Inside the Mobile Revolution

A POLITICAL HISTORY of GSM

Europe's most successful industrial policy intervention – propelling mobile phones into the hands of over 4 billion people

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2nd Edition

Foreword

Over the period 1984-87 the political and strategic direction of GSM was being shaped by France, Germany, Italy and the UK. It was the genesis of the mobile revolution. This is the UK record of what happened, how it happened, why it happened and captures the political dynamics within which it all took place.

The GSM 1800 MHz (PCN) element was added a few years later when the UK's DTI was at the leading edge of telecommunications liberalisation and I propelled it to be the first credible entity to set out the vision of the personal mobile phone *as a consumer product* ('Phones on the Move') and put forward the conditions to make it happen.

My election as Chairman of the Technical Assembly of the European Telecommunications standards Institute in 1988 then provided an excellent vantage point as GSM went through its transition from a policy to a new born infant digital mobile industry.

All this left me sitting on a unique (although in parts partial) account of how GSM came to be the mobile radio equivalent of the cosmic "big bang" and one of Europe's most successful high technology projects.

The GSM element of this account was written within 12 months of the signing of the GSM MoU in Copenhagen in 1987. I had no motive to spin the story in any particular direction or make any particular claims for the success of GSM, which was still a few years away from even getting off the ground. It was simply a means of unwinding on holiday in the French Alps from a tumultuous 18 months by recording to paper what I had just seen and been through. It went straight into a drawer.

Shortly after the launch of GSM (in 1991) would have been an ideal time to publish the story. A close friend and former DTI colleague Jonathan Phillips stayed up one night and read the manuscript. His red ink over the draft said it all. There was no way it would have got official approval for publication without ripping out the very heart of the story – the political dynamics. The story was to remain hidden behind the Official Secrets Act for the next 17 years gathering dust.

The manuscript was next visited in 2008. Europe's leadership in mobile radio had largely been ceded to other parts of the world. So much had gone wrong and some of this had been driven by the changing role of European governments and regulators. I decided to try to publish my GSM personal account to show how things had worked successfully in the 80's as part of an analysis of how things were working (or not working) in 2008. This was pre-empted when Lord Carter invited me to sit on the Digital Britain Steering Group in 2008. Rather than drafting my analysis I finished up drafting the infrastructure section for Lord Carter for his Digital Britain report.

It was fun and it simplified what to do with my GSM account. It just needed to be a public record of an important event in Europe's industrial, social and political history. No longer would everyone know how the PC and World Wide Web revolutions had come about (with over 1.3 and 2.5 billion users respectively in 2010) but know very little about how the even more successful mobile revolution had happened (with over 4 billion users in 2010). Finally the curtain would be pulled back on how GSM created a mobile revolution.

Prior to publication I shared a draft version with former colleagues who had worked closely with me on the GSM project at the time. Some colleagues took exception to parts of the account relating to the period 1984-87. I was asked to change some things and delete others. A lively exchange of e-mails followed.

Armin Silberhorne, a former senior German Official I had worked very closely with, best summed up the different viewpoints with his comment that a "political" account will always be seen differently through different eyes. This was very insightful. Officials at the time from France and Germany would view GSM through the eyes of those working in a state monopoly, with a Minister fully in charge – an ordered world in which engineers sought the best technical outcome…with the power to make it happen. Deregulation was still around the corner for them. The UK had already unleashed competition. In a competitive market nobody is in charge. I could see all the market and industrial forces tearing the GSM initiative apart … for the UK…GSM was a huge political challenge. In this respect the UK brought a unique contribution to the GSM initiative since, by the time GSM was launched in 1991, mobile competition had become almost the norm across the European Union.

Those who may only want to read this account with an eye to seeing if Europe could create another GSM success today should fast forward to Chapter 24. Certainly the Global Banking Crisis has shattered the belief that *everything* is best left to pure market forces and there is much to be re-discovered in this book about the lost art of EU inter-governmental intervention in mobile communications infrastructures that Europe used *so successfully* to launch GSM in 1991.

Stephen Temple CBE
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(A personal account from the UK perspective of Europe's most successful high technology project that propelled the mobile phone into the hands of 4 billion people)

Chapter 1

AN UNPROMISING START

Mobile phones are commonplace now. In the 1970's they were associated in the public's mind with Rolls Royce cars. Not without reason. They cost £5,000 to buy and a lot to run. A truly elitist service. Even at these prices the British Post Office had a long waiting list of people wanting a service and it only connected cars to the telephone network and not people.

More radio channels were needed to expand the service. The conceptual break through came out of the famous ATT research labs in the USA. The land would be covered in a honeycomb cell like structure of radio coverage areas. The necessary number of radio channels would come from re-using the same channels again and again (say every 3rd or 5th radio cell). The idea was presented to the FCC in a paper in 1971 by Joel Engel, Richard Frenkiel and Philip Porter called "High Capacity Mobile Telephone System Feasibility Studies and System Plan"

However the problem with such a plan was that a car might pass across several such radio coverage cells during a telephone call. What a nuisance if the telephone call was lost each time and the customer had to re-dial the number. Advances in microcomputers provided the practical solution. Calls were automatically handed over from radio cell to radio cell without the customer knowing. Cellular radio was born.

The Scandinavian countries were the first in Europe to make a commercial success of cellular radio. The French and German Governments tried to organise a joint effort to secure an industrial lead. The idea was for their respective industries to design a new version of the analogue technology and for the two countries to then put it into service. They tried to tempt the UK to join this endeavour. For a brief period the UK flirted with the idea. But a new thinking was sweeping through the UK. The Government was intent on introducing competition at the earliest possible moment. They selected Cellnet (a joint venture between British Telecom and Securicor) and Racal Vodafone (referred to just as Vodafone in the rest of the account) to be the two UK national cellular radio operators. A variant of the established USA analogue technology won the day. Kenneth Baker, the Minister for Information Technology, announced the decision in Parliament. Just to add salt to the wound Mr Baker sent a letter to the French Minister expressing hope that the French would see sense and follow his decision. As it happens, from a purely market led standpoint, it was probably the most sensible thing that the French Government could have done. A very astute French engineer called Philippe Dupuis recognised this. He could see the potential growth in this new market and had been arguing the case within the French PTT for using an established technology, perhaps the one the Nordic countries had developed. He was a lone voice. Industrial manufacturing strength took primacy in French mobile radio policy. The customers could wait.

The co-operation between the French and the Germans staggered on for a short while. Then the industrial tensions eroded the relationship. Siemens tugged away at one corner and Matra at the other. The dreams of a Franco-German common cellular radio system collapsed. Each went their own way with quite different technical standards. Italy quietly produced a unique Italian system. Others picked up a hotchpotch of standards and frequency channels. A spectacular failure of European standardisation was complete. A consumer wanting to cross the length and breadth of Europe using a mobile phone (which in

those days was only car phones) would have found their car filled with so many different equipment boxes there would have been no room for any passengers. The markets were all out of phase, the service focus (with the honourable exception of the Scandinavian countries) was purely national, equipment supply was local to the extent possible and there was no political ambition to change things.

For cellular radio the Single European Market seemed a very long way off. In fact little power resided in the EU over telecommunications in 1984. (Note: it was the EC at the time but will henceforth be referred to by today's title of the EU). The Commission had no locus and were looking for a way in. Power was firmly in the hands of each country and the main vehicle for cooperation took place in the European Conference of Post and Telecommunications administrations (known by its French acronym CEPT).

Those few members of the public who've heard of the CEPT probably associate it with postage stamps. Its distinctive logo is four post horns. In 1984, CEPT was a loose association of European Postal & Telecommunications Administrations. They met from time to time to discuss common problems and improve ways of working together. On the technical standards side it used to bring together the experts from the telecommunications operating companies. At that time, with the exception of the UK, these were state owned telephone monopolies.

International telecommunications depends upon a high degree of co-operation and one might have imagined that common technical standards were the natural state of affairs. It wasn't and there were numerous standardisation failures. The huge profits of the telephone operators allowed these standardisation failures to be bridged at international gateways. But technical experts in both CEPT and its international counterpart (the International Telecommunications Union) kept on trying – often in good faith. Too often, particularly in the more competitive areas of technology, the result was a catalogue of different national technical standards put between wrappers and dressed up as a common standard. The core network side fared a little better in respect of successful standardisation outcomes.

A working group was set up in 1982 by CEPT Telecommunication Commission. Its mandate was to harmonise the technical and operational characteristics of a public mobile communications system in the 900 MHz band. It was called in French “Groupe Special Mobile” or GSM for short. The word “special” recognised the complexity of the task meant a dedicated group was needed rather than parcelling out the different technical tasks across a number of the existing CEPT specialist groups The group was born amid the tensions of establishing the first generation analogue cellular radio systems. It witnessed the abject failure of European co-operation. The political will was just not there for a serious effort at a common European cellular radio standard.

GSM had its first meeting in Stockholm in December 1982 and the early participants realised that the window of opportunity had passed to standardise these analogue systems and optimistically referred to them as “interim” systems.

The Chairman of GSM was Thomas Haug from Sweden.

Figure 1 – Thomas Haug – Chairman of GSM

He was one of life's gentlemen. I cannot imagine an unkind thought ever cross his mind. He also had enormous patience. He would be severely tested on both attributes over the next 5 years.

Chapter 2

UK SEEDS OF THE NEW BEGINNING

I joined the GSM group in November 1984 for its sixth meeting. It was held in London.

I had only just came to the DTI from the Home Office where I had been responsible for planning the mobile radio services of a large number of English police forces and fire brigades. At the DTI I was to represent the UK at international bodies responsible for the standardisation of telecommunications networks– a function that the just privatised BT had carried out well – but new network competitors created a need for a light neutral oversight.

My new office was in 1 Victoria Street, whose modern looking façade disguised relatively drab offices. The Division I had joined (T-Division) was located on the 5th floor but they had run out of space. I found myself alone in a corner office on the 3rd floor with a partial view of Westminster Abbey. The only member of staff allocated to me left the same week. "Nothing personal" said David Barnes cheerfully. The DTI couldn't match the £23,000 a year plus car he'd been offered by one of the new cellular radio operators. My new Secretary (Janita) turned out to be more enduring and very competent in planning the hectic travel schedule I was about to be pitched into as I, in turn, threw my all into getting the UK influence felt on the development of the new European Single Market in telecommunications.

Compared to the Home Office the DTI was relatively lax in respect of its filing system at the working level. In the Home Office every issue travelled around in huge files carrying anything ever said on an issue. DTI were in the habit of writing scribbled comments on loose minutes that left nobody with any responsibility for record keeping. I could not find any papers anywhere on what the DTI policy was for the GSM, which seemed odd for a committee that already had met 5 times over two years. All David told me before he left was that the aim of GSM was to agree a new standard to enable a pan European service to start in 1988.

This left me having to think the issue through from first principles. The UK had unleashed the forces of competition. This alone would diminish the influence of Government. In addition it was the policy of the Government to let market forces determine outcomes wherever possible. The opening of the new UK cellular radio services was only a few months away. I couldn't see how our two commercially driven national cellular radio operators, Cellnet and Vodafone, would welcome a new standard emerging as early as 1988. They would surely put pressure on the DTI to try to defend the analogue standard (TACS) the UK had only just adopted in Europe.

Somebody in BT sent me some past GSM papers and I noted a proposal that the GSM standard should be “digital”. Whilst there were many advantages with digital technology there would also be huge challenges in getting a digital technology to work well enough in the harsh environment of a mobile radio connection, where signals got blocked or reflected by anything in the way. I was sceptical that the digital technology could advance far enough fast enough. The huge problems made it very attractive challenge to a number of European research laboratories.

There was a tendency in Europe to have research driven technology, quite divorced from commercial reality, calling the political shots. I feared the research community might see “digitalisation” as an end in itself. It was not tenable, 3 to 4 years after a spectacular take off of cellular radio services in the UK to tell the UK mobile phone companies that they had chosen the wrong technical standard and would have to start all over again. A telecommunications network standard, once selected, was likely to have a life of at least 15 years. That would put the UK beyond the year 2000 for a change of its cellular radio standard.

The fact was that the UK government had, metaphorically speaking, put its telecommunications market into a UK boat and was rowing it hard away from continental Europe. A cellular radio service working across Europe looked quite hopeless and this was the prevailing view of most observers at the time.

This initial assessment didn't mean I was not attracted to the idea of a European wide mobile radio

service. *If I had any role as a senior public official it was to change the course of events in the national interest.* But how?

The only glimmer of a way through was if the new standard really had compelling commercial advantages over the one the UK had just adopted. That was the axis around which I had to turn the stampeding horses. What were the commercial benefits of a new digital mobile technology? I had worked in CEPT in 1976 on satellite broadcasting and knew that this was likely to involve trying to shift the culture in GSM more towards market objectives. In doing so it was essential to get the two UK mobile radio operators fully engaged in setting what those commercial objectives should be.

The GSM meeting was upon me. I had to anchor my market oriented peg in the ground.

It was smiles all round when I welcomed the GSM delegates to London. The smiles faded with a statement that it was far from agreed by the UK that GSM should be digital technology. We didn't object to the idea being explored. However, at the end of the day, the technology had to show itself better than the existing analogue systems.

I was a new boy disturbing a very settled consensus.

The British Telecom research engineer, who had been attending GSM since its inception, was furious. His senior managers were on the phone to me. But BT's world had just changed. It was my call.

A Norwegian PTT engineer, during one of the coffee breaks, also left me in no doubt that my intervention was not welcome – the gist of his blunt comment was "So you've come to sell European industry down the river in mobile radio technology as you did for maritime satellites".

We had known each other in the 1970s where he had been a part of an effort to create a European maritime satellite terminal standard to rival a USA standard that had already been introduced by the US maritime satellite operator COMSAT.

In my judgement there was not space in that fragile embryonic market for two competing technical standards. As a young satellite systems engineer in the Ministry of Posts and Telecommunications I'd advised the UK government to back the USA standard (Marisat) and this view had prevailed.

Was this the right outcome? The European technology was only a variant and not an advance. It risked damaging the commercial prospects of the service whilst only ever being in line for the second prize by coming late to market. The bigger prize was a viable world wide maritime satellite service meeting the operational, safety and social needs of the global shipping community. It was the right call. And the lesson I had taken away was that if European industry was to win with the GSM technology – Europe had to be first and not second in bringing its technology to market. Timing was everything.

Just before the London GSM meeting in 1984, decisions were taken in France and Germany that were to have far reaching consequences. It was to pluck GSM out from being a third division activity of minor technical interest to the premier league of European political-industrial policy. It was the pattern of European leadership in the 80's that if anything new and progressive emerged in the EU – it usually came out of the crucible of the Franco-German bi-lateral relationship.

Franco-German government co-operation had been institutionalised by an annual meeting of the two Heads of State. In advance of this ministers of the various ministries would meet to cement new co-operation deals. They were fed the options in the preceding months of horse-trading between their respective officials.

The German research ministry had been sponsoring some research into digital cellular radio with an industrial company called SEL. It was well known in the mobile radio world that the Matra system, that France Telecom had been persuaded to pick up, had insufficient capacity to last France much beyond 1988. The German industrial policy vision was to set up a Franco-German industrial consortium to pick

up the SEL digital technology and for France Telecom to adopt it for its operational needs. The German PTT (Post, Telephone and Telegraph administration ie the telephone company) would then follow and adopt the same technology when capacity limitations also required it to bring in a new system. This was thought (at the time) to be later due to Germany having a higher capacity analogue system than the one France had deployed.

The SEL technology came out of the military stable and was called Wide band TDMA. The TDMA stood for Time Division Multiple Access. It was a way of arranging a number of mobile telephone users to time share the same radio channel. "Wide band" meant that there was a very large number of concurrent telephone calls to be carried, so the radio channel had to be very wide to accommodate them all.

Those responsible for operational services were not going to make a leap into the dark… whatever the industrial policy ambitions. The experts from two PTT's had written into the agreement that practical tests should precede any commitment for operational use. The French experts squeezed into the agreement that the field trials should also look at the technology that they had been exploring. This was a technology called narrow band TDMA.

This effectively turned the field trials into comparative tests. However to those outside there was a widely held assumption that if the SEL wide band TDMA technology proved itself, it would be adopted. (Note: the German and French officials involved at the time considered this widely held perception to have been wide off the mark).

This political initiative fitted in neatly with the current thinking in GSM that the next generation system should be digital. The strategy of the French and German officials coming to GSM was clear. They had to deliver a European standard wrapped around the technology emerging from the Franco-German trials. In this way a European size of market would be created. French and German industry would then be uniquely placed to supply this market. They could then leap-frog over all the present first generation suppliers and assume a leading position.

The deal was cemented through a political declaration at a Franco-German summit in October 1984.

While this high level politics had been taking place in continental Europe I'd been developing some new thinking in the considerably less stratospheric 3rd floor of 1 Victoria Street. I'd been nudged into it by a chance meeting with an engineer from Racal. I was sitting next to him at a meeting. The meeting started late and we had a few minutes to introduce ourselves and have a brief chat. His name was Ted Beddoes. He was a very good radio engineer bubbling with enthusiasm. Up to then I had been quite sceptical on the digital technology being able to deliver clear advantages within the time-scales being envisaged. To my surprise I found him much more bullish. This had a lot to do with Racal's background in military radio. The enthusiasm of a senior engineer from one of our major players caused me to accelerate the second part of my strategy and that was to engage the two UK mobile radio operators in thinking through what a digital cellular radio technology had to deliver commercially.

The DTI had one really valuable card to play – frequency spectrum.

Europe's frequency managers met from time to time in a CEPT Group called R21 chaired by Klaus Olms of Germany. They had been visionary enough in 1982 to pencil-in 10 MHz of radio spectrum at 900 MHz reserved "for a pan European cellular radio service".

Figure 2 – Klaus Olms who led Europe's "radio frequency" visionaries

David Court and his colleagues in the DTI's radio regulatory division had managed to keep this intact in the UK in spite of DTI Ministers' rush to license analogue cellular radio services.

At some point in time the operators would want to get their hands on this radio spectrum and this provided a route by which a European standard could be introduced into the market. It was elegant in that it did not impose a technology on anyone. The mobile operators would be free to accept the new spectrum or not but the technology strings attached would serve the wider public interest of a European wide mobile radio service. (These radio frequencies will be referred to in this account as the GSM frequency channels).

I brought around the table the technical directors of the two UK mobile radio companies. They were completely preoccupied with making a success of their present analogue cellular radio networks. There were two barriers to surmount. The first was for them not to see any new emerging GSM standard as a threat. If that happened I would be sunk. I had no technical resources of my own. The second barrier was at least some prospect, no matter how vague, to pick up and commercially exploit a new standard. My carrot was the reserved GSM frequency channels.

The meeting opened with a “motherhood” question - if a technology emerged which offered to improve their business - would they want to adopt it? "Yes" they replied. My next question was get them to list the factors which they saw as being important to the success of their business.

In a short time both operators mutually agreed a list:

- Quality of the voice conversations
- Cost of the fixed infra structure
- Cost of the subscriber equipment
- Efficient of use of radio channels
- Viability of hand portables

I then proposed that these should be the criteria by which we judged whether to agree to any emerging GSM digital cellular radio standard.

We will come later to the significance of adding “Viability of hand portables” but a picture of the world's first cellular mobile radio with its inventor, Dr Martin Cooper, summed up the challenge.

Figure 3 – The world's first cellular mobile phone but a world away from a mass consumer product

It was then necessary to set the threshold for this agreement. For each item I reasoned that the new standard should result in a performance no worse than that being achieved by their present networks. But in order to qualify as a second generation standard then surely the very minimum should be that one of the factors be significantly better. I held my breath. Only one factor being significantly better? Slightly to my own surprise the Technical Directors from both operators readily agreed. Perhaps it was not surprising as they were the Technical Directors and I was pushing at half opened doors. The real test would come with their CEO's and commercial divisions.

Positioning is important before entering any diplomatic argument. The criteria the operators had agreed offered scope for manoeuvre. Nobody could seriously argue with the logic that a second generation

should be better in some way than the first generation standard it is supposed to replace. The rest of Europe couldn't claim that our threshold was being set deliberately high to shoot down the emerging standard. We were only calling for one factor to be significantly better! If the chosen digital technology didn't even measure up to this minimal threshold - we had a valid excuse for bailing out. The politicians, press and public would understand perfectly well how reasonable we were being in declining to accept a second generation standard which wasn't as good as the one we had. Re-enter the UK analogue standard (TACS) onto the European agenda?

On the other hand if the digital technology did measure up to the threshold there would then be clearly something in it for the UK operators and the public. By getting the experts from the operators themselves to define the factors I had them working with me to define the standard. I knew that this may not be sufficient for them to consider putting any emerging GSM standard into commercial service. Far from it. But it created space in which the UK could move. I worked that evening writing-up a UK contribution for the next GSM meeting.

The next GSM meeting took place in Oslo in February 1985. Snow was on the ground. On my way to the meeting place I stepped off a pavement onto what I thought was compressed snow but the snow surface hid a pool of icy water below that flooded into my shoe. It was a sign of things to come. My expectation was of a relatively straightforward run at the GSM meeting.

Also arriving to the meeting were officials from France and Germany who had carefully co-ordinated their positions. They wanted a full time task team (which was known in CEPT circles as a permanent nucleus) set up immediately to draft the standard along the lines their industries were developing. The idea of such a task team had been around since 1982 and even supported by a European Commission Official. But the first time I came across it was in Norway and assume that it was essential to demonstrate to French and German Ministers that the pressing time scales set by the French operational needs could be met.

The French needed a new high capacity system by 1988. The UK operators would fall off the wagon on that sort of short time-scale. So throughout the meeting I resisted setting up such a task team. I said it was premature. The French and German tabled a paper, which set out the time scale of their field trials. They hadn't entirely thought through the practicalities. Until the field trials were over there was very little for such a team to do on the standard itself. This was the first casualty of the French putting in alternative approaches in the field trial. I tabled an alternative action plan, based on the French/German contribution, but factoring in the delays the trials would inevitably create and it got support. They lost ground.

But I was also to lose ground. The UK ideas on the selection criteria were skilfully manoeuvred into a ditch. The French and German Officials proposed in the main GSM meeting that my paper on the five criteria should be put to a working party for detailed consideration. By the end of the week it hadn't even been discussed. Thomas Haug was most apologetic. It had somehow just got lost. The research/technology led culture in the GSM in 1984 had no inclination to allow in <u>any</u> barriers in the way of a new digital technology.

Chapter 3

GETTING THE UK's INDUSTRIAL ACT TOGETHER

The French and German governments invited their national industries to put forward proposals for their collaborative field trials. The governments were to pay 100% of the R&D (Research and Development) costs. Four consortia were selected. The first was a consortium of industrial giants comprising SEL of Germany and Alcatel of France. They were to trial the wide band TDMA solution based on the SEL work. The second was the German arm of Philips who had some novel ideas for different technologies in the two different directions of transmission. There would be a wide band TDMA system from the base station to mobile radio. In the other direction of transmission they proposed a much simpler system where each voice call had its own radio channel. A third included Bosch of Germany looking at a simple narrow band TDMA solution. The fourth was a small French company looking at a narrow band TDMA solution with an additional idea of making the frequency channels hop around all the time to avoid interference.

There was a nice symmetry of two wide band and two narrow band TDMA solutions. The French PTT managed two of the contracts and the German PTT managed the other two. The German PTT took care that it was the French who managed the SEL led consortia contract. Just a few days before the French PTT let the contract they discovered that one of the industrial companies in the SEL led consortia had sub-contracted some work to an Italian Company. They quickly sent a request to the Italian Government to help contribute to the cost. The Italian Government refused. It was so late in the day that France had no choice but to proceed. They were far from happy at the thought of subsidising Italian industry.

Meanwhile in the UK there was a total preoccupation by the two mobile operators with rolling out the UK analogue cellular radio networks. The haste with which the UK government had selected the TACS analogue standard, based as it was on an established US technology (AMPS) and the speed with which licensing awards were made gave UK manufacturing industry absolutely no chance to develop any hardware. The two UK networks were therefore being built, at that stage, almost entirely on imported equipment. UK industry were out of the game of supplying first generation cellular networks, even before the game had started.

Some argued that the start of the new 900 MHz analogue cellular radio services could have been delayed a year or 18 months to give our manufacturing industry a chance to develop the necessary equipment. But the UK Conservative Government applied a consistent set of priorities to all their decisions. *Top priority was the consumer interest, second was the financial services sector (there appeared money to be made from mobile radio), third was the other service industries (in this case the mobile network operators and service providers) and absolutely bottom of the heap was the UK manufacturing industry.* *(Note: It may be going too far to say that the French and German Governments order of priorities was the complete inverse in 1984 but certainly a good case can be made that their manufacturing sectors have been given a consistently higher priority than that of the UK and the outcome is clear to see in 2009).*

Against this unpromising political backdrop I had not given up trying to find a way in for UK manufacturers for the GSM opportunity. In early 1985 I received a number of invitations to visit research laboratories in the UK. During a visit to British Telecom Research Laboratories I saw some work they were doing on digital voice coding being funded by BT mobile. This is one of the key components for digital cellular radio. It converts the human voice patterns into a highly efficient stream of computer numbers (1s and 0s). It was interesting but not particularly heavily resourced. I visited Racal Research and saw a relatively modest digital radio activity. During a visit to the Marconi research laboratories I was sworn to secrecy, as they were about to reveal work they were doing on digital voice coding. I held my breath as I was ushered into the laboratory expecting great things in what had once been the UK's radio research powerhouse ..... what I saw was a total anticlimax. It was a solitary printed circuit board with the beginnings of a voice coder. They were about two years behind the work in British Telecom's Labs.

Compared to the fully funded programme announced by the French and German Governments the UK's total effort was paltry. The only chance was to get the UK companies to pool their efforts.

The next day I telephoned David Tennet the Technical Director of Marconi. I found him a live wire and very clear thinking. I put it to him that adding all the efforts of all the UK companies amounted to pea nuts relative to the effort the French and Germans now were mounting. Even the Scandinavian countries had a much better organised effort. Why not a joint UK effort? His reaction was positive and enthusiastic. It was the green light to sound out the other companies.

Before long I had British Telecom, Racal, Marconi, STC and Plessey around the table. A good spirit existed. Everyone knew that the sum total of 5 peanuts was only 5 peanuts. Across the water the effort looked really impressive. Ted Beddoes, who by that time was doing a short secondment in the DTI working for me, found out what one of the consortia was being paid by the French and German governments. Scaling it up to all consortia, (which wasn't an accurate thing to do), produced a grand total of £30 million pounds. (Later the figure was revealed to be 18 mECU)." We need to do more " said a BT engineer at one meeting. Everyone nodded.

My DTI colleague John Avery had a budget for supporting industrial R&D. He was willing to support a small collaborative project on a 50:50 basis with industry.

The show was on the road. British Telecom, Racal, Marconi and Plessey wanted in. STC fell by the wayside. Kenneth Corfield had just left STC after the company had incurred some financial losses. The City of London, whose short-termism has probably inflicted more damage on the UK manufacturing base than occurred during the entire Second World War, put into STC a new management team tasked with swinging the axe on any new expenditure and a lot more besides. As usual it was long term R&D that got tossed over the side of the ship. The STC engineers were disappointed. I regretted this in view of the very fine research record of their Labs at Harlow in Essex.

The first problem was how the project could be conveniently broken into three pieces when there was four companies. Plessey came to my rescue without prompting. They didn't think any practical work should start until a technical audit had been carried out on the different proposals being trialled by the French and the Germans. They angled for a position to lead this audit. The other three companies reasoned that the broad band systems were so complicated that there was no chance of building a working system in the time available. They were game for going straight for a narrow band TDMA system.

Plessey got the study they were pressing for. They were to analyze the four French/German systems against the UK's five criteria. It was called “the top-down” study. The practical work was then carved out amongst the other three on an amicable basis and the UK digital cellular "Test Bed" was born.

British Telecom had the voice coder work. They were clearly in the lead for this component. Marconi happened to be a company with a long tradition as a supplier of radio transmitters, so they got the transmitters/receivers. Racal's digital expertise had impressed me and they were given the TDMA bit. John Avery found a few hundred thousand pounds and with the Minister Geoffrey Pattie's endorsement we were away.

A few hundred thousand pounds may seem paltry but it is amazing what can be done by a very small team, very focussed, no frills, no red tape and only a very short time.

It wasn't long before the engineers from the three companies gelled into a close knit team working all hours. The activities were supervised by a working group that brought together the UK preparations for GSM and an industrial R&D activity tracking the emerging standard. It proved an effective formula. Whilst the UK was still only at the fringes of events this collaborative effort enabled the UK to make a much stronger input to the standardisation effort. That said the sheer size of the Franco-German R&D effort gave substance and credibility to the digital technology and provided the main engine for the GSM initiative over this phase.

Chapter 4

THE TRIPARTITE AGREEMENT ON DIGITAL CELLULAR RADIO

In 1984 and in another part of the telecommunications technology field, the French found themselves in a quandary. What to do about their telephone exchange industry? The telephone exchange is at the heart of a telephone network. The new generation had become giant computers. Like any computer they required huge amounts of software to operate. The software was becoming more and more complex and very expensive to maintain. Ever larger markets were needed for these software driven telephone exchanges to be an economic proposition.

The French knew that British Telecom was looking to introduce a second independent telephone exchange supplier. This was to put competitive pressure on GEC and Plessey who were supplying the System X exchange. "Late and overpriced" was BT's view of their principal telephone exchange suppliers. The French PTT were also not adverse to a bit of competitive pressure on their main supplier Alcatel. They approached British Telecom and proposed a deal where each would use the others principal supplier as a competitive second source.

This was a classical reciprocal deal in industrial policy terms. Except British Telecom were not the least bit interested in industrial policy. This was the new British Telecom who would shop on the world market and buy the best. The French overtures were snubbed and British Telecom ran an international competition. The British Telecom experts saw the French telephone exchange as a bit long in the tooth. To add insult to injury it was thrown out of the competition at the preliminary sift in a very public way.

Perversely this rejection by BT turned out to be a favour to French industry. It no doubt contributed to the imaginative decision by France whereby Alcatel bought out ITT's European telephone exchange interests which were mainly in Germany in the form of SEL. This created the foundation for Alcatel to become the largest telecommunications manufacturers in the world. It was a truly masterly European industrial restructuring. However, this helpfulness to French industry by BT was not so evident to the French at the time. They were livid. Not only was their industrial policy in tatters but the telephone exchange of their national champion was publicly damned as not even worthy of making BT's short list.

A Financial Times conference on telecommunications took place in London just after BT had rejected the French Government overtures. The Director-General of the French PTT slated British Telecom in public. Sir George Jefferson sent an olive branch round in the form of offers of co-operation in other areas. This included a pan-European cellular radio system. The top manager in their mobile radio company John Carrington was dispatched to Paris. His interest in a pan European mobile radio service was ignited by customer feedback that they were irked that their UK mobile phones stopped working a few miles the other side of Calais. It was the point when BT crossed the Rubicon in support of GSM.

Figure 4 – John Carrington, the CEO of BT Mobile

John tabled a draft for such a co-operation agreement. The co-operation agreement included a provision on the cooperation on technical standards and sharing R&D results. When I heard about this I was irritated. It was not that I had just not been consulted but I felt that the overture was premature.

My Under Secretary, Alastair Macdonald challenged me - "Wouldn't it be better to be on the inside and influence things?" he asked. I felt that the risks of getting committed to a technology that may turn out to be well removed from market realities outweighed this. He listened and did not press his point. I sent John Carrington a stiff note that under no circumstances could he agree to anything that was inferior to the UK's analogue mobile radio system.

As it happened the French were in no mood to receive these overtures from British Telecom anyway. The dialogue fizzled out.

However the French were more receptive to overtures from the Italians. Mr Randi from the Italian holding company STET was sceptical about the success of the Franco/German initiative. On the other hand there was a small chance it may succeed. Getting into a co-operation agreement with the French and Germans was an insurance policy. This policy wasn't free. I learnt later that STET had to pay something to the French PTT. This done, a tripartite co-operation agreement was signed in Nice in May 1985 between France, Germany and Italy. The text wasn't a million miles from the one John Carrington had deposited with the French PTT in the sense of offering a sensible entry point for the UK into this agreement had the French been willing and the DTI not holding back.

This agreement established a political power structure across Europe sitting over the GSM committee and effectively setting its strategic direction. It was very obvious that the tripartite agreement was far from balanced. Within the tripartite agreement was a kernel in the form of the bilateral political agreement between France and Germany glued together by the jointly funded R&D trial. The next ring was France, Germany and Italy within this new digital cellular cooperation agreement. Sitting outside of this were all the other European telecommunications administrations sitting on GSM.

It would be a fair description in this picture of European power and influence over the direction of GSM to add the UK in a fourth (outer-outer) ring as it pursued its unique path of competitive mobile network operators.

Chapter 5

BERLIN GSM - BLOOD ON THE FLOOR

The next GSM meeting where sparks were to fly was in Berlin in September 1985. It was a significant meeting.

The French and German officials had met with the Italian officials and aligned their positions before the meeting.

The first argument was on the setting up of the permanent task team of experts. The French and Germans wanted this immediately. My further efforts at delay came to nought. It was agreed to set up the team. No sooner had this been agreed when the French head of delegation Philippe Dupuis gave a long speech about this incredible French engineer with quite stunning qualifications who might just be persuaded to lead the team. There is an unwritten rule in international bodies that it is not wise to have too many elected officials from the same country. The France PTT already controlled two of the four working parties in the GSM, including the vital one dealing with the radio interface. Without a second thought I heard myself telling the meeting that we had an equally good candidate but I wasn't in a position to give his name. The fact that I couldn't give his name was an understatement. Prior to Philippe Dupuis speaking, the thought had never crossed my mind. It left me with the not insignificant problem of finding a suitable candidate.

Another battle was the extent to which this task team would take over the main body of the specification work from the Working Parties (which only met from time to time) or essentially be a supporting resource for these existing Working Parties. Sweden and the UK favored the first approach and the French and Germans favoured the second approach. The second approach won the day.

The next day the GSM were trying to set down the general policy requirements of a pan European digital cellular radio system. I was insisted that the new system had to accommodate competitive operators. This pushed up the temperature in a room full of monopoly mobile network operators. This love of network competition by the British Government was a disease that might spread. The biggest panic attack came from the GSM delegate from the Danish telephone administration. The Danish politicians were in process of reviewing their telecommunications monopoly. If GSM put out a statement that the new European cellular radio system would accommodate competitive operators - someone in the Danish Parliament might ask whom the other mobile operator in Denmark was going to be. The UK was not going to export this heresy called competition. He adamantly refused to accept any reference to competitive operators. We glowered at each other.

There was no mileage being at odds with the Danes. We were really good allies on another battle in GSM. This was to get hand portables as an essential feature of the new GSM system.

It may seem incredible now. But there was a solid body of European technical and commercial opinion in 1985 that saw cellular radio only as phones in cars. There were sound economic reasons for this. It cost a lot of money to build radio base stations and for decades the rule was to find a high site somewhere, build a tall mast and blast out power as far as the eye could see. The only problem was that for a two way telephone conversation power had to be blasted back the other way and for the mobile the only source of power was a battery – in fact a car battery. A car also allowed a decent aerial to be mounted on top of the car bonnet to assist in getting enough signal back to the base station. This allowed relatively low investments in mobile networks that in turn meant that a relatively low number of customers made the proposition viable. It was a comfortable low risk place to be for the mobile radio operators.

Motorola did the pioneering work to make a viable truly portable mobile phone – the iconic brick emerged. It was heavy, expensive and had a short battery life. If you happened to move around a relatively small area near a base station (in City centres) it was possible to make telephone calls but it was only to easy to

move out of range and no calls were possible – which was over most of a national service area. The mobile networks were optimised for the car phone and the mobile hand portable just took pot luck as to whether they worked or not. That was not to say they were not marketed enthusiastically and both UK mobile radio operators were shipping them out of the door at £3000 a piece as fast as they could lay their hands on them.

The DTI gave an R&D grant to a small UK company called Technophone to develop the world's first "pocket" analogue mobile phone, the PC 105. It was sold under the brand name Excell. I supervised the R&D contract for the DTI and forced myself to carry an early model (the PC 105) to and from work.

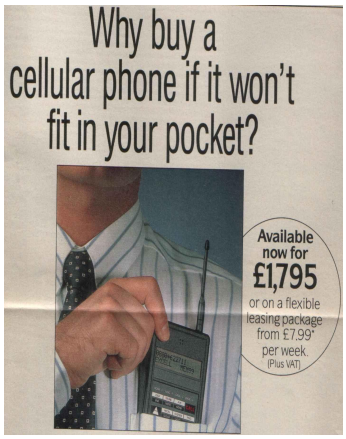


Figure 5 – Advertisement in 1986 for the world's smallest mobile phone

It had its limitations. Whilst the bottom of the phone certainly fitted into my shirt pocket, the top stuck right out. So it travelled in my brief case. The short battery life forced a discipline to plug it into a battery charger at each end of my commute. Ted Beddoes made a joke that the success of the personal mobile phone would need a change of British cultural whereby one always plugged the mobile into it charger when arriving home - before kissing the wife. The first model also had a tendency to drop calls – reflecting just how far the technology was being stretched to get its size down.

But when I did not have it with me I was surprised to find that I missed it. It was like going back to black and white TV after watching colour TV. It was a clear sign to me that it was a technology that would stick and not a passing fad. It was my conversion that the hand portable was the key to any future mobile radio system. We needed a GSM network designed to make the hand portable mobile much more viable.

Only my Danish colleague Marius Jacobsen was giving me any active support on this in the GSM meeting.

It was time to find a compromise on the competition issue. In the lunch brake I offered a neutral text which referred to the need for the new GSM system to accommodate "geographically co-located operators". I pointed out that this could be interpreted in Denmark as the overlap at the boarder with Sweden and in the UK as competitive operators. He wrote the words down and started to play around with them. It was a deal.

Others in the main meeting went along with the compromise; although I got a lecture from the Klaus Spindler from Germany that the UK couldn't expect the rest of Europe to pay any extra cost for a system to accommodate more that one mobile operator. This was a generous offer coming from the German PTT who, at the time, were one of the main political advocates in Europe of the virtues of a monopoly telecommunications service. (Note: some GSM colleagues believe the discussion on co-located operators took place at the Paris meeting of GSM).

The only moment of respite during the week was a short presentation by Phil Porter and Pete Arnold from

a USA R&D establishment called Bellcore (the R&D centre for the US regional Bell telephone companies). They had come to Europe to tell the GSM about their research work on digital mobile radio. They slammed the idea of a network that accommodated both car radios and hand portables. Their vision was of a network based entirely of hand portables. They predicted that this would eventually replace the fixed wire line telephone. Most of the European engineers listened politely. They were preoccupied with a car telephone service. They still hadn't got it. Even more alien was the idea of competition with the fixed wire line telephone.

For my part I carefully noted these interesting ideas. One day their time would come. As it happened not long after Lord Young arrived at the DTI.

If the meeting had been tough thus far worse was to come. I was still being given the run-around on the paper on the five commercial criteria. It hadn't even been discussed. The meeting was already about half way through. I raised the matter in one of the main GSM sessions pointing out the problem of GSM trying to select between systems with no agreed criteria. Surely agreeing the criteria was best done at the beginning before some of the strengths and weaknesses of the particular systems became apparent?

The French official Philippe Dupuis didn't think this was timely. The German official thought that the working party under the French chairmanship was best qualified to deal with the matter “in their own way”. Right on cue Renzo Failli from Italy asked for the floor. He did a very good act of getting highly irritated or perhaps he was. “How could the UK waste so much time of so many delegates with its interventions on a paper of no interest” he demanded, “The GSM had far too many important things to do. He said that Italy did not even want to consider the UK paper”. The UK was getting beaten up by the gang from the tri-partite digital cellular radio agreement.

This last statement from Renzo Failli went too far in terms of CEPT protocol where each country at least had the right for its contributions to be considered. I knew it was my opportunity. I whispered to Ted Beddoes not to get alarmed but it was time for me to lose my temper. As Renzo Failli finished I banged the table and exploded into a rage which sent shock waves around the room. “We had formally tabled a contribution. Whilst we had no right to expect people to agree with it, we did at least have a right for it to be considered”.

Pitching the argument on the right for consideration rather than on the content gave me the moral high ground. The Chairman Thomas Haug knew he had to make space for a proper discussion. The five criteria were at last in play. During the GSM discussion a sixth criteria was added. This was the ability of the system to support data services (eg text messaging). It was helpful to digital technology case. Our operators didn't object so the UK accepted it.

Towards the end of that GSM meeting I took a lunchtime stroll around the block with Renzo Failli.

Figure 6 – Renzo Failli, led in GSM for the Italian operating company SIP

Fences needed to be mended. He asked me why the UK was so hostile to the digital technology. I explained that in the competitive UK environment any new technology had to sell itself. We couldn't

impose something just because it was called “digital”. It had to have some virtues over our current analogue cellular radio standard TACS.

He probably did not comprehend the dynamics of a competitive market. In Italy mobile competition did not exist. He stressed that the UK had to give up the idea of pushing TACS as the European standard. The main virtue of the digital technology was simple that it didn't yet exist. It was industrially and politically “neutral”.

The UK did not have any active plans to push our TACS standard in GSM but it was one of the de facto options if there was no agreement on a common digital technology. But his argument on “a neutral technology” in terms of practical European politics rang true and was good advice.

I staggered home from the Berlin GSM meeting totally exhausted. It had been an awful meeting.

There was no respite from the gloom when, a few days later, there was a conference in London on global telecommunications developments. A very senior British Telecom executive gave a speech that was well reported in the press. He firmly predicted that a pan European digital cellular radio system would not happen this side of the year 2000. Nobody dissented.

It was a very low point for me. It all looked pretty hopeless from a UK perspective. Then a small green shoot appeared...

A few weeks later there was a meeting in Brussels to discuss EU policy for mobile services. The six criteria were duly pushed from the UK delegation. In these specialist meetings the local UK Representatives (under the Foreign Office) usually just nipped in, said hallo and rushed off to one of the dozens of other meetings taking place. The UK delegation was Greg Faulkner, a diplomat on loan from the Foreign Office, who headed up our international telecommunications policy branch at the DTI and myself.

The objective of the European Commission with this particular series of meetings was a very low-keyed report to try to bring views of Member States closer. But national officials were always on their guard for what went in them in case they were used by the EU Commission later to extend the power and reach of the EU – a drive that seemed to be in their DNA. It therefore came as a complete surprise when *the French delegate* asked for the floor and fully supported the six criteria we had put forward for selecting the GSM technology.

Figure 7 – Philippe Dupuis, France's leading mobile radio strategist

It was Philippe Dupuis and he even referred to it as "our" six criteria. I was bowled over. With such influential support the first peg of the strategy was firmly in the ground.

Chapter 6

THE QUADRIPARTITE AGREEMENT

Just before the Berlin GSM meeting the UK played host to one of the Working Parties of the GSM. It was customary in CEPT for the host administration to hold a dinner for the participants, usually towards the end of a one-week meeting. It was one of those rare idyllic English evenings. The day had been sunny but not oppressive. Entering the restaurant I bumped into one of the senior Italian delegates Mauro Sentinelli. He was a very warm and charming man and we exchanged pleasantries. He took me to one side and said that the Italian Minister was coming to London in a few weeks time. His Company had in mind to suggests to their Minister to encourage the UK to join the French/German/Italian digital cellular co-operation agreement. What was my view? I said that we would be delighted to join once the GSM had agreed objective criteria for evaluating the worth of the digital technology. He smiled. He understood my position perfectly.

Figure 8 - Mauro Sentinelli, whose initiative began the UK's journey into the Quadripartite Agreement

We agreed that his Minister would make the suggestion and I would brief my Minister to suggest that this would be possible if Italy could support the UK in getting the five criteria accepted. The next day I prepared a brief. It went into the machinery pulling together the DTI Minister's briefing for the meeting with the Italian Minister. It made it clear that until the criteria were agreed in GSM we did not view it as timely to join the tri-partite agreement on digital cellular radio. The Italian Minister came. Exchanges took place according to the scripts we had prepared. There the matter rested.

Life for Greg Faulkner and I was a juggling act, with so many international meetings to have to attend. I had no support staff and Greg's team was thin on the ground. Two middle ranking officials had been lured away by higher salaries to British Telecom and Mercury. This only left two very junior staff manning the office when Greg and I were overseas at meetings – which was most of the time.

In the autumn of 1985 a cabinet reshuffle took place. Leon Brittan arrived as Secretary of State at the DTI. Normally an incoming Minister would immerse himself in domestic issues before finding any time for international travel. What was unusual with Leon Brittan was that one of the first things he did was to make a quick courtesy call on Ministers in Germany. It caught us on the hop. Greg was abroad the week he arrived. So was I. Round came the commissioning notice to all DTI Divisions bearing a red immediate flag calling for briefing material to be submitted by the following day. No GSM mobile phones in those days. We were both out of contact. Greg's two junior staff were in a flap.

One of the few things of any international flavour they could lay their hands on was a copy of the brief I'd prepared many months earlier for the Italian Ministers visit to London. They did not understand its context. They blew the dust off and dutifully changed all references from Italy to Germany. This was sent forward to our embassy in Bonn.

The embassy staff in Bonn were in a quandary of a different kind. The agenda between the German PTT Minister Dr Schwartz Schilling and Mr Brittan looked very sparse. Not surprising since on de-regulation the UK and Germany, at that time, were at opposite poles. The only item which seemed remotely positive was some obscure matter on pan European digital cellular radio. Even this appeared very half hearted with my strong caveats about the five criteria being first agreed in the GSM. Contact with London was useless. Anyone who knew anything was away. The meeting looked on the cards to be a potential embarrassment. There was nothing else for it. The man on the spot had to take a decision in the best interest of Anglo-German relations. Out of the brief went all the qualifications about the 5 criteria. It still looked a bit half hearted.....maybe just a little more enthusiasm...!

When I got back to my office I read the Foreign Office reporting telegram with mounting disbelief. The impression came across of Mr Brittan hurtling into the German PTT Ministers office, pumping his hand as he immediately enthused - "We'd just love to join your digital cellular co-operation agreement". The German Minister and his officials were caught completely off-guard. My caution in GSM was widely interpreted as negativity. Ministry Officials had been fed a diet from their representative on the GSM of this negative attitude of the UK towards the Franco-German initiative.

Dr Schwartz-Schilling mused out loud that a European system stretching from Milan to London was a very nice vision for Europe. He caught the moment. To the surprise of his officials he agreed on the spot that the UK should join and told them to look into it.

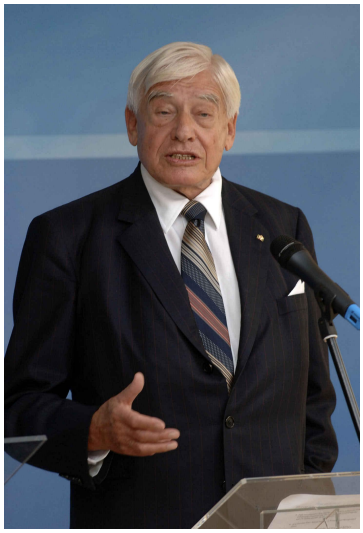


Figure 9 - Dr Schwartz-Schilling, the German Minister who exercised a powerful political influence over GSM

That afternoon I was telephoned by a German official who broadly confirmed the picture painted in the UK Foreign Office reporting telegram. He said how surprised they had been by Mr Brittain's proposal. He was not the only one who was surprised. I had not anticipated getting propelled forward quite so quickly or quite in this way. It was not clear why Germany or France would want us in the agreement and for this reason had envisaged a first approach to the Italians as a follow-up to their overtures. It was my turn to seize the moment.

We discussed the mechanics of the UK joining the agreement. This involved preparing an Annex covering our entry. This needed to be sent to all existing parties for signature. He suggested that since the chances of getting the four Ministers in one place were negligible multiple copies needed to be prepared. These should then be orchestrated in a sort of postal dance. At the end of the dance all parties

would finish up with four originals signed by all four Ministers. This sounded very complicated. My alternative proposal was to make one copy and circulate it around. The last one would make copies for the other three. There was a taking of breath at the far end. But he went along with the idea.

There was another reason for doing things this way. Germany and Italy would sign the new agreement. But relations with France were at a low ebb following the snub British Telecom had shown the French PTT over the purchase of a second source of telephone exchanges. If the new agreement arrived at France last the other two could then put some pressure on them to sign...if they proved to be difficult. I had no comprehension just how difficult France would turn out to be.

As a matter of normal procedure a copy of the new annex was sent to the DTI solicitors. A few days later a note came back, not objecting to the new annex, but the original agreement between the French, Germans and Italians. The DTI solicitor doubted that it would be acceptable to the EU competition authorities. She advised that the DTI shouldn't sign.

I phoned her up. It was not really up to the new boy to the club to say that we wanted to join but we wanted the others to first change the club rules. We were in no position to dictate terms. "Could she not give a professional judgement of the likelihood of risks of any European Court action ?" The solicitor stuck to her guns. She said she knew the Brussels competition authorities were itching to have a go at the monopoly national telecommunications authorities. She couldn't recommend that the slightest risk was taken.

This was getting things completely out of proportion. A note went up to the Junior Minister Mr Butcher fairly setting out the pros and con but recommending he ignore the solicitors advise and sign the new agreement. It came back signed.

It passed through Germany quickly then languished in Italy for a while. That is nothing unusual. I happened to be in Italy in May 1985 visiting STET to discuss co-operation on a broadband switch project which Plessey were interested in. It was an opportunity to raise the progress of the digital cellular co-operation agreement. The reaction of Mr Randi, a very senior STET executive, took me a little aback. He was sceptical about the GSM project. Italy couldn't wait. It needed to satisfy its market now with an analogue system.

This was one of a number of indications of the market pressure tearing away at the pan European cellular radio initiative. The markets of the cellular radio operators were essentially out of phase. It was clear from Mr Randi's remarks that Italy would not wait for the digital cellular radio system and were likely to dash to install an analogue cellular network.

Shortly afterwards our annex to the digital cellular co-operation agreement arrived signed by STET and the Italian Ministry. It was signed by a DTI Minister and duly passed onto France. There followed a complete silence and I knew this had nothing to do with bureaucratic inefficiency – the French PTT were a very efficient administration.

In July 1986 my diplomatic colleague Greg Faulkner and I flew to Odense in Denmark, the birthplace of Hans Christian Andersen. It was the meeting of the CEPT Telecommunications Commission, the management level overseeing the whole of CEPT's telecommunications activities. One of the main agenda items was the new Memorandum of Understanding on terminal equipment type approval. I had been largely responsible for writing this MoU. A second UK objective in Odense was to press the French as to why they were holding back from signing the digital cellular radio co-operation agreement. The two were to become politically entangled as a result of an inspiration from Greg Faulkner.

GSM was not the only thing on my plate over the previous 12 months. A lot of work had gone into this terminal equipment “type approval”. “Type approval” is used for equipment that has to meet Government regulations. Testing every product coming off a production line would be expensive. So in most cases only one is tested. It is assumed to be representative of that "type" of equipment. All subsequent equipment of that "type" is then deemed to meet the regulation and therefore approved.

Up to then the same testing was being repeated in every EU country adding to the cost and delays in getting new products to market. The aim of the agreement before the Odense meeting was common regulatory standards and one-stop testing for telephone terminals. What was quite out of the ordinary was why this was being discussed in CEPT at Odense and not in the EU in Brussels.

In fact in 1985 the EC Commission had tabled a draft directive that would give them new powers in proposing which regulatory standards should be used for telephone equipment type approval. A committee of Member States, voting by qualified majority, would take the final decision. This seemed fine to me. It moved us forward on market opening – a stated priority of the UK Government as part of the Single Market project. It was therefore somewhat surprising to receive a stiff note from the DTI division responsible for "standards". The note accused me of conceding sovereignty to Brussels in the standards area. This was not something the Secretary of State, Norman Tebbit, wanted.

I couldn't believe it – I was being hauled before the Secretary of State for something so close to the Government's heart - "market liberalisation". (Note: The legal background was that once a new regulation is agreed in the EU then competence, or sovereignty as it has become known as, moved away from national governments and over to the EU).

My experience in dealing with Ministers up to then was light as previous roles were either technical or operational. My arguments would need careful rehearsal before the meeting. The EU Single Market was a major political objective of the Government. This was a first step in getting a single European market in telecommunications products. The standards were prepared by CEPT but it lacked a decision taking culture. There was no weighted majority voting in CEPT. Indeed in CEPT the UK had the same votes as Liechtenstein. In the EU we had 10 votes. The Commission were on our side on this one...

It all sounded pretty compelling to me. I went into the meeting feeling confident.

Half an hour later I found myself outside the Secretary of State's office in a daze. Norman Tebbit and Mrs Thatcher had just come back from the EU Council in Rome fuming. Their anger was in part against their EU partners but they were even more peeved with our own Foreign Office. "They would sell us down the river for asbestos mines in Greece" was the colourful expression I recall being used to describe our Foreign Office's behaviour in Rome as Normal Tebbet viewed it.

Mr Tebbit asked me who led for the UK in CEPT – answer the DTI. Second question – who led for the UK in the EU – answer the Foreign Office. He then made his a decision. Market opening in the rest of Europe was desirable but not if it involved losing any UK freedom of action. Things were to be kept as far away from the Foreign Office as possible. My instructions were that he wanted the type approval liberalisation but the job had to be done entirely by CEPT. I threw in my last card – but what about the advantage the EU gave for "weighted" voting. His response floored me. He wanted weighted voting in CEPT as well ! Getting weighted voting in a tradition bound organisation like CEPT? I had shot myself in the foot and was now landed with solving that problem as well.

It took over a year to work my way around the problems set by Norman Tebbit. Fortunately we were not the only country, at that stage of the EU's history, trying to keep things far away from Brussels as possible. But their motives were quite different. My new allies were governments that had more in mind holding onto their national powers to protect their industries from Far East imports. Politics makes strange bed fellows.

The proposal we put forward to our European colleagues in CEPT was a complex structure that had CEPT making the standards in their traditional way, a new structure of Administrations under a memorandum of understanding adopting the standards by weighted majority voting and an EC directive then automatically giving the result legal force in the EU. The result of all this work was to be presented to the CEPT Telecommunications Commission for their approval. Then the EU Commission had reluctantly agreed to table the corresponding Directive that gave the arrangement its legal basis.

The memorandum of understanding required a new committee to be set up (called TRAC). A Chairman

had to be elected. Having been one of the principle architects of the MOU I was the front running candidate for the post. In spite of this (or even because of this) the French put up a rival candidate. After all the hard work I really felt entitled to this modest first step on the ladder to some elected position in European standards making. As the Telecommunications Commission meeting progressed it was evident that there was quite solid support for me to chair this new type approval standards committee. The French candidate wasn't going to make it.

The French delegation was decidedly evasive when Greg questioned them on the progress on France signing the digital cellular radio agreement that would allow the UK to join.

Greg took me to one side during a coffee break. Why didn't we do a trade with the French? I should withdraw my candidacy to allow their man to become Chairman of this new type approval standards committee and in return they would sign the new digital cellular co-operation agreement to allow the UK to join. I was stunned. He went on to quietly put the choice back in my lap, like the good Foreign Office diplomat he was. "You need to decide what you really want" he said "Is getting the UK into this digital cellular radio agreement more important?" We might be in the birth place of Hans Christian Andersen but I felt sure this was not a script he would have written.

Figure 10 – Greg Faulkner, FCO diplomat finds a key to get the UK into the quadripartite cellular radio agreement

I reflected as my coffee went cold. The government was shifting Ministers at the DTI around like a game of musical chairs. Norman Tebbit had left the DTI. So had his successor Leon Brittan. Mr Channon was now the Secretary of State at the DTI. When I had put up to Mr Channon the result of my new MoU I had expected at least a “well done”. It was the only time in the history of the EU that the EU had ceded its legal powers to an outside entity, let alone an informal one. Instead I got a bland “the Secretary of State has noted your submission”. It was not evident either that we had a vibrant terminal equipment industry thrusting to get into the European market. They were more concerned that we had unilaterally opened our market and they were getting beaten up by cheap Far East imports. The Governments thrust for opening the European terminal equipment market was largely ideological. As Mr Tebbit had shown, this was not at any price.

On the other hand there were now real efforts being made by the UK operators and industry for digital cellular radio. I knew that British Telecom were really keen to get into the agreement. Vodafone was warming to GSM. It was also getting tougher and tougher running against the pre-coordinated views of France/Germany and Italy at GSM meetings. The priority had to be to get inside and influence events as Alastair Macdonald had put to me a year earlier. Within a few moments my dream of a European chairmanship evaporated before my eyes. I gave Greg Faulkner the go ahead to negotiate.

The French could hardly believe their luck. A reference back to Paris produced an additional demand that British Telecom agree to set up a joint group to study running a joint aeronautical telephone system.

British Telecom was contacted in London. The deal was struck. A letter from Sir George Jefferson was faxed to the French PTT Director-General in Paris. To the disbelief of all the other CEPT delegations my name was withdrawn as a candidate for Chairman and offered for the Vice Chairman's position (all the work and none of the power). The UK now supported the French candidate.

Before we left Odense we checked with the head of the French delegation that the digital cellular radio cooperation agreement had been signed. He assured us that it had gone up to the Director General *and been signed.*

On my way down to my holidays in the South of France, where my wife Jocelyne's family lived, I called in to see the new French Chairman of the Type Approval Standards Committee appointed in Odense. He knew that initially he had to lean heavily on my expertise. I readily gave him that support. A deal is a deal.

Just before I left his office I telephoned Philippe Dupuis. It had been a month now. We had seen no sign of our copy of the digital cellular radio co-operation agreement. Renzo Failli had told us that the next meeting under the agreement was in Rome that September. I asked Philippe when we could expect to receive a copy of the signed agreement. There was a long embarrassed silence. "I'm not quite sure how to tell you this" said a hesitant Philippe Dupuis "But the agreement has not been signed. It was put before the French PTT Director General as we'd been told. However he had refused to sign it. He wanted to wring some more concessions out of British Telecom before agreeing to sign it". He was genuinely embarrassed. I was mortified.

I phoned Greg Faulkner. He was as mortified as I was. We kicked it around. We had showed our cards and the French were raising the stakes. We could hardly reclaim the foregone chairmanship now. We baulked at pressing BT to give more concessions. An agreement is an agreement.

It was a game of poker and we had to raise the stakes. We would tell the world that the French had signed the agreement and simply roll up to the next meeting in Rome and see what happened. After all the head of the French delegation to the Telecommunications Commission had told us that the agreement had been signed. Who were we to think anything to the contrary? Let the French do the explaining. It was agreed that he would send immediately an effusive telegram to the Germans, Italians and French expressing delight that everybody had now signed and that we looked forward to seeing our new partners in Rome. I went onto my holiday gritting my teeth.

In September 1986, a week before the Rome meeting, Philippe Dupuis telephoned me. Would we consider attending the Rome meeting as observers? “Whatever for?" I asked with feigned innocence. "As far as we are concerned we are full members of the digital cellular co-operation agreement. Far be it from us to doubt the word and integrity of the head of the French delegation to the CEPT Telecommunications Commission."

I duly arrived in Rome together with a representative from Cellnet and Vodafone. I could feel the tension in the air. I gave a flowery speech thanking all my colleagues for their efforts to make this tripartite co-operation into a quadripartite co-operation. The UK would do its best to play its full and constructive part.

All eyes turned to Philippe Dupuis. To everybody's amazement he smiled and welcomed us to the agreement and apologised for the papers having been “mislaid” by the French PTT.

The temperature in the room nose-dived. Renzo Failli was in the chair and was at a loss what to do next. He had not expected matters to be resolved so rapidly. He filled the vacuum by spending the next thirty minutes on how to number the papers now there were four parties to the agreement.

At the end of the two day meeting it was customary to sort out where the next meeting would be held. I came in like a flash. London was offered to cement our “new” status as full members.

In January 1987 Mr Pattie the Minister for Information Technology was visiting Paris to pay a courtesy call on the French PTT Minister M Longuet. I'd prepared the brief for him on GSM. High on the list of things

for him to say to the French Minister was “how pleased we were to be party to the digital cellular co-operation agreement”. The brief made the purpose of this loaded statement absolutely clear.

Figure 11 – Sir Geoffrey Pattie, UK Minister who kept the UK in the game, unblocked the GSM technology impasse and called for officials to draw up the GSM MOU

Mr Pattie is one of life's great ambassadors. He has wit, charm and presence. It wasn't long before he was chatting to the French Minister like a long lost friend. In came the magic sentence about our presence in the digital cellular co-operation agreement. The conversation halted abruptly. The French Minister looked totally perplexed. He turned to M Grenier, one of his top officials and asked why he hadn't been told of this. M. Grenier mumbled something about a very recent development. They hadn't time to brief the Minister. The conversation moved on.

I'm told that the next day M Grenier stalked into the Director General's office with copies of the digital cellular co-operation agreement. He put it on his desk saying "The games-up ". The documents were signed. A week later Alastair Macdonald and my new chief Robert Priddle were in Paris visiting the French PTT. When Robert got back he sent me the signed agreement with a hand written note which said that they were handed to him by M Grenier "without so much as a blush".

I just sat at my desk and stared at the signed copies of the agreement for what seemed a very long time.

In an account that Philippe was to publish on the GSM's history many years later he was to sum up this whole saga in a single very diplomatic sentence...”Very soon after Stephen Temple succeeded in making the UK join”...

Was it worth all the blood, toil, tears and sweat?

It was later to prove critical to the whole European GSM project. When Germany, France, Italy and the UK move together - the world changes!

But in September 1986 we were still some way off from moving together in the same direction.

Chapter 7

GETTING OUR MAN INTO THE SEAT

After the Berlin meeting of the GSM in the autumn of 1985 there was the little problem of finding a UK candidate for the GSM Permanent task team. The British Telecom Research Laboratory let me know that they had a man. They told me his name. I winced. Not likely to attract many votes. Donald Cameron, a marketing executive from Plessey, telephoned me. He suggested William Gosling, their Technical Director, as a part time manager of the Permanent task team. The idea of getting anyone from industry into the closed world of CEPT was a complete non-starter. Even if it had been within the rules I could imagine the howl that would have gone up from the other European manufacturers. Too much was at stake. I could see no ray of hope. I felt glum.

Out of the blue Bernard Mallinder phoned me. He was the operations director of Cellnet. He made some gentle enquiries about the position to run the new GSM Permanent task team. He had a lot of international committee experience. He was looking for a change. He said that he may be interested but wasn't sure how to approach his boss John Carrington. He asked me what the chances of getting DTI support. I said that the DTI would be more than pleased to support him. He was well known and well liked in Europe. I was asked not to say anything to anybody.

A day later the phone rang. Equally out of the blue it was John Carrington. He wanted some confidential advice from me. He had an excellent manager ready for a change. What would be the DTI reaction if he were to put Bernard Mallinder's name forward. I said that the DTI would be more than pleased to support Mr Mallinder. John Carrington said that Bernard was coming in for a chat about his career the following day. He'd be grateful if I would not say anything to anybody.

It was a strange experience to know the outcome of a meeting that hadn't yet taken place between two parties who had no idea of the likely reaction of the other. I was delighted with this turn of events. What unbelievable luck. With a man like Bernard Mallinder as the UK nomination we were in with a good chance. It was unlikely that other PTT's could offer a man coming anywhere near matching Bernard Mallinder's qualifications and experience.

Figure 12 – Bernard Mallinder, who drove the GSM standards making engine room

I ran Bernard's campaign in confident style. I withdrew from the chairmanship of the committee that ran our digital cellular radio test bed and put him in the chair instead. This enabled him to build up his credentials on the new digital technology. A letter went from the DTI to all CEPT delegations extolling his experience and qualities. This was backed up with telephone calls to administrations likely to be sympathetic. There really is no substitute for a bit of old fashioned lobbying in running a man for an

international position.

The decision on who would head the new permanent task team was to be taken at a GSM meeting in Athens in February 1986. The election for this new position was well down the agenda. Ample time to gaze around the room. The meeting room was long and narrow. The end wall had a massive window overlooking a breath taking view. By chance the ratio of the height to width of this window was around 16 by 9 – and I mused on the extent to which this was contributing to the pleasure of the view, as this happened to be the aspect ratio of the proposed wide-screen TV's of the future – another project I was to get pitched into in Brussels a few years later.

This digression is mentioned to illustrate that not all the meetings of GSM were riveting stuff. There was a real art in gearing down one's mind to the generally slow pace of CEPT standards committee meetings and moving up a few gears when one got back to the hectic normal pace of life. CEPT was very inefficient in its standards making. Many of its meetings were scheduled to last a week. The first half a day was generally a complete loss as delegates dumped on the poor host administration huge thick technical contributions that had to be photocopied and distributed before the meeting could even begin. Then it was the practice in CEPT for each delegation to present their technical contributions. This was pointless as most delegates could read the document in a fraction of the time. There followed two days of productive discussion. Then half a day had to be set aside to prepare the report of the meeting decisions. During this time the host would lay on a coach for a sight-seeing trip. All very agreeable. Then the last day was spent agreeing the report of the meeting decisions – which could often result in a re-run of some of the arguments but more often was a signal to book on an earlier flight home. When ETSI took over GSM a few years later the productivity of standards making shot up. Out went the sight seeing and of course in came the full electronic transfer of documents. All that was to come much later.

Before I left for Athens we had a number of enquiries from the UK technical press on what our chances were in Bernard winning the position. We underplayed our prospects. While I was in Athens I was told that Prof Gosling had been interviewed on Radio 4 and talked about the pan European digital cellular radio initiative and of the cliff hanging election which was about to take place in Athens. Plessey did a good marketing job for Bernard (and Plessey). Quietly I knew it was in the bag – entirely due to having a great candidate to field. When the Agenda item came up Thomas Haug went around the table and support from Bernard was unanimous. (Note: The French and Germans viewed Bernard's appointment as high time that the UK took its share of the standardisation management work and Bernard was seen as the best man for the job but from a UK perspective, at the time, we were marginalised outsiders trying to secure a modest influence entry to what we saw and felt was a well organised Franco-German show).

Chapter 8

GSM FREQUENCY CHANNELS AND THE DELUGE

In parallel with GSM's quiet progress in the proverbial back-room, analogue mobile radio services were grabbing the public's attention across Europe, led by the Scandinavian countries, with services in the UK also starting to accelerate away. As the autumn of 1985 approached stories of mobile phone congestion in central London started to circulate. A commercial conference on cellular radio was held at the Barbican in London. Colin Davis, the Managing Director of Cellnet, made a public statement that the surge of demand was so great that Cellnet would require access to the channels being held in reserve for the GSM system.

Two days later Thomas Haug, the Chairman of the GSM, telephoned and asked what the basis was for Colin Davis' statement. It was new to me. I suggested that it was no more than a kite being flown. In December at a Christmas reception given by Cellnet at the Ritz. Colin Davis, a large man, bore down on me. He said that the European system would never happen, at least in the UK. The reason was that the government, in licensing two competing systems, had unleashed a tidal wave of competitive energy. The force of that tidal wave was gathering strength and would simply burst the dam protecting the GSM frequency channels. He urged me to face the reality. With “beating me up” over reserving the GSM frequencies ticked off his lobbying list Colin engaged gear and moved off to talk to another guest.

At the beginning of January 1986 an invitation to a lunch given by Vodafone arrived to celebrate the first birthday party of the opening of their cellular service. The guest of honour was Geoffrey Pattie the Minister for Information Technology.

I strolled from my office to the Savoy hotel where the lunch was held and still arrived far too early. After wondering around for 10 minutes to kill time I found myself loitering outside the door where the lunch was to be held. I quietly turned the door handle with a view to seeing the lie of the land. To my shock the door immediately swung open under the energetic power of Sir Earnest Harrison, was swept over to the bar and surrounded by Vodafone Executives.

While we waited for other guests to arrive I asked him about the City of London "short termism". What effect did it have on the running of his Company? He said that it put enormous pressure to focus on short term profits. When he'd decided to become a cellular radio operator it had been all money out and nothing back for quite some time. It wasn't long before the buzz being put around in the City was that Ernie was getting past it, he was over the hill and it was time for him to be pensioned off. Now the City could see for the themselves the rapidly expanding cellular radio market and it was now "Ernie the far sighted" from the very same people. It confirmed other anecdotal evidence that the UK's industrial decline had, in large measure, been the product of the lack of access to long term patient capital and the rise of the casino mentality in the City of London.

These insights into the UK's version of capitalism by a successful industrialist came to a halt as some more guests arrived, including Alastair Macdonald. Still no Minister! Ernie Harrison had his back to the door for a brief moment. The Minister Geoffrey Pattie quietly walked in. As he approached Ernie Harrison, he put his figure to his mouth to beckon us to silence. To everyone's surprise he suddenly clasped Ernie Harrison from behind with a bear hug. A look of shock and complete disbelief crossed Sir Ernie Harrison face. The Minister let go and stepped back in my direction. I stepped back to make room for him and toppled over a low coffee table. As Ernie Harrison spun around Alastair Macdonald feigned a look of shock and then with a grin on his face said that he wouldn't have come if he'd known it was going to be that sort of party. The tension broke. The room descended into hearty mirth.

We sat down to a pleasant lunch. Then came the after lunch speech. Ernie Harrison talked of the unforeseen explosive growth of customers. If this miracle of UK liberalisation was not going to be stopped in its tracks both operators needed more frequency channels. The memory of the meal faded rapidly in

my mind. He had a proposition. The DTI should “loan” both the operators the frequency channels being held in reserve for the GSM system and in return they would put their maximum effort into the development of the GSM system. As the words "GSM system" were mentioned he gave a long penetrating stare in my direction.

Mr Pattie thought for a few moments and said that he would give an answer within a few days.

In the taxi back to Victoria Street Alastair Macdonald instructed me to contact the Radio Regulatory Division and get a submission up to Ministers in 48 hours. Unfortunately everyone who mattered was on the usual extended Christmas to New Year leave. The Duty Officer gave me the home telephone number of Alan Marshall one of the Assistant Secretaries. He agreed to come in.

Prior to Ernie Harrison's bombshell a few other matters had accumulated where some political guidance was needed. There was the matter from the Berlin GSM meeting of how many operators the European system should accommodate. An even bigger issue was who would be the eventual recipients of the UK's reserved GSM frequency channels. Would it be the two existing operators? Or was an opportunity for a third operator. When the original competition had been run off both Cable and Wireless and GEC had been very disappointed. They were both carefully watching the situation. A few memos had been passing around at official level on the various options but nothing had been decided.

From my perspective there was much merit in giving the European digital opportunity to the two existing UK operators. The rapidly expanding network coverage and customers base in the UK showed that competition was working successfully. A new third unknown mobile operator was no help in the enormous task of defining the new GSM technical standards, whereas the two existing operators were committing their scarce technical experts to this vital task. If the DTI signalled that the frequencies reserved for the GSM network would go to a new entrant the two mobile operators would redeploy their experts.

More arguable was my perception that the risk was high of the two incumbent mobile operators betting everything on advancing the TACS analogue technology. History is full of examples of better technologies never quite making it. An inferior technology can often get sufficient volume behind it to make prices low enough to beat off the challenge. A new entrant was in a particularly weak position to be the sole carrier of the huge task of introducing an entirely new technology.

Finally the hostilities I had encountered in the rest of Europe in getting them to accept the idea of two operators seemed a great achievement in view of the prevailing climate. Effective competition, which we had at the time, seemed far more useful to consumers than simply maximising the number of competitors.

It was a fairly straight forward political choice as to whether extra domestic competition or the introduction of the European system was to be given the higher political priority. *It was my firm view that the UK, as part of Europe, would need a pan European cellular system in the 1990's to support its business people and citizens travelling around the European Union.*

The submission to Mr Pattie on the Vodafone demand for the short term “loan” of the GSM frequency channels was an ideal opportunity to bring this fundamental political choice of priorities to a head.

Everyone knew that the Conservative government orthodoxy was that market forces should be the undisputed king and European “anything” was secondary. Competition was becoming more of a mantra than a valuable economic tool. The “servant” in the Civil Servant often led to officials put up submissions trimmed by what they believed Ministers wanted to hear and particularly with a government having very strong ideological convictions. It does not take many submissions to be thrown back before everyone gets “on message”. I was not in the least bit confident of winning the argument. But at least the case in the best long term interest of the UK would have been put before Ministers...that was the best I could do.

When I got to Alan Marshall's office he'd already hacked out a draft. It basically didn't say yes on the GSM frequency issue and didn't say no. It proposed monitoring tests on congestion.

Alan read my proposed text on the telecommunications policy issues. He draw a sharp breath. My text read that if the two operators signed the digital cellular co-operation agreement (which was by that time out of Germany and on its way to Italy), the Minister would give a broad hint that this would appear to make a third operator “a less that practical proposition”.

"You'll never get away with it" said Alan. His heart went along with what I was proposing but his wise politically instincts were saying it was politically off-limits. In the end we agreed that my proposition should be included but together with a well-balanced list of all the pros and cons. The covering minute would strongly recommend that Mr Pattie should call a meeting of officials to discuss the matter in view of its far reaching nature. We included Alan's idea of tests to verify whether the need really existed.

In an act of purely wishful thinking I attached to the submission a draft letter for Mr Pattie to send to the two UK operators that more or less closed the door on a third UK operator at 900 MHz in favour of a pan European digital cellular radio service. The submission went up.

John Avery, my colleague in the Division responsible for telecommunications policy, came back off leave. He did not like the submission one little bit. His remit was domestic and was keen to expand mobile network competition. It was far more in tune with government policy and very much in tune with Oftel thinking. He was however mollified that the submission was only a basis for discussion. We awaited the proposed meeting with the Minister – which is the normal way in which policy differences are resolved.

A few days later I hurried back in the rain to my office from lunch. It was January 24th. I walked into the DTI building past a sizeable pack of waiting reporters. The newspaper billboards screamed the latest on the 'Westlands' crisis. There was a very surreal atmosphere in the Department as the crisis neared its peak. Leon Brittan was on the point of resigning. Only a handful of officials were involved in the crisis but most people knew at least one of them, including the well respected, Colette Bowe, who was press secretary to Leon Brittan.

As I passed through my secretary's office I glanced at my in-tray. At the top was a copy of a letter from the Minister to Sir Earnest Harrison. I stopped to read it. It was the draft, which had gone up with the submission. Not a word had been changed. I picked it up and turned it over. My heart missed a beat. It had been signed by the Minister and sent!

A week later the private secretary of Mr Butcher, the junior minister, telephoned me. Did I know the date for the meeting to discuss the submission on Sir Earnest Harrison's request for the GSM frequency channels? Their attention was drawn to the letter Mr Pattie had already signed and sent. Everything went quiet. The policy had been set, at least as far as the third mobile operator was concerned.

Had Mr Pattie read the submission, shared the vision of a pan European digital cellular system and overrode the recommendation for a meeting? Or had all eyes been on the 'Westlands' crisis and the private office had become dysfunctional, as the Secretary of State was about to resign – a big thing for any Whitehall Department. I didn't know anyone in the Minister's private office on a personal basis to satisfy my curiosity.

The letter from Mr Pattie had only bought some time as far as the GSM frequency channels were concerned. The localised congestion problem remained. Subscribers were flocking onto the analogue systems at a faster rate than the cellular radio operators investments could keep up.

The real answer was for the cellular operators to invest in more radio sites. But apart from this costing a lot of money it would take them at least 18 months to get them on stream due to planning permission delays. Meanwhile with customer complaints piling up I couldn't see Ministers indefinitely allowing some perfectly usable frequency channels remaining idle in the cupboard. I'd heard Colin Davis warning words about the deluge.

“If the operators got their hands on the channels we would never see them back again”, Donald Cameron

from Plessey darkly warned me on the phone. He said that it was the existence of the reserved GSM radio channels that was driving industry forward to invest in the new digital technology. Once they were in hands of the two existing operators for their expanding analogue mobile services he doubted whether, politically, they could ever be wrestled back from them. He was quite possibly right.

David Court from the Radio Regulatory Division came up with the solution. The Ministry of Defence had some frequency channels immediately adjacent. The cellular congestion problem was only in central London. Military exercises usually took place well outside of London. Couldn't the cellular operators use the military frequencies?

There is no doubt that the Ministry of Defence had done quite well in the various Whitehall carve-ups of radio frequencies. Many believed too well. They were sitting on many unused frequency channels. They felt vulnerable. This put them in a very obliging frame of mind when it came to some relatively small gestures to their civilian colleagues. He hit the right bell.

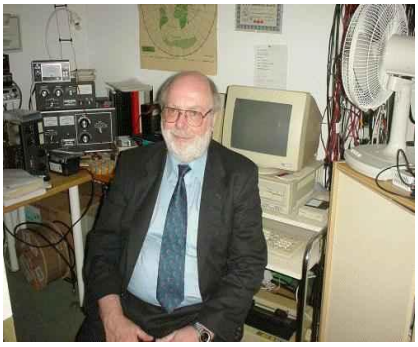


Figure 13 - David Court, who went on to become the first Director General of the GSM Association

The MOD was willing to consider the matter. There was only one snag. The cellular radio equipment on sale to the public could not operate on the MOD frequency channels. But they were well within the design range of new mobile phones. Thus the congestion problem could still be solved much faster than bringing into use new base stations.

I telephoned Bernard Mallinder. He was now working for John Carrington before taking up his appointment with the GSM Permanent task team in Paris. I put it to him. Short term pain for long term gain? They could finish up with both the Ministry of Defence frequency channels and the GSM channels. He said he'd discuss it with John Carrington. I put the same proposition to Ted Beddoes to discuss with his managers at Vodafone. John Carrington came out strongly in favour. The Vodafone managers took more persuading. Eventually they agreed.

The tidal wave Colin Davis had predicted swept on but safely deflected. The GSM frequency channels remained safe and dry…for the moment.

Between the two companies Cellnet probably paid most heavily for this solution. They had misjudged the growth and under invested more than Vodafone. They also suffered as a result of using a Motorola switch designed for the US market and the new bigger version was late. For a brief period this gave them greater congestion problems on their network. The word soon got around amongst the customers. Cellnet lost market share.

This was to come back and hit the GSM initiative with a vengeance when the “loan” of the GSM frequency channel issue surfaced for a second time only 8 months later.

Chapter 9

MRS THATCHER & THE EU COUNCIL GET INVOLVED

A country choosing between alternatives technologies can be a difficult business at the best of times. This is because a given technology doesn't usually do everything better than the alternative. It does some things better and other things not so well. Countries are often in different situations and therefore may have different views on the relative importance of particular features. Where it can get completely out of hand is when industrial advantage and industrial politics comes into play.

As it turned out getting the UK united behind one of the candidate technologies was relatively straight forward. Both operators preferred the Narrow band TDMA solution. Their view was heavily coloured by the transition problems they would face. Once the channels set aside for the GSM were all used, every time they wanted to expand the GSM system they would have to withdraw channels from the existing analogue system. Since there would be a lot of customers still on the existing analogue system for many years, the less channels they had to withdraw each time the better. The Narrow band TDMA system would therefore be less disruptive to customers than the Wide band TDMA system.

Most of UK industry came behind this choice since the Narrow band TDMA system looked easier to implement. They were starting further back and had more catching up to do. The UK test bed built around the Narrow band TDMA system was also a unifying factor. The only significant dissenting voice was GEC. They liked certain features in the Wide band TDMA system. David Tennant telephoned me. He said that they didn't want to rock the boat and would accept the Narrow band TDMA choice. At the working level the consensus was complete.

Working with UK industry in this way and with government officials from the rest of Europe absorbed an enormous amount of my time. I had not paid any attention to the rest of Whitehall. That was nearly a very serious error.

The wake up call came via a phone call from Bernard Mallinder from Paris. It was early July 1986. "You've got trouble brewing old friend". He had heard on the grapevine that there is a report circulating somewhere in Whitehall which slated the DTI for doing nothing on the new digital cellular radio technology in the face of the major French and German Government's digital cellular radio initiative.

A week later there was a meeting between Alistair Macdonald and John Fairclough the new Chief Scientific Advisor to the Prime Minister. He'd come to talk about fibre optic communications that John viewed as the key to the new digital revolution. As the meeting broke up I asked him whether he would like to see what we were doing in the digital cellular radio field. He said he'd be delighted. A date in September was set.

Donald Cameron, one of my star performers for such occasions, was intending to go off to Tunis for a holiday in September. I twisted his arm to delay it. Robin Potter from British Telecom Research Laboratory had been told by his boss to attend a staff meeting on the day in question. I phoned his boss. "This is the third time we've tried to organise this staff meeting," he growled. He finally relented. This went on until the team was assembled; including my final star performer Mike Pinches from Vodafone.

On the due date in September 1986 we had the narrowband TDMA test bed parked in a vehicle in Victoria street. John Fairclough turned up and received the five star treatment.

Over lunch John Fairclough became quite enthusiastic. He said that this was the first time anyone in Whitehall had given him such a presentation. As lunch progressed John Fairclough's fertile imagination moved up a gear. "You know this has all the elements of a test case for European co-operation in high technology. If Europe can't agree on this - what hope is there for other areas? What is needed is for the Prime Minister to throw GSM down in front of all the European Heads of State as a challenge for Europe.

This would help to create a dimension above the narrow technical pre-occupations of the experts". I choked on my well-done steak. I'd only intended to limit the damage of some official in the Cabinet Office whose knowledge on digital cellular radio had come from newspaper cuttings. “Industrial policy” was no longer politically correct and picking winners positively frowned upon. I was hoping to get away with both by creeping under the radar screen with a bit of help from a friendly DTI Minister or two.

My briefing effort with John Fairclough had come too late to stop the document Bernard had warned me about. Criticism of the DTI appeared in an ACARD report circulated by the Cabinet Office. Alastair Macdonald was irritated. He was determined to raise this at the next meeting with John Fairclough. This happened a week after the demonstration.

When the day arrived we sat in Alistair’s office waiting for John to arrive. The door opened and at first just a hand appeared and waved. A cheerful voice said "In case your wondering what this is I'm just throwing my hat in first". A beaming face appeared. " I owe you an apology Alistair." said John, " After the GSM test bed presentation I know the DTI is doing a splendid job." This took us both aback.

Before we'd recovered John was seated and expanding on his idea on raising this with the Prime Minister.

"Don't you think that the French and Germans might see this as being upstaged ?" asked Alastair. But, as chance would have it, we had just assumed the EU Presidency, the last of the big four countries to do so for some time. This gave us a well-accepted political locus in European affairs. The matter rested that John would raise it with the Prime Minister.

The officials in the Cabinet Office saw in John Fairclough, fresh from industry, as somebody in need of careful minding from the wily mandarins from the various Departments of State. "Watch it John " one of them advised him "You'll put the Prime Minister over the top of the trench to lead the charge and when she looks behind her...DTI will be nowhere to be seen. Where will that leave you? Just make sure Geoffrey Pattie has the support of the top industrialists before you raise it with the Prime Minister!"

The ball passed back into my lap.

Sometime later I met John on a flight back from Brussels and he told me a delightful story about his Cabinet Office minders. He'd just arrived and was brimming full of specific ideas to put to the Prime Minister. His minders warned him against putting specific ideas forward quite so soon. It would be much better to warm her up with a general appraisal of the situation, perhaps some very broad policy options. Having got her oriented in the right direction the ground would be fertile to put some of his more specific proposals. He reluctantly accepted the advice. Papers were commissioned from the Cabinet Office staff. They were about as general as they could get. They were submitted to the Prime Minister. He was called to a meeting to discuss the paper. As he entered Number 10 the Prime Minister was just coming down the stairs with his report in her hand. "Woffle John! Just woffle!" she said, "What I wanted is some specific ideas". John told me that he could have sunk through the floor.

The condition set by the Cabinet Office was that Mr Pattie had to show that he had the support of the high level UK industrialists. He called a round table meeting.

In preparation Robert Priddle set up a meeting in mid October between Gerry Whent of Vodafone and John Carrington of British Telecom. It went well. My groundwork on the telephone with their support staff was productive. They both expressed enthusiasm. They agreed on the key points. A date in early November was fixed for the round table to be chaired by Mr Pattie.

Nothing was left to chance and my industry contacts were contacted to make sure compatible scripts were being put up to our respective masters. The day before the meeting Gerry Whent telephoned me. He just wanted to warn me that his managing director Ernie Harrison was particularly sensitive about his status relative to the Chairman of British Telecom, Ian Vallance. There was to be no question of the BT Chairman being treated as the senior man.

Next day I arrived at the meeting room 15 minutes early. I set out the name places with BT and Vodafone on the opposite side of the table from the Minister. I carefully moved the chairs so that the Minister's chair was exactly opposite the space between the chairs of Ian Vallance and Ernie Harrison. A small detail perhaps but as Gerry Whent himself was to say to me later about Vodafone's huge achievements - success is getting a thousand small details right.

The Minister's round table meeting unfurled mostly accordingly to script. Mr Pattie got everyone at ease joking about not really being allowed to have industrial strategies any more. Ian Vallance was worried that co-operation might impede competition. Mr Pattie allayed his concern saying that talking of competition now was a bit like firing the starting gun when the runners were still in the changing room. One of the industrialists were worried about the 1991 date being promised for the start of service. I pointed out that a later date could put pressure on the French to ditch the digital cellular system in favour of an analogue system. Mr Pattie suggested that we all went along publicly with the 1991 date for international reasons but agreed to say inaudibly under our breadth ".... but very late 1991".

Gerry Whent made a surprising departure from the agreed script proposing that the DTI should give £15 million to the two operators who in turn would fund prototype work with UK manufacturers. This brought a sharp rebuke from Sir James Blyth from Plessey. Plessey had learnt its lesson about accepting development money from the customer. This was the only discordant note.

A note was sent across to the Cabinet office recording the high-level industry commitment to GSM.

To my surprise Robert Priddle told me a few days later that the job was still not yet done. The Foreign Office had demanded “a strategy paper” for GSM but they had not elaborate what this was.

For the first time I sat down and thought through a complete industrial strategy for getting a pan European cellular system to market. The strategy would have four parallel planes of activity.

The top plane was the political level. The political will had to be generated to make it happen since markets were all out of phase across Europe. The French and German agreement had started the process. John Fairclough's initiative with the Prime Minister would extend the process to the rest of Europe.

The second plane of activity was to get the commitment of the cellular radio operators to purchase the new networks and open a service on a common date. This was a crucial commercial agreement. Vague promises to open a service sometime were not good enough. My calculation was that at least three large markets had to come on stream at the same time to generate enough economies of scale. It would have to be a big enough bang to ignite the whole industrial supply chain from chips to large mobile telephone exchanges. The risks were too high to make it tenable for one or two countries to try and lift an immature technology all on their own.

The third plane of activity was the technical standardisation effort in GSM. Failure to agree a common technical standard would leave Europe with nothing.

Finally the fourth plane of activity was the industrialisation by industry. They needed to see a big enough market to motivate them to invest huge sums of money to make it happen.

It was essential for the strategy paper to begin by headlining how big the GSM opportunity was likely to be. The number of mobile phones was the critical data. No numbers existed over such a long time period. The industry itself was tearing up their forecasts every 12 months as growth kept exceeded expectations.

Projecting the future number of mobile phones in 1986 for the next 10 years was a slightly crazy undertaking. History was rich in pundits that had got forecasting spectacularly wrong. Like the mid-West newspaper in the US, just after Graham Bell had demonstrated the telephone, had the big vision that one day every town in America would have one.

It might have been easier to have plucked a number out of the air based on the golden rule of forecasting for political purposes - that it had to be a number big enough to make politicians take notice, not so fantastic that nobody believed it and far enough into the future so as not to be around.

In view of the stratosphere this paper seemed heading towards some real world quantification looked necessary. But where were the numbers to come from? The solution I chose was to use the best mobile penetration rates in Europe, which in 1986 came out of the Scandinavian countries, where one of them was touching 20%. This figure was applied right across the rest of Europe that was averaging under 2%. This number of customers was then multiplied by £200, a reasonable stab at the average selling price of a GSM phone over a 10-year period. A figure of £10 billion emerged and, by chance, met the golden rule.

It may surprise some that this was the first occasion when a classical industrial strategy had been done. But industrial strategies had gone quite out of fashion in Whitehall during this period. My boss Robert Priddle looked at it with an admiring comment – just like one of those French grand designs!

But it turned out that we had completely misunderstood what the Foreign Office had in mind in their use of the term “strategy”. What they wanted was a diplomatic plan of action, for example that Ambassador "Y" would see Minister "X" and so on. It was back to the drawing board.

When the Foreign Office version of the strategy was ready we went to a meeting at the Cabinet Office. Mr Williams was the Cabinet Office senior official preparing for the Heads of State Meeting. (He later became head of the Commission Services). Also at the meeting was Mr Braithwaite from the FCO who had just returned from being our Ambassador in Moscow.

As I sat down I put my briefcase by my feet. In the briefcase was my Excell mobile phone – key to my effort to base policy on hands-on experience. Mr Williams was in full flight when the wretched mobile phone started to ring. I tried to ignore it. It persisted. Now everyone was trying to ignore it. Oh God, I thought what do I do now. It is no good I'll have to make the best of the situation. I got it out of my briefcase as casually as I could and answered it. As my conversation progressed the senior officials opposite me went from shock to horror to disbelief and finally to laughter.

It is my claim to the very dubious distinction of being the first person in the world whose personal mobile phone rang at the most embarrassing time. I may or may not have been the first but I certainly wasn't the last.

On the matter in hand John Fairclough had done his job well. Mr Williams was in favour of the matter being raised at the summit.

Mr Pattie sent a note to the Prime Minister Mrs Thatcher formally seeking her agreement.

Figure 14 – Mrs Thatcher allows GSM on the EU political agenda providing it is uncontroversial

The reply from Mr Powell, her Private Secretary, said that the Prime Minister would agree provided she could be assured that it would not lead to discussion.

Back into my court.

A meeting of the Quadripartite partners in Paris was already in the diary. It got the job done without the need for ambassadors running around. The UK presidency was the last opportunity for any one of the four countries in the quadripartite agreement to get the matter raised at the EU Heads of State level. They were all in favour. This was reported back to the Cabinet Office.

The 1986 European Council in London under the UK Presidency was a two day affair. At the end came the communiqué. The serious newspapers next day reported all the things they saw of any importance, Aids, terrorism and a dozen other things but not a word about Europe's future in mobile radio. The complete communiqué arrived a few days later. The pan European cellular radio system got three lines on page 44.

For all that work?

Despite my disappointment at its low visibility there was a pay off from Mrs Thatcher's support in getting this onto the agenda of the EU Council.

It gave the Commission the confidence to table a draft Directive to require radio channels to be made available by all Member states specifically for the GSM system. It had got Sir John Fairclough fully on-side. Without doubt he, Alastair and Robert Priddle gave me the air-cover in Whitehall to pursue the DTI's last great industrial policy strategy for two decades.

Equally important is that the discipline of fully developing an industrial strategy had given me the foresight to make a timely move later that was to prove crucial to the success of the pan European digital cellular radio initiative – the drawing up of the GSM MOU.

This only happened due to the mix-up with the Foreign Office over the word “strategy”. It had forced me into looking at the big picture and this had brought sharply into focus a missing vital component. A technical standard plus some fine political words would not alone create a service or the market for cellular radio products. My analysis had revealed that the key to successfully driving GSM to market was to harness of the combined procurement power of the mobile phone operators. This created the market at the service level, with the manufacturing opportunity being pulled along behind. It also aggregated all the purely national service areas across Europe to form a virtual European wide mobile radio service area for travellers. It was the big bang that would ignite a new digital mobile universe – a truly grand design!

Chapter 10

THE TECHNOLOGY CHOICES – THE EASY BIT

The French and German governments had tried to position the decisive European decision processes as the best performer in the Paris field trials. They had been quite open in allowing other countries to contribute their technologies to be tested along side. There seemed an implicit assumption by the SEL led consortia that providing their system performed it was home and dry. My strategy was a wider comparison based on the six more market-oriented criteria.

There were a number of key events scheduled on the international calendar in the second half of 1986 leading to the selection of the preferred technology.

The Madrid GSM meeting in September 1986 would put the seal on the rules of the selection process. Later in October there was to be a Technical Conference in Stockholm on digital mobile radio. The Nordic countries ran it. It was not an official event but its timing made it an influential peer group meeting. In November/December 1986 the Franco-German R&D trials would be run off in Paris. In the Hague in late January 1987 an expert group of the GSM would analyze the R&D results and draw up a technical recommendation. All this would lead to a meeting in February 1987 of the GSM itself in Funchal on the Island of Madeira ...to make the most significant decision of the decade in mobile radio. Between the Hague and the Funchal meetings the UK was hosting the meeting of quadripartite digital cellular radio co-operation agreement.

The Madrid meeting of the GSM was a good-tempered affair. The Spanish Telefonica telephone company were excellent hosts. The meeting agreed that the objective was to select a technique rather than a particular manufacturer's solution. I proposed that the GSM should set the height of the hurdle at a readily achievable level. We should only select the broad parameters of technology. That would be difficult enough. There were a lot of different versions of the narrow band TDMA technology around. The press would quickly seize upon any small disagreement over detail as evidence of the inability of Europe to agree - once again. This would cast a shadow over the initiative. The French added the suggestion that the choice should include with or without frequency hopping. With this gloss there was unanimous support for this approach.

The Madrid GSM also revealed a change in the leadership of the German delegation. The German PTT Minister wanted to see a much greater priority on mobile services. The mobile radio section head post was split and the incumbent Klaus Spindler elected to run the new part dealing with private mobile radio services. A new man was brought in to run the public mobile radio services section. His name was Armin Silberhorn. He turned out to be somebody who not only understood the technical issues well, had a good commercial mind but also possessed very great determination.

We spent an evening touring the sherry bars of Madrid to get to know each other and I came away with a good impression of a trustworthy partner and a hangover.

Figure 15 – Armin Silberhorn, very purposeful new German GSM leadership

The technical conference in Stockholm should have been a relaxing affair. My nerves were on edge even before I started out. Donald Cameron had sent me an advanced copy of a speech that his Director, Prof Gosling, intended to give. I wrote back asking him to remove the section about the French Minister's wish for competition being a problem for Europe. I argued that this wasn't something for a manufacture to raise at an international forum. I made a number of other suggestions concerning diplomatic problems the speech was likely to cause. All to no avail.

Then on the plane and airborne Ted Beddoes told me that Racal's Research Director was about to give a speech in London to the Institution of Electrical Engineers. He was proposing to cast doubt on whether digital technology could carry any more traffic that the existing analogue technology and his conclusion was that everyone should not be bothering with the digital technology just yet. My first concern was whether it was true. The second was that it was not exactly opportune to raise it in public now. His engineers had been fully locked into our DTI consultation arrangements. Why hadn't this concern been raised much earlier? What I would have given for a telephone service on board the aircraft at that moment.

The conference itself lived up to expectations. The tension could be felt. Prof Goslings speech irritating all our French colleagues. Donald Cameron explained to me later that, at that time, Plessey were nowhere in cellular radio. They had to take an aggressive profile just to be noticed. To be fair Prof Gosling's speech contained some important messages although I doubt anyone spotted them. One was the need for Europe to move and hit the 1991 window if it was to stay ahead of the North American digital technology threat. But I wished Donald had toned it down the political bits.

Most of my time at the conference was spent chasing one European expert after another trying to tie down just how much extra traffic the proposed digital technology would carry over the analogue technology. Opinions seemed to vary between slightly better to ten times better.

Eventually one expert from Ericsson research showed me some graphs. They showed that for the same capacity the digital technology would give a higher voice quality. If you then adjusted the analogue technology to bring the voice quality up to the same level - then the capacity of the analogue system would go down. This didn't seem a compelling argument. Customers seemed quite happy with the voice quality they were getting.

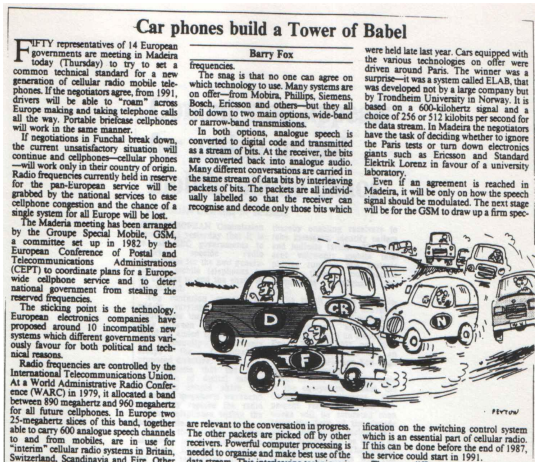
More encouraging was the view of another expert that analogue systems would set a physical limit to how

close radio cells could be pushed together to increase capacity. The limit would be set by intelligible cross talk between telephone calls ie one user would start to hear in the background the conversation on another telephone call. With digital systems the cross talk would be a hiss rather than an audible conversation. In this way cells could be pushed closer together. That sounded a little more convincing but not exactly overwhelming.

This degree of vagueness on something as essential as the system capacity was the trigger later for the UK to insist in Madeira that the GSM standard must include a provision for a half rate voice coder. In this way, if nothing else, the capacity of the GSM system could be doubled over the life of the system simply by introducing new handsets with a half rate coder that captured advances in voice coder technology.

Towards the end of the conference the session chairman decided spontaneously to give an off-the-cuff tutorial on some of the technical problems with the digital mobile technology. It was well intentioned. Unfortunately the list of problems was so long as to lead to a rather flat note for an otherwise successful conference. I'd been feeling somewhat on the defensive on the part of the UK after Prof Gosling's speech. It was an opportune time to buff up our European credential. My intervention was along the lines that the technical issues were important but the greatest problem was to get 15 European countries to agree at GSM in Madeira. I expressed confidence that with the support of the experts in the room - Europe could pass this great test and GSM would become a flag ship of European co-operation (a line I'd borrowed from John Fairclough). Flowery speeches are not my normal fare but it brought a round of applause and certainly getting the atmosphere right can influence willingness to compromise.

November 1986 merged into December as vehicles trundled around the streets of Paris and millions of data bits flew through the air to be captured and fed into computers for analysis. The media was beginning to take an interest.



Car phones build a Tower of Babel

Barry Fox

FIFTY representatives of 14 European governments are meeting in Madeira today (Thursday) to try to set a common technical standard for a new generation of cellular radio mobile telephones. If the negotiators agree, from 1991, drivers will be able to "roam" across Europe making and taking telephone calls all the way. Portable briefcase cellphones will work in the same manner.

If negotiations in Funchal break down, the current unsatisfactory situation will continue and cellphones—cellular phones—will work only in their country of origin. Radio frequencies currently held in reserve for the pan-European service will be grabbed by the national services to ease cellphone congestion and the chance of a single system for all Europe will be lost.

The Madeira meeting has been arranged by the Groupe Special Mobile, GSM, a committee set up in 1982 by the European Conference of Postal and Telecommunications Administrations (CEPT) to coordinate plans for a Europe-wide cellphone service and to deter national government from stealing the reserved frequencies.

The sticking point is the technology. European electronics companies have proposed around 10 incompatible new systems which different governments variously favour for both political and technical reasons.

Radio frequencies are controlled by the International Telecommunications Union. At a World Administrative Radio Conference (WARC) in 1979, it allocated a band between 890 megahertz and 960 megahertz for all future cellphones. In Europe two 25-megahertz slices of this band, together able to carry 600 analogue speech channels to and from mobiles, are in use for "interim" cellular radio systems in Britain, Switzerland, Scandinavia and Eire. Other frequencies.

The snag is that no one can agree on which technology to use. Many systems are on offer—from Mobira, Philips, Siemens, Bosch, Ericsson and others—but they all boil down to two main options, wide-band or narrow-band transmissions.

In both options, analogue speech is converted to digital code and transmitted as a stream of bits. At the receiver, the bits are converted back into analogue audio. Many different conversations are carried in the same stream of data bits by interleaving packets of bits. The packets are all individually labelled so that the receiver can recognise and decode only those bits which are relevant to the conversation in progress. The other packets are picked off by other receivers. Powerful computer processing is needed to organise and make best use of the

were held late last year. Cars equipped with the various technologies on offer were driven around Paris. The winner was a surprise—it was a system called ELAB, that was developed not by a large company but by Trondheim University in Norway. It is based on a 600-kilohertz signal and a choice of 256 or 512 kilobits per second for the data stream. In Madeira the negotiators have the task of deciding whether to ignore the Paris tests or turn down electronics giants such as Ericsson and Standard Elektrik Lorenz in favour of a university laboratory.

Even if an agreement is reached in Madeira, it will be only on how the speech signal should be modulated. The next stage will be for the GSM to draw up a firm specification on the switching control system which is an essential part of cellular radio. If this can be done before the end of 1987, the service could start in 1991.

Figure 16 – New Scientist view of the Paris trials summed up the sceptical wing of the media

Various systems from the Franco-German R&D programme were tried out. When the SEL wide band TDMA system came to its turn the word came back that it had problems. Its critics nodded knowingly.

A week later the opposite news came through. It had performed according to the expectations SEL had for it. Credit where credit is due. It was an excellent achievement by their research engineers. They certainly confounded those critics that said that it could never be made to work.

Then came the turn of Ericsson to try out its narrow band TDMA system. It under performed significantly on expectations. Shock waves rippled out from Paris.

Other test beds were towed around Paris including a TDMA test bed from Nokia but none shifted the

balance of results.

The tests to all intents and purposes were over. A proven performance versus a system, which should have done better, but on the day didn't. The prospects for the narrow band TDMA started to look grim.

All that was left was for a little known University based outfit from Norway to trundle around Paris with their lash-up of a narrow band TDMA system. The large industries hardly gave it a second thought. Then even bigger shock waves of seismic proportions emanated out of Paris. The Norwegian lash-up of a narrow band TDMA system from Trondheim University had outperformed the SEL wide band system from a star studded industrial consortium.

Thanks to two inspired Norwegian researchers Torleiv Maseng and Odd Trandem - the game was still wide open.

Chapter 11

VODAFONE'S SECOND ASSAULT ON THE GSM CHANNELS

The small technical community that GSM comprised followed all this hive of technical activity avidly. The real world had other pre-occupations and was moving on apace.

In November 1986, far from the clatter of vans full of electronic equipment being bumped and shaken over the back streets of Paris, Chris Gent the Managing Director of Vodafone took the head of the Radio Regulatory Division out to lunch. He had a small problem. He'd run into planning permission difficulties, particularly with some of the “loony left wing” boroughs in London. Some of the new radio transmitter sites he thought he could depend upon were being held up by these unhelpful planning authorities. How about the temporary loan of the GSM channels? He was invited to put his request in more formally. I got a copy of the letter and immediately wrote to the Assistant Secretary asking them to kill the idea stone dead. It would bring a lot of trouble for our European initiative.

During a regular visit to Vodafone Chris Gent asked for my views. My suggestion was that it would be better to secure our support for finding solutions to his site difficulties.

For a while things lay dormant. I was irritated to then be invited to a meeting at the Radio Regulatory Division set up for Chris Gent to present his case for the temporary use by Vodafone of the reserved GSM channels. He explained his traumas with what he described as the loony left, including questionnaires on how much equipment Racal (then still the parent company of Vodafone) had sold to the South Africa apartheid regime. All this was blocking their planning applications for radio masts going before local planning committees.

The critical commercial period for Vodafone was from January to June 1987. From June to December the problem would gradually ease. After December 1987 the Ministry of Defence channels would come into service and the problem would go away. On the other hand the GSM channels were just sitting there doing nothing.

The rest of the meeting was spent with me raising difficulties and my Radio Regulatory colleagues finding on the spot solutions. It came down to my perceptions of the possible diplomatic problems due to the wrong signals being given to Europe. As Chris Gent left he said casually that, if it was helpful, he could get Sir Earnest Harrison to raise it with the Prime Minister. This was a coded message that this request wasn't to be treated lightly by officials. For Chris, in early 1987, GSM was a possible “nice to have” around the corner – today he had a far more pressing problem of meeting customer demand and the GSM channels used for his analogue network would fix it.

A few days later my phone rang. It was Colin Davis the Managing Director of Cellnet. What's this he'd heard about Vodafone wanting access to the GSM channels? "Small world is cellular radio " I thought. As it happened Cellnet had scheduled a meeting with a party from the Radio Regulatory Division the following week. I suggested he might redirect his question to them.

He did this quite eloquently. At least some of those colleagues who had been shooting down my arguments at the meeting with Vodafone flipped and decided that giving Vodafone the reserved GSM channels might be a little politically fraught. But there was now momentum behind the Vodafone proposal. The Vodafone lobbying machine swung into action. I was clearly a lost cause. I had the impression of contact being taken above, below, to the left, to the right.

The now traditional Vodafone Annual birthday lunch was coming round in early January 1987. The content of Sir Earnest Harrison's after lunch speech was a foregone conclusion. A defensive brief went up to Mr Pattie advising that the timing of the Vodafone request couldn't be worse as far as the European initiative was concerned. The request should not be agreed this side of the Madeira CEPT/GSM meeting.

It simply wasn't worth the risks. Thereafter we'd have to consider the issue in the light of the prevailing situation.

At that stage I was the only thing standing between Vodafone and the reserved GSM channels they were after.

The day of the Vodafone lunch saw the snow was still wreaking havoc on transport. It was the 14th of January 1987. Snow or no snow I had to be there. I battled my way through the snow drifts to my nearest big town. I caught the one and only train out of Woking station to Waterloo. As I padded into the hotel in my Wellington boots, shoes in hand, I happened across some executives I knew from Plessey. In the same hotel as Racal? This was too much of a coincidence! Later Racal and Plessey started a joint venture company called ORBITEL to manufacture digital cellular radio products. Mike Pinches became its Managing Director.

When Sir Ernie Harrison stood up for his after lunch speech everyone tensed. He went right over the top. "Please, please, please don't refuse us these channels" he beseeched the Minister. We are only asking for the loan of *a modest 3 MHz* from the 10 MHz being held in reserve.

Mr Pattie stood up to reply. He said that we couldn't be little Englanders and be impervious to the effect of what we were doing on the rest of Europe. He couldn't agree to Vodafone having the channels before the Madeira GSM meeting. He would consider any new request afterwards on a week-by-week basis.

There the matter rested. The friendly and overly firm handshake from Chris Gent after the lunch left me in no doubt that he would be knocking on the DTI door immediately after the Madeira meeting.

One problem at a time !

Chapter 12

The ROAD TO MADEIRA

The start to 1986 was particularly arduous. Snow had brought the rail network to a complete standstill. I worked from home and wanted one last check around my colleagues in the quadripartite agreement before I or anybody else in the UK dug any deep trenches.

It was in fact the last point when the door was genuinely half-open for the UK to contemplate the wideband TDMA alternative. On the known facts everything pointed to narrowband TDMA being in the UK's best interest but if the decision would inevitably slide towards wideband TDMA the UK would need a quite different negotiating position.

Armin Silberhorn in Germany was non-committal. His experts were still studying the matter. Renzo Failli confirmed his support for the narrow band TDMA solution. Philippe Dupuis said that the French PTT was considering its position. His preference was to support the wide band TDMA solution in order to improve their bargaining position against the Scandinavian countries and finally agree to the narrow band TDMA technology. He couldn't see any other outcome securing European unity. This flexibility surprised me. Taking this into account and the fact that all the Scandinavian countries supported the narrowband TDMA I cast the die – the UK would go all out for narrowband TDMA

Before the fateful Madeira meeting of the GSM, the experts were due to meet in the Hague to assemble the technical evidence.

In these multi-lateral games it was essential to be two moves ahead. Supposing the Madeira meeting was inconclusive the matter would move up to the political levels very quickly. The technical evidence was likely to be a report an inch thick full of maths and graphs. Each side would selectively draw on the material that suited their position. Somehow GSM had to distil the choice into something much more condensed and readily understandable at a political level. That is far from easy.

Between other jobs I kept fiddling around with the basic technical factors. By Saturday night I'd managed to distil them down to three tables. It was time to get a real expert involved. Ted Beddoes got to work and thought of a natty way of boiling a respectable comparison down to just one table. It was exactly what was needed – all a single page.

Figure 17 – Ted Beddoes, a gift of explaining complex things in a simple way

The next week the French had called an unscheduled meeting of the digital cellular quadripartite group in

Paris. It was just before the Hague meeting of experts. Their man would be in the chair. They didn't want the meeting turning into a dog fight. They wanted the four countries to work together towards a common goal.

We went around the table. Italy and the UK favoured the narrow band TDMA solution. An important argument was that the wide band TDMA solution was so complex that for some time only the SEL consortia would know how to industrialise it. Where would be the competitive supply of mobiles?

Armin Silberhorn said that Germany had a slight preference for the wide band TDMA solution. He felt that the wide band TDMA solution would lead to a lower infrastructure cost for the German situation. But he added the rider that Germany could support the narrow band TDMA solution if it proved the only way of getting European agreement

Philippe Dupuis made a strong point that the wide band TDMA solution was a fully defined solution from one company and therefore the industry could industrialise it immediately. On the other hand the narrow band TDMA solution had so many variants in different parts of Europe that the best part of 12 - 18 months would be lost arguing over details. The only UK argument the France could accept as valid against the wide band TDMA solution was the lack of competitive supply of mobiles.

This was not a promising start.

The conversation then moved on to the meeting of expert in The Hague. The French chairman was a very clever engineer called Alain Maloberti from the PTT research laboratories CNET. I have met a lot of French engineers and they have all been good. But Alain was very very good.

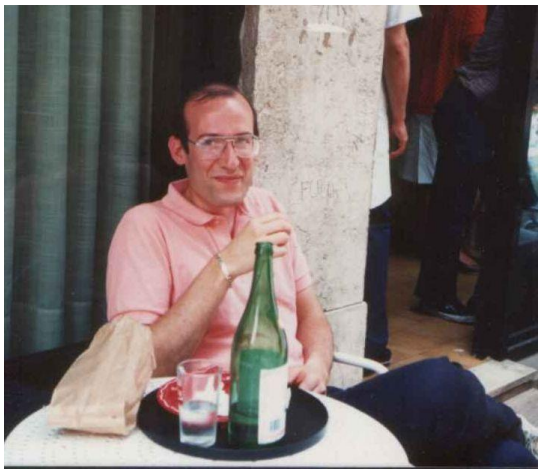


Figure 18 - Alain Maloberti, the brilliant French radio engineer that led the GSM radio system design

Alain said that he intended to try and go further than agreement to the broad avenues. For each avenue he would try and fill in a table of the major characteristics. This would be easy for the wide band TDMA solution was since there was only the one version on the table. The narrow band TDMA technology would prove more controversial. There were a lot of different opinions amongst the experts. He produced a table of the characteristics he had in mind. I recognised it as a solution, which a French company had tried in the Paris field trials, but putting right its main deficiencies. In fact what he proposed wasn't all that far from the UK's own test bed.

Suddenly the pieces in that corner of the jigsaw fell into place in my mind. Turning to Philippe Dupuis I said that, supposing as part of the decision processes, the four countries supported the precise narrow

band TDMA solution shown in Alan Maloberti's table - wouldn't that remove the French objection to time being lost in failing to agree parameters. Before waiting for an answer I turned to Armin Silberhorn. If three of your major partners supported the narrow band TDMA solution wouldn't that create the conditions you've described for Germany supporting the narrow band solution? Continuing my act of levitation I turned back to Philippe Dupuis. That's three countries potentially supporting narrow band TDMA technology. We're so close. Can you support it under the conditions I've described? "Yes" he said after a long moment of hesitation.

There was an atmosphere of disbelief. Had we really agreed to the narrow band TDMA technology !

We got down to business. Both Germany and France made it clear that they would need to continue to publicly support the wide band TDMA technology for domestic reasons. In Armin Silberhorn's words we'd just agreed to parachute and land in the same field at the Madeira GSM meeting itself. We agreed to let the case for the narrow band TDMA solution come through at the Hague meeting of experts.

Ted Beddoes left for the Hague. As we parted I said "Don't forget, the only thing that matters is to get agreement on the one page table". Poor Ted. Every single day I was on the phone harassing him about the table.. "It's too early" he said. "Well go out and lobby a few people" I retorted. By the last but one day he had convinced most people that an Executive Summary was needed. In the middle of the morning of the very last day he produced his Executive Summary and distributed it to all delegates...at least to all those that hadn't already left for home.

The absentees by this time happened to include the German delegation and half of the French delegation. It was not done deliberately by Ted who had no way of knowing that others had booked early flights home that meant them leaving before the scheduled time.

With strong Scandinavian support Alain Maloberti was forced to conclude that the meeting had endorsed the Executive Summary. It showed the clear technical advantages of the narrow band TDMA technology in a very simplified way.

	Analogue or Digital	FDMA or TDMA	**Narrowband or wideband TDMA**
Speech Quality	Comparable	Comparable	Comparable
Spectrum Efficiency	Comparable	Comparable	**Narrowband**
Infrastructure and Mobile Cost	Digital	TDMA	**Narrowband**
Hand portable Viability	Digital	TDMA	**Narrowband**
Flexibility for new services	Digital	TDMA	Comparable
Risk	Analogue	FDMA	**Narrowband**
Spectrum Management	Comparable	FDMA	**Narrowband**

Figure 19 – The comparison table Ted Beddoes tabled at the GSM Working Party 2 meeting in The Hague that pointed up in a simple way that narrowband TDMA was the best solution

It was later to prove a very controversial table and there was resentment in both France and Germany that it had been sprung at the last minute in the Hague.

The formal quadripartite meeting took place in London a few weeks later. The deal appeared to be holding together. The first day seemed to go well. Around 6pm Ted Beddoes excused himself to get

changed for the dinner we were hosting that evening. In a rather low keyed way the German expert pitched into a criticism of the one page Executive Summary. He said that under something called "spectrum efficiency" they wanted the wide band TDMA and narrow band TDMA technologies to be given the same rating. Bernard Ghillebaert, senior and influential French Official, then pitched in with support. Within a few minutes a row had built-up. I called for an adjournment.

Figure 20 - Bernard Ghillebaert, the power-house driving the French GSM initiative

Once outside of the room I demanded "What was all this about?" He said that the Executive Summary had been swung on the expert group through Ted Beddoes deliberately waiting until the German and French experts had left for home. I lobbed back that this was not the informal agreement we made in Paris that would allow the advantages of the narrow band TDMA technology to come through. Deuce! A calmer discussion followed. He explained that his internal report had gone up to his Minister and this had shown the two technologies as comparable for this parameter. I offered him a compromise of an asterisk and a footnote that some Administrations considered the two technologies as comparable on this characteristic. He agreed.

Things were back on track...or were they?

I was concerned at what this incident was signalling. On the one hand Bernard Ghillebaert was intellectual very sharp (an attribute that GSM was to benefit greatly from in managing such a large project through a committee) and very decisive. If he held a view he was more than capable of fighting for it very effectively.

On the other hand both French and German officials had exposed themselves quite early in the game and the domestic industrial and political pressures on them were enormous. Where exactly did France now stand?

After the dinner Robert Priddle and John Carrington concluded that things looked quite optimistic. I cautioned them that all may not be well.

The next day we had the Chairman of the GSM Thomas Haug from Sweden as our guest. His interest was the success of the GSM Madeira meeting.

An understanding of how the Madeira meeting would be handled was scripted.

Having disposed of all of the technical reports Mr Haug would invite countries to express their preferences. All would be found to prefer narrow band TDMA technology except two. The two would be sent out to reconsider their position. They would then return and say that, in the interest of European unity, they would go along with the narrow band TDMA solution. There was a slight skirmish between Armin Silberhorn and Philippe Dupuis on precisely when they would return - before or after the narrow band TDMA parameters had been agreed.

After our guests had left there was a press briefing. Interest in the Madeira meeting in the media had been mounting since October. A number of unhelpful articles had appeared. Most were ill informed. One had referred to a secret agreement between the UK and Sweden. Such an agreement was news to me and wasn't helpful in confidence building with our French and German colleagues. However, since we'd given no information we only had ourselves to blame if the press became inventive.

Robert Priddle had agreed that we issue a press release giving our proposed position for the Madeira GSM meeting. The press office objected. Unless a Minister was announcing something positive it is not usual for a press release to be issued by the DTI. He advised that we held a non-attributable press briefing. I entered the world of 'a DTI source said that...'

The reporters kept asking what the UK position would be if the rest of Europe backed the wide band TDMA standard. I thought I saw where the dangers lurked. I explained that we'd taken a lot of diplomatic soundings and as far as I could see there were only two possible outcomes to the Madeira meeting: either the meeting agreed upon the narrow band TDMA technology or there would be no agreement. This was a very accurate analysis. Only two countries were known to support the wideband technology whereas all the other countries with a view supported the narrow band TDMA technology.

A few days later I was dismayed to see one journal run the headline leading with "UK ultimatum”

UK ultimatum on wideband system

by Mary Wilkinson

Britain and the Scandinavian countries are expected to pull out of a pan European digital cellular radio network unless an Ericsson proposed standard is chosen at a meeting next month.

The CEPT working party on mobile radio, the GSM, meets in Madeira in February to decide on an air interface standard defining the way a mobile radio should communicate with a base station. The proposed European cellular network is planned for introduction in 1990 and would allow users to move from country to country on the same system.

Ericsson of Sweden has proposed a narrowband time division multiple access (tdma) system, which has the backing of the Scandinavian PTTs and the British contingent on the GSM. According to sources within Ericsson and the British team, which includes British Telecom, Racal, Plessey, Marconi and STC, Scandinavia and Britain believe the other options are unworkable. They will participate only in a narrowband system.

A GSM subcommittee meeting in the Hague this week is expected to recommend two air interface methods to the main group for a decision in February – narrowband tdma and a system proposed by Alcatel of France and SEL of West Germany, wideband tdma.

In a move seen as putting pressure on the GSM, Ericsson and Siemens announced last week they were teaming up to develop a digital mobile telephone system based on the narrow band technology.

Ulf Johansson, vice president of Ericsson's cellular radio division, said the company was "very much convinced" its standard would be chosen for the European network. And Mike Pinches, technical director of Racal Vodac, said the

Figure 21 – Unhelpful press spin on DTI briefing for GSM Madeira meeting

The gist of the article was that either the rest of Europe accepted the narrow band TDMA technology or the UK would block agreement.

Chapter 13

A WEEK IN MADEIRA CAN BE A LONG TIME

When the Portuguese offered to host the key GSM meeting they asked the GSM delegates where they preferred to meet – in Lisbon or Madeira. There was no doubt in Thomas Haug's mind that Madeira should be the venue but some delegates were firmly against it. So he asked for a democratic show of hands The result was roughly 50-50. But Thomas absolutely wanted to go to Madeira, but it was too risky to start counting votes. His old friend Marius Jacobsen then intervened and said that he had been there several times in his younger days (he had been a telegraph operator onboard a ship) and found Funchal totally without merit. He therefore thought that, because of this background, he should be given two votes, to which Thomas replied that ”Maybe you should be given your two votes, but as Chairman I should be given ten, and Madeira it is”. So the decision was taken perfectly democratically - although with some heavily weighted voting!

Madeira is a lovely island and whilst the sun was not likely to shine in February the temperature would be ideal. I decided to make a special effort and take my wife Jocelyne with me. She'd had a tough time with all my overseas business trips. We took some money from our savings to pay for her trip. To loud protests from my sons they were deposited at my sister's place and we headed for Heathrow. My expectation was for the days to be busy but there would be time in the evenings for a relaxed time in Funchal with Jocelyne. Things didn't quite work out that way. The meeting unfolded like a bad dream.

On Monday Philippe Dupuis told his quadripartite agreement partners that late on Friday Alcatel had got wind of what was afoot. They had got into the French Government at a very high level (I later learned that this was the Prime Minister's office). He'd lost his negotiating freedom - at least for the moment. We weren’t to worry though.

Armin Silberhorn told me after lunch that there was also a temporary hitch for him. The French had contacted his Ministry late on Friday. His boss had been out, so instead they had contacted his Permanent Secretary. He had not been briefed and did not know what was going on. He had put Armin on hold. Again, nothing to worry about. He was trying to unblock things.

Thomas Haug opened the GSM meeting, went through all the preliminaries and started to tread water.

Tuesday and still nothing. Jocelyne and I had a very pleasant dinner with the French delegation on Tuesday night. They had no news.

Wednesday everyone started to get irritable. By mid afternoon I decided enough was enough. We hadn't even gone around the table to see where everyone's views were. Where would we find the time to reconcile the different narrow band TDMA variants? The quadripartite partners had at least agreed to follow a process, even if the result may now be more problematic.

Thomas gave me the floor. The UK demanded, I said, to know where delegations stood on the main issue. It was like adding a 30000-volt charge to the room. Thomas Haug agreed to my request.

He began with what he thought was an easy question - just to build confidence. “Could everyone agree that the new system should be digital”? he asked. A real motherhood statement for that assembled gathering.

There was a look of disbelief from the delegations, probably including my own, when I asked for the floor. I reminded delegations on the reserve we had put originally on whether GSM should be digital. However I would be happy to lift this reserve providing the GSM could agree now that the decision on the choice of technology would be taken on a technical basis. By this I meant that the GSM should first accept the Executive Summary table from the experts.

There was a great relief all round that this was all I was asking for. Nobody dissented. I'd edged the crucial single page comparison table up a notch.

There followed the high drama of the roll call of delegations to state where they stood. The French and Germans were isolated but there were also one or two waverers including Switzerland.

It was then proposed that a small expert group should meet that evening to tie down the narrow band TDMA technology parameters. This was following the agreed script. Wim van Eck from the Dutch PTT was given the job of convening the group. The task was going to be tricky. There were some genuine uncertainties. To this could be added some national pride, personal prejudices of experts and a generous helping of industrial interests. The one trump card was the common foe in the form of the wide band TDMA technology industrial camp. But would that be enough?

The GSM meeting moved on to some lesser issues. By then I was only half listening to other delegates. The distraction was a picture emerging in my mind of just what GSM was setting out to do with the narrowband TDMA technology – design of a huge complex system *by a committee*! It was without precedent. On any sort of rational basis this was a mad undertaking. How could this ever succeed?

Out of this dark cloud forming in my mind a light emerged. Instead of having to decide a definitive list of characteristics I proposed the concept of "Working Assumptions". The first rule was that these were to be the best choice of characteristics in the light of knowledge at the time. But they could be changed later in the light of new evidence. Thus nobody need feel that his or her case was irrevocably lost. However the second rule was that the onus of proof lay with those wishing to displace the working assumption. Further that any evidence to challenge a working assumption had to be gathered outside of the GSM. The third rule was that the evidence had to show that the proposed new assumption was better and not just comparable to the one it was intended to replace.

To understand the value of this procedural innovation one has to appreciate that CEPT worked by consensus. Everyone had to agree. My reasoning was that if a glimmer of hope was left that the minority party could always return later and retrieve the situation they may be more inclined to accept the majority decision. Further there were genuine uncertainties. Often in politically charged environments everyone finds themselves forced to watch mistakes pass through unchallenged lest it opens all the other delicately poised compromises to re-discussion and pulling down the whole agreement. The concept of "Working Assumptions" allowed mistakes to be retrieved later in an ordered fashion. Genuine mistakes could be retrieved without unravelling all that had been previously agreed.

I described this approach as setting the parameters of the system in slow drying cement.

Philippe Dupuis had been thinking very much along the same lines and the proposal was adopted without discussion. Alain Maloberti, who took the brunt of leading the detailed design of the GSM radio system, said many years later that without the "working assumption" approach the job of producing the detailed GSM specifications would not have been possible. It would have been too complex to handle the uncertainties, different parts of the system being defined in parallel and fragmentary national/industrial pressures.

As the GSM meeting broke up that afternoon the quadripartite agreement partners plus Sweden agreed to meet in the foyer of our hotel at 8pm to take stock. The French and Germans said that they would be contacting their Administrations and would let us know the latest situation. I sorted out a back room for the expert meeting with the hotel staff. Ted Beddoes from Vodafone and Robin Potter from British Telecom Research Laboratories would attend the expert meeting.

Thomas Haug turned up in the hotel foyer with a colleague around the same time as me. Bernard Mallinder and Renzo Failli then arrived. Eventually Armin Silberhorn and Philippe Dupuis arrived looking very glum. Their political instructions from home had hardened. They had to support the wide band TDMA solution. That or nothing!

Thomas Haug threw his hands in the air "That's it then, no agreement." The others looked depressed. The cohesion was started to disintegrate.

The incident in London with Bernard Ghillebaert had already had me doing some contingent thinking about this very situation. It was clear that any agreement was going to be delayed. The decision would be taken in another place. But what could GSM do in Madeira to prepare the best set of cards for the new players who would take the decision?

There was still all to play for such as a unanimous technical report highlighting the advantages of the narrow band TDMA technology, a 13 to 2 result in respect of national preferences and a well defined set of narrow band TDMA system parameters. I pitched my plan of action with all the optimism I could muster. Armin Silberhorn responded with immediate enthusiasm. Others nodded. The French officials neither agreed nor disagreed. The meeting broke up. I phoned Jocelyne and we went out for a quiet dinner.

We returned to the hotel at about eleven in the evening. I said that to Jocelyne that I would see her a bit later. I wanted to check how the experts were getting on. As I appeared in the back room Ted Beddoes grabbed me and took me to one side. The meeting had not been a good idea. Everyone was at each others throats and nothing had been agreed in three hours. "Let me have a go" I said confidently.

Within half an hour I had everyone's united on at least one thing. I was the problem.

On one technical characteristic there were three choices. There was fairly equal support for two of them. The Swedes were the sole advocates of the third. Their game was to say that they were prepared to drop their preference if one of the other two choices being proposed by their ally Norway was chosen. It seemed perfectly logical to me that we could get the choice down to just the two. It was at this point everybody rounded on me and accused me of bringing politics into a purely technical discussion.

Undaunted I pressed onto the next characteristic. I fared better on that one. It was the number of telephone channels on each radio transmission. The German expert wanted 14 and the UK wanted 8. My experts told me the smaller the number the better for hand portables. It affected the size of capacitor needed to supply the energy surge for the TDMA burst of data. It was therefore important to one of the six criteria on our list for the digital technology. I managed to isolate the German expert and the world finished with GSM having 8 telephone channels per radio frequency channel.

At 2.30 am the meeting broke up. I went off to join Jocelyne and in the absence of room service the others raided the hotel kitchens. That was also not exactly the most fruitful expedition as the hotel had only left out tins of sardines. Mr van Eck got to bed at 4 am after writing his report. There were still too many loose ends. The narrow band TDMA coalition was in danger of breaking up into factions fighting each other.

At 9 am the GSM meeting recommenced. Something I'd learnt from the Foreign Office many years early when I was on the government delegation that set up Inmarsat was “The package deal”. I'd discussed this at breakfast with Ted Beddoes and Robin Potter and got their support. The French and German experts were effectively neutralised in the definition of the narrow band TDMA system since they had been instructed to only support the wideband TDMA solution. This created a vacuum that had to be filled by somebody. Why not us? Just before the coffee break I proposed “the package deal” to the GSM meeting. Something for everybody! It got general support and no opposition from France and Germany. It was game on.

There were two thing of particular importance to the UK. Ted, Robin and I decided to go for one and sacrifice the other. The one we went for concerned being able to double the capacity of the system sometime in its life (provision for half rate coders). This ensured the digital GSM solution could tick the box on one of the key UK evaluation criteria. What got sacrificed was BTRL's full rate voice coder technology, which was a credible candidate but the German coder from PKI had wider expert support from within GSM.

There are good package deals and bad package deals. Critical to success of a good package deal is to share things out in a way that the best elements go in and not the worst. There also had to be something significant in the narrowband TDMA package for the French and Germans if Europe was to ever arrive at a final agreement.

My proposal was that the Germans would get the PKI voice coder design. It was a logical place to start a package deal. All the competing speed coders had been evaluated in a multi-laboratory testing programme under the supervision of a Speed Coder Expert Group. Whilst the overall analysis showed that no single coder could be declared the winner in all respects, the experts believed the coder from PKI and the coder from IBM France were superior. (Note: in fact the GSM full-rate coder was actually based on merging features from both these voice coders and my politically driven choice was going with the flow of what the experts had already decided). The next element was more controversial and that was that the French should have the frequency hopping feature that they attached importance to. The Nordics would get the modulation method (it had come out best in the Paris trials). There was even something for the Swiss who had to be kept on board. They (and others with mountainous terrain) were worried about long radio echoes in mountain valleys. A parameter (delay equalisation) value would be chosen to cover their interest.

When Robin Potter from BTRL got home he received a lot of stick from BT for giving up their voice coder proposal. But he could see what I was seeing – a fleeting window of opportunity for a narrowband TDMA agreement.

The principle of the package was quickly agreed by GSM but it took the rest of the morning to tie down the details.

After lunch the Portuguese had laid on a coach for some sight seeing around the island finishing up at a restaurant for a dinner. I remained behind with Mr van Eck to write up the package deal together with the characteristics agreed on the previous evening. It was slow and tedious as the good natured Portuguese secretaries struggled with a foreign language and our bad handwriting.

We finished at 7 pm. One of the secretaries had been asked to drive us to the restaurant. I'm not sure whether it was my natural courtesy or sense of survival which caused me to hold open the door of the front seat for Mr van Eck. It was only a small Fiat but was I grateful that it was Mr van Eck who had the best view of the hair pin bends coming up at 50 miles per hour. He is a big fellow and I'm sure his weight cut at least 15 mph off the car's intended speed. She drove like a mad woman. We staggered into the restaurant. I found my wife. She was seated at a fully occupied table next to the Madeira director of tourism. To a round of applause I kissed her on the cheek and went over to a vacant seat next to Philippe Dupuis and his wife, still a little wobbly from the car journey.

The last day was ghastly. The French didn't like the element the Germans were getting out of the package deal. The Germans and Italians didn't like the bit the French were getting. The Swiss and Germans didn't like the way I'd defined the parameter dealing with their mountain echo problem. The Swedes didn't think the French should get anything the way they had behaved. Even my own delegation was up in arms about some detail on data transmission. On top of all this the French started to get cold feet in allowing narrowband TDMA to be quite so dominant in the emerging GSM report.

Thomas Haug gave me a back room and it became a sort of doctor's surgery. I had a perfect rapport with Thomas who ploughed on with the GSM meeting dealing with some of the lesser issues.

Early visitors to the back room were Bernard Ghillebaert and Philippe Dupuis. Bernard had received new detailed instructions from the head of CNET (the French PTT research laboratory) – an old hand in CEPT technology battles. The narrow band and wide band TDMA systems had to be given absolutely equal treatment. If a set of working assumptions were being drawn up for the narrow band TDMA solutions then a list must also be drawn up for the wide band TDMA solution. Both had to be agreed by GSM and placed side by side as equals.

This carefully balanced approach had been the CEPT custom and it always led to an impasse. My diagnosis was that the more unbalance in favour of the narrow band TDMA solution the better and flatly refused. Philippe Dupuis looked at Bernard Ghillebaert and I could see a resigned shrug passed between them. From this I deduced that Armin Silberhorn had probably told them that he would only give German support if they persuaded me first. They may also have held back as, in their hearts, they believed the narrowband TDMA was the right outcome.

The German position was confirmed to me later in the morning. Robin Potter had asked a very senior executive from British Telecom to find out from Armin's chief Mr Haist what was going on in the German Administration. The message we got back from Germany via these informal channels (Note: which may not have been from H Haist himself) was that we should establish the evidence at the GSM that the narrow band TDMA technology was better.

It was a very politically complex situation. SEL was now French owned. This largely freed the German mobile operator to look at the technology choices much more on merit. There was less political pressure to wrap a German flag around a piece of technology. This gave Armin Silberhorn a little bit more room to manoeuvre in Madeira. But the political agreement tied him closely together with France. The French PTT experts had always been more open-minded and were leaning towards the narrowband TDMA solution. But Alcatel had effectively wrapped the French flag around the wideband TDMA. The French PTT were also responsible for industrial policy…hence the instruction to support the wideband TDMA. The French GSM team therefore had absolutely no room to manoeuvre but were conflicted between the instructions they had to follow and what they would have liked to have done if Alcatel had not made its high level political intervention. By default the UK had become the rallying point for the narrowband TDMA at Madeira and left reading the script that at one time Philippe and Armin had been a party in drafting together with Renzo Failli. Had the French and German delegates believed the wideband TDMA technology was the right solution for GSM I would not have had such a relatively easy run in putting the right politics in place behind the narrowband TDAM statements coming out of Madeira.

Armin Silberhorn acted in a very statesmanlike manner with one of the final proposals to the GSM Madeira meeting that the GSM record a request that the two dissenting countries should be asked by the middle of March to say if it were possible for them to join the majority. This was straight off the agreed script.

Figure 22 – The GSM Madeira Meeting in February 1987 ends in 13:2 impasse

It may have been a meeting of a standard group but at the same time it was the stuff of theatre, with Thomas Haug, the theatre director, struggling to control the flow of the play without sight of the script and a group of prima donna actors meeting from time to time off stage to sort out the latest crisis.

Figure 23 – GSM actors temporarily leave the stage

(Note: Mr van Eck, who wrote-up the narrowband TDMA package deal, is the man holding his hand to his head)

At one level the GSM Madeira meeting had failed – there was no agreement on the choice of technology. But at another level the GSM meeting had just adjourned and the theatre company moved to another place. What they parted with was a technically good narrow band TDMA system having been defined, a unanimous report stating in simple terms that on all counts it was better than the wide band TDMA system and a 13 to 2 majority in favour of the narrow band TDMA solution. On the face of it was not a bad outcome. But as Donald Cameron from Plessey said to me later that week "13 to 2 sounds impressive until you look at who the two are!"

The next phase of the standards battle would take everyone into completely uncharted waters.

Chapter 14

IT NEVER RAINS BUT IT POURS

In the first two weeks after the February Madeira a letter went from the DTI Minister Mr Pattie to the French Minister Gérard Longuet. In the letter we tried to imagine the internal argument going on in France. Our aim was to give ammunition to those who might be fighting for the narrow band TDMA case. The way the UK had turned their back on the French effort to find a common solution to the first generation analogue cellular systems had not been forgotten in the French PTT. The letter was largely discounted on these grounds.

With Germany we took a different tack. It was very low key. Our aim was to make the German senior officials aware of our intense interest and add a further dimension to their decision taking. We couldn't afford any risk of the letter itself causing offence. That said the letter did very little good either.

We briefed the press about the Madeira outcome. I was invited to give a lunchtime speech by one of our leading trade associations the Electronic Engineering Association. Amongst their members were a number of large multinationals that I hoped could be relied to report back to their European headquarters. There is always a tendency to over estimate the internal communications of some large organisations! I gave a very up beat speech exuding confidence that the decision for narrow band TDMA was inevitable.

Our Embassies in Paris and Bonn were briefed to apply pressure.

We soon ran out of things to do ! Having fired all the diplomatic salvo's there came a lull. It then became a matter of waiting. The game was playing-out elsewhere.

There is an expression “it never rains but it pours”. The whole European GSM project is in a precarious position. France is pulling out all the political stops to hold Germany in tightly to the agreement that will effectively give Alcatel technology supremacy. The market leaders in cellular radio, the Scandinavians, would immediately launch a standards war. Europe's mobile radio industry is poised once again to balkanise. The only thread holding things together is the UK who, on the one hand, sit inside the quadripartite digital cellular radio agreement (with its links to Germany and France) and on the other had became the de facto leader of the narrowband TDMA camp. A very weak thread indeed!

Then the UK itself starts to fall into disarray.

Vodafone picked their timing impeccably. There was absolutely no information coming out of France or Germany. The tenure of the Vodafone attack was - we were being monkeyed about by the French and Germans with little prospect of getting anywhere. Meanwhile we could at least make a success of our national analogue mobile radio networks. Can we now have the loan of 3 MHz worth of the GSM frequency channels?

Figure 24 – Gerry Whent and Chris Gent, driving forces of the Vodafone success

The Minister demanded information from me on the European situation. Separately he asked for a report from the Radio Regulatory Division on the frequency channel situation. The Minister's private secretary told me that, as Mr Pattie had handed him the file, he said he was minded to give Vodafone what they wanted. We were to learn later that Alcatel were making the mirror image argument to French and German officials that the UK government would inevitably cave in to Vodafone, the narrowband TDMA camp would then fall into disarray ...so why not get on with making a success of new wideband TDMA cellular radio networks in France and then Germany.

This flurry of activity coincided with my colleague John Avery applying his mind to the competition implications of the Vodafone request. Everybody, with one exception, were bending over backwards to find a way to give Vodafone what they wanted. He asked one of his staff - would we all be doing the same if the request had come from British Telecom? “Certainly not " shot back the Grade 7 official. "That confirms my suspicion that we are not being even handed” said John Avery. It also confirmed my long standing impression of John Avery as a sound regulator. "We must get the matter put over to the Director-General of Telecommunications at OFTEL" he instructed, "We need a ruling on the competition implications". The Minister agreed.

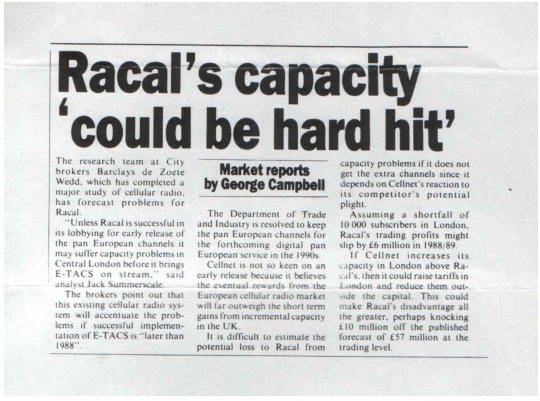
Later Prof Carsberg was to remark dryly to John Avery "That's a right poisoned chalice I've been given". I just welcomed the extra breathing space.

Meanwhile Cellnet (and BT) had become thoroughly alarmed at what was going on. They launched a very public campaign against Vodafone being given the channels. They complained that in the previous year their investment had fallen behind their customer growth. The degradation of service had led them to lose customers to Vodafone. Now the boot was on the other foot Vodafone were running off to the Government for a quick no cost fix. It wasn't fair. Further if Vodafone were given the channels then that would be the end of the pan European cellular radio initiative.

So public was the campaign that it was going to be a self-fulfilling prophesy. They were turning my speculation of possible damage into an almost certainty. Bernard Mallinder phoned me from Paris. He'd been put on notice by British Telecom to leave the GSM Permanent task team and come home.

Previously when there had been public slanging matches at the Director level between Cellnet and Vodafone, the co-operation in GSM between engineers lower in the two organisations had been largely unaffected. Perhaps a bit of leg pulling. This was quite different. Bitterness permeated all the way down to the lowest working levels on the collaborative R&D programme and CEPT GSM activities.

Vodafone felt a certain indignation when city analysts started to predict massive shortfalls of their profits if they were denied the channels.



Racal's capacity 'could be hard hit'

Market reports by George Campbell

The research team at City brokers Barclays de Zoete Wedd, which has completed a major study of cellular radio, has forecast problems for Racal.

"Unless Racal is successful in its lobbying for early release of the pan European channels it may suffer capacity problems in Central London before it brings E-TACS on stream," said analyst Jack Summerscale.

The brokers point out that this existing cellular radio system will accentuate the problems if successful implementation of E-TACS is "later than 1988".

The Department of Trade and Industry is resolved to keep the pan European channels for the forthcoming digital pan European service in the 1990s.

Cellnet is not so keen on an early release because it believes the eventual rewards from the European cellular radio market will far outweigh the short term gains from incremental capacity in the UK.

It is difficult to estimate the potential loss to Racal from capacity problems if it does not get the extra channels since it depends on Cellnet's reaction to its competitor's potential plight.

Assuming a shortfall of 10 000 subscribers in London, Racal's trading profits might slip by £6 million in 1988/89.

If Cellnet increases its capacity in London above Racal's, then it could raise tariffs in London and reduce them outside the capital. This could make Racal's disadvantage all the greater, perhaps knocking £10 million off the published forecast of £57 million at the trading level.

Figure 25 – City analysts start to undermine the Vodafone share price

"Who was feeding this disinformation to the city?" they asked.

Then Corporate British Telecom waded in. They would take the Secretary of State to court if he conceded the Vodafone request they hinted. "BT's gone nuclear" remarked John Avery to me.

In parallel with this domestic drama playing out I was attending a series of meetings on Brussels throughout March 1987. They concerned a draft directive reserving the GSM channels solely for the pan European digital cellular radio system from 1991 onwards. The date so far in the future offered no obvious help to my immediate domestic predicament. The Commission officials could see the commercial pressures building up not only in the United Kingdom and elsewhere. Michel Carpentier the head of DG XIII wisely decided that the Commission should table the draft directive to hold open the European opportunity.

The initial Commission text explicitly mentioned the precise 10 MHz we were holding back for GSM. The Germans objected because they had located their cordless telephones in 1 MHz of this particular 10 MHz. This was in line with a CEPT recommendation. Just trying to be generally helpful I suggested to the Council Working Party that, in order to meet the German concerns, the text could be redrafted to reduce the 10 MHz to 9 MHz. The Germans offered an alternative solution. This was to refer to countries holding back any 10 MHz anywhere the full European cellular radio allocation of 25 MHz. The Commission officials took both these ideas back to tidy-up the text between meetings.

At the next meeting the new text read "any 9 MHz of the full cellular band of 25 MHz". In other words they had combined the two ideas apparently not realising that they were two different ways of solving the same problem. They could have restored the 9 MHz to the full 10 MHz in the new formulation. I sat there in the meeting in Brussels musing on whether to bring this to their attention. A germ of an idea occurred to me. I kept quiet. Nobody else had spotted it.

Next day I put my idea to my chief Robert Priddle. It was clear that with the current public profile of the issue, if Vodafone weren't given something, their credibility would take a real knock. That was not in our interest. But that is not to say that they had to be given everything they'd asked for. They had actually asked for 3 MHz. If they were given say 1 MHz (the piece that had fallen out of the draft directive) it might just about get them out of their corner. To Europe we could claim that we hadn't given away any of the 9 MHz of spectrum "identified in the EC Directive". British Telecom could claim that their lobbying had squeezed Vodafone down from 3 MHz to 1 MHz.

Robert appeared only half convinced but thought the idea worth while having up our sleeves.

I phoned the OFTEL official dealing with the case to put the European situation to him. The official told me that the European implications were for the DTI to deal with. They were only going to treat the competition issues. I reminded him of Prof Carsberg's statement some while earlier that he saw the pan European system as being very much in the consumers' interest. I added that surely a Company as sophisticated as Vodafone doesn't ask for precisely what they actually need. Couldn't he at least to put in the option of giving Vodafone less than they had asked for "if that were to be necessary to cope with the international implications"? He promised to put it to Prof Carsberg.

There was a long standing meeting with Vodafone and British Telecom to discuss our fall back position on the GSM technology arguments. In view of the complete standoff between both the Companies I thought it would be prudent to see them both separately. I met John Carrington first at the beginning of April. Having disposed of the European issue I turned to the Vodafone request for the temporary loan of the GSM channels. I weathered his verbal battering and pressed on. Surly he'd had enough experience of the political levels to know that the political odds were in favour of Vodafone being given something. John Carrington acknowledged that this appeared to be the way the wind was blowing. He said that they felt that they had not got their case across to OFTEL.

This was the cue to float out my 1 MHz idea, emphasising that it was purely a personal idea. His colleague Peter Carpenter leapt in immediately and said that they would demand the same. "What for?" I asked "You've said publicly that you don't need them. Why don't you ask for something you do need?

You've been hemmed in on a number of fronts by DTI/OFTEL". "Such as?" John Carrington demanded. "That is for you to decide" I said "But purely as an example OFTEL have been denying you an additional paging channel. This has been a thorn in your side". "That thought had crossed my mind." said John Carrington.

The matter was left there.

The paging channel example hadn't plucked out of thin air. I'd met the Deputy Director General of OFTEL Bill Wiggleworth socially many months earlier. We'd got around to talking about paging competition. He mentioned that they had denied British Telecom an extra paging channel in order to get the competition established. But they now recognised that they would have to give them the extra channel. Otherwise British Telecom might find other ways of increasing the capacity by introducing a new standard. This would be an even greater disadvantage to British Telecom's competitors. Thus sooner rather that later OFTEL was going to have to let British Telecom have the extra channel. That little information nugget was ready for market.

The meeting with John Peett from Vodafone was tense. After we'd dealt with the European matter he took the initiative to present their case for the loan of 3 MHz of the reserve GSM frequency channels. He'd brought Ted Beddoes with him. Graphs were put on the table showing congestion projections under various assumptions. I floated out the one MHz idea with him. John Peett screwed his face and said that he was appalled by the idea. " What is that was the only thing on offer?" I asked. "Such a proposal would be so contemptible as to be not even worth considering" he said.

John Peett was "one of the best" as a negotiator but that performance took me quite aback.

The crunch was a meeting of Officials called by Robert Priddle to consider what should go up to Ministers. We had the report from OFTEL. They recommended that Vodafone be given the channels. This surprised John Avery. It would seem that effective rather than fair competition was to be the yardstick. However I was at least grateful that the hook had been put in concerning the possibility of a reduced amount of frequency channels... if the international situation demanded it.

Figure 26 - Robert Priddle, masterly DTI senior civil servant

The head of the Radio Regulatory Division and one of his Assistant Secretaries were present. His Assistant Secretary was in favour of giving Vodafone everything they were asked for. If frequencies could be commercially exploited that was to be preferred to them lying idle was his argument...which, to be fair, accorded with good economic principles. I pitched in with my one MHz compromise. John Avery

immediately supported it. The discussion went around in circles but Robert Priddle got everyone lined up behind the idea.

Robert put a masterly submission up to Ministers proposing that soundings should be taken on the proposed deal. He got authority from Mr Pattie to proceed.

Chapter 15

MANOEUVRING BEHIND THE SCENES

Occasionally Philippe Dupuis and I chatted on the phone. He told me that Alcatel had been in to see the French PTT at a senior level. They had asked for time. They had used their subsidiaries in a number of European countries to test out the strength of the CEPT position. The intelligence they got back was that a number of European Administrations might be persuaded to change their minds. Their engineers spent a hectic weekend writing up a huge technical report. They went a bit over the top. Every single parameter in the one page table produced by Ted Beddoes had been inverted. The wide band TDMA standard was presented as being superior on every single count.

An Alcatel road show started to travel around Europe. Bernard Mallinder kept me up-dated on where they were and where they were heading. Switzerland was their first port of call.

Armin Silberhorn in Germany and I were in touch on a regular basis. It was usually at home when I phoned since any spare moments were usually at the end of the day and the German working day was over. (Germany was one hour ahead of us). Within in short time his wife must have got an impression of a lodger moving in. A voice would shout to some distant room "Armin! it's Stephen".

The German Minister had ordered them to do an in depth technical reappraisal. The technical studies required information from the manufacturers. The information they received was contradictory.

One Thursday night we chatted on the phone. He was in a particularly good mood. "On Monday there will be a battle of the giants at the Darmstadt technical centre" he announced. "Alcatel will be confronting Ericsson in front of the German PTT technical experts. The outcome will influence what recommendation is put to their Minister."

This was a very clever initiative. Alcatel clearly had mastery of the wide band TDMA technology and Ericsson were one of the most widely respected telecommunications systems companies and under the leadership of Ulf Johansson their mobile division were powered up the learning curve of narrow band TDMA.

But this news also rather concerned me. The ink was still wet on the Alcatel study. To have all that new material suddenly sprung at a confrontational meeting was akin to throwing sand in the eyes. A fair debate required everyone to have the same basic data. Only in this way was a fair peer review possible.

The next day Bernard Mallinder told me the Alcatel team were in Italy to see the Italian phone company SIP. After lunch I telephoned Renzo Failli. He confirmed my fears. Alcatel had bombarded the SIP officials with graphs, equations and measurement data. Renzo was astute technically and very much on top of the new digital technology. But even he didn't pretend to have understood most of it. I asked him whether he could fax the Alcatel report to me. He exploded. "It's over two centimetres thick". We had a haggle and eventually he faxed the key chapters.

It was thick. It took about an hour to receive all of it over the fax machine. By the time I sat down to scan the report it was past 6 pm on a Friday night. It was as obtuse as I had feared and time had run out for Armin to do anything. There was only one option. I resolved to get the report up to Ericsson that evening.

I telephoned Ulf Johansson of Ericsson. I couldn't get him at his office. Somebody gave me his home number. He wasn't home either but his son promised to pass on a message. About half an hour later he phoned back. He was very interested for his engineers to see the report before going to Darmstadt on Monday. He gave me a fax number.

By this time the DTI staff running the fax machines had long since gone. The duty officer turned out and

opened the communications room. We were confronted with a fax machine, which looked more like a giant computer. The duty officer shrugged. He left me struggling through the fax handbook. I thought I'd got the hang of it. The document in its entirety passed through the machine. I telephoned Ulf to see if it had been received. Ulf in turn phoned his duty room. It hadn't arrived. Back to the handbook. Some commercial attaché in Africa would be having a puzzling time on Monday morning trying to fathom the technical gibberish sitting in the fax in-tray! I tried again and telephoned Sweden. This time success! I left the DTI building very late that night.

The great battle of the industrial giants took place in Darmstadt. It seemed that Ericsson had given a good account of themselves. The Alcatel engineers had been caught out on a number of points and had to retract some claims. It was only a small a step along the way but only part of a much bigger struggle taking place in Germany.

Alcatel had done a very good lobbying job at the highest political circles in Germany and managed to convince them that Alcatel SEL had the most advanced mobile radio technology which had to be exploited in the best of German mobile radio customers. Documents were being supplied by SEL to politicians that were not being passed down to the officials responsible for GSM. Armin Silberhorn had a big challenge on his hands. One of the first things Armin did was to cut himself into the flow of the Aclatel-SEL lobbying documents hitting the Ministry at high levels and ensured that they all received proper expert scrutiny.

On the 24th and 25th February Armin held a workshop between the Ministry and their technical arm FTZ to plan the way forward. Frieder Pernice was involved and Friedhelm Hillebrand was asked to help.

On 11 March 11th the Minister Dr Schwartz-Schilling ordered the President of FTZ to carry out an internal examination of the two rival technologies. This took place in Koblenz and it was down to Armin, Frieder Pernice and Fred Hillebrandt to defend their preferred position of narrowband TDMA. This won the day and led to a recommendation to the minister for narrowband TDMA. A week later the President of FTZ presented his findings to the Minister and recommended the narrowband TDMA solution. Armin and Fred participated in the meeting. Armin asked the Minister directly whether the decision was to be based only on technical and commercial criteria or whether there were any other criteria or factors influencing the choice. This was to flush out whether industrial policy was to be a factor in the choice or not. The Minister said that the decision should rest on just the technical and commercial criteria and endorsed their recommendation.

The German Minister was in no rush to make his decision known to the rest of Europe. He had a political agreement with the French to cooperate over the digital cellular radio project. He reasoned that if his experts came to a certain technical conclusion that narrowband TDMA was better - why were the French not coming to the same conclusions? He ordered Armin Silberhorn to go to Paris and prepare a joint technical report with the French Officials.

Armin, together with Fred Hillebrandt and Frieder Pernice went to Paris, on March 18th. On the French side was Philippe Dupuis, Bernard Ghillebaert and Alain Maloberti which they had expected. But the surprise was to see that the French PTT had company. The head of Alcatel's mobile communications was there. There followed a long and inconclusive discussion followed by a long lunch.

Over lunch Philippe Glotin, the senior executive from Alcatel, told them about the moves by Vodafone to get access to the GSM channels. He noted that this was likely and once this was conceded then the UK would be out of the GSM game.

After the lunch Philippe Dupuis and Armin Silberhorn went back to prepare their joint report. The gist of it was that, whilst the GSM may have over stated the advantages of the narrow band TDMA at Madeira, overall it remained the best technical and economic choice. A copy was faxed to me.

I learnt later that Philippe Dupuis paid a high price for this technical report. His chief tore it up, re-wrote it himself, added the conclusion that the wide band TDMA solution was right for the French situation and then put it up to the French minister. The manufacturing advantages was being given a higher priority than

the needs of the mobile service business.

Ever since the Madeira meeting, when the French Prime Minister's office had become involved, Philippe Dupuis had exercised less and less control over events. It had become far too political and driven by the industrial policy side of the French PTT. But at least he was in the thick of the action. After the meeting with Armin Silberhorn he was simply cut out by those at the more political level now driving things. He did a wise thing in the circumstances, took some leave and went skiing.

The German Minister's next move was to send his Senior Officials led by Mr Haist to agree a common line with the French. The meeting was to take place on March 25th 1987 with M Roulet leading on the French side. Armin Silberhorn told me the evening before that the meeting was to be a show down. The Germans proposed to take a tough line. They would be sending a note to all the other CEPT Administration telling them that Germany proposed to adopt the narrow band TDMA solution. It was up to the French to associate themselves with this or go their own way.

The report I got from Armin the following evening was one of despair. Yes the German team had started out with a tough line. All had gone well until the lunch break. Over lunch the French side suddenly sprung the idea of more comparative trials. One of the German party responsible for procurement immediately reacted enthusiastically and said that he happened to have some money left in his budget for this. The head of the German team wavered and the tough line disintegrated.

Upon hearing this from a very depressed Armin I immediately faxed a note to Martin Boyle at our embassy in Paris asking him to go in to see the French PTT and tell them that the UK government viewed further tests as a waste of Europe's time. By complete coincidence he and his chief had an appointment with an official in Minister Longuet's cabinet the next morning.

Minutes before the UK embassy officials arrived for the meeting the report of the Franco-German meeting proposing more tests landed in the in-tray of this top Cabinet official. He only had a few minutes to glance at it when in breezed our men in Paris saying what a complete waste of time these extra tests were. The French Cabinet official went into orbit. How did the British (of all people) get hold of such a sensitive report even before he had even read it.

That furthered the cause of Anglo-French understanding !

It was time to reflect. The UK had become effectively no more than spectators. Voyeurs even. How could we cut ourselves into this dialogue? I got up and fetched a copy of the Quadripartite agreement to study. Up until now the French and German Administrations had been doing no more than GSM had asked them to do. Reconsider their position. Fresh trials were a whole new ball game. Whatever happened to the Quadripartite Agreement?

On Monday 30th of March I sent Armin Silberhorn a very formally worded diplomatic style note. It reminded him of the written obligations his Administration had entered into which referred to working with the other three partners. Why were they now only working with only one other partner in what was clearly a new phase of activity? Italy and the UK had a right to be told the present German preference.

Armin was not happy to receive the note. Yes he agreed that I had a point but the Germans also had a specific agreement with the French. Which took preference? He would consult his chief.

Next day Armin telephoned me. He asked me whether I could get our Minister Mr Pattie to send his Minister a note saying that proposals for fresh trials had to be first discussed amongst the four countries. "What if Mr Pattie phoned his Minister? I asked. Armin like this idea even better. But it had to be done before Friday lunchtime. Why so soon? This forced him to reveal that on Friday afternoon on the 3rd April the French had arranged for their Minister to telephone his Minister.

I phoned Mr Pattie's private office. My heart sunk when they told me that Mr Pattie was in the USA. He wouldn't be back until late Thursday afternoon. That made things very tight. I took a deep breath and

asked his private secretary to put the telephone call in the Minister's diary for Friday at 8am.

On Friday I arrived at my office at 7.30 am. It was agreed that we would initiate the call. The previous day I faxed to Armin a copy of the brief I'd put up to Mr Pattie. There was to be no scope for misunderstanding.

At 8 am there was no sign of Mr Pattie. Was my luck about to run out? At three minutes past 8 the German Minister's office telephoned us. Mr Pattie's private secretary took the call and spoke in fluent German. I was quite impressed. I hissed to him to ask how tight the German Minister's schedule was. With some relief we were told that he was free for several hours.

After 15 minutes Mr Pattie arrived cursing the traffic.

The call was put through. Afterwards Mr Pattie told me that the German Minister had recounted the history of the initiative and said that when the project started he hadn't dreamed that so many versions of the digital technology would emerge. He expressed his preference for the narrow band TDMA but baulked about going public. He owed this to his French colleague. However, he agreed that hence forth all activity should take place within the group of four countries!

Mr Pattie had pressed him on time scales. They agreed that senior officials from the four countries should meet and try and find a solution. If this was not possible the four Ministers should then meet in Bonn. Mr Pattie extracted from him that this should be envisaged before the end of May.

The German Minister and Mr Pattie had changed the game. The inner circle of just France and Germany had now been expanded formally to include the UK and Italy. We were still some distance from an agreement but the world had just changed.

As I left the Minister’s office the DTI officials for his next meeting trooped in. Sale of Rolls Royce.

The Germans busied themselves setting up the meeting of senior officials. A date of 23rd April was set. I busied myself with other problems crossing my desk. But I had occasional forays to further our prospect. With the appropriate clearance...a discrete briefing to David Thomas of the Financial Times for example. He was an incredibly good reporter who was following the story closely. What really impressed me was the diligent way he would check back to get the detail right.

GEC telephoned me and asked if I would be prepared to see Philippe Glotin from Alcatel. He was visiting them and had asked if GEC could arrange a meeting with me. It was a very friendly meeting. I was impressed with his intelligence and commercial astuteness. He had a statesman like quality. I told them of the overall strategy I'd been discussing with other European colleagues in order to get the market moving. Later he told the GEC man that he had learnt more from me in five minutes on what was going on in Europe than the French PTT had told him in totality.

At the meeting Mr Glotin then turned to the real reason for his visit. Alcatel wanted to become the second French mobile operator. Motorola and Alcatel had an interest in getting a TACS network up and running. The French military were being difficult in releasing any 900 MHz frequencies. Some hush hush system. Could I get my Ministers to apply pressure on the French government? I said that I didn't think we had those sorts of lines of communication with the French at the present. Further, I was not sure it was in our interest in view of our commitment to GSM. The matter was dropped.

What came across to me from this meeting was that the French establishment was also working to keep GSM on track by defending the GSM frequency channels against commercial pressures to implement an analogue cellular radio system in the same way as I had been doing in the UK.

Some time later Alcatel lost interest in being the operator of the second French cellular radio network. The French PTT had told them bluntly that either Alcatel was a supplier to the French PTT or an enemy. They could choose.

A week later I was in Brussels at a technical conference to give a paper on European developments in cellular radio. The audience was packed. The GSM standards impasse was a hot topic. My paper examined the interplay between competition and co-operation in making a success of high technology in Europe. I could feel the audience warming to my theme. My usual approach in my public papers was to give a paper with 90% good common sense perhaps wrapped up in an imaginative way. Then other 10% was the DTI message that justified the public expense for the trip. The 10% on this occasion was to paint the virtues of competition in the provision of mobile services. My theme was that co-operation was needed to create the standard but competition was essential to drive it into the market. I plugged the narrow band TDMA technology - of course. The 90% was my prediction that European industry had to adjust to the fact that cellular radio was in process of adjustment from a professional electronics industry to a consumer electronics industry.

The questions afterwards were lively.

In the margins of the Brussels meeting I briefed Philippe Dupuis on the telephone conversation between Mr Pattie and Dr Schwartz-Schilling. I also briefed Philippe Glotin in detail. It was a risk but the right decision.

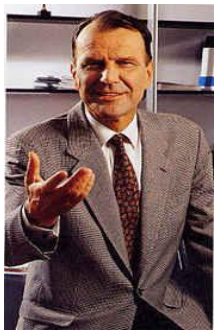


Figure 27 – Philippe Glotin from Alcatel took the key decision for France to support narrowband TDMA

He was a man one felt instinctively able to trust. He replied that he had guessed as much but that SEL were painting a much rosier picture of being able to turn the German government around to supporting the wide band TDMA. The very next day Philippe Glotin reported back to Alcatel that the support for the narrowband TDMA was overwhelming and the company took the fateful decision to no longer pursue the wideband TDMA technology but this did not emerge for several more weeks.

Other forms of contact were taking place in parallel with these events. In the middle of March I had arranged a meeting between the four large countries on an EC Research and Development programme called RACE. The aim was to align our views on the content of the programme. A lunch was arranged at Lockets. One of the senior German officials from their Research Ministry took me to one side afterwards. He had given SEL their research contract for developing the wide band TDMA system. He suggested that the best way to find a solution would be to let the leading European suppliers get together quietly and make a deal. He suggested that GEC could be a major player if the DTI would come behind the wide band TDMA solution. It was far to late in the day for this sort of horse-trading.

The next social encounter turned out to be less cordial. The French PTT had opened an office in London. It was one year old. A party was thrown towards the end of March. A large number of officials flew in from France from the Director General down. The French must have made up their guest list from a who's who of the UK telecommunications sector. The number two at the French DGT was M. Grenier. He circulated around the cocktail party. I was itching to put the narrow band TDMA case to him. He eventually arrived nearby. The conversation started in a low key noting how well we were co-operating on the EU RACE R&D programme and some areas of EU legislation. What a pity that we had this problem

with the digital cellular radio standard.

M Grenier said that he had personally put up the recommendation to his Minister in favour of the wide band TDMA standard. He said that in France all the demand was in the towns. The wide band TDMA standard was more economic in the cities (which was true). Thus he had concluded that the wide band standard was better for the French situation. I noted that their present experience with their public mobile radio system seemed to suggest the complete opposite. They had a system only covering Paris and one covering the whole of France. They were only charging half the tariffs for the one covering Paris but they still had a massive waiting list for the service covering the whole of France.

He then veered to the industrial advantages. My response was that mobile technology would be moving towards the consumer mass market in the 1990's. I doubted whether France and Germany alone could make a success. Their markets were not even in phase. I paused but then went too far and tossed in that France were blocking any European agreement on GSM! At this he lost his temper. He said that he could respect my previous arguments but what I had just said he didn't like at all. A French diplomat quickly intervened to talk about other things.

On Monday a colleague in the French PTT told me that news of our row had spread around the French PTT.

The date set by the Germans for the meeting of senior officials in Bonn was approaching. Still no solution was in sight. I was at a meeting in a British Telecom building one morning. The cellular radio in my brief case rang. I excused myself and went into the corridor to answer it. Philippe Dupuis was on the other end. He was telephoning from a chalet in the French Alps. He was just about to go up onto the ski slopes. A friend in CNET (the research arm of the French PTT) had contacted him. Alcatel had been into see them asking whether the narrow band TDMA solution could be changed slightly so as to enable them to salvage something from their wide band TDMA development work. He thought he would pass it onto me for what it was worth.

The following week I was on a plane to Rome. From there I would fly onto Bonn for the four-country meeting. The purpose of the Rome trip was far from clear. Mr Butcher the junior minister had visited Rome a few weeks earlier. He had been well received everywhere he had gone. I was sent down to "follow up" his successful visit on the recommendation of the UK embassy.

My visit coincided with Mercury being in Rome to try to secure interconnection of their switched telephone service to Italy. They were having the greatest difficulty in getting any interconnection agreements with the rest of Europe. The local UK embassy official took me uninvited to the Mercury meeting with ASST, who were responsible in Italy for European connections. We were not exactly made welcome. The UK embassy man kept nudging me that I should say something. The Mercury team were being given quite a hard time. Just before the lunch break I gave a strong speech extolling Mercury as the chosen second force in UK telecommunications. I pointed out the strength of Cable and Wireless behind them. I felt sure that they would act to increase the total traffic between the UK and Italy to mutual benefit. It had the UK Embassy man nodding vigorously. It didn't seem to please the head of the Italian side.

On our way to lunch the head of the Italian side took me to one side. An interconnection with Mercury was an irritation as far as they were concerned. All the hassle and what were Mercury able to offer ? A few percent of what British Telecom were delivering. On the other hand if it was that politically important then providing it didn't cost them anything, they were prepared to go along with it. I passed this on to the Mercury representatives. Almost exactly the same sequence of events took place in Germany at I meeting I had set up for Mercury. Mercury was given a very hard time in the morning. Then two German colleagues took me quietly to one side on the way to lunch. They talked about the hassle for a few per cent of traffic. But they also were curious as to why I was pressing them so hard. They could understand that a show might have to be put on in front of Mercury but did the DTI really want the German PTT to damage BT, the UK national flag carrier?

The story helps to illustrate the climate in Europe in the mid 80s in which we operated and just how out of

step the UK was with the rest of Europe in opening up its telecommunications market to competition.

The rest of the trip was exchanging some pleasantries with a large number of Italian officials. On the flight to Bonn I asked on the plane for a Financial Times. What a surprise to see a leading editorial about the pressing need to unblock the digital cellular standards issue. What impeccable timing just prior to the meeting of the four officials. It was not of my doing and it further enhanced my regard for the FT and the late David Thomas.

The Bonn meeting started in the evening with a dinner of senior officials. The French Director General broke the news that the French were prepared to compromise. We must be prepared to make slight adjustments to the narrow band TDMA solution. These were identified. Essentially the French wanted to knock out the piece of the package deal that the Norwegians had got. During the dinner I had a real go with one of the French experts sitting next to me who had been at Madeira when we'd settled the package. His view was that this was the French price of a settlement. They had to support the interest of their industry.

Figure 28 - Torleiv Maseng, Norwegian researcher, loses in the industrial power play, but has a place in GSM history

After the dinner Robert Priddle asked me what I thought. I said that it would anger the Scandinavians but they would probably accept it. The solution the French were pushing was slightly less efficient but offered industry slightly more flexibility in implementing receivers. As a price for a European deal we had little choice but to go along with it.

(Note: Having read my account in December 2009 Alain Maloberti sent to me an alternative view. It is very insightful and readers may find it interesting to read this technically oriented perspective alongside my more politically oriented account:

“One of the things that Torleiv got right in the first place with the proposal he made late 1986 was to have a sufficient amount of redundancy in the signal to better protect it from propagation impairments. The other NB-TDMA propositions either did not include any redundancy (which led to disastrous results) or include (for fear of losing too much bandwidth) a too small amount: this is one of the reasons for the better results (notably in spectrum efficiency) in the Paris trials.
However, contrary to all the other proposals, this redundancy was put in the modulation and not in a separate channel coder. This both increased the complexity, and prevented a proper efficiency of the error correction at very low speed (typically pedestrian usage), which was much better handled by a simple modulation, with an added independent error correction combined with frequency hopping. This has indeed proven very efficient later both to ensure hand-held quality for slowly moving customers, and better spectrum efficiency when fractional reuse was introduced (mainly by Ericsson in the first place).

So the discussion was held on purely technical grounds and the new scheme considered better and certainly not "less efficient". It is fair to say that this on-going discussion provided Alcatel (and possibly also the French ministry) with an excuse to get out of the corner they were and rally the majority camp still holding their head up, but the change was technically sound and has proven so. I remember that you always thought the choice of the modulation scheme to be political, and we discussed a lot together in Madeira as I was not in favour of including this in the set of working assumptions: I was convinced that we should be able to get a technical agreement. The inclusion was not so bad after all, since its change gave an excuse to some proponents to join the NB-TDMA camp later; so we both were right in some way ...). That noted, we now return to Bonn in 1987:

At the meeting next day the deal was put on a more formal basis. The French and Germans had a haggle about a technical feature called frequency hopping with the French liked and the Germans didn't. I fielded a compromise which they both accepted.

There was no more perfect time to launch my second parallel plane of activity than this Bonn meeting. Robert Priddle had cleared the intention to raise the issue with the German senior official who was chairing the meeting.

As the meeting of senior officials past its critical stage on the technology dispute Mr Haist the German senior official turned to me and invited me to present my analysis of the commercial prospects for GSM and the need for a commercial strategy to get it to market. The bottom line was that a new initiative was needed to draw up a commercial operators agreement. I proposed that Ministers of the four countries should instruct their officials to draw up such an agreement and for this to be ready for signature by September of that year. Everybody supported this. A group of experts were charged with sorting out the details of the modified technology package deal sought by the French and exploring further my suggestion for the commercial operator agreement to implement GSM.

All was now ready for the meeting of Ministers in Bonn on the 19th May 1987.

Chapter 16

PATTIE DEFUSES THE UK GSM FREQUENCY CHANNEL ROW

We had just finished an official dinner hosted by the German Ministry Officials at the end of the meeting of Quadripartite agreement partners. Gerry Whent, Peter Carpenter, Ted Beddoes, Robert Priddle and I were booked into the same hotel. Robert suggested we might all return to his room to review what we had heard from the Germans and French at the Dinner. It was around midnight.

We had just had a glass of whisky thrust in our hands when Robert suddenly sprung the subject on everyone of Vodafone being “loaned” one MHz of the GSM frequency channels. There was no mention of the trade. The reactions were quite unpredictable.

Gerry Whent from Vodafone went into the most amazing string of calculations. It was all done out loud. Following it made me quite dizzy. In about five seconds he had deduced that the one MHz would give him about an extra 10,000 customers. "This was wonderful news" he exclaimed "Vodafone is absolutely delighted." I sat there with my eyes out on bean stalks and nothing to do with the whisky, which I hadn't touched. What had happened to the proposal that was so contemptible as to be not even worth considering?

The sheer apparent joy of Gerry Whent had Peter Carpenter from British Telecom within seconds in a rage or so it seemed.

Robert Priddle said, "Let's sleep on it".

I caught Peter Carpenter at breakfast next morning. He was back to his normal very rational self, which made me wonder how much of the previous evening was theatre. I advised him not to overplay his hand. "Put your trade to Robert Priddle this evening on the way home and if it is not outrageous you may find him receptive".

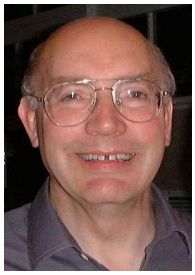


Figure 29 – Peter Carpenter vigorously defends BT's interests

That evening as we moved towards the check-in counter I headed Gerry Whent and Ted Beddoes to one side. "Let Robert Priddle and Peter Carpenter take a seat away from the rest of us "I suggested, "Perhaps Robert can talk Peter Carpenter into taking a more reasonable attitude on the GSM channel issue".

Next day Robert Priddle said what had transpired. Peter Carpenter had demanded agreement in principle to the extra paging channel and an agreement to British Telecom being able to buy more shares in Cellnet for the purpose of disposing of them in back to back deals with other European operators. In return he agreed to call off the campaign against the DTI giving Vodafone any channels and issue a favourable press release when the Ministers decision was announced. Robert Priddle, in “reluctantly” conceding the paging channel, made it clear that the timing of when they would get the paging channel would have to be

left to OFTEL. Peter Carpenter said that the main thing was to know that they could plan on it being granted.

Robert felt justifiably satisfied.

Within the next few days things moved swiftly. Legal advice was taken, details sown up and the matter ready to put to the Minister. Mr Pattie suggested we explained the matter to our opposite numbers in France, Germany and Italy. I took the liberty of also briefing a Commission official Christian Garric just in case the draft directive was to go horribly off the rails. The 9 to 10 MHz issue did get briefly mentioned in the Council Working Party at a very late stage. The UK suggested it was far too late in the day to be making any radical changes. The Belgian presidency supported us and Christian Garric on the part of the Commission held his peace. The briefing had proved prudent.

The final touch was the DTI press release. The target audience was Europe. "Mr Pattie rejects the Vodafone request for the GSM frequencies channels but...lets them have a few channels used in Germany for cordless telephones". That should get the message across I thought. The draft came back from the DTI press office reading "Mr Pattie gives Vodafone much of what they want !". A brief stand up row with the press office ensued. The press officer explained that classical information policy was that Ministers always had to give good news. They must never say anything negative. We explained that our European policy required the message to be negative. As we were driving the policy and not the press office he should back-off. The press officer reluctantly backed down.

The reward in terms of press coverage was pleasant indeed. "Pattie defuses cellular radio row" in the Financial Times set the tone. This was particularly helpful in view of its wide European circulation.

Government defuses cellular phone row

BY DAVID THOMAS

THE GOVERNMENT has defused a row in the fast-growing cellular telephone industry by releasing additional transmission channels in a way which satisfies both cellular network operators.

The dispute arose when Racal Vodafone, one of the two operators, asked for 120 of the 400 channels reserved for the proposed pan-European digital mobile service to tide it over a temporary capacity shortage in London.

Cellnet, the other operator, complained to the Office of Telecommunications (Oftel), the industry's regulatory body, that Vodafone was trying to gain an unfair advantage by avoiding further investment to raise capacity in its network.

It also argued that the release of channels could prejudice the delicate final stages of the negotiations on setting up the pan-European system.

However, Oftel advised the Trade and Industry Department to release extra channels to Vodafone.

Mr Geoffrey Pattie, the Information Technology Minister, yesterday said he had decided against releasing to Vodafone any of the spectrum earmarked for the pan-European system.

However, Vodafone is to be given access until the end of the year to 40 channels in the 900 MHz band currently being used in some other European countries for cordless telephones.

Mr Chris Gent, Racal Vodafone managing director, said yesterday it was planning to raise the number of its London base stations from 20 to 36 by the end of the year.

Mr Gent said the extra channels and the new base stations would be sufficient for Vodafone to be able to increase the rate of signing new subscribers from more than 1,000 a week now to more than 1,300 a week.

However, Cellnet said yesterday: "As Racal have only received 40 channels any relief of their London problems can be expected to be short-lived."

Mr Colin Davis, Cellnet's managing director, said Cellnet would not be applying for the release of any more channels as a result of the Government's decision and added: "It's encouraging that Racal has not achieved its ambition to get 120 channels."

Separately, Mr Pattie approved a £1m project, involving British Telecom, Racal, GEC and Plessey, for initial technical work on the British end of the pan-European system.

Figure 30 – David Thomas of the FT pitches the outcome of GSM frequency row perfectly

Cellnet remained bitter about the outcome. However they had put their case to OFTEL and lost. Prof Carsberg's ruling had clearly given a higher priority to effective competition than fair competition. But for the rest it was smiles all round. The Secretary of British Telecom told a senior official at a social event " a just about adequate sweetener to what might otherwise have been a very bitter pill". This was taken to mean that they felt quite pleased. British Telecom's paging rivals had not been disadvantaged. OFTEL had already decided to give British Telecom the extra paging channel. The timing was still in their hands. Taking Gerry Whent at face value Vodafone were pleased with their extra 10,000 customers. Manufacturing industry were pleased that the European opportunity was still on track. Our European partners were relieved that we could still be relied upon in spite our quaint embracing of something called competition.

For me it was a narrow escape from the makings of a first class disaster.

I was not entirely out of the woods. An unexpected ambush arose, this time on the draft EU directive. Another DTI colleague took me to task for giving sovereignty away to Brussels (again) this time in the area of frequency channels.

This seemed a very extreme view. The UK had already accepted the MAC broadcasting satellite directive that had set the technical standard to be used on specified frequency ranges. All the GSM directive was doing was inverting the logic. I couldn't see any practical difference. Second the pan European digital cellular radio service was a UK policy objective and the draft directive supported this. Third I argued that this was the very area where it made complete sense for EU action. There couldn't be pan European radio services without pan European frequency ranges being identified. He was unconvinced.

The next thing I knew was that he had put a paper into EQO, the Cabinet Office official inter Departmental Committee on European matters. In it he suggested that the rest of Whitehall might have an opinion on this major ceding of sovereignty in radio frequency spectrum. The Chairman was a bit bemused to find that the only interest in the paper came from the two DTI officials present. Arguments were put and he arbitrated ...on my side.

(Note: Later Prime Minister John Major was to secure agreement from the EU on remitting some legal powers back to Member States as part of the deal over the Maastricht Treaty and the Cabinet Office trawled around Whitehall for ideas of what might go on the list. Somebody in the DTI put frequency spectrum forward and it was remitted back under national sovereignty).

Chapter 17

THE TURNING POINT - BONN MEETING OF MINISTERS

Back in the UK a general election had been called. Mr Pattie agreed to take time out from electioneering to attend the Bonn meeting of Ministers. The embassy in Bonn contacted me and said that the Ambassador had invited Mr Pattie and two officials to be his personal guests at his residence. Clearly Mr Pattie's personal secretary would be one guest. I contacted the embassy and put in a special request that the Ambassador receive an additional guest. A war had broken out between the two operators on the GSM frequency channel issue. This had almost wrecked co-operation on the European project. Blessed would be the peacemaker if the relationship between the two sides could be restored onto some working basis. The Ambassador agreed. Gerry Whent of Vodafone and John Carrington from BT were both delighted with the invitation to join the Minister's party at the Ambassador's residence. Meanwhile the German PTT was asked to book me into a local hotel - clean, comfortable but distinctly not cool compared with our Embassy in Bonn.

The meeting of Ministers on the 19th May 1987 was more of a ceremony than a meeting. There was a short speech from each party. When it came to Mr Pattie's turn he raised the need for an operators agreement. He suggested that the Ministers instruct their officials to have such an agreement drawn up in the form of a Memorandum of Understanding ready for CEPT Director-Generals to sign in September. This was agreed. There followed the signing of a common declaration by the four-countries on the introduction of a pan European public digital cellular radio service. In addition to the Minister signing for the UK, John Carrington from BT and Gerry Whent from Vodafone also signed the declaration.

For the first time Germany, France, Italy and the UK had committed themselves to a common strategic vision for Europe's mobile radio infrastructure and a fuse lit on the GSM “cosmic big bang”

Figure 31 – Quadripartite officials with the critical Ministers 1987 Bonn Agreement on GSM

Afterwards came a press conference. One reporter asked Mr Pattie whether an incoming Labour Administration would be committed to the agreement. Mr Pattie was a too wise political hand to fall for that one.

The agreement was treated with scepticism in other parts of the world. This view is best summed up by a reported comment made by Bob Foosaner (former FCC Chief of the Private Radio Bureau) in July 1987 that “...these agreements are the first of their kind, but will they hold?”

That evening the German Minister hosted a dinner. As the meeting broke up we made for the lifts in the hotel where the dinner was being held. As it happened Gerry Whent and I travelled down in the same lift as the German Minister. I suspect out of politeness Gerry Whent congratulated the Minister on finding a

solution to the GSM standards argument. The Minister shot back that for some people a lot of face had had to be saved. As if for emphasis he repeated …a lot of face!

I made my way towards a mini bus the German PTT had laid on to get me back to my hotel. Already sitting there in the mini bus was M.Grenier the very senior French PTT official I had the row with in London. He had clearly forgiven me as he grinned and thrust a bit of paper into my hand.

He'd been thinking about the EU Commission proposal for establishing a European Telecommunications Standards Institute. He'd called his boys, Mechel Toutan and Jean-Baptiste Main de Boissière, in for a brain storming session (Note: well that was what he said but in fact Michel Toutan was a very senior figure in the French PTT. Jean-Baptiste Main de Boissière was a brilliant young diplomat on secondment to the French PTT). M Grenier thought the PTT's had to seize the initiative or somebody else would. He welcomed my reactions. I looked at the scrappy bit of paper thrust into my hand. It looked suspiciously like another large job.

CHAPTER 18

THE GSM MOU - GSM GETS A TURBO BOOST

At the end of July 1987 the Italians had arranged a large technical conference on digital cellular radio in Venice. I agreed with Armin Silberhorn, Philippe Dupuis and Renzo Failli to take advantage of the event to draw up the proposed commercial operators' agreement that I named "a Memorandum of Understanding". We all agreed that we should extend the co-operation at this critical stage to include Sweden. Through them there was a good chance of bringing in the Scandinavian countries. Renzo Failli had arranged for us to meet in the head office of the local telephone company SIP. They were housed in a magnificent old Venetian building, which they were in the middle of renovating. It was a tasteful blend of modern corporatism and historic preservation. We worked in the Director's office resplendent in dark oak panelling.

My text had been circulated for the commercial operators' agreement. I'd given a lot of thought to the balance between the competitive freedom of the individual enterprises and what needed to be done in common; the need for consensus where possible and the need for a vote to remove unreasonable obstruction to the common endeavour; the need for co-operation on key matters and the need to preserve competitive freedom of action.

The heart of my MOU was the common resolve to get systems to the same standard into service by a common date of 1991. I reasoned that if everyone was shooting for the same target, they would be under the same stresses and therefore more likely to find common cause in agreeing upon solutions. This was to cause some friction later, with some countries that wanted to join the agreement for political reasons but did not foresee implementing systems on the same time time-scale. I stood firm on this point and it helped in advancing the investment in GSM networks in a number of countries. The impact was to be dramatic. It aggregated together the procurement power of all Europe's mobile radio operators to kick start competitive supply of GSM systems, it combined the markets for the mobile equipment that rippled all the way back to the competitive supply of semiconductor chips and brigaded together all the national service areas into one huge European wide service area for the traveller.

We went though the draft text. The only point to cause any real heart searching was whether the agreement was for signature by the cellular operators only or by governments as well. Renzo Failli said that his Ministry would insist on signing. Our view was that it should be a purely commercial agreement. For this reason the DTI would not sign. Both Armin Silberhorn and Philippe Dupuis rounded on me and said that they wanted the DTI to sign. The recent row between Vodafone and British Telecom/Cellnet was fresh in their mind. They found it difficult to comprehend that competitors could still cooperate on a self-enlightened basis. For them the DTI represented the glue for any co-operation. I backed down and we went through the text and carefully separating out the obligations. The commercial operators were to carry the commercial risks and responsibilities. The government's role was limited to appropriate supportive actions such as technical standards.

One matter that was made the subject of voting was the technical standard. The Germans pushed this very hard. They said that the dispute that they had just gone through must never happen again. It was absolutely ridiculous in a modern age that a dispute on technology was resolved at a meeting of Ministers – what did they know about technology? We put in a weighted national voting arrangement to ensure that nobody was tempted, when losing, to take the dispute off to Brussels. It signalled for the first time the willingness of the powerful European PTTs to cede their sovereignty on technical standards. It laid down the foundation for the voting arrangements for the European Telecommunications Standards Institute.

Occasionally amongst all the pressures a fleeting opportunity arises to look around and see another world. Here it was Venice. I had never thought much about Venice before I got there…a product of a narrow UK technical education. With the Memorandum of Understanding agreed with surprising ease I approached the associated Technical Conference with a relaxed frame of mind. The organisers helped with some

arranged tours. Venice took my breath away. How could humans conceive and build such a lovely place and on such a scale ?

Figure 32 – Stephen Temple, carries draft text of the GSM MOU to Venice

When I got back from Venice the next task was to sort out who would sign the Memorandum of Understanding for the UK. The choice was between the existing two operators and a third operator since there was only 10 MHz of GSM frequency channels.

I rehearsed the same argument that I had put in the submission to Mr Pattie the previous year. Giving the opportunity to the existing two operators would ensure the smoothest transition to the new technical standard. The change over would be like the change over from the old black and white TV standard to the 625 line colour standard. An overlay network would be built. This would need new frequency channels if there wasn't going to be a sharp reduction in the quality of service resulting in withdrawing channels from the old analogue service. Then new customers could buy equipment to the new digital standard without disturbing the service to existing customers. There was also the need for a healthy cash flow to allow the necessary bold investment in networks to be forthcoming.

Robert Priddle and John Avery considered the matter. Both were inclined to support the existing two operators but for different reasons. Both felt that some reward was due for the extraordinary effort they had made so far. Their licences obliged them to cover 60% of the United Kingdom population by 1989. They had both achieved this two years ahead of time. The UK growth figures for the number of subscribers were looking outstanding relative to those of most of the rest of Europe. It was one of the few (if not the only area) where the introduction of network competition was delivering success.

A submission went up to Ministers recommending that Cellnet and Vodafone should be the UK operators for the pan European digital cellular radio system. The note went to John Butcher copied to the Secretary of State. The Minister accepted the recommendation and a press announcement was issued next day.

Just before I went on leave a note came down from the Permanent Secretary's office (Sir Brian Hayes) to John Avery. Lord Weinstock had telephoned the Sir Brian complaining about this decision. He suggested that Ministers might have been wrongly advised. Out came all the files. To me it seemed perfectly proper advice based on impartial analysis. I went on holiday to the French Alps. John Avery was left handling the hot potato. It needed careful handling. The paper, which really settled the matter in terms of Ministerial commitment, was the letter from the former Minister Sir Geoffrey Pattie to John Carrington and Gerry Whent.

When I got back from my holiday I wrote a submission to Ministers to clear the Department signing the Memorandum of Understanding. Lord Young had just arrived as Secretary of State. We lost our Minister for Information Technology. Instead Lord Young decreed that our submissions went up to the junior Minister John Butcher copied to him and Kenneth Clarke, the Chancellor of the Duchy of Lancaster. Following this procedure I put up my submission to Mr Butcher. A few days later back came his agreement.

A week later I received my airline ticket to Copenhagen where the Memorandum of Understanding was to be signed. Four hours before I was due to leave for the airport a note arrived on my desk from the Secretary of States office saying that the Secretary of State did not think we should sign. I phoned the Secretary of States office and explained that it was a bit late in the day to be receiving such a note. His private secretary suggested that I fax over a supplementary note and he would try to get the Secretary of State to look at it. Thirty minutes before I was due to leave for the airport I received clearance from the Secretary of State's Office.

In the run up to the Director General's meeting in Copenhagen I speculated how many signatures we would get on the Memorandum of Understanding. We had set the equivalent of three large countries to make the Memorandum valid. I knew the Scandinavian countries were vacillating. They didn't need the capacity of a new system until well into the 1990's. On the other hand they had hitherto led Europe in the development of cellular radio. The idea of the large central European countries stealing the lead with the new technology would be a blow to their pride and industrial lead. Perhaps four or perhaps eight?

At Copenhagen Airport the Danish PTT had laid on a small bus to take us to our hotels. In the bus was Colin Davis the Managing Director of Cellnet, Chris Gent the Managing Director of Vodafone, Robert Priddle and myself. We talked for a while about Cellnet's sponsorship of car racing. Chris Gent said that he thought that this form of publicity was not cost effective. Colin Davis disagreed. Certainly at this point in time many members of the public referred to cellular radio as "cellnet" at a time when Vodafone had secured market leadership in terms of numbers of connected customers. As we neared the City centre I asked Colin Davies how much freedom he had from British Telecom to buy in the best interest of Cellnet. "Complete freedom" came back the expected reply. "Would he contemplate switching all his fixed links to Mercury if they offered him a better deal?" came my tricky supplementary. "That would be a career bending decision " shot back his witty reply.

It was a relief to see that an atmosphere of normality had returned at the top between our two mobile radio operators. There was still a long road ahead to define the GSM standard in detail and this would require the experts from both companies to be working in harmony. This was to be cemented by a new DTI asset – David Hendon joined my team and led for the UK in the huge task of defining the GSM technology in detail. Unlike the USA and Japan who produce alternative digital radio technologies but only the radio interfaces bit – GSM on the other hand was to be a completely new telecommunications platform including both a new digital radio interface, mobile telephone exchange and intelligent network.

The Director General's meeting had been ostensibly called to discuss the establishment of a European Telecommunications Standards Institute. Mr Loenberg from Denmark had agreed to also include the pan European digital cellular radio item.

It took much of the morning thanks to a last minute attempt by M Grenier from the French PTT to get the French language as the authorised text for the MOU. The Memorandum had been drafted in English. The French argued that French was the official language of CEPT. The Germans were incensed at this. Most European Governments can accept English Language as an informal working tool but as soon as things become elevated to a formal level then a whole new political dynamics kicks in. If the German language was to be added then the Italian Government would have little choice but to insist on Italian as well and so on.

A compromise was suggested from the Chair that the French and English texts should be co-equal. This satisfied the French although it defied common sense. The Germans remained unhappy. Mr Loenberg from Denmark had a remarkable talent as Chairman in these sorts of situations. It comprised of pushing

his luck to the very limit. The Germans graciously gave way.

Mr Loenberg then asked who intended to sign. Everyone was truly amazed at the number of hands that went up - thirteen operators from twelve countries. Spain had still to get authorization from their Board. I went off to get the Memorandum tidied up and the sheets prepared for the Director Generals to sign. By lunch time the job was done. As I arrived in the restaurant for lunch the Portuguese delegate hurried up to me. He had just got authorization from his company to sign. Good bye lunch. It was back to the office to get the additional paper drawn up. After lunch I had the agreement laid out for signing.

Figure 33 – Ib Loenberg from Denmark steers the GSM MOU through to signature

This was to prove to be the mobile radio equivalent of the cosmic “big bang”. It would sweep away analogue mobile radio systems across Europe into the dustbin of history, burst out of Europe and sweep around the world, knocking the mighty Japanese and US digital technologies into a poor second and third place on the way, crush telepoint and paging services and knock the stuffing out of the market for mobile satellite systems – Chris Gent was to describe it 20 years later as the most important document in the history of mobile radio.

CHAPTER 19

FROM GSM TO PERSONAL COMMUNICATIONS NETWORKS

With GSM well under way my mind turned to other things. We were seeing a proliferation of ideas emerging in mobile radio ranging from telepoint to mobile satellite systems. Observers at the time seemed to view this world of technology change from one of two viewpoints. The first was that the technology was becoming chaotic. It wasn't fruitful for Government to try and predict its future, let alone have views. It was best left to the market to sort out. The free market economists came behind this viewpoint but took it to an unreasonable extreme where regulators for national infrastructures took pride in having no opinions on technology - the so called “technology neutrality” mantra. The second view was that all emerging technologies had to be part of a coherent framework. No losers. Many papers emanated from the EU Commission in Brussels in this direction. Again it was an extreme view of an over regulated world.

It was certainly evident that the challenge of the 1990s was not finding new technological ideas. The real problem was getting the new ideas we already had to the market. The vision we needed in the DTI was how technologies were likely to map onto economically viable market needs and where government should have an informed view (national infrastructures) and where should they butt out and leave it to the market (consumer electronics). That was the task I set myself.

I started with the presumption that the basic service being sold in mobile radio was "mobility". At one extreme cordless telephones offered the public mobility of 100 metres or so around the base unit. It cost under £100 for both the mobile unit and a base unit. At the other extreme was satellite communications. One geostationary satellite offered mobility over one third of the globe. But the mobile unit cost several thousand pounds. The equivalent of the base unit cost hundreds of millions of pounds.

My analysis mapped what was likely to be happening between these extremes. The GSM systems would offer a service over the whole populated regions of Europe. The present national TACS networks offered a service over 90% of the UK. Then there was a leap to a cordless phone. This was the basis of the telepoint idea to offer a radio version of a public call box.

Figure 34 – Telepoint positioning itself with elegant cordless handsets

The service would only be available within 100m of designated spots at railway stations, by Post Offices etc.

The gap in this emerging picture was a dense coverage of towns and districts providing a continuous mobile phone service based only on small hand portable mobiles. The wire line connection to the home would go. Each one of the family would have their own pocket mobile phone. I was in fact fleshing out the idea I'd picked up in Berlin from our Bellcore R&D colleagues and locating the space in the market where it might fit into the mobile radio world emerging in 1988.

In January 1989 I was invited to give a paper at a technical conference in Amsterdam. A Commission Official I knew was on the organising committee. He asked me to give the paper. I was now Chairman of the ETSI Technical Assembly. It was important to be seen on the European technical circuit so I agreed. He specifically asked me to do something on mobile radio. It was not the sort of venue to be stressing the

UK's concerns on competition in Europe, or to be more precise the lack of it. Instead I set down my vision of the district mobile phone service based entirely on the small pocket mobile phone. I had some good quality art work drawn up for the slides to hold the audience attention.

It was a quiet conference. The presentation interested the people attending but didn't cause a stir.

Meanwhile Vodafone and Cellnet were going from success to success with the build up of their subscriber bases, turnovers and profits. Sir Brian Carsberg, the Director General of Telecommunications (OFTEL) was starting to become uneasy. Prices of mobile phone calls didn't seem to be coming down with any great speed but mobile phone company profits were soaring. Prof Carsberg started to make public noises about the need to see more competition in cellular radio. Other telecommunications companies were also taking due note of the large profits of the cellular radio operators. It didn't take too many hints from Sir Brian Carsberg before they were at the door of DTI demanding an opportunity to also be a mobile phone operator.

Mercury and GEC were knocking the loudest. Sir Eric Sharp (Chairman of Cable & Wireless) had invited a colleague from the Radiocommunications Division (the new name for the Radio Regulatory Division) to see him in order to find out what frequency spectrum might be available for a third cellular radio operator. The colleague said that there was simply no suitable spectrum left. The GSM frequency channels had now been given to the two existing operators, so had the analogue spectrum and so were the MOD frequency channels. There was nothing left. To Sir Eric Sharp this was the wrong answer and his lobbying efforts moved up a gear.

Pressure from Sir Brian Carsberg and pressure from industry continued to mount on the DTI.

The Secretary of State Lord Young responded to the pressure and instructed the Radiocommunications Division to find radio spectrum for a third UK mobile radio operator.

Figure 35 – Lord Young, DTI Secretary of State steps up UK mobile radio competition

This left the Radiocommunications Division with the unenviable task of seeing what scraps of radio channels could be scrabbled together around where the present cellular radio services operated.

I viewed these developments with some misgivings. My priority was still the pan European service that was still two years away from opening. The duopoly model was working well - as was the layer of “service providers” the DTI had structured into the regulatory framework. But if Ministers wanted more mobile operators in the UK market then officials had to see how best this could be done – including me.

One of my responsibilities at the time was R&D funding for radio technology. A programme of research into personal communications had been pulled together. We had looked at the radio spectrum to see where mobile radio services were likely to go in the far future. The present cellular radio bands around 900 MHz were boxed in. Below were the television bands. Nobody could see the politics of TV services being pushed out in the foreseeable future. Below this came many military services. You can't have a modern war without consuming large amounts of radio channels for all manner of command, control, guidance, communications or whatever. Much below this there is simple not the space for very much at

all.

The obvious place to look was upwards in the radio spectrum. Several Universities were doing work in the very high reaches known as “the millimetre wavelength” regions. They offered visions of radio transmitters in every room of the house and every lamppost. The economics of this looked hopeless.

My decision was to push the research programmes to work in the 1800 MHz area. It was intended to be long term research. It was preparing the ground for the future. I didn't expect commercial applications for at least 7 years or so. That was certainly the prevailing view in the rest of Europe and for that matter the rest of the world.

It was a very long and lonely weekend. I agonised over whether to push forward to Ministers the idea of pulling forward in time the opening up the 1800 MHz bands for the third UK operator now? My credibility was on the line.

There were a lot of reasons not to do it. It would be moving 7 years ahead of when all my technical peers were expecting to bring this frequency range into use. There were no mobile radio components anywhere in the world working over this frequency range. The radio wave propagation was far more adverse for coverage over very large areas than was the case for 900 MHz, where the present operators were located. This would lead to a much more expensive infrastructure for the same coverage area. What commercial enterprise would want to travel the stony road of opening up a completely new frequency range ? The fact that they were new entrants made it even less logical to be the ones having to bear the cost of developing entirely new radio components.

Putting such a proposal forward seemed to carry a high risk of being laughed out of court.

On the other hand trying to squeeze three dynamically expanding operators into the limited 900 MHz would soon lead to all three being bottled up. It is widely known that cellular operators can increase the capacity of their networks by radio cell splitting. These smaller cells allow frequency channels to be re-used again and again more intensively. However each new cell requires building a new base station site. This increases the capital and running cost for the mobile network operators and the cost gets reflected back into the cost of mobile phone calls. If this went too high it would depress demand and impede the march to a mass consumer market.

My long term objective was to drive cellular radio to becoming a mass consumer market. Thus the DTI had to release enough new radio spectrum to allow an unimpeded road to this vision. In was a necessary lubricant to accelerate the flipping of the business model from a relatively small number of large radio cells serving relatively few customers to a very large number of small radio cells serving a mass market. Since we had powerful commercial interest knocking at our door, perhaps this was the opportunity to harness their drive to shoulder the burden of bringing this large extra tranche of spectrum at 1800 MHz on stream and more to the point get mobile operators to flip from a relatively small number of large radio cells to a very large number of small radio cells.

Having decided the right national strategy the bigger problem was how to sell it to politicians and industry.

The strongest card was that opening up a new range of frequencies would allow more than one new competitive operator. This would appeal to our pro competition Ministers and the Director General of Telecommunications, Sir Brian Carsberg. That was half the job done.

The main downside of 1800 MHz was the adverse radio wave characteristics in getting signals to mobile phones 7-10 miles away. Industry would baulk at the very high investment costs arising from this.

At this point I had a conceptual break-through.

My vision of a local mobile phone service based entirely on small hand portable phones turned the logic on its head. A small pocket mobile phone had very limited radio power. This meant that only short

distance from a base station were possible anyway. My pitch would therefore be a new service that would leap straight to a hand portable dominated mobile network of very small cells. For very small radio cell structures the 1800 MHz band was an advantage over 900 MHz in being able to control the small radio cell boundaries. This focus on the pocket mobile phone was in line with the emerging market trend.

The next part of my analysis was the technology to be used for these new 1800 MHz based networks. I decided that the only common sense way forward was to re-use the GSM technology but working on the new frequency ranges. This would lower the development costs for the new operators and take GSM up to an even large-scale economies – all pulling in the same direction of global scale economies. This in turn would drive down the price of mobile phones and fuel the transition to a mass consumer market. Strategy complete!

On Monday Robert Priddle met with the head of the Radio Communications Division and two of his senior staff. They rehearsed the problems of finding any spectrum at 900 MHz. I tabled my idea of opening up the 1800 MHz band. There was a shocked silence. One of the Radio Communications Division officials asked whether I had taken leave of my senses. My response was ready: Two operators at 1800 MHz versus one operator at 900 MHz – which might have more attraction for Ministers.

With Robert Priddle's support it was agreed that it should be trailed as an option in any submission. Robert Priddle raised the matter with Alistair Macdonald the Deputy Secretary. He thought it worth taking informal sounding with Lord Young before any formal submission was made. The Secretary of State embraced the idea with enthusiasm. It accorded with his own vision of advanced networks supporting small lightweight pocket telephones. Sir Brian Carsberg also liked the idea of two new operators rather than one. The idea was now had legs.

It was agreed that the next step would be a public consultation document to sound out the opinion of prospective operators and industry. The window of opportunity had opened for new 1800 MHz mobile radio systems and my quiet back room thinking (and to give credit to Bellcore's willingness to share their ideas in Berlin) had positioned me to seize it.

Speed was the watchword from Lord Young. That weekend the dust was blown off the paper I'd read at the EUROKOM conference in January and re-wrote it as a consultation note called "Phones on the Move" over a weekend. Two further ideas were added. It was my view that once the GSM system had behind it huge volumes of equipment the semiconductor chips would become cheap commodity items. Manufacturers would need to find new ways of differentiating their products. They would do this by adding new functions like electronic diaries and other Information Technology novelties. I coined the term the "office in the pocket" to express this vision. This didn't stretch the credulity of my DTI colleagues.

Figure 36 – The “office in the pocket” arrives by 1996

However, when I also added the idea that these phones would become an alternative to the fixed wire line telephone I got loud protests that this was going over the top and likely to lose credibility for the exercise. I held my ground but did have to concede some softening of the words.

One of my reasons for putting this threat to the wire-line telephone was to stimulate BT's strategic thinking to up grade the local loop to broadband so as to offer richer wider band services in order to stop their fixed customers defecting to mobile radio.

The document referred to these new networks as personal communications networks (hence the term

PCN). This term came from a LINK R&D programme I had running called "personal communications".

Lord Young moved immediately to announce the issuing of the "phones on the move" consultation document. The date he chose was 26th January 1989, the day already selected to announce the winners of the hotly contested competition for telepoint licences. My colleague from the licensing side argued in vain that this was not a good idea. It would take the shine off the telepoint licence announcement. Lord Young said he wanted to signal a sea change in the mobile radio landscape in the UK. The Press Office supported him. It went ahead.

Predictably there was adverse press comment on the effect of the "Phones on the Move" consultation on the investment confidence in telepoint. I don't believe for one moment that this was a significant contributor to the eventual demise of telepoint in the UK. In some ways it might have galvanised telepoint to move a bit faster to capture the four-year window of opportunity open to it and secure their space in the market. Business schools will no doubt have a field day analyzing why telepoint failed. There were a number of other factors. The main one was the cross subsidy of cellular radio handset prices. This gave a false impression of the relative cost of ownership between cellular and telepoint. Another was that the UK market alone did not provide the economic basis for the telepoint technology. I did what I could for the telepoint players to come together on a single telepoint technology and widen the number of countries interested in allowing the service.

For telepoint to succeed it would have had to ride on the back of a quite independently driven cordless telephone market, either in the residential market or the business market. But industry was slow to come to market with cordless Private Automatic Branch Exchanges based on CT2 technology. In part this was as a result of underestimating the complexity of the network aspects. For the domestic market the CT2 cordless telephone and base unit came to market retailing at £300. But the first generation analogue cordless telephones were already retailing at well under £100 in high street shops driven by cheap imports from the Far East. Even when Rabbit was introduced by Hutchinson the price was still up around £200. It was clear at such price levels there would not be a mass market of domestic cordless telephones upon which a public telepoint service could build out from.

The other glaring deficiency of Telepoint was a lack of investment in a dense network of public telepoints. At its peak there was 1 telepoint for every 80 BT public telephone boxes. This was summed up in a cartoon published in the FT at the time

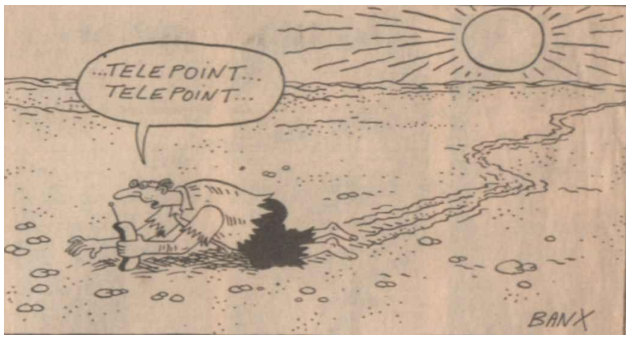


Figure 37 – Banx cartoon in the FT sums up the public perception of telepoint as a convenient mobile service

Telepoint was a lost cause.

Notwithstanding the concerns on the impact on Telepoint, the "Phones on the Move" consultation document got a favourable press. It was generally well received by industry. By the end of April we received some 17 substantial responses and 12 smaller ones. These divided broadly into those who envisaged a personal communications network based upon some form of low powered cordless

telephone and the other based on a hand portable based GSM type network that could also accommodate car phones in the early phase. Although a lot of work went into the submission there was no surprises. The best response from a purely technical viewpoint came from GEC. The one from Mercury was very weak. Their proposal had not been thought through.

As part of preparing for the "Phones on the move" consultation publication I had contacted the National Radiological Protection Board. They are the UK's acknowledged authority on medical effects of radiation on the human body. They were given the sort of power levels that personal radios would emit at the new 1800 MHz frequency ranges. The National Radiological Protection Board replied that at the sort of low powers I'd quoted they did not consider there to be any risks. This statement went into the "Phones of the Move" document.

In the GEC responses to the consultation was a very good analysis of the state of knowledge on the health issues arising from the use of low powered radio sets close to the body. In it they showed that some radio designs with internal as opposed to external aerials could emit local power concentrations that came close to the recommended safety levels. It was a sort of local focusing effect similar to a magnifying glass. Since it was still under the limits there was nothing of concern. But I did pick up upon this and quietly commissioned some work with Bradford University to see if the mobile radio industry would be stopped in its tracks if the medical authorities suddenly demanded safety power limits to be lowered significantly at some point in the future.

Bradford University explored two designs for me. The first was a "stalk" aerial that would pull the radiating element of the aerial well above the head. The comic cartoonists would have loved it. The second was a type of aerial called a phased array. My idea was to arrange the phasing so it would add in the far distance where the power was needed but cancel close to the aerial where it was not needed. The report came back showing that the two designs could bring the power down by a factor of 10 and in the case of the phased array by a factor of up to 100 over a large volume of the head. This gave me the assurance I needed. We could move responsibly towards this mass consumer market with ample safety margin to accommodate any future changes in medical opinion.

Later the industry was to find an even simpler solution with the so-called hands-free kits that comprised an ear-piece and microphone that kept the mobile phone well away from the head. But this was not to stop the media from whipping up a massive health scare two years later and I will come to how this arose in a later chapter.

CHAPTER 20

FROM CONSULTATION TO COMPETITION

The intention of my licensing colleagues was to follow the consultation phase by a competition run by OFTEL to select two Personal Communications Network operators. This was envisaged to have been completed by the end of the year. Pressure came from Lord Young to speed up the time scale. We met with OFTEL officials to discuss how this might be done. It was there that we first heard of OFTEL's wish for Mercury to be given one of the licences immediately. My licensing colleague Peter Smith and I objected. We argued that Mercury should have to compete like anyone else. This would stimulate them to improve their proposals.

There followed a meeting between Sir Brian Carsberg and Lord Young. In advance of the meeting Lord Young indicated his support for our advice for no special treatment for Mercury. But at the meeting Sir Brian Carsberg argued with some force in favour of giving Mercury a bye in the competition. He said that we had already set this precedent when Cellnet and Vodafone had been chosen for the UK's first cellular radio operators. British Telecom (the partner in Cellnet) had been given a licence in advance of the competition for the second licence that Vodafone had eventually won.

Figure 38 - Sir Brian Carsberg was worried about the competition implications of Mercury not having a mobile radio licence

Sir Brian argued that Mercury was the Government chosen vehicle to apply competition to BT. The importance of mobile radio was such that he doubted if Mercury could compete effectively if its portfolio lacked a mobile radio dimension. Alastair Macdonald and Peter Smith were swayed. I was less than happy largely as I had run the consultation round and told all the companies that there would be two licences on offer. I insisted that Sir Brian Carsberg put his recommendation to the DTI in writing. I could see from my DTI colleagues' faces that they thought I was pushing my luck a bit. But it was later to save the DTI's reputation.

After Lord Young left the DTI he joined the Board of Cable and Wireless which had been a beneficiary of his decision to give Mercury a mobile radio licence without a competition. A leading Sunday Newspaper claimed that something improper had happened at the DTI in respect of this decision. An inquiry followed and the letter I had insisted the Director General of Oftel send to us provided the audit trail to an absolutely clean bill of health.

The decision on Mercury led onto further DTI consideration of the number of licences. My licensing colleagues felt that a competition for just one licence might be seen by industry as an anticlimax having been promised two.

Radiocommunications Division expressed concern on whether they could find enough spectrum for the new total of 3 new mobile operators. Already some of the spectrum at 1800 MHz was blocked by the existence of some Home Office Police and Fire Service point to point radio links. I said to my

Radiocommunications division colleague at one meting with Lord Young that I couldn't see how anybody could have been so stupid as to have put police and fire radio links in this band. Lord Young must have wondered what brought on this outburst. It was a private joke. Some eight years earlier I'd been in charge of these services in the Home Office and secured this allocation for the Home Office from the same colleague Mike Goddard.

My view on the number of PCN licences was that I did not think the UK market would bear three PCN operators ie a total of 5 UK mobile operators. I lost that argument.

The competition then proceeded. A number of powerful consortia were formed including many international companies. We were particularly generous in allowing bids from US Companies despite their own laws forbidding UK companies in the USA more than a 20% holding in any company using radio frequencies. I was some distance from the competition. This was run by OFTEL. However I did remark to a colleague at the time how on earth British Aerospace was going to feed so many capital hungry businesses as aerospace, motor cars and telecommunications.

A musical chairs in the industry followed with the very capable John Carrington from BT finished up in Cable & Wireless who were the leading shareholders in a PCN consortium with Motorola and Telefonica.. He brought with him Peter Carpenter and Robin Potter from BT Research Laboratories. So much for my concerns on competence at Mercury! They now had a first rate team.

My next mission was the European Commission. A few months earlier one of my staff had run into a Commission official who expressed misgivings at the UK going off on its own in this way...again! The Commission had in mind a frequency conference in 1992 to find some common frequency channels for a third generation system being introduced around 1996. A presentation was fixed up with Commission Officials via our representation in Brussels. The presentation was well attended. It was also remarkably warm. What was demanded of us from Christian Garric was that we use the European Telecommunications Standards Institute (ETSI) to make the PCN standard for us. He also wanted us to share our strategic perspective with our colleagues in Europe. He said that the rest of Europe viewed the UK telecommunications market as a sort of laboratory. The more successful UK outcomes (eg our mobile radio policy) offered Europe a view of the best way ahead for them. *This was an endorsement of our efforts to engage with the rest of Europe.*

Asking ETSI to make the standard for us had its advantages and disadvantages. The disadvantage was that we lost control on the time scale and outcome. The advantage was that it made information on the specification widely available and understood by industry. This would encourage competitive supply. It also helped to reduce our risks of being so far out in front and leap-frogged. This might leave us isolated in Europe on a standard not attracting the same economies of scale. This analysis reinforced my belief that our best interest and that of Europe was served in basing personal communications networks on GSM technology.

The move of the PCN standards making into ETSI proved tougher than I had expected – particularly taking into account that I was by then Chairman of its Technical Assembly. But nobody in Europe understood what personal communications networks were. This was evidenced by the collapse of the Vodafone share price which I come to later. Industry was also finding the development burden of bringing GSM to the market straining their skilled resources and money. They were not looking for anything new to come along quite so soon.

When it came up in the Technical Assembly for decision I found myself in a slightly awkward position. I got support from Alcatel who recognised the strength that the use of GSM technology in new frequency ranges would bring to Europe. There was also some opposition and particularly from Philips. I was in the chair. My style of chairing these large assemblies of several hundred delegates did not help. My normal approach was to let all viewpoints express their view. I would then see where the balance of opinion was and then test the meeting by suggesting there was wide support for proposition “x” and ask whether this was a view everyone could support?

On this occasion there were very few interventions. In essence three people had shown strong support, one strong opposition and most keeping their heads down. When I got to the bit about...there appears to be wide support for ETSI taking on the PCN standardisation task I could see the Director of ETSI Karl-Heinz Rozenbrock adjust his glasses several time to try to see where all the raised hands were I had obviously seen. As my luck would have it nobody sustained their objections.

This outcome was in the best interest of ETSI. It strengthened their GSM standard and showed that it could respond to the requests of Member State Governments for standards. This didn't stop some murmuring that I'd ridden the decision though from the chair.

The UK's PCN initiative also created a technology revolution in linking remote base stations back to the core telecommunications networks. One of the dreams most mobile radio engineers have is a mobile radio base unit on every lamppost. A nice metal or concrete structure exists. It is fed with electricity. It illuminates where people walk. One reason why the idea has never got anywhere is that each lamp post has to be linked back to the telephone switch. The cost of these communications links starts to be a dominant cost element in the system. It occurred to me that Personal Communications Networks at 1800 MHz would start to accrue this sort of overhead. Several submission to the "Phones on the Move" consultation document had brought out this point in varying degrees. If Personal Communications Networks came to heavily depend upon BT local connections to connect their base stations it would leave BT to set a price floor on local mobile telephone calls. That couldn't be good news for competition with the local copper wire telephone loop.

My colleagues in the Radiocommunications Division were pressed by me to find some radio spectrum to allow the Personal Communications Networks operators to provide their own radio links to their base stations. Since my concept was short distances between base station sites this would allow frequency ranges to be used in the mille metre ranges of the spectrum. For many applications these ranges are not suitable due to high signal loss during heavy rain. But with well focused aerials, short distance and perhaps daisy ring configurations they could be successfully used. I backed this up with data showing the cost of linking by other means. They agreed. Spectrum was found at 38 GHz. I think they were quite pleased to find a viable application to open up wider commercial use of these very high reaches of the radio spectrum.

Figure 39 – Mike Goddard, DTI radio spectrum manager, finds the spectrum to fuel the mobile revolution

Sir Bryan Carsberg added his own creative contribution into the personal communications network intervention. The new PCN operators were to get more spectrum at 1800 MHz, paid lower unit radio spectrum annual licence fees and received a higher mobile call termination rate than Vodafone and Cellnet - all to offset the high cost of the much larger number of base stations these new networks would require.

The OFTEL recommendation on who should receive PCN licences was put to the DTI. I was disappointed that this hadn't included GEC but having given the job to OFTEL of choosing the winners there was nothing anyone in the DTI could say on the outcome. My opinion was based on the technical quality of their earlier submission.

Whilst not being personally involved in the selection process a copy of the proposed press announcement from our licensing colleagues passed across my desk. It was careful to point out the space still left in the market for telepoint. I checked it for its technical accuracy. That was all.

Just after it had gone out I saw a copy of a note from Alan Marshall in the Radiocommunications Division. He expressed concern on the effect of the press release on Vodafone. What had come across to him was that it seemed all bad news for Vodafone. I had not read it from this viewpoint possibly because, like everyone else, the concern had been the weak position of telepoint. Vodafone were the strongest player in the market.

Two days after the announcement of the PCN licence competition winners on the 22nd June 1989 Ted Beddoes, now back at Vodafone, faxed me. Could the DTI endorse a press release they were proposing to send out to their City analysts. This was simply passed on immediately to my licensing colleagues who were now driving the policy.

The Vodafone press release was trying to make clear that they could also introduce Personal Communications Networks but at the 900 MHz frequencies. My licensing colleagues were not sure it was the DTI's role to argue Vodafone's case with their City analysts. There was a delay. The Vodafone share prices started to slide. City analysts started to phone the DTI. Vodafone was saying one thing and the DTI simply rehearsed the competition mantras that came across as something different.

A letter from Sir Ernie Harrison came in on 29th June demanding clarification. The letter contained some differing interpretation from that held by the DTI. It all centred around what exactly Personal Communications Networks were. There was a further delay. By this time the share price was in free fall. By the time the DTI had got to the point of sorting out a line the damage was done. The share price had dropped by some 30%.

The effect on the Vodafone management was traumatic. They had lost personal fortunes in share options measured in millions. They also believed that plans for overseas expansion on the back of share deals had been scuppered. Sir Brian Carsberg was quite sanguine about the fall in share value. He believed that the price was inflated by a speculative element that was due to burst anyway. I had regrets. If my colleague in the Radiocommunications Division had spotted the unintended down side of the press release why hadn't we? Vodafone must take some of the blame. Days were lost over a misunderstanding with words. It wouldn't have taken much for one of them to come up to London to sort matters out around a table. Whatever the rights and wrongs and without telling my colleagues I went down to Vodafone several months later and personally apologised to Gerry Whent on behalf of the DTI for being less than helpful.

After the successful licensees were chosen in late 1989 I set myself the task of trying to steer all the PCN licence winners towards a common standard and was very explicit that this should be GSM. Bullets started flying from all directions. This was "intervention". I was trying to "pick winners". It was a matter that should be left to market forces. We had to be technology neutral.

I never bought into the thesis of regulatory or government “technology neutrality” when it came to national infrastructures. The technology defined what the nation finished up with. We had influence and not to use it when things could travel in a direction that would leave the UK with an inferior infrastructure seemed itself to be a decision – and a wrong one.

On this occasion I had the support of my colleagues in TP Division who were in the policy driving seat, the industry itself who fell behind my idea remarkably quickly and most important, the support of the Secretary of State Lord Young.

Although I won that battle (and it was the right call) I was to lose the war over “technology neutrality” of governments and regulators for telecommunications infrastructures in general.

A new breed of economic regulator was emerging focussed only on the short term interests of consumers

and taking decisions with wilful blindness to the technology consequences – the result was to make the regulator process like a loose canon sliding over the deck of a ship as far as technology outcomes were concerned. This was only possible without serious consequences due to the overwhelming momentum that had built up behind GSM. To all these new kids on the block the market seemed to deliver all the benefits of network standardisation without anyone having to lift a finger. Magic indeed!

The war we did win overwhelmingly in 1989 (and rightly so) was the case for mobile network competition. Both Orange and Mercury One-2-One added huge momentum to the UK mobile radio market and for a while it was Europe's largest mobile radio market.

Orange focussed on building up their brand and investing in a really good network. In parts of the country they had a better network than O2 and Vodafone and this underpinned their brand value. They were probably the most successful GSM 1800 MHz operator in Europe.

Mercury One-2-One went for a different strategy. Eric Sharp left Cable & Wireless and the senior management changed. John Carrington moved to found C&W mobile and Richard Goswell took over at One-2-One. The C&W Board rationed the capital they were prepared for Mercury One-2-One to invest in their new mobile network. They launched their new service with a network only covering London out to the M25. It was a big mistake for which they never fully recovered. The team under Richard only stopped this becoming a disaster with their ground breaking “free calls evenings and weekends”.

One of their marketing executives told me at the dinner to celebrate the launch of the new Mercury One-2-One service that they took advice from a leading PR guru on how they could get the public to take any notice of them with such a poor network. The guru said that their were only two words in the English language that were guaranteed to grab the public attention “sex” and “free”. Since “sex” was quite inappropriate – this left them struggling to find how best to work in the word “free” into their proposition. They did it in style and undoubtedly, in the process, advanced my vision of the mobile phone as a mass consumer product by several years.

The “Personal Communications Network” industrial intervention was decisive and comprehensive:

- Government set a well judged strategic vision for a mobile radio infrastructure that would comprise a very high density of base stations (needed to support a consumer mass market in mobile phones)

- It released new mobile radio spectrum at 1800 MHz tied to this vision

- It directed the technical standard towards a GSM technology back-end to ensure very early economies of scale and inter-operability

- It intervened to bring down the back-haul costs of linking such a high cell density mobile radio network through releasing the 38 GHz spectrum

- It tilted the playing field to get the economic conditions right for investment by giving more spectrum at 1800 MHz, charging lower unit radio spectrum annual licence fees and mandating a higher mobile call termination rate than the two incumbent mobile radio operators

- It harnessed the competitive energy of the private sector to deliver the vision

It was like strapping a giant booster rocket to GSM that accelerated the passage of the mobile phone towards a mass consumer market.

CHAPTER 21

GSM'S EXPANDING UNIVERSE

Most technology revolutions have been in the making for quite a number of years before they reach critical mass (the tipping point) and explode upon the world. So it was with GSM and even more so for PCN at 1800 MHz.

It took a long time for my colleagues in Europe to work out what the UK had done with Personal Communications Networks at 1800 MHz in 1989. They were looking for some hidden technological advance. They couldn't believe all the hype when all they could see was simply another GSM network but running at much higher frequency ranges. I attended several conference to point out that the real revolution was the “regulatory gunpowder” including releasing enough spectrum to open up an unimpeded road to a mass consumer market and the high degree of competition we had introduced that would drive that revolution forward with increasing speed and force.

In Germany Government officials had their own reason for wanting to believe that Personal Communications Networks was just another GSM network at 1800 MHz. The network operator had been separated off from the Ministry in the form of a commercial company called Telekom. This changed the Ministry thinking towards issues such as creating more competition in the German mobile radio market. If PCN was something distinct then, by German law, Telekom had to be given a share of it and that would diminish the scope for new competition. But Telekom were a powerful lobbying force. It was not completely in the bag.

Another visit had planned for a DTI Secretary of State to Germany. But this time it was Nicholas Ridley. A bit of helpful lobbying on using GSM at 1800 MHz seemed useful so we put a brief up on the PCN issue.

A curt note came back from his Private Secretary that he did not understand it. One of my colleagues went up to brief him and got as far as the revelation that it was possible with a mobile phone to make a call to the phone on his desk. Mr Ridley had got mobile phones somehow mixed up in his mind with walkie talkies. The state of Nicholas Ridley's technical education didn't look promising in terms of him persuading the German Minister of the merits of GSM for Personal Communications Networks.

When we got to Bonn we went straight to the Ambassadors residence for lunch. The lunch was with some very senior German industrialists and officials. There followed a fascinating conversation on the merits of a free market economy ably hosted by our Ambassador Christopher Mallaby. I had met the Ambassador when he was Head of Chancery in Moscow in 1976 and I was a young Home Office official over for a meeting with Russian officials on broadcasting satellites. I was surprised he still remembered me. (I was later to bump into him briefly at Buckingham Palace when I was collecting my CBE and he was to be knighted – which added to the pleasure of the occasion).

After the lunch Mr Ridley retired to his room. He came down five minutes before we were to leave for the Telecommunications Ministry. For a few moments we were alone. It was my last chance for a top up briefing. Within a minute we were in animated conversation. He was genuinely interested. The Ambassador joined us. He proposed we continue the conversation in the car.

The ride to the Ministry found me in the back of a Rolls Royce squeezed between the Ambassador and Mr Ridley trying to keep up with Mr Ridley's demands for ever more detailed explanation of how Personal Communications Networks worked.

When we arrived at the Ministry Mr Ridley was masterly. He explained to the Germans the key features of Personal Communications Networks and why the GSM technology was the best choice to go for. When he finished he turned to me with a huge grin and a look on his face that could only be read - how did I do? I gave him a discrete thumbs-up sign.

The Germans adopted our Personal Communications Network technology (but without doubt for their own reasons) and licensed a new operator.

Other parts of Europe moved to follow the Germans. The EU Commission then swung behind the duopoly model and it became EU policy that there should be a second GSM mobile radio operator in every EU country. In most European countries a third mobile operator followed shortly afterwards.

In general this has been the stable model market structure in Europe with the third player into the market struggling. The exception has been Orange in the UK where their commitment to network coverage and genius for building a great brand pulled them at one stage into market leadership in the UK.

The value of these new mobile radio entrants being channelled towards the GSM technology cannot be over stated. Whilst the incumbents still had their analogue networks generating revenue and growth the new entrants were entirely dependent on new GSM mobile handsets coming on stream quickly in order to drive any traffic through their expensive new networks.

Mannesmann in Germany probably did more than any other mobile operator in accelerating the development progress of GSM mobile phones. They had rolled out a £600m network across Germany but could not lay their hands on a single GSM mobile. The mobiles were tied up with teething problems and lack of type approval equipment. At the first of the GSM Congresses in Cannes George Schmitt from Mannesmann Mobilfunk vented his frustration on the supply industry by giving out badges implying that GSM should now stand for “God Send Mobiles”.

The second GSM operators put huge pressures on the incumbent mobile operators to accelerate the roll out of their GSM networks. Coverage of GSM rolled out well beyond that provided by analogue networks. This was critical in allowing simple “GSM only” mobile phones onto the market and not requiring more complex and expensive dual standard mobile phones (arguably a mistake that occurred with the introduction of 3G networks in Europe).

Eventually the vital GSM mobile phones arrived on the market. The very first type approved GSM mobile in Europe came from a UK supplier called Orbitel - the joint venture between Racal and Plessey. The UK approval body (BABT) pulled out all the stops to make this happen. The mobile was the size of a ladies handbag and the battery lasted for 6 hours on standby and only 30 minutes talk time. I made a GSM call in 1991 on this GSM mobile but had to drive to Putney hill to find some GSM coverage. The phone was soon left behind in the mobile race in Europe but according to Orbitel (at the time) continued to sell in some parts of Africa where its huge size turned out to be a status symbol.

Figure 40 – Europe's first officially type approved GSM mobile, the Orbitel TPU 900

The investment levels injected into the venture were far too small to make a sustainable mobile business. The business was eventually sold to Ericsson.

The Motorola GSM version of their “brick” (their model 3200) was launched in 1992 with much more success. It was essential to Mannesmann's getting their GSM service off the ground. It is the mobile phone most people in the world associate with the launch of GSM.

This was the period when companies had to make strategic choices where to put their resources. Motorola was to make one of the great strategic errors in mobile phone history. The prevailing view in Motorola over the critical period was that digital mobiles would consume more power than analogue mobiles and as such they would be heavier, cost more *and be largely limited to use in cars*. In fact Motorola had even tried to persuade Mercury One-2-One to abandon digital mobile radio in favour of narrowband TACS.

Motorola hedged their bets on GSM but much more of their energy went into their new very small analogue mobile phone – their MicroTac, an amazing piece of analogue technology for its time. The company view was that the analogue technology would win the mobile handset race in the early 90's and placed their bets accordingly. Europe had never got its mobile radio act together in the past, so it was not an irrational decision – it just turned out to be the wrong one.

The Motorola MicroTac was launched in April 1989 into a world of rapidly expanding analogue mobile networks right across the world. A huge hidden development overhead with this strategy was all the re-development that was needed to make it work with the plethora of quite different analogue mobile radio technical standards and frequency channels.

Figure 41 – Motorola backs the wrong horse, as amazing as is MicroTac analogue mobile phone was

Nokia, on the other hand, effectively bet the company on GSM. Under the leadership of Jorma Ollila the company moved from a struggling highly diversified industrial conglomerate (1991 was one of its worst years financially) to a narrowly focused mobile radio company.

In 1991 they bought a small UK enterprise called Technophone for £34m. Technophone was started in the UK in1984 by Nils Martensson, an ex Ericsson engineer. As early as 1986, with the help of a DTI grant (mentioned in an earlier chapter), they were making the world's smallest analogue mobile phone under the brand name Excell. By 1991 Technophone was Europe's second largest mobile phone manufacturer by handset volume after Nokia. After the take-over the Technophone UK facility became one of Nokia's R&D centres and added significantly to their know-how for making mobile phones much smaller. These technology assets were then harassed to Nokia's better international distribution to position Nokia as the “Number 2” mobile phone supplier in the world after Motorola.

Nokia launched its first GSM mobile phone, the Nokia 1011, on 10.11.1992. The timing was perfect and the bet well placed. Like a surfer, with a mixture of skill (inspired intuitive user interface) and luck, they were lifted by the rising GSM tidal wave to global dominance. From 1991-2000 Nokia’s number of employees doubled, net sales grew ten-fold and operating profit grew a hundred-fold.

A tale of two company strategies around the choice of technical standards. By 1997 GSM had up-ended the global mobile phone industrial landscape. Motorola lost its crown to Nokia and was never given the space to re-claim it.

Figure 42 – Nokia's first GSM mobile phone that fired the gun on the GSM technology mobile phone race

The Nokia 1011 fired the starting gun on a technological race every bit as ferocious as the one driving the PC forward. In the case of the mobile phone it was less about processing speed and memory but battery power consumption and the leaps in technology were no less spectacular. Every 18 months new smaller mobile phones were coming onto the GSM market with longer talk times and standby times for less battery size and rendering earlier mobile phones obsolete to the point of being unsellable. The mobile phone industry has been under this relentless pressure ever since – a principal characteristic of a consumer market. It would be wrong to convey that Motorola had lost the plot entirely. For example in 1993 they brought out their GSM version of micro tac in 1993 that was only slightly bigger than the analogue version. It contributed greatly to PCN breaking through. But they had lost the initiative and relative momentum to Nokia.

For the next 10 years GSM mobile phones were generally 18 months ahead of any competitor mobile technology in terms of performance and functions. It was a matter of commercial common sense that if development resources were scarce, then getting a new feature on a GSM phone opened up a much bigger market than getting the same feature on the phone using another mobile phone technology. The competitive dynamics of the GSM handset market was every bit as important in expanding the GSM universe as the GSM mobile networks themselves.

The large Japanese multinational companies were completely blind sided by the emergence of GSM. They were tracking US digital cellular radio standards closely and putting a lot of focus on a better version of telepoint called PHS (Personal Handyphone Service). They thought the technology would be a winner in emerging markets in Asia and had time on their side. In a blink of an eye GSM had swept into China and most of the rest of SE Asia. It was game over for the export prospects for PHS. Japanese industry found themselves having to grapple with a technology that was quite new to them and spent a decade running to catch up with companies like Nokia in a product area that should have been a competitive strength for their giant consumer electronics companies.

A myth has been fostered in some quarter that GSM was an exercise by European governments in protectionism for their local manufactures - with an eye to helping them to global dominance. The truth is somewhat different.

First the global dominance point. There was no ambition in the 1980's amongst government officials to export GSM outside of Europe. The challenge in getting the service rolled out across Europe was so monumental that it would have been an unwise distraction. The survival of GSM was far from assured. I had included a paragraph in the GSM MOU about working cooperatively to provide advice to operators in other parts of the world who were considering using GSM. This was largely based on the philosophical commitment of all telecommunications officials towards international cooperation.

What was more relevant in GSM being taken outside of Europe was the political battle of philosophies that took place in setting up the European Telecommunications Standards Institute (ETSI).

This philosophical battle took place at two levels. The first was whether the new European standards body for telecommunications was to be a closed club of European monopoly network operators (as CEPT had been) or fully open to the supply industry and for that matter any interested party.

The second battle was whether ETSI was a vital weapon in defending the Single Market as Fortress Europe or be open to the world. Traditional protectionism was pitched against globalisation and liberal free market ideals.

In setting up ETSI in 1987 I found myself pushing at an open door with colleagues from Germany, France and elsewhere to make ETSI open to all interested parties within Europe. But the battle between regionalism versus globalism was more hard fought. Membership of ETSI was limited to entities from CEPT countries and most companies and governments wanted it kept that way.

The period 1988-1992 was a transition period for Europe from the prime aim being a regional market to the prime aim being Europe as part of an open global markets. By 1988, in most northern European countries (including Germany), economic liberals were starting to gain the upper hand and France was wavering. By the time the Single Market had been completed by 1992 the world had left behind notions of closed regional blocks and marching towards full globalisation.

This shift of political strategic trade priorities was mirrored within ETSI. In 1988 I had an uphill struggle to move ETSI opinion to opening up our technical working groups, including GSM, to any companies outside of Europe. The concept of regional standardisation blocks was too prevalent and particularly Japanese technical standardisation bodies were not open to anyone outside. For a while I gave up.

Then I met Bob Horton, an official from Australia, at a meeting at the International Telecommunications Union in Switzerland. He expressed worries about the trend towards regional standards bodies and Australia being shut out of all of them.

It occurred to me that Australia had historically followed the trends of European technical standards in telecommunications – why would we want to push them into the arms of another regional block? I fought a very hard battle in the Technical Assembly to push through a proposal to open ETSI up to Associate Members. They would have the same rights as European members but their votes (if ever a vote took place) would be recorded separately to reflect the affected markets. Eventually, with support from some industry members, but not all, I got agreement to Associate members on a case by case basis and Australia would be invited to become ETSI's first associate member.

It was not that Australia had been particularly pushing for this. So I telephoned Bob Horton and a meeting in Melbourne was set up with the chairman of their national telecommunications standards committee. Between a hectic schedule of other meeting I flew out to Melbourne, had a 2 hour meeting with Australian Officials, wrapped up the agreement and flew straight back to London – hoping my body would not notice the time shift over such a short period.

Opening ETSI to members from outside Europe sent the right signals around the globe to any mobile operator (and their governments) that the GSM technology was to be shared and they would have a stake in the evolving specification of the ETSI GSM standard and the right to participate.

By 1992 the philosophical battle to open up GSM standards making to all interested parties had been largely won.

The politics of European protectionism for local suppliers was also transformed over the same period. In 1985 there can be found a very specific protectionist text in the tripartite digital cellular cooperation agreement between France, Germany and Italy. By 1992 the only favour local European industries got with GSM from governments was involvement in the preparatory phase, the opportunity of a huge new market and a time to market advantage that came with the sheer speed of the GSM initiative.

The two major European companies that were sharp enough and fast enough to recognise this were

Nokia and Vodafone. There were also start-up enterprises with the same fine judgement – the most notable was Mobile Systems International founded by the engineer and entrepreneur Mo Ibraham. None were beneficiaries of special favours or protectionism from EU governments.

The involvement in the preparatory phase probably did favour the European big network companies due to the sheer complexity of the network side of GSM but that was the extent of it.

However in this new global world order "government barriers to trade" were swept out and "private barriers to trade" from Intellectual Property Rights were allowed to sweep in. In this new game Motorola, *a US company*, had a very good a fist of cards in this respect. They were better placed than many European manufacturers who had grown up in nationally protected markets. The horse-trading on GSM patents took place entirely between industrial companies with no government involvement. There is anecdotal evidence that essential patents were used by some of the big companies to limit market entry of new GSM mobile phone suppliers in the early years of GSM.

This should lay to rest the myth that GSM was an exercise in protectionism by European governments.

What this analysis of GSM also helps to clarify is the space where European Governments today can help local industries – namely to create new market opportunities around an emerging technology, with full involvement of local suppliers in the preparatory phase, and doing this at the fastest possible speed. Then it is down to the suppliers to make something of the opportunity and take their newly acquired expertise into the global market.

This is exactly what happened with the internationalisation of GSM. The real graft of taking GSM outside of Europe came not from government officials but the large European systems companies such as Ericsson, Alcatel, and Siemens etc. We were occasionally asked for political support. For example I received a government delegation from China in my DTI office to talk about GSM but the sponsors of the visit were Alcatel.

The first export of GSM outside of Europe came as a complete bombshell. One day I got a telephone call from Australia. It was Bob Horton. Why had the DTI blocked an export licence for the GSM to Australia? he demanded with obvious irritation. That was the first I knew that anyone was exporting GSM to Australia. I was mortified and promised to look into it for him.

It turned out that the UK had finished up as custodians of one of the GSM encryption algorithms. In those days this fell into the same category as war munitions in respect of export licences. I did not get a lot of insight from the officials in our export-licensing department. They simply had a book of instructions that said that GSM was limited to CEPT Europe. Australia was not in CEPT Europe, so no export licence.

It was really embarrassing that the first country to be refused an export licence was such a good friend as Australia. My next port of call was GCHQ to tidy-up this misunderstanding.

This bit of housekeeping cleared the way for GSM to move smoothly outside of Europe and it did so with ever gathering momentum.

Thailand much to my surprise not only went for a GSM but also did it at 1800 MHz, the first emerging country to do so. A few years later I hosted a reception for a visiting Thai delegation led by a Minister. They were much more on the ball on all aspects of mobile radio technology than many of our DTI and Oftel officials.

The last big influence I had over the internationalisation of GSM concerned international roaming. It took me all of 30 minutes to accomplish and was probably as significant to the success of GSM with the global travelling public as the previous 3 years I had put into the GSM technology and commercial strategy.

It had always been the DTI intention for the GSM MOU to be a purely commercial agreement between the mobile network companies. I viewed the government's role as largely accomplished. It was important to

good industrial policy to know when governments should move out of the way and let the private sector take the lead. But Germany, France and Italy had pressurized us into signing the MOU and so in good faith I attended the first few meeting of the MOU signatories. The first meeting objective was to get Armin Silberhorn elected as the first MOU chairman. Beyond that I was there just to listen.

It was in this frame of mind that I listened to the first discussions on the principles for charging for international roaming ie people taking their GSM phones with them abroad. The Italian telephone company were taking the lead in the discussion and putting forward the model that was used in many countries for paging services. For paging service you paid a monthly subscription of say "x" to be paged over a single city. Then you paid "2x" if you also wanted to be paged in a second city. To be paged over the whole of a country would cost a great deal of money. There was a certain logic to this since the product a mobile or paging company was selling was "mobility".

The Italians proposed the same principle was used for GSM roaming. On top of this, of course, would be the mobile phone call changes themselves. Other mobile phone operators around the table were nodding vigorously.

My mind wondered over how this proposal might play out in the DTI. Robert Priddle would sign off my expenses so I would have to persuade him what level of GSM subscription I would be allowed to buy into. He would probably approve Belgium since I was forever going to Brussels. He would suck his teeth at the thought of Paris or Bonn and beyond that I did not stand a chance. I then scaled this up across all the organisations with people who travelled.

It was obvious that several things would happen if the paging tariff model was applied to GSM. There would not be a lot of GSM roaming - so what was all the point of aligning the technical standards. Second, since the competition authorities would not allow the mobile phone operators to discuss the actual prices to be charged - a very high subscription priced operator in say Germany could suppress roaming call revenues to other European operators from visiting Germans. Finally I thought that a mobile phone would likely prove of most value on unforeseen trips but they would be typically the countries that were not part of the subscription.

It was not really my role as a government official to comment since this was a purely commercial matter. But it just looked to be wrong.

During the coffee break I approached Armin Silberhorn with my misgivings. He said that he could see my concerns but what was the alternative? My proposal was that "the whole of Europe" should be the normal default roaming area. I asked if I intervene would he supported me? He agreed.

When the meeting recommenced I asked for the floor. My speech was very political. Officials and Ministers from all the CEPT countries had not just gone through hell to break down the technical barriers to roaming across Europe only to see our tariffing colleagues put tariff barriers back in their place. Only for the second time (the first being in Berlin) I thumped my fist on the table as I finished my intervention with the cry - "one subscription, the whole of Europe". Only I got a bit carried away with the rhetoric and this time had misjudged the force with which my fist hit the table. All the coffee cups around the room jumped up and fell back with a really dramatic clatter. This loud clatter was the unintended cue for Armin to come in with full fury demanding there was to be no backsliding on a European wide GSM roaming area. It won the day.

It was part theatre but mostly passion on the part of both of us to deliver the vision of what we believed Europe should be aspiring to. This became the basis of GSM roaming across Europe and then to most of the rest of the world.

This was not the last of the barriers that had to be knocked down to make it an everyday thing for people to carry their mobile phones when they went abroad. The airport authorities in several countries took the view that mobile phones were a security threat. My early experience of carrying my GSM phone was to have it taken away at both Munich and Schiphol airports, put in an envelope, handed to the cabin crew

by security staff and given back to me in London – evidently deemed to be every bit as dangerous as a gun.

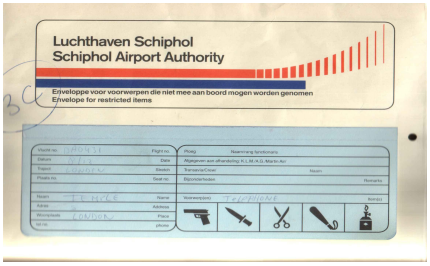


Figure 43 – The packet my GSM mobile phone was put into by airport security at Schiphol

It took another call to Armin Silberhorn to gently let Munich know that they were now part of the EU Single Market. The GSM tidal wave swept these restrictions away.

Taking Europe (and later the world) as a single roaming area was another of the driving force for GSM to be adopted around a world. It chimed well with a world that was already on a path towards globalisation. It has been a boon to business travellers and tourists alike and in a few instances saved lives.

One of the first instances of the safety benefit from GSM was reported in a newspapers a few years after GSM was launched. Some German skiers in the French Alps were caught in an avalanche. In earlier times they would have left their “national” mobile phones at home as of no use. GSM changed everyone's habits and made it a natural thing carry mobile phones everywhere. They were found by France Telecom engineers position fixing on their GSM phones.

In September 1999 The Sunday Times revealed that one of their reporters, Jon swain and his cameraman Chip Hires, had found themselves ambushed in the Far East by gunman and fled down a bank and into the undergrowth. Jon Swain called for help on his mobile phone.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that would kill me

3 Swain and Hires run away from the car. One of the gunmen fires shots in their direction as the pair dive over a bank and scramble for cover in the undergrowth

4 Swain calls for help on his mobile phone, while Hires tries to signal to a military helicopter buzzing overhead by flashing light off a piece of broken glass

Figure 44 – Sunday Times reporter's dramatic endorsement of the GSM roaming agreement

The amazing thing was – a GSM mobile phone network happened to be on hand to accept his call.

Another event that caught the headlines later was a boat that had lost power and its ship-shore radio and found itself drifting in stormy waters off the coast of Indonesia. A girl on board saved the situation with an SMS message back to her boy friend in the UK. Via a long chain, the local rescue services were alerted to rescue them.

At the other end of the scale from these dramatic headline stories have been millions of people getting themselves out of short term fixes in foreign parts by virtue of the very simple thing of getting out their GSM phones, no complexity, no hassle, not even having to think about it...just making the call. There is an even larger number of parents, spouses, friends etc having the peace of mind knowing that the person they care about has with them a GSM mobile phone when travelling around the world.

It took more than just alignment of technologies to achieve this but a new culture embedded from the very outset of GSM that nothing less than “the world” would be the service area for the international roaming customer – a revolution in the way people thought about mobile radio.

CHAPTER 22

UNINTENDED CONSEQUENCES

When big revolutions occur there can be unintended consequences. The first of these emerged around 1989. Somebody in Oftel, who wore a hearing aid, was playing around with a new digital cordless telephone called CT2 and noticed a buzzing in his hearing aid when the cordless phone came too close to his ear. He reported this to the Radiocommunications Division who were not quite sure what to do and brought it to my attention. I asked British Telecom Research Laboratories to do some tests for us. While they were about it they were also asked (as an after thought) to look to see if the same effect occurred with GSM mobile phones as they tended to work at power levels 10 times higher than cordless phones.

They sat a deaf person with a hearing aid in a special room that was deadened to external radio waves and the digital phones to be tested were each brought forward little by little. The cordless phones certainly did interfere with hearing aids but only when they were very very close to the ear. But the real horror story emerging was that the GSM phones cause massive amounts of audio interference at significant distances away – in fact the BT research Lab staff member doing the testing had to pull the hearing aid out of his ear such was the pain from the audio interference.

At first there was complete bafflement. How could a GSM signal at 900 MHz break through a purely audio frequency device like a hearing aid? Then the BT engineers worked out what was happening. It was the Time Division Multiple Access feature. This arranged a telephone call from any mobile as a burst of data and then a long silence, which was used by other mobile users to send their bursts of data. This pattern of a signal and silence just happened to be at a repetition rate that fell into the audio range of human hearing when it passed through any electronic device that acted as a detector. In technical terms a GSM signal was being amplitude modulated. All the geniuses around Europe and for that matter the rest of the world and nobody had spotted this.

Equally amazing was that there were dozens of GSM breadboard lash-ups working around European laboratories (for several years) and nobody had noticed this GSM signal breaking through into audio devices. At the DTI we had parked our GSM test bed outside the DTI building and had loudspeakers in the conference room but nobody heard any audio breakthrough. Yet BTRL had done carefully controlled experiments not only with hearing aids but other audio devices and it was a bit like bursts from a machine gun breaking through.

We had a problem. The GSM bandwagon was already rolling. Chips were coming out of semiconductor manufacturers and GSM networks had already been ordered. A colleague from the Radiocommunications Division proposed that we would have to ban GSM mobile phones in the UK market and stay with the analogue mobile radio technology. That was not something the UK could do unilaterally.

A new technology that was going to hit all the deaf people in the UK had all the alarm bells ringing in my mind in terms of political consequences. We could not sit on this and had to get a note up to Ministers but saying what...?

The next step was to call in officials from the Department of Health and see what their views were. I was expecting the worst from them...but still stumped on what we could do about it. The only solution would be a complete change in the design of the technology in the direction of mobile to base stations. But the industrial consequences of this would be enormous. It did not look do-able.

The meeting with Department of Health Officials arrived and we set out the findings of the BTRL research. Their response took us by surprise. It was one of complete indifference. The officials said that deaf people had interference to their hearing aids from all manner of electrical devices for example neon signs – he did not think that one more source of interference would matter one way or the other. I was shocked in the

sense that I had expected them to aggressively defend their constituents and demand what we were going to do about it.

I put up a low-keyed note to Ministers and proposed we did more tests on various hearing aids.

Here the story improved markedly in that some hearing aids were absolutely immune to the audio breakthrough from GSM mobiles, some were bad and some very bad indeed. It all depended upon the design of the hearing aid. The issue quietly wound its way up to the European level and the legal position was that it was down to hearing aid manufacturers to improve the immunity of their hearing aids to the GSM interference.

The European standards body responsible for defining these immunity standards for hearing aids were very miffed. So were the European hearing aid suppliers.


Radio Storm Hits GSM

Figure 45 – GSM was an unwelcome surprise to hearing aid suppliers

It turned out that the hearing aids that had this total immunity to GSM interference came from South Korea and the very badly designed ones came from some European suppliers. But we reckoned it would take 4-5 years before GSM mobile phones had penetrated the market in such numbers that deaf people had significant encounters with people using their GSM mobile phones. That would be ample time for better European designs of hearing aids to come onto the market and diffuse out into the population of the hearing impaired.

We were lucky that a chance encounter of a digital cordless phone with a deaf official brought the problem to our attention very early on and this unintended consequence of the GSM technology was handled with almost no fuss. The world seems to have muddled through with interference with other audio systems . There can be few people that have not, at some time, been in a room when a GSM phone has broken into the audiovisual equipment in a meeting room. But nobody seems to have had the technical curiosity to ask why. And the answer would have been to get the supplier of their audiovisual equipment back to properly suppress their badly designed audiovisual system.

Another unintended consequence of GSM was to significantly increase public unease on the potential health hazards of holding a mobile phone close to the head. Certainly public concern with the safety of using portable mobile phones came with the analogue cellular radio networks. It was fuelled by some reports from the Soviet Union suggesting much lower power limits than Western Scientists could find the scientific evidence for. I recall reading the information leaflet that accompanied the Motorola “brick” that their lawyers had carefully drafted to ensure that, should there ever be a problem, the user had been warned – so don't come suing Motorola. But the industry had handled this public unease with care. GSM itself appointed an expert to scan all the scientific papers but the search was inconclusive. In addition public health scares usually materialise only with something the mass of the population thinks may affect them and the number of people using the brick mobile phones costing £2000 each was still very small.

Three things ratcheted up the public unease. The first was a bit of black propaganda against TDMA technology coming out of the USA that somehow bursts of radio waves might be more harmful that a continuous stream of radio waves. The second was the bringing into use of the 1800 MHz bands that at an early time had tended to be called microwaves by some parts of the industry. That in turn got linked across to microwave ovens where a health scare of leaky microwave ovens had caused sales of these ovens to plummet. The third was that the market for hand portable mobile phones (as opposed to car phones) was starting to grow rapidly.

This had been handled well in my “Phones on the Move” Consultation document and I'd gone the extra mile to satisfy myself that the industry had the means to respond to any future lowering of the RF power safety limits on mobile phones.

All this was to prove insufficient to ward off the dreaded “health scare”.

The source of the storm started in an innocent proposal from one of the universities for an R&D project to accurately measure the RF power from a mobile phone. The reason for this is that the “human head” is what is called “a dielectric” in electrical terms and this modifies the behaviour of a nearby mobile phone aerial. So simply testing a mobile phone on a production line was not giving a really accurate measurement of how the mobile radio behaved with a human head slapped against it. I supported the project since I knew that the internal aerials, now becoming commonplace with mobile phones, did not have easy to predict characteristics which way radio waves would be directed.

This was all very technical and boring research hackwork. The project was included in a long list of research projects made public. The technical press picked this up and commented that the DTI must be concerned about the health effects of mobile phones to be even studying the matter – and completely missed the point that we were not studying the health effects – only how to accurately measure RF power as close range. The Daily Telegraph then picked up the same spin on the story but in a slightly exaggerated form.

Then a radio journalist decided to interview one of the University professors concerned in radio research. The journalist was a very pretty young lady (or so I was told). The professor was asked one of those tutorial "please tell me how a radio wave could possibly cause cancer?" type of questions. The Professor evidently never stopped to put his reply into a context of extremely high power radio waves or very low power radio waves or if he did it was not listened to. What was picked up by other sections of the press was that some professor had said that mobile phones could cause cancer – which is not what he said.

By this time the DTI press office were being bombarded with press enquiries. We had to get out a press release. Now! But we could not get hold of the expert from the National Radiological Protection Board. He was off site at a meeting (and no mobile phone). It was neither right nor credible for the DTI to give a medial view.

We missed the window and the story turned into a full-blown media driven health scare. I watched the story spin completely out of control getting ever more depressed. Finally the London Evening Standard hit the absolute pits - "cellular radios fry your brains" cried the headlines. The only crumb of comfort I could draw was that I could not imagine the story getting any worse. The other crumb was that the story had nowhere to run since we were not hiding anything under the carpet. Eventually we got NRPB to issue a press release. Nobody was listening.

As with most health scares the public memory is very short. The industry has played its part in funding a lot of research into seeing if there are any adverse health effects. Meanwhile the sheer convenience of the mobile phone has seen it become a mass consumer item and it is doubtful if many people can even recall the headline of mobile phones “frying their brains”.

Scientific progress has always run on the presumption of innocence until proven otherwise. When Ministers say that something new is “safe” this is slightly disingenuous since the accurate position is that

no evidence (has yet) been found to prove it to be harmful. Under these circumstances the issue for me has always been that consumers should have the choice. Those consumers wanting to exercise prudence needed to have the option of hands free kits or other means of putting distance between the mobile phone and the body.

I have also been confident that, if any adverse health effect is ever proved, then *it will be due to the power level of the mobile phone transmitter being too high*. My reasoning for this conjecture is that the world has been bombarded with very low levels of radio waves since the beginning of time and the human race has thrived – so the power level of the radio waves can only be the principal issue. Here the trend of mobile networks has been all been in the right direction.

The enormous increase in the number of base stations (from 1000 covering the UK in the 1980's to over 12,000 today) has dragged down the mobile phone power levels by a similar order of magnitude. This is one of the wonderful features of the GSM technology - the mobile phone RF power level is automatically wound down the nearer the user is to a base station. *Thus if mobile phones were "safe" in 1991 then, on average, they are more than 10 times safer in 2009.*

A third unintended consequence of GSM related to patents or more broadly "intellectual property rights".

When I was Chairman of the ETSI Technical Assembly a huge row broke out on Intellectual Property Rights and GSM had ignited it. It pitched most European suppliers and mobile operators on one side and three large US multinationals on the other. It was a clash of culture between the old European ways of doing things, where patents in telecommunications standards were open to all and either free of charge or a very modest royalty was charged (eg 2% of the selling price) – to a new world order where Intellectual Property Rights were to be a weapon to be used by suppliers to leverage market advantage.

The three US companies were DEC, IBM and Motorola and they led the charge in ETSI towards this new world order.

ETSI was not an IT standards body so I did not have a lot of sympathy with the IT companies trying to import their business models into a public network environment. But I was concerned about Motorola, as they were a leading player in our industry. I therefore flew to Chicago to meet Chris Galvin the CEO of Motorola to explain the majority position in ETSI.

In turn he explained to me that Motorola were spending huge amounts of speculative R&D on technology that would take 10 years or more to get to market. For this reason they needed to be aggressive over protecting their IPR and *he quoted their Iridium Mobile Satellite venture* as the prime example.

Motorola and the US IT companies won the battle in ETSI and some pretty weak IPR rules were put in place.

The IPR row was to have far reaching consequences for the industry. It triggered a complete change of behaviour by European manufacturers towards Intellectual Property Rights. By the time 3G technology arrived in the market the cumulative royalty levels being imposed on a 3G mobile had became as high as a staggering 30% of the ex-factory cost of the phone and billion $ law suits had become a feature of the industry.

There is a certain irony in Chris Galvin using *Iridium* as the reason for taking a tough line on Intellectual Property Rights in GSM in that Iridium and indeed a number of other mobile satellite businesses proved a severe commercial disappointment - largely as a result of GSM.

When these satellite projects were conceived analogue cellular radio networks covered population centres and not a lot beyond. There were millions of square miles of land that looked likely to never be covered. Even in a well-populated continent like Europe around two thirds of the land area had no mobile coverage and large parts of Asia and Africa had no mobile coverage at all. The business model of these mobile satellite systems was to cover all these more remote regions and aggregate enough traffic to

make the investments pay.

But the coverage of GSM networks exceeded all expectations in three respects. First, in places like Europe, the combination of good profits and strong competition saw mobile operators push their GSM coverage not only to where people lived but more remote areas where they took their leisure. Second, GSM networks swept through all the developing countries in Africa and Asia. Third it all happened relatively quickly. The money on these satellite systems was committed before these satellite operators came to realise that they were about to lose a huge slice of their target customer base to GSM networks.

Figure 46 – Iridium mobile phone

At the end of March, 1999, the $5 billion satellite system Iridium had 10,294 subscribers, far short of the 500,000 needed to reach break-even. At midnight on March 17, 2000, Iridium shut off service to their 55,000 customers and the network assets sold for $25 million by the end of the same year - about the same time as GSM was just passing its 200 millionth customers.

The overall impact of GSM was phenomenal. It not only overtook the analogue mobile radio networks but swept them relatively quickly into the dustbin of history, crushed telepoint and paging networks, left the mobile technology standards of the US and Japanese in a very poor second and third place and knocked the stuffing out of mobile satellite networks and send many of them crashing back down to earth. Yet all the pioneers set out to do was to have at least one compatible mobile technology rolled out across Europe to create a pan European digital cellular radio service!

Perhaps the biggest unintended consequence of all is for GSM to have become the engine driving the ubiquity and scale economies of the mobile phone to the extent of putting the mobile phone in the hands of over 4 billions people - many of whom live in the poorest countries on the planet.

Chapter 23

GSM and the 7 mobile radio revolutions

Why did GSM succeed so spectacularly?

Certainly GSM was a classic piece of good industrial policy that can be summed up in a brief paragraph:

European Governments set a strategic vision for the future mobile public infrastructure in an area of demonstrable market demand and radio channels were reserved for this purpose. A new technical standard emerged in a timely manner. Industry had a choice as to whether to invest in new mobile infrastructure using the new spectrum (or not). If they did, the condition was to use this common technical standard. A means was found to spark the competitive energy of the private sector to successfully deliver a public good – a compatible mobile radio service right across Europe with sufficient scale economies to put the benefits of this in the hands of ordinary consumers.

It followed the two rules of good industrial policy -

- that if the public policy case exists to intervene then Governments must intervene decisively and comprehensively – half interventions are worse than no interventions
- A sense of urgency is applied to get the technology to market on-time

But there was clearly more to the GSM outcome than just an intelligent well judged industrial policy.

The enormous energy driving GSM forwards was also due to the fact GSM was no less than 7 separate mobile radio revolutions, all inter-twined and happening to come together at the same time.

Pulling apart and identifying these separate strands helps to illustrate why GSM was so transformational on both the industry and the market:

Revolution 1 – Analogue to Digital

There is a very long-term trend in modern electronics to move from analogue to digital technology. Underpinning this has been the incredible pace of advance of silicon integrated circuits.

But there was nothing inevitable about mobile cellular radio networks going digital end-to-end. The massive installed base of analogue based networks, or terminals or services has its own momentum and it is never easy to write off the sunk cost. For example in 2009 the wire line telephone voice signals sent to most people's homes are still analogue. Across Europe television is still being received on analogue TV sets in many homes.

Not only did GSM establish the digital mobile technology in the market but it comprehensively swept away Europe's analogue mobile analogue networks into the dustbin of history in a remarkably short time.

Revolution 2 – From monopoly operator to network competition

The UK already had cellular radio network competition with its analogue cellular radio networks but it was the sole exception. In the rest of Europe the monopoly telecommunications operator provided mobile services. The argument ran that one single larger national mobile network would be cheaper than two smaller mobile national networks and a single mobile operator would use radio frequency channels more efficiently. There is some truth in this. Where this defence proved no longer tenable was that by 1989 the UK's

number of mobile radio subscribers was 5 times bigger than that of Germany. Lord Young presented these numbers in a statement he made in the House of Lords that year on the success of mobile competition in the UK. This was the evidence needed by the pro-liberal sentiment sweeping across Europe.

GSM technology arriving on new frequency channels provided the opening for new market entry. It became the opportunity point for all EU countries to introduce cellular radio network competition. The result was the transformation of the markets in France, Germany, Italy, Spain and elsewhere creating growth, jobs, much improved business efficiency and, of course, the demand that drove GSM up the success curve.

Revolution 3 - From a National to a Global Service

Prior to GSM (and outside of the Nordic countries) mobile radio was regarded as a purely national thing. The operator's territory was national, the network was therefore only national, the choice of technology was a national prerogative, the customer base entirely based in the country (with no doubt exceptions of a few rich visiting businessmen) and the supply industry was local, if it had the capability.

After GSM the licensing basis of GSM remained national but the Memorandum of Understanding effectively federated all the national GSM networks into a single virtual European network service open to all European mobile phone subscription customers. This got extended later to most of the rest of the world. It became an important reason for selecting the GSM technology which got re-enforced with each new country opening GSM networks.

The GSM roaming model is a marvel in its own right. Within a few minutes of stepping off an aeroplane, a person's mobile phone has hunted around to find the network with the best signal, it has requested a service connection, the selected network has signalled to the customer's home network to validate the customer and the home network has sent a set of codes to allow for secure connection/billing whenever the customer then wants to make a telephone call. The customer's mobile phone attaches itself temporarily and security to a local mobile phone network in that country.

The added bonus abroad is that with this "hunting for the best network" feature a foreign customer enjoys a much better mobile phone coverage and reliability than they ever gets at home

This small miracle extends in the other direction. Anybody in the world can phone that customer on his or her mobile phone (without ever having to consider whether they are at home or abroad) and that call will be delivered anywhere in the GSM world where the customer is visiting.

Today we just take all this for granted.

Revolution 4 – Professional electronics to Consumer Electronics

Mobile phones started life as very expensive equipment produced in relatively low volume. Whilst a number of large companies made mobile phones in 1984 there was also space for small to medium sized players as well.

The turning point for the industry can be traced back to the DTI "Phones on the move" consultation document for GSM at 1800 MHz. It was not the first to have the vision of everyone carrying a personal mobile phone connected to a mobile network built for this purpose. But it was the first to come out of a credible organisation and the leadership to say...and now we will make it happen.

The conditions were created to flip the mobile phone business model from a wide area mobile network supporting relatively few (mostly business) customers with expensive mobile phones to dense urban area networks supporting a mass consumer market with cheap mobile phones. The scale economies created by GSM then made the demand side of the business

model to work. Mobile phone annual production increased from the 100's of 1000's to the 100's of millions by the mid-90's. The price of personal mobile phones fell from £2000 in 1986 to £20 each by 2006. Along the way innovation by the mobile phone operators in the service pricing model to "pre-pay" provided a further fillip to the mass take up of the mobile phone. This completely changed the character of the mobile phone supply industry from professional to consumer electronics.

Once the very dizzy pace of technical advance led to tiny GSM phones having standby times measured in days rather than hours the mobile phone passed its next milestone on its way to becoming a consumer product – good styling and design. The Nokia 8800 series introduced towards the end of 1999 was a sign that a consumer market was well in place.

Figure 47 – Style was now a driving force in the market as technical advance to shrink size slows

The consumer electronics industry is a radically different proposition. It is a huge component sourcing, large scale manufacturing and high volume global distribution business. It is a game for the giants and even the largest can catch a cold as a consumer electronics business has to be finely tuned to mass customer taste and fashion. This can be very fickle.

The mobile phone has become the most likely carried item after the wallet and house keys. This fact has spurred innovation to pack other functions into the mobile phone and other industries have seen their product sucked into mobile phones and given away free, for example digital cameras or MP3 players.

Revolution 5 – From car-phones to personal mobile phones

The reason for the rise of the personal mobile phone has already been explained above. But this does not entirely explain the death of the car phone that would have offered better performance out of towns and avoided the hassle of car kits that were tied to specific mobile phones.

The car phone might have survived if mobile radio operators had allowed a customer to have two SIM cards for the one subscription and car manufacturers had been given more incentive to integrate mobile phones in cars.

The solution that prevailed was the personal mobile phone with a hands free kit for the car. With GSM came the death of the car phone.

Revolution 6 – From Voice to low data Multi-media

Analogue cellular radio was limited largely to a voice telephone service. Modems could be rented to run over the analogue mobile phones but the costs were high and the data rates limited to only hundreds of bits per second.

GSM came along and offered, in addition to voice, both a text messaging and a stunning (for the time) 9.6 kb/s data service. This is to be compared with a typical telephone modem over a fixed telephone connection in 1984 running at 1.2 kb/s to connect computers together.

Around this time 2.4 kb/s modems over telephone lines were only just being introduced. Thus

GSM was a very big leap forward in data communications at the time. There was even a row in GSM over a speed as high as 9.6 kb/s as this threatened the very lucrative private wires that on offer over the fixed networks at exorbitant prices in some countries.

The data speed of GSM has been expanded over the life of GSM. When it hit 56 kb/s with the arrival of GSM-GPRS *this ignited a lot of new multi-media possibilities in mobile phones.* This in turn stimulated the demand for new mobile phones.

A further evolution of GSM came in the form of EDGE technology that has stretched the data speeds to 200 kb/s or so but this development collided with the introduction of 3G technology to address specifically the rising demand for every higher mobile data speeds.

An even bigger transformation occurred with SMS text messaging. SMS is the biggest text messaging community in the world and much larger than any of the proprietary Instant Messaging communities on the Internet. A lot of the industry were taken by surprise with the popularity of SMS with school children but with the cost of a mobile phone call being many times higher than the cost of an SMS text message...it should not have been that much of a surprise that those on limited budgets would fall upon text messaging with such alacrity.

Revolution 7 - From a wired to a substantially unwired telephone world

In 1984 the total number of mobile voice telephone calls was a tiny dot compared to the huge universe of wire-line telephone calls. By 2001 some 40% of calls to or from people at home were via their mobile phone – even though a cheaper wire-line alternative was nearby.

At the heart of a number of these revolutions has been the transformation of “the business model” of the mobile phone operators from selling a high priced service to a few to selling a much lower priced service to the many. The last 5 years has seen the emergence of another radical change in “the business model” of the mobile radio operators from pricing of calls per minute to flat rate pricing models...the mobile revolution continues.

This begs the question as to whether Europe could create the necessary condition for another GSM type success?

Chapter 24

Could Europe create another GSM success?

The Political History of GSM offers some insight into just how GSM was shaped into the success it turned out to be. But there is another way to address the question and that is to look around today at the three great consumer revolutions of the past 20 years that we all enjoy today and these are the World Wide Web, the Personal Computer (PC) and the GSM mobile phone. What they all have in common is that they are all global. The World Wide Web will hit 1.5 billion connected PC's in the world by 2010, the PC itself must now be several billion and of course the GSM mobile phone has passed a staggering 4 billion.

Another thing they all have in common is that their success flows from rigid adherence to a common technical standard and the benefit of this only becomes so transformational when that common standard is both pervasive and global.

But what is even more insightful is that all three took radically different routes to their global standardisation success.

The history of the World Wide Web is well known. A talented individual took time out from his day job (of helping to smash atoms) to work on an idea that did not even have anything to do with the organisation he worked for. This happened just at the critical time when the Internet was at a juncture between heading towards a series of large walled gardens or a fully open space and the champions for an open Internet could not get hold of and propagate the new World Wide Web standard fast enough. It was a lucky “one in a million” shot!

The problem with lucky one in a million shots is that it does not form a sound basis to reproduce it in other areas. This is where the PC and the GSM mobile phone offer models with much more reasonable odds of success.

GSM was a political/regulatory intervention. In fact, as I have shown earlier, it was 4 interventions. The first was the engagement by governments with the long term direction of national mobile infrastructures and a willingness to do this at the European level. This led to the statement from the 1986 European Council. This political support gave the mandate to the European Commission to make a regulatory intervention in the form of the GSM Directive. Whilst many have deliberately misrepresented this as governments imposing a technology on the market, as I have shown, the actual mechanism was that government’s offers new spectrum “with strings attached” to support a public good of a harmonised system across Europe. Industry was free to accept this spectrum or not. Then there was the technical standard where government were more involved than they are today. Finally was the mechanism to harness this set of political initiatives to the powerful market forces that would create the commercial success. This was the GSM MoU. Again the MoU as a policy instrument has not been well understood. What it did was to harness the combined procurement power of every single mobile radio operator across Europe and then compress this into a very narrow time window and *a bit like nuclear fusion* – this created an explosion of industrial energy all the way down the industrial eco-system. It was the spark that ignited the GSM success as a mass consumer product on a global scale.

What was almost as remarkable as the success of GSM was the way all European Governments, Regulators and the Commission then walked away from this model just as it delivered Europe's most successful high technology intervention! They had all bought into a new ideology coming largely out of the USA that all of these things were best left to the market, market forces would always deliver optimal outcomes and decisions about infrastructures and their technology was a matter for the private sector.

So can the private sector consistently create global standardisation successes? The answer is “yes” given the right model of capitalism. Here is where the Personal Computer offers the best and most consistently successful model. It began with IBM, the overwhelmingly dominant

computer company at the time, imposing the PC architecture on the global market. The story is then followed up by Microsoft, the dominant supplier of operating systems for the desk top PC. Technology cycle after technology cycle for the operating system Microsoft has used its massive market dominance to impose its technology as a global standard on the market. As uncomfortable as many Europeans are with market dominance – it has to be said that Microsoft has created an enormous public good in respect of global interoperability. Tens of thousands of software companies have been able to deliver thousands of PC software applications with the scale economies to make them affordable to a large number of consumers and businesses. In addition the dominance of Microsoft has led to the success of Word, Excel, Power Point – which have all been vital to commerce and industry improving their competitiveness.

This is certainly no lucky accident. It is a product of a US industrial policy over many decades that comprises:

- allowing the emergence of a dominant global company (providing they do not abuse that dominance),
- Governments staying out of mandating technical standards
- granting such private companies a monopoly on their new technology (80 years in the case where the technology is protected by copyright),
- protecting that monopoly with fierce global intellectual property right laws and
- allowing the dominant players the super profits needed to support large future investments in R&D to maintain their dominance over many cycles of new technology.

There are at least 4 other large US companies today in IT and Communications (ITC) that have the size to exert dominant market power and successfully force industry standards onto the global market.

The USA has shown that private industry ("the market") can produce great global standardisation results - *given their model of free market capitalism*.

Europe has only bought into half of the US model which involves governments and regulators pulling out of any involvement in the technology for new infrastructures and leaving standards to "the market". Similarly Europe has effectively de-coupled spectrum policy from public infrastructure and in some cases even moving towards spectrum becoming a commodity to be traded (*and, as an aside, potentially fracturing spectrum re-farming cycles that have been critical in fuelling new technology revolutions since the days of Marconi*). It also rigorously upholds Intellectual Property Rights.

But Europe has rejected the other half of the successful US model. European competition authorities go to great lengths to pre-emptively forestall market dominance and intervene to foster new market entry eg reserving a 3G licence for a new entrant. And the more successful they are in achieving this goal, the less likely that new global standards will emerge out of Europe driven by a single company. The result is much more likely to be piece-meal investments and in the longer term, damaging fragmentation

For communications infrastructures fragmentation seriously erodes the economic externalities and damages national competitiveness.

But the number of players is not the only issue.

The US model of free market capitalism also allows super profits (that comes with dominance) and this provides the money for investment in next generation technologies.

In the European model for the mobile radio market there is a single minded regulatory pursuit of ever lower prices – where mobile operator profits are not only competed away and but also regulated away. This happens without regard to where the money is going to come from for substantial investments in R&D, new generations of mobile networks and universal coverage from those new networks? This is not a conscious choice by the European regulator – it is simply that, in the European model, it is not the regulator's job.

The European model has been slowly driven the European mobile industry between two stools. It leaves Europe just hoping for the “one in a million” lucky shot in terms of new GSM sized successes. It is not an ideal place to be.

The European mobile radio market has been largely shielded from the adverse consequence of the regulatory model it has been pursuing since 1993 only by virtue of the network investment cycles being relatively long and the huge momentum created by the GSM “big bang” that carried Europe through into 3G.

But it is only possible to eat the seed corn for so long... the patchy implementing of GSM EDGE, relatively low investment by companies like Vodafone in R&D, the truly massive number of data-speed “pot holes” in 3G coverage, falling behind in rolling out the next generation mobile technologies are all signalling that Europe has lost the will to be at the leading edge of mobile radio.

As little as two years ago this analysis would have looked like nostalgia for a long lost by-gone age. Governments and regulators, not just for mobile radio but across the entire economy had bought into the belief that “market forces” alone would deliver near perfect outcomes. Had I been asked the question two years ago “Could Europe create another GSM success” my answer would have been – around a one in a million chance!

Then the world was taken by the financial services industry, seen by everyone as the model of the success of unfettered “market forces”, to within inches of a total melt down of the global economy!

It took this near economic catastrophe for illusions about leaving everything to “market forces” **to shatter** and for governments to re-awaken to the fact that they have a job to do, amongst others, as stewards of national infrastructures and in the EU Commission's case - pan-European infrastructures.

There have been a number of European government reviews signalling a re-engagement by governments on the strategic direction of telecommunications networks.

In the UK's case Lord Carter led the way with his Digital Britain Report that embraced the need for the next generation mobile technology and the extensive deployment of optical fibres. This has been followed up with the Digital Economy Bill that would place on the independent regulator, Ofcom, the duty to promote investment in infrastructure alongside its duties to promote competition.

Figure 48 – Stephen Carter signals UK government re-engagement with future national network infrastructure

In October 2009 the outgoing EU Commissioner announced that she wanted to harmonise the technical conditions of use for the 790-862 MHz sub-band so that the Single Market was not fragmented when EU countries open the sub-band for new services in their country. Service providers and makers of devices and applications could then do business across borders, while consumers would find it easier to use 'roaming' services when they travel. What was most

remarkably was the Commissioner adding the comment - *a similar approach laid the ground for the emergence of GSM mobile phones in the 1990s!*

At the same time the GSMA (the association of mobile radio network operators) unveiled an imaginative European Mobile Manifesto of new opportunities which it believed the mobile industry could help to achieve – *given the necessary supporting regulatory measures*.

Europe appears to be travelling back (or forwards depending upon your viewpoint) towards the earlier successful European model of capitalism whereby governments (or their regulators) have the opportunity to set the long term strategic objectives for modernising infrastructures and the competitive energy of the private sector is harnessed (to the extent possible) to deliver it. What is likely to follow will be the re-coupling of key internationally harmonised radio spectrum with strategic national objectives

Many would say I am being unduly optimistic *and certainly in January 2010 it was far from yet being a full circle*… but enough elements are in place for Europe to be able to create another GSM type success and certainly both the European economy and the mobile radio industry have need of it.

...and as we saw with GSM, the best help that can be given to local industry is their involvement in defining the opportunities and *the very fast speed* in bringing those opportunities to market

...and why limit this successful model to just mobile radio?

...and why limit it to just Europe?

Chapter 25

A Footnote in History

There was a large amount of work carried out over my time in the GSM but it was only a minuscule fraction of the work that was still to come to develop the full technical standard, industrialise the technology, roll out all the networks and create the services. The first meeting of the signatories to the GSM MOU was a turning point. It began the transformation from a project led by the few into an industry comprising thousands and then hundreds of thousands and eventually millions.

It was not that my exit from the scene left me short of things to do. GSM was one of a number of projects I was involved in. Digital TV was beckoning and crying out for a European initiative. I very soon found myself working for Ian Taylor and Michael Heseltine in bringing about a digital terrestrial TV revolution in the UK.

Around 1989/90 David Hendon took over the GSM project from me at the DTI.

Figure 49 – David Hendon who took over from me at the DTI and went on to shape UK government policy for 3G

He had a bigger mountain to climb with others in GSM to ensure the GSM technical standard, comprising thousands of pages, emerged on time together with European wide mobile type approval. He went on to playing a leading role in shaping the UK government policy for the 3G mobile multimedia revolution in a very different political climate a decade later. Very few Civil servants can claim to have netted the Government a cool £20 billion in a single week. But that is his story to tell. He, as much as anyone, has encouraged me to tell mine.

Over the next few years David, Jonathan Phillips (by then head of DTI international telecoms policy) and I had more projects running in parallel on the Single European Market than we could sensibly handle. The only place we could find to meet to keep each other informed was a pub in Brussels called The Princess - since we were all criss-crossing Brussels. Now, if we had GSM mobile phones at the time, that coordination could have been done from anywhere...an example of technology progress sometimes being a mixed blessing.

Philippe Dupuis and Thomas Haug continued to play a leadership role in GSM. Armin Silberhorn and I were to meet up later and work together on the constitution for the industry standards group DVB that created the foundation for the digital television revolution in Europe. Renzo Failli and Bernard Mallinder faded from the European standards scene. Ted Beddoes rose to become Technical Director of Vodafone and later CEO of Dolphin Telecom. Alain Maloberti and Bernard Ghillebaert became legends in France Telecom for their role in the GSM initiative and others active at the Madeira meeting, such as *Fred Hillebrandt*, *Thomas Beijer* and O*sten Makitalo*, went on to make a significant contribution to ETSI standardisation.

And if credit is being given (as it should) , a mention should also be made of those who drove the less visible side of the GSM technical success for example *Jan Audestadt* from Norway and *Michel Mouly*

from France in respect of the hugely intensive work on GSM network architecture and Martine Alvernhe from France on service definitions.

I am also appreciative of the many up dates on the progress of GSM that Mike Short (who was Chairman of the Global GSM Association 1995/6 and Board Member until 2001) has given me over the years.

For the most part we have all been air-brushed out of history. All this comes with the passage of time and particularly as a result of hundreds of thousands of talented people taking over from where we had left off and carrying the main burden of making GSM an everyday reality for over 4 billion people.

I welcome comments on this book, particularly from those involved at the time, with the possibility of a 3rd edition in mind. I also have a GSM Historic Centre on my Web site www.stephentemple.co.uk **where I would be happy to post the accounts of others.**

Annex 1 – Glossary of Terms

CEPT – For the purpose of this story the Conference of European Posts and Telecommunications administrations that sat over the GSM standards group when it was a part of CEPT. In fact there was an intermediate management tier called CCH but GSM was essentially self-managing over its entire life.

DTI – UK department of state for trade and industry matters. The name changed several times under the Labour Government that tended to use the term “business” rather than “trade and industry”

GSM – Name of the standards group (picking up the French acronym of the Group Special Mobile or special mobile group). It also became the name of the 2nd generation digital cellular radio standard Europe adopted and deployed in 1991.

EU – European Union.

ETSI – European Telecommunications Standards Institute, Europe's officially recognised body for making telecommunications and mobile radio technical standards.

Hz – Characteristic of a radio wave that is used either to define where in the electro-magnetic spectrum a radio carrier is sits or how wide it is. One hertz (one cycle per second) is too small to be useful in talking about radio systems and the terms kHz, MHz and GHz are most often come across. A kHz (pronounced kilo-hertz) is 1000 Hz. MHz (pronounced mega-hertz) is 1,000,000 Hz. GHz (pronounced giga-hertz) is 1,000,000,000 Hz.

MOU – Memorandum of Understanding, a handy format of international agreement that did not have all the political overtones of a Treaty and none of the huge legal detail that tends to accompany commercial agreements.

Narrowband TDMA – A system used for GSM where the radio channel was only 200 kHz wide

PCN – The term the DTI coined for GSM networks running at 1800 MHz that were intended for small hand mobile phones and stood for Personal Communications Networks

PTT – The government structure that existed in most European countries that ran the telephone services and was also a government department with a Minister. In some countries there was a separation between the government owned telephone company and the government department such as Italy.

TACS – The analogue cellular radio standard the UK adopted in 1982 for its first generation cellular radio networks. It stood for Total Access Communications Systems but was in fact the US AMPS standard running in a 25 kHz channel rather than the 30 kHz used in the US.

TRAC – Technical Recommendations Application Committee, an informal group that decided which voluntary CEPT technical recommendations for terminal equipment would be turned into legally enforced EU regulations.

TDMA – A technical way of arranging a number of telephone calls to be sent over the same radio channel where the data from each call was compressed sent as a burst and then expanded into a continuous data stream at the far end. Each burst was carefully timed to last for one time slot and the GSM radio channel had 8 such time slots.

Annex 2

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6. Ted Beddoes for his suggestion for including the neat comparison table coming out of the GSM Working Party 2 meeting just prior to the critical GSM Madeira meeting
7. Alain Maloberti for this insight on the GSM “modulation” issue after the GSM Madeira meeting.
8. David Hendon for his encouragement to publish this account as a public record

Annex 3 – Regulation, Technology Neutrality and Technical Standards

I have always been a passionate believer in common technical standards for our public telecommunications networks. I am not the first to press the cause of public standards. In 1215 the barons of England forced on the wicked King John a clause on standards in the Magna Carta - only in those days it was not proprietary technologies but proprietary weights and measures short changing the masses.

Public standards of national infrastructures are demonstrably in the consumer interest. In mobile radio they create economies of scale that puts mobile handset prices within reach of the largest number of people. They make the network services more competitive - as customers can switch service provider without having to change their mobile phones. It also makes the networks much more useful for consumers and business people alike, when they go abroad. It also creates the most ideal conditions for 3rd party application developers in only having one set of development costs and the largest possible market. It is a win for nearly everybody and maximises the economic benefits.

It is therefore all the more surprising that, in the 1990's governments and regulators right across Europe bought into the belief that networks standards should be left "to market forces", "fragmentation" equalled "consumer choice" and its was somehow a regulatory virtue to embrace "technology neutrality".

This has led to the emergence of a particular version of European capitalism being applied to the European mobile radio market that was a hybrid mix of non-intervention in technical standards but strong intervention in the market industrial structure.

	Government intervention on the strategic direction of networks and their technology	Strategic direction of networks and technologies left entirely to market forces
Government intervention to promote competition and forestall dominance	**Balanced intervention** **The successful European GSM Model for mobile radio in 1987**	The European regulatory model for mobile radio 1993-2008 New standardisation weak
Dominance left entirely to market forces providing there is no abuse of dominance	State owned telephone company model Customer responsivenes weak	**No intervention** **The successful US model working in the IT industry**

Figure 50 – The various *models of capitalism* for "network" markets

What has driven this hybrid model is the belief that, somehow, market forces always delivered optimal outcomes and one can never have too much of a good thing in terms of network competition.

But in arguments I have had with regulators, other strong reasons for this conviction has emerged.

The most significant of these is risk aversion. Every regulator I have argued with speaks with conviction that the industry is better informed to choose network technologies. Hard on the heels of this comes the view that, as regulators, they are more likely to make the wrong choices. I have set on both sides of the fence at senior positions and frankly it is no easier to see the future sitting in the Civil Service or sitting in the Corporate Headquarters of a large enterprise. In fact I was probably better informed when I was in the DTI as I had the trust of all the competitors and they were telling me things that they were not telling each other.

But the biggest single difference I found between working in the government service and in the private sector was the attitude towards risk. There were very concrete reasons for this. In the private sector a company is ultimately judged by making a profit. Many things can go wrong but providing even more things are going right and a net profit is delivered – the market is usually forgiving of error. In the public sector every single error is picked up and is ammunition to be used by the media and opposition parties to attack the government and public officials. *The government is being judged by its errors and the private sector is being judged by getting enough things right.* It is therefore understandable that when an economic guru comes along with a vision that governments/regulators should not be taking responsibility for the technical standards of public networks but leave it to market forces – the message would come as a welcome relief and cherished as a virtue.

Once this belief in market forces had been established the approach becomes solidified as those adept in economics and price regulation tends to be recruited into top policy positions and engineers find themselves pushed to the fringes of policy development.

This lack of technical expertise then feeds a deep misunderstanding of the difference between “a technology” and a “technical standard”.

GSM is a technical standard but only of the essential interfaces and broad capabilities. This almost certainly will discriminate between broad technology solutions at the level of *compatibility* at the essential interfaces.

But at the same time a GSM network or mobile phone can then be implemented by a wide variety of different technologies at the level of implementation. This fact tends to erode away the differences between broad technical solutions with the passage of time as further iterations of the respective technologies tend to converge.

Even at this level of competition – there is even fiercer competition between the technology companies where a common technical standard has been imposed, as there is no proprietary technology “lock-in” barrier to hide behind.

My case is that Governments/Regulators should be promoting common technical standards for the essential interfaces and broad capabilities of national communications infrastructures. After all these technical standards define how good the network is that a country finishes up with for the next 15 years. Where market forces are getting out of hand and tearing away at these common technical standards there is a justified case for regulation to impose these common technical standards. A consequence of this is to take some responsibility to ensure fair conditions for private intellectual property rights caught up in those public technical standards.

Where governments/regulators can get relief from having to choose between technologies is to leave that choice to industry standards bodies - providing they deliver a clear and timely choice and resolve fair conditions for IPR. There is still space in this regulatory vision for “technology neutrality” and that is neutrality in how a technical standard is implemented.

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