to the building up of a new infrastructure, which prefer to rely on private companies through licensing after auction, a more optimal alternative in the eyes of economists when it comes to the allocation of rare public goods like UMTS frequencies. Of course, efficiency of private companies appears as largely superior to public management but this has to be double checked. It is surprising indeed to observe that public authorities in Europe, and especially in France, are trying to privatize so quickly and without any debate rare public goods like UMTS frequencies.

Lastly, development of a new infrastructure for the mobile Internet should include reserves or even criticisms on the part of actors themselves (content providers, operators of infrastructures, software publishers) and the Internet leading companies. The issue here is to know if this new network will generate

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[9] For Curien (2001), this scenario could happen: «over-estimation of a new technology potential, refusal of traditional models of evaluation, overbid in the estimation, contagious feeling of euphoria, gregarious behavior of purchase, exchange of promise more than shares, arrival on the stock market of a small bearer, refusal of opposite analysis...» (Curien, 2001, p. 63).

[10] Compare the High Speed Rail Infrastructure in France.

new practices, new uses and new services, i.e. create dynamics similar to that following the rise of the Internet via the classical telephone network. As Shapiro and Varian (1998) mentioned, monopolies in the economy of information have justification but remain of a temporary nature. Let new technologies develop – here the UTMS – and avoid restricting the competition between the classical telephone network and new networks like the UMTS mobile Internet one!

Investments in the mobile Internet rely on complex logic. It is initially a question of proposing an alternative supply of mobile Internet resources and access, alternative supported by economists: competition between large Internet networks will have a huge impact on the supply of services and on prices. The aim of the UTMS network is also to counterbalance the dominant position of the United States in the field of Internet technologies and services for the benefit of sharing out of competencies between Europe, Japan and the USA. This sharing out of competencies could only lead, in a digital world where mass effects and self reinforcement processes as well as supply externalities are important, to a balanced development between the three great geographical areas. Moreover, it is also a question of maintaining an open door for technological innovation on the spinal column of the Internet – the network – which will be likely to create new uses and new needs. And finally, it aims at implementing, through strategic choices of investors, a long-term profitability, far away from the practices of *«winner-take-all-society»* which can only increase inequality and social disappointment, especially in Europe.

## 4. The challenge of UMTS not in terms of technique but services and habits

The main issue of UMTS lies in understanding of the many uses of this new technology (Guichard, 2001) because challenges of UMTS are not technical. They are based on perception of this technology and the adoption of these tools by common users. With such point of view where focus is laid more on the actor than on the technique, it is essential to reverse the trend by raising a fundamental question: which costs are to be charged on the end-user? Consequently, which pricing policy is to be implemented? This cost will then be transferred, on the one hand, onto the price of licenses and, on the other hand, on costs of setting up such infrastructure; but not the opposite as it is the case today with the allocation of licenses in Europe. If the UMTS takes part in the third industrial revolution of digital economy rooted in the mobile Internet, it is clear that these effects will be different from those observed in the second industrial revolution (automobile, television, telephone). Of course, as in the second industrial revolution, the UMTS will have a strong impact on economic growth, ways of life and habits, but this impact will be determined by the final consumer who will invent new uses, with nomad behavior for example, and will get hold of the technologies of the mobile Internet. In short, services are a core issue of the UMTS dynamics – this reality was largely ignored during the process of allocation of licenses and development of the UMTS in Europe.

Let us take the example of transport to highlight the impact of the UMTS on our ways of life and our practices – transport has always been the key point of a particular informational relation between transport modes and people, either when using a private car – the advertising board on the side of the roads, or in public transport – advertising in trains, tramways or subway. This form of one way informational communication has some «public» characteristics because it is available collectively without mechanisms of exclusion or rivalry. But this form of omnipresent informational relation is associated with a private informational relation between a transport mode, considered as a support of communication, and people: to read a newspaper or a novel in the subway is connected with this type of communication but this relation can be also expressed by means of a free hands portable telephone in cars, by increasing use of digital personal assistants (PDA) or pocket computers in public transport. Instigated by the rise to power of the 3rd generation networks, these modes of communication occupy an increasingly significant place in the user's informational practice without however replacing the newspapers. Nevertheless, the trend towards the digitalization of information should accentuate their role in the future.

This form of communication experiences a huge revolution. It is based on a new form of informational private proximity which fits into two dynamics – passive logic when it deals with a written support, or a more active logic when it deals with a mobile telephone, a PDA or a pocket computer. Indeed, a lot of interesting innovations relating to this active informational proximity develop in the field of software, for example, likely to manage flows of information and news from Press Agencies in public transport, news from the Stock exchange in real time, weather forecast, etc. It appears finally, that these developments are not neutral in terms of transportation. Public transport has, if this evolution is confirmed, a real advantage facing car mobility as it can be observed in the rapid development of mobile software applications for mobile people and «nomads» in public transport considered now by the public transport operators as strategic customers. This strategy is based on the idea, traditional in information economics, that these developments of information economics are limited by the «economy of attention» (Shapiro and Varian, 1998). Thus, in public transport, long periods of time «of free attention» can be exploited. In this part, it will thus be the question of considering the impact of time in public transport as from one point to another, when mobility becomes important in terms of content and services under the impulse of new wireless Internet technology. It appears that we are slowly moving from the concept of «transported people» to the concept of «a mobility improved by contents and services».

## II. The debate on the allocation of UMTS licenses

Eleven Member States of the EU have allocated UMTS licenses, a total of 48 networks. These countries represent 90% of the current GSM network (Commission Européenne, 2001). Conditions of allocation of these licenses vary from one country to the other. The European Union[11] determined a global time-table for the process and «the capacities of new 3G services». Each member state remains responsible for the process of allocation in compliance with community practices: open processes and reciprocity, transparency, non-discrimination. This distribution of competencies between the Union and the member states is a real weakness of the system and generates distortions in the setting up of the UMTS network and services:

- Three processes have be implemented: auction with endogenous prices, comparative bidding or «beauty contest» with an administered price *ex ante* or a mix of both. The number of licenses obtained varies from 4 to 6 according to countries. Compared to the population, prices of licenses are established between €650 and 0 (see Table 1).
- Licenses have variable duration according to countries. Their coming into effect varies too.
- The obligations as regards coverage of the population are different from one member state to the other.
- There is no harmonization of the allocation of frequencies by operator.

For the European Union, cost of licenses rise up to €130 billion, while it is necessary to add an appreciable equivalent amount for building up of the network (Commission Européenne, 2001).

This allocation process has now considerable consequences for the future of UMTS. Indeed, the level of prices will influence the future prices that users of UMTS and mobile Internet will have to pay, a key factor for the success of the UMTS. Will consumers experience an over-tariff ex post to recover the price paid for the licenses? The price to be paid by consumers may well be motivated by the current critical financial situation of telecom operators which have now to set up the network. Lastly, the process of allocation of UMTS licenses and their prices will determine the level of coverage of the territory and the population (Curien, 2001). Too high prices of licenses would be a threat to public service and to the equal access of mobile Internet and UMTS by the whole population – it means a two-tier mobile Internet. Moreover, a very high price level will imply the mutual sharing of networks in less populated areas, a step which is likely to limit competition.

[11] Decision №128/1999/CE of the European Parliament and the Council of 14/12/1998; «Journal Officiel» L 17 of 22.01.1999, p. 1.

*Table 1:*

**State of UMTS licenses in the EU member states** (on March 20, 2001)

| COUN-TRY | Date and status | Number of licenses (incumbent operators) | Allocation mode | Price paid in € and duration of licenses | Price in € per capita | PIB/hb (OECD =100) | Population coverage obligation |
|---|---|---|---|---|---|---|---|
| Germany | 8/00 – done | 6 (4) | Auction | €50.8 bn / 20 years | 620 | 106 | 25% by end 2003 50% by end 2005 |
| The United Kingdom | 4/00 – done | 5 (4) | Auction | €38.475 bn / until 31.12.2021 | 652 | 100 | 80% pop. by end 2007 |
| France | 7/01 – under way | 4 (3) 2 licenses to be issued | Comparative bidding + payment | €9.8 bn + admin. fees (for 2 licenses) / 15 years | 270 | 98 | Voice: 25%>2 years; 80%>8 years Data: 20%>2 years; 60%>8 years |
| Italy | 10/00 – done | 5 (4) | Auction | €14.64 bn / 15 years) | 242 | 98 | 7.2004: regional capitals 1.2007: main provincial towns |
| Spain | 3/00 – done | 4 (3) | Comparative bidding + payment | €520 m + yearly tax + admin. fees over 20 years: €14,1 bn / until 8.2020; 10 years extendable | 361 | 81 | 1.8.2001: cities > 250 000 inhabitants |
| Austria | 11/00 – done | 6 (4) | Auction | €0.83 bn / 20 years from license award | 103 | 110 | 25% by 31.12.2003 50% by 31.12.2005 |
| Belgium | 03/01 – done | 4 (3); 3 licenses attributed | Auction | €450.2 m (for 3 licenses) / 20 years | 44 | 109 | 30%>3 years; 40% >4 years; 50% >5 years; 85% > 6 years |
| Denmark | 10/2001 – pending | 4–6 (4) | Auction | Not allocated | – | 118 | |
| Finland | 3/99 – done | 4 (3) | Comparative bidding | €1000 per 25 Khz license; admin. fee / network license: 20 years; freq. license 10 years renewable | 0 | 102 | No specific obligation but Ministry to ensure implementation of licenses |
| Greece | mid 2001 – pending | 4 or more (3) | Auction | Not allocated / 15 – 20 years | – | 66 | – |
| The | 7/00 – | 5 (5) | Auction | €2.68 bn / until | 170 | 112 | 1.1.2007: cities |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nether-lands | done | | | end 2016 | | | > 25,000 inh. + main |
| Ireland | 4/01 – pending | 4 (3) | Comparative bidding | Not allocated / 15 to 25 years | – | 113 | – |
| Luxem-bourg | By 6/01 – pend-ing | 4 (2) | Comparative bidding | Not allocated | – | 176 | |
| Sweden | 12/00 – done | 4 (3) | Comparative bidding +payment | Total €46.800 + 0.15% annual fee / 15 years (network li-cense) | 0 | 103 | |
| Portugal | 11/00 – done | 4 (3) | Comparative bidding | €400 m+ annual fee / 15 years | 40 | 74 | 20%>1 year; 40%<3 years; 60%>5 years |
| TOTAL | | | | €130 bn approx. for 10 countries | | | |

Source: Le Monde, 1/06/2001; Idate Institut; Commission Européenne, 2001, p. 15–16

The situation of the allocation process of UMTS licenses in Europe is particularly interesting.

The United Kingdom was, in March – April 2000, the first country to choose an auction as the mode of allocation of 5 UMTS licenses. 4 operators were already active on the GSM market. A debate took place at the Radiocommunication Agency on the type of auction to be used and the «English auction»[12] was chosen (Curien, 2001). Nine Telecom operators entered the auction (4 established operators and 5 newcomers). The price level reached €38 billion for 5 licenses and led the operators to investigate the opportunity of a common split of the costs in building up the network's («mutualisation»).

The Netherlands tried to follow the British example: 5 licenses were allocated with 5 main operators already on the market. Facing such a difficult market, newcomers decided to contract with established operators instead of trying to challenge them. At the start of the auction, only one new operator tried to enter the market (*Versatel*); the auction reached an inferior level than that reached in the U.K. (total revenue: *euro* 2.7 billion).

Following the case of the United Kingdom and amidst the full stock market euphoria for Telecom shares, the price level of licenses in Germany after auction was €8 billion per operator, a total of €50 billion, to pay within one week after the auction. Some analysts are convinced that a «miracle» occurred in Germany because the context before the start of the auction was sub-optimal (Curien, 2001). The auction type chosen was the «English» one based on 12 blocks of frequencies: a UMTS license exists with 2 to 3 blocks (6 x 2 or 4 x 3). This choice could have led to the risk of concentration of mobile telecommunications

[12] Open and ascending auction based on optimal individual strategies.

in Germany (4 licenses of 3 blocks) on the future market. Seven telecom operators started the auction. One of these operators, *Debitel*, withdrew from the competition when the license price reached 60% of the U.K. price (Curien, 2001, p. 19). The telecom operators launched a race to obtain a broader frequency band than their competitors, even if they were six and could have shared 6 licenses based on 2 blocks with limited spendings. Consequently, the revenues earned per license by the German Federal Government reached 98% of the UK level. Small operators had to spend astronomical sums and, in a deconcentrated competitive environment of 6 operators, the question is now to know if there is room for all operators. A consolidation of the German market by concentration is to be expected.

Sweden chose a different process: the four operators selected decided to pay 0.15% of their sales revenues to public authorities until the end of the license time period. The logic behind the Swedish process is in complete opposition with what took place in the UK and continental Europe and should be given the credit for not limiting the chances of success of the UMTS.

In France, 4 licenses were open for UMTS. The market was segmented into 3 established operators (*France Telecom, SFR* and *Bouygues*). The market is open and attractive for a fourth operator. The government decided to call for a «beauty contest» or comparative bidding because the auction was considered «out of control» and too «political oriented» in a liberal way (shortly expressed: too «English»!). The government feared also that the auction could lead to the level of price which would be too high and thereby may lead to the elimination of the third GSM operator. Some arguments also rejected the auction as being a threat to the «Public Service à la Française» in rural and less populated regions. But avoiding auction means also less active competition «for» the market; this will be very clear after the UMTS process allocation in France. At least, the comparative selection appears as a new tax raised on innovation which gives few incentives, and not as a «market price».

After a comparative selection, the price fixed by the state was very close to the anticipated level of balance of the estimated auction market[13]. The third operator decided to leave the race, involving in his decision a fourth potential new operator, *Suez*. In addition to this, the delay taken by the state to organize the allocation process of licenses revealed a cumulative «memory» of various races for UMTS licenses in Europe: after the sharp rise of prices in Germany and in the United Kingdom, the operators were on the defensive facing a level of debt which became alarming[14]; two operators, *France Telecom* and *Cegetel (Vivendi Universal,* obtained a license (€4.95 billion for a 15-year license, with the half of the amount to be paid in 2001 and 2002, and the second half spread

[13] Curien (2001) shows that, for €30 billion to be paid, the price level in France is not far away from the level of prices paid in UK or in Germany (approx. €50 billion) because the cost of setting up the UMTS network in France (estimated to €20 billion) is much higher than in UK or in Germany. This is due to the large rural and low populated areas.
[14] Same situation in Belgium where 3 licenses out of 4 were allocated.

out over thirteen years); two operators withdrew following the huge level of investment requested (*Bouygues Telecom* and *Suez)*.

The debate on the UMTS in France highlighted the tensed relations existing between the Authority of Regulation of Telecom (ART) and the public authorities (the Ministry of Finances). The ART was opposed to the state on at least 2 issues: on methods of allocation of licenses (idea of free access to support investment and innovation) and on procedure planning[15]. Facing the huge prices of licenses in Germany and in the United Kingdom, the French State wanted by all means its share of the «cake». Instead of the expected €20 billion, only €10 billion were collected of which 50% are to be transferred, in 2001 and 2002, to the Reserve Funds for Retirements[16], the balance being affected as clearance of debts. The conclusions of this process for France turned out to be unclear and destabilizing: first the state listed double the amounts in the budget, that is to say a lack of revenues of €2.48 billion in 2001 and 2002. Secondly, the split of the market into 2 operators is likely to raise suspicion of the European Commission which is in charge of the control of free and fair competition within the member states. The European Commission could well decide to cancel or to restart the whole process in France. One of the solutions being investigated would be to start the tender again. This would imply for the French State the refunding of the two operators selected during the first turn, France Telecom and Cegetel! The state would then be facing an incredible and unique situation. Let us suppose that the new price of licenses is set at €2 billion against €4.95 billion currently, still over fifteen years (50% payable the first two years), France Telecom and Cegetel would thus have paid €3 billion too much in 2001–2002, which the State would have to refund!

Many questions remain unanswered: first, on the accuracy of the process and on the prices chosen for the UMTS licenses by the European Commission and then by the member states. Hertzian frequencies are public goods, as expressed by the Common Law[17] of the *Conseil d'Etat* in France (*Le Monde*, 2001, p. 18). License fees must be proportional to the use of public goods and/or proportional to the incomes raised by the operators, as it took place in Sweden. Secondly, how will the French State allocate the two licenses which have not been affected in the first place? How is it possible to guarantee equal and fair treatment and non-distortion of competition for the two first selected operators? According to the European Union, the number of UMTS license must equal the number of GSM licenses increased by one. France is far from this situation of reference[18].

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[15] The ART wanted, during a certain period of time, to postpone the process of the allocation of UMTS licenses facing the withdrawal of 2 operators.
[16] With the objective to reach €150 billion in 2020.
[17] In French: Jurisprudence.
[18] In June 2001, the government planned to wait for the next presidential election to postpone the problem for the next government!

The last development of the UMTS story in France confirms our prediction the second turn was organized by the government in 2002 to open market to more than 2 operators; the license was extended from 15 to 20 years. The price of the license was reduced from €4.95 billion to €619 million and this was applied for the previous operators France Telecom and SFR. To this fixed amount, 1% of the UMTS operating income will be added and paid each year to the state. France remains now clearly behind U.K. and Germany – it seems at this time that Germany[19] and U.K. will not change the rules and the deadline agreed for the launch of UMTS services in these countries – and appears to pay the cost of the crash of the financial bubble!

From the point of view of firms and on a European level, it appears that the incumbent telecom operators are well positioned on the market segment of the UMTS. In Europe, France Telecom appears to be more involved in the UMTS technology, just in front of Vodaphone (the United Kingdom), the world leader. It seems clear that in the future a movement of mergers should be expected.

*Table 2:*

**Owner of UMTS licenses in Europe**

| Group | Licenses obtained (directly or via partners) | Total financial spending for the purchase of the UMTS license (€) |
|---|---|---|
| France Telecom (F) | F, D, UK, I, NL, Austria, Belgium, Portugal, Sweden, Switzerland | 22 840 |
| Deutsche Telecom (D) | D, UK, Spain, Netherlands, Austria | 15 380 |
| Vodafone[20] (UK) | UK, D, I, Sweden, Portugal, E, Austria, Netherlands, Belgium | 21 170 |
| Telefonica (E) | Spain, D, I, Switzerland, Austria | 10 850 |
| British Telecom (UK) | UK, D, Netherlands | 15 774 |

Source: Institut Idate quoted by le Figaro, 1.06.2001, p. V; F for France; D for Germany; UK for the United Kingdom; NL for the Netherlands; I for Italy

[19] Before the crash of the financial bubble, the operators in Germany had to pay *euro* 8.4 billion for one UMTS license!
[20] The Vodafone group is the first world mobile operator.

To face the crisis which shakes the telecommunication sector and to try to reduce the total UMTS bill in Europe (license + installation of the network), the European Commission proposed two directions: lengthening the validity period of licenses and sharing out of the network – mutual sharing of the infrastructures. But there is no guarantee that the splitting up of the infrastructure would have no impact on fair competition. The situation is particularly inextricable in Germany where the operators spent colossal sums to have access to the UMTS. According to certain estimates, on €223 billion of investment in infrastructure planned between 2002 and 2006, the savings would be of 25%, that is to say €56 billion approximately (*Les Echos*, 2001, quoting a study of Merrill Lynch). At least, some analyses have shown that «mutualisation» of the network would be a prelude to many mergers in the sector, as expected in Germany.

## Short summary

In Europe criticisms are expressed today to question the profitability and relevancy of the developments of the Second Generation of Mobile Internet (GPRS) and the third generation (UMTS). The objectives of our paper are, firstly, to assess the development of the UMTS technology in Europe – issue of allocation of licenses, risk and uncertainty of telecommunication sector. Secondly, we focus on importance of taking into account the role of services and adoption of these technologies by consumers.

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