



MorganDoyle Limited

DoCoMo 3G Trial and Early Service

White Paper

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1 Introduction

Technical and business innovation has brought DoCoMo to the forefront of the Japanese mobile market with the success of i-mode, its Internet based data service. By March 2002, there were 32 million i-mode subscribers and i-mode had generated \$3bn of revenue for DoCoMo in the preceding year.

To maintain their successful growth curve, DoCoMo have continued with their innovative approach. For example, they are currently running a joint trial with Coca-Cola, called c-mode, to



examine the potential for combining mobile technology with that for vending machines. More significantly, perhaps, they were the first network

operator (NO) in the world to launch a 3G commercial service in October 2001. The service is called FOMA. It is based on DoCoMo's W-CDMA air interface, which is officially recognized as an international standard within IMT-2000.

Since NO's around the world have invested heavily in 3G licences and continue to invest whilst building out the 3G infrastructure, it makes sense to study the early experience in Japan. This paper gives a brief overview.

2 Market Update

An official government statement, reported by Reuters, gives some indication of the strength of, and expectations for, the Japanese mobile market. Sales totalled \$57 billion in the year to March 2000, accounting for about 40 percent of the Japan's whole telecom market. The number of cell phone users at end of January 2001 was nearly 60 million, with more than half of them subscribing to market leader DoCoMo.

The market for third-generation (3G) mobile phone services is expected to grow to \$360 billion by 2010, six times the size in the year to March 2000. Of this, 66 percent is expected to come from content and e-commerce services. The market for handsets is projected to be worth \$40 billion by 2010, whilst carriers' spending on 3G infrastructure and running costs is expected to be \$75 billion.

The ministry estimated that it would cost \$4-8 billion for a telecom carrier to establish a nationwide 3G network.

3 Timetable

Like much of the rest of the industry, NTT/DoCoMo had been researching the technology to be used with 3G for more than a decade. Spectrum licencing and build-out of a suitably robust infrastructure allowed DoCoMo to initiate a trial service in Tokyo in May 2001. The service was actually launched in October 2001. Teething problems and handset availability meant that this launch had been delayed by more than six months from the date originally set.

4 The Trial

That the FOMA service was eagerly anticipated is shown by the fact that more than 147,000 people applied to take part in the trial, which was restricted to Tokyo and some districts of neighbouring Yokohama and Kawasaki. Just 3,330 of the applicants were chosen to test the handsets.

Participants in the trial were given the handsets for free, but had to pay a fee for the amount of data they sent or received - three minutes of data transmission cost between \$0.75 and \$1.15.

The trial lived up to its name, in the sense of being both a test of proof of concept for DoCoMo and a test of patience for the participants. DoCoMo had warned participants that the technology was not operational to the standard expected of a commercial system. The screens of the 3G phones on trial could 'freeze', for example, requiring the phone to be re-booted via a power cycle. The network itself was limited as well - the telecoms ministry had not guaranteed the technical quality of the 3G service, which in Japan is a precondition for running a commercial network. There were also a number of teething troubles, including:



- e-mail services from personal computers failing to reach handsets for 18 hours because of a technical problem at a server; and
- a software glitch meant that delivery of the much-vaunted videophones was delayed.

Despite the spate of technical problems, the first impressions were favourable, although some participants were sceptical that the extra costs involved would be borne by regular subscribers.

5 Early Service Results

The service was launched in October 2001 after a very great deal of marketing hype. Uptake is disappointing. By December 2001 there were only 27,000 FOMA subscribers, but Docomo were still confident in gaining 1.5 million FOMA subscribers in the business year beginning on April 1. They were predicting 150,000 by the end of March 2002.

6 Issues and their Resolution

Why has uptake been so slow when overall the trial was received well by its participants?

6.1 Applications and Services

The main answer is that the benefits that FOMA provides to its subscribers do not stack up against the costs. Commenting on the low uptake of FOMA, the Qualcomm Japan president Ted Matsumoto said, "For the current year, 3G won't exist in an acceptable form because the applications aren't there yet." The initial set of applications are not very different from those available with i-mode, the only advantage is a "potentially" faster download. FOMA provides a maximum data download rate of 384 kbps and a data upload rate of 64 kbps. However, these are maximum data rates that are usually not reached in actual service at the moment. The average service download rate is more like 200 kbps under good conditions and can be much lower, under overloaded conditions or in an area with poor reception.

Ironically DoCoMo have made the mistake with FOMA that other mobile operators made with 2G and that they themselves avoided with i-mode. One reason that WAP was shunned is that the operators tried to sell 'WAP' rather than services built on it; those operators that are currently rolling out GPRS are also trying to sell technology. Whilst a few enthusiasts will buy technology, most are only interested in the application of that technology in the form of useful services.

DoCoMo are gradually putting this right. New handsets will be capable of rendering multiple services (see below). More importantly they are creating partnerships with mainstream enterprise software vendors with a view to creating mobile applications for the business sector. For example:

Iona, September 2001. DoCoMo adopted the IONA e-Business Platform as the distributed computing infrastructure and application server core for its next-generation network management system for FOMA.

PacketVideo, September 2001. DoCoMo and PacketVideo reported the development of the world's first one-to-many live video distribution platforms that will enable delivery of live-video streaming content over FOMA.

Lotus, November 2001. Lotus and DoCoMo signed a memorandum to jointly develop business applications for FOMA.

Oracle, March 2002. Oracle and DoCoMo teamed up to collaborate on developing mobile business solutions for DoCoMo's 3G network, specifically using the Oracle9i Database with spatial technology, Oracle9i Application Server, Oracle9i Lite and Oracle E-Business Suite.

Many futuristic applications are planned within DoCoMo's vision for FOMA:

"People will be able to use their cellular terminals to check home security cameras, swap video e-mail, and access a whole range of other futuristic services. FOMA technology allows phones to be equipped with voice recognition software, providing simple Internet access for the visually impaired. It also enhances service for customers who prefer to give commands verbally rather than enter them manually. Meanwhile, we are designing handsets that will feature IC cards loaded with heavy-duty encryption, allowing them to double as mobile banking and stock-trading terminals. Such security capabilities will provide subscribers with a new level of convenience and will serve to encourage the growth of e-commerce. In the not-too-distant future, we envision services evolving to the point where they are all part of an advanced intelligent network. Such a network will be capable of integrating many different communications systems and thus supporting the emergence of universal mobility."

6.2 Handset Availability

The launch and initial roll-out were hampered by handset availability. New devices are continually being introduced. DoCoMo plan to start selling a 3G mobile phone equipped for its i-motion video-clip transmission service, as well as videophone, in March 2002. Whilst they already offer models equipped for videophone, the FOMA D2101V will be the first handset equipped both for i-motion and videophone.

The phone includes two built in cameras - one for videophone and the other for digital video/photos with 3x zoom - with a 64kbps transmission speed. It will also send/receive i-mode emails of up to 10,000 alphanumeric symbols (or 5,000 full-space Japanese characters), with maximum 384 Kbps downlink connection.



The growing enterprise and consumer interest in PDA devices should also help to boost the wireless market. Global PDA shipments in 2000 exceeded 10 million units, a four-fold growth in three years, according to Nikkei Market Access. PDA's have the benefit of freeing the carriers from the expectation of device subsidies. Users are willing to pay, say, \$300 for a Sony Clié 760 PDA, while they will not pay the full \$500-600 for a cell phone.



6.3 Costs

At launch the 3G-enabled phones range in price from about \$250 to \$500, compared to \$230 for last generation i-mode phones. However, by January 2002 the NEC N2001 FOMA handsets were listing for less than the cost of some 503i-series 2.5G (PDC) handsets because of lack of consumer demand.

Likely costs for the service are not easy to estimate, for, like all NO's, DoCoMo offer their customers a wide range of billing plans. There is a basic monthly charge plus usage charges. The usage charges depend on the size of the basic monthly charge and also the amount bought in advance, whilst the basic monthly charge is subject to discount, if, for example, the subscriber elects automatic bank payment, and special offers. The basic monthly charge varies between \$30-120, whilst the usage charges vary between \$1.5-15 per Mbyte. At launch the monthly service fee was expected to be around \$80 to \$85 - an increase of 30-40 percent over the rate for i-mode. For comparison, typical GPRS charges in the UK are \$0-50 per month for access and \$3-30 per Mbyte.

6.4 Coverage

Lack of uptake in the early period following the trial may have been due to the limited coverage of FOMA, but, again, DoCoMo are addressing this with an aggressive roll-out plan. They regularly issue details of their current coverage and the rollout plans (see the table below for the plans as issued in March 2002).

The service should be available in virtually every major Japanese city and cover 60% of Japan's populated areas by April 2002, and, by the end of the 2002 fiscal year, should cover 90% of all populated areas

In summer 2002 DoCoMo plan to introduce a "dual network" system to enable users who own both a FOMA (3G) and a conventional (2G) mobile phone to use the same phone number for both handsets.

(1) Services

Music Distribution Service M-stage music	Scheduled for Spring 2002
Dual Network Service for conventional mobile phones (FOMA terminal and conventional mobile phone can be used on the same number.)	Scheduled for Summer 2002
International Roaming Service	Depends on installation of connection points for W-CDMA.

(2) Service Area

Service commencement for DoCoMo Hokkaido, DoCoMo Tohoku, DoCoMo Hokuriku, DoCoMo Chugoku, DoCoMo Shikoku, DoCoMo Kyushu (Major cities nationwide)	Spring 2002
Major areas in Kita Kanto and some areas in Koshinetsu (DoCoMo)	Spring 2002

7 Conclusions

The early FOMA experience reinforces the notion that ought to be well understood by now - subscribers are interested in the use to which technology is put, not the technology itself. This is especially true for business, which most commentators, whether from business, operators or press, agree will be the sector that trail-blazes 3G.

I-mode demonstrated that users will rapidly adopt new technology if it is reasonably priced with appropriate handsets, coverage and above all interesting/useful services. In the business world this means providing business applications and services that will make a difference to the bottom-line. For any service to be successful, NO's and their partners must be able to put a convincing argument that satisfies the business imperatives and ROI. It seems unlikely that NO's will be able to create such applications on their own, and will need to create the environment to encourage suitable application development. This could mean a carefully chosen mix of:

- Creating **partnerships** with meaningful joint development programmes. Partnerships might include systems integrators – many of the 'new' business applications are likely to be modules integrated (to some extent) with existing business systems.
- Providing **development support**, e.g. tool-kits, test centres, etc.
- Ensuring **open access** to their networks. In Europe this means enabling roaming solutions as well as allowing easy access onto the in-country network for third-party suppliers. This has not been the case for GPRS to date, but this may be related to the ability (or lack of it) to collect billing metrics.
- Providing network **support services**, e.g. location based services, billing services, CDN services, etc.

8 Contact Details

For further information or advice contact *MorganDoyle* Limited. The latest contact details can be found on our website at <http://www.morgandoyle.co.uk/>