

**Hot topic of December 2006**

## **The challenges of mobile HD TV**

With the launch of its mobile HD TV offer on 16 November 2006, Orange positioned itself as a driving force and a forerunner in the field of television for mobile phones. This upgrade to the Orange World Video portal's offer brings a new level of image quality that before was unimaginable on mobile phones. France Telecom's r&d continues innovating in this domain to keep its competitive edge by offering its customers a richer, simpler, more accessible mobile TV experience. We take a look at solutions currently under research in the Group.

### **Mobile TV: where do we stand?**

Over the past ten years, with the digitalisation of signals and increase in bit rate on telecommunication networks, the small screen has undergone profound changes. Television programmes, up till now broadcast on radio waves and received on aerials, are now available through cable, satellite, DTTV, ADSL, mobile phone, PC or multimedia walkman. Digital TV is everywhere, generating not only new formats (HDTV, dedicated channels for mobile phone...), but also new applications (interactive TV, customised TV, targeted, interactive advertising...) and uses (TV and video on demand, control of live broadcasts...).



In the field of digital TV, France Telecom has undeniable know-how, with the Group being among the first operators to introduce television and video on demand on the ADSL access network first in France, and then abroad. On the mobile side, Orange was one of the first mobile operators to introduce live TV on mobile phone. Launched in France in December 2004, the offer, which is accessible via an all-image Orange World Video portal, was rapidly rolled out in England, Spain, Belgium, the Netherlands, Switzerland and Poland. It has been a sounding success: France today counts more than 400 000 active customers with 5 million clicks per month, of which

54% for TV. At the start of 2006, over 65% of Orange's broadband mobile customers were active on the TV/Video-on-demand service and generated 4.5 million clicks per month. Among these, 200 000 even benefit from an unlimited weekend option.

### **More than just TV**

To understand the stakes involved and customers' expectations of mobile TV, one must bear in mind that mobile TV is not just TV on mobile phone.

Video on demand and its evolutions sometimes offer a format that is better adapted to customers' tastes and desire to choose what they want to see, and when.

In France, access to short video-on-demand (VoD) concerns 75% of all active customers, whereas more than half of them do not even look at live TV. These uses could develop with the arrival of TV on demand (TVoD) that will let users choose when they want to watch their favourite programmes, as well as self-produced contents that will enable them to broadcast their own contents on mobile phone.

The two offers, TV and VoD, are therefore inseparable and, to meet customers' demands, offer a variety of contents and uses to build an attractive offer.

### **Successful beyond all expectations**

Though many telecom stakeholders didn't believe in it, television on mobile has been a tremendous hit. The craze for this new use is accompanied by an ever-growing demand for accessibility, richness of content and quality of service (23% of all 3G customers and 29% of all EDGE users would like better image quality for TV). On 1 June 2006, Orange therefore launched three unlimited TV options giving access to over 50 channels and thousands of videos. Thanks to the rollout of the 3G+ network (HSDPA), Orange was also able to expand its service offer in November 2006 by launching mobile HD TV, which works under 3G/3G+ coverage and provides hitherto unseen quality on mobile phones.

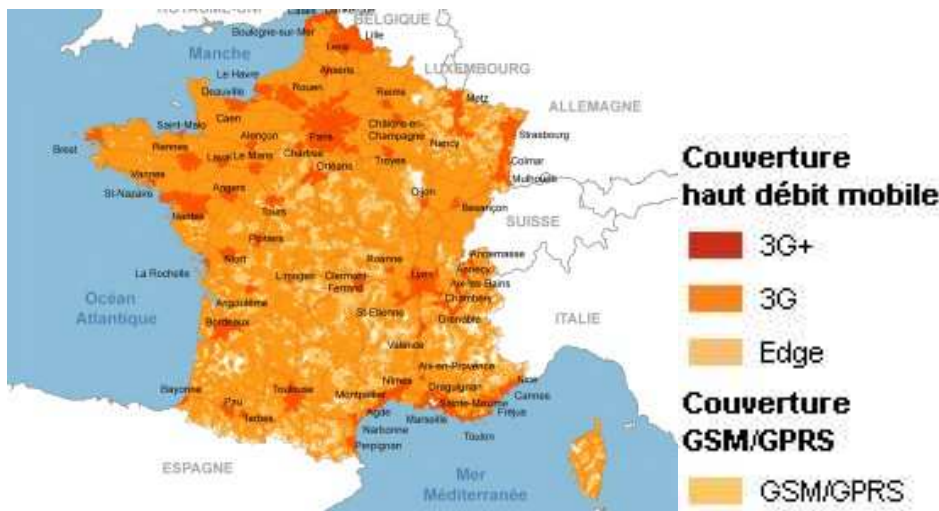
### **Mobile broadcasting standards**

With the arrival of DTTV and the disappearing of so-called "analogue" wireless television broadcasting, frequencies will be freed up. These could be put to use, in addition to 3G, to broadcast television to mobile phones. The inconvenience of UMTS is in fact that one frequency channel is attributed per user. So, if in a UMTS cell ten people are watching the same TV programme at the same time, ten channels will be used. The throughput is therefore considerable and does not allow an unlimited extension of the service. Mobile broadcast solutions such as DVB-H (Digital Video Broadcasting-Handheld) technology, use one single transmission channel for each television channel to cover all customers. Unlimited TV thus becomes possible even when a large number of users want to access the contents. These solutions will make TV accessible to the masses while limiting the consumption of radio frequencies. They will however not be able to carry the most popular channels in the main living areas, since regulatory and economic conditions are currently not conducive to the deployment via these technologies of a TV/Video offer as rich and coverage as wide as those offered by cellular networks. Interactive uses, premium contents, VoD, will also still be delivered via the wireless mobile network, since broadcast solutions are not adapted for this. These will therefore appear in addition to 3G coverage, as part

of a revenue model integrating the two solutions in an optimal way with, for “broadcast” transmission, a limited rollout that is concentrated on the main living areas.

## The mobile HD TV offer

On 16 November 2006, Orange launched its exclusive mobile HD TV offer. This TV/Video offer with high-definition quality provides viewing comfort and an image quality that is smoother and clearer than anything seen on mobile till now. To use it, one must have a HD TV-compatible device (currently the [Samsung SGH - Z560](#) handset), subscribe to the Totale TV HD mobile option, and be inside a 3G or 3G+ coverage zone. Today, 60% of the French population could therefore access it with 3G technology, and nearly 17% via 3G+ or HSDPA (mainly in Lyon, Nice, Marseilles, Montpellier, Bordeaux, Toulouse, Paris, Lille and Nantes).



This mobile HD TV offer is characterised by rich video feed and a bit rate that is two and a half times higher than that used up till now for standard mobile TV. The video coding bit rate is in fact 250 kbps with the MPEG-4 video standard (and its future upgrades). The device has a QVGA-type screen with 320 x 240 pixels.



## A wide variety of contents

The mobile HD TV option gives access to more than 50 channels live (general interest, DTTV, children, entertainment, sports) as well as thousands of videos in mobile HD quality, unlimited 24 hours a day, seven days a week. With this launch, Orange expands its range of unlimited multimedia TV options launched in June 2006:

- TV option: nearly 20 countrywide channels and DTTV live, as well as VoD;
- total TV option: TV option channels, plus 30 theme channels, as well as VoD;
- TV-music-surf option: TV option, music videos, music services and browsing.

### ■ les chaînes nationales et TNT



### ■ les chaînes thématiques...



The mobile HD TV offer thus means an abundance of contents, coupled with unlimited access. The customer is billed in a clear way thanks to a simple subscription option.

### A mobile HD TV label



To receive the manufacturer's label "HD ready", a television set must conform to certain minimum conditions: 50 centimetre screen, an image of 720 lines... Since a mobile phone will never have a screen of these dimensions, Orange, with the technical support of the r&d teams, drew up specifications for a "mobile HD TV" label, with a full list of criteria with which a mobile HD device must comply:

- display with at least 250 000 colours in 240 x 320 pixels;
- play MPEG-4 video feed at 250 kbps and display in QVGA at a rate of 20 images/s;
- play H.264 video feed at 250 kbps and display in QVGA at 15 images/s;
- play audio feed coded in HE AAC v1 and v2;
- be compatible with 3GPP R6.

These criteria are not fixed, but will be updated along with technological developments in order to offer customers the best available technology on their mobile phones for TV/Video services.

### Technologies in addition to 3G

France Telecom was one of the pioneers in putting the DVB-H mobile broadcast solution to trial with its partners [Bouygues Telecom](#) and [TPS](#). Work done since 2005 has focused on quality to equal the current mobile HD TV experience. These studies showed that trial customers were particularly enthusiastic about the proposed image and sound quality, and that they had high demands in terms of service availability and coverage. Against all expectations, the tests indicated that a significant part of mobile TV uses takes place at home, and as much as 70% inside buildings.

France Telecom plays an active part in the field of mobile broadcast, in France as part of the [Forum TV mobile](#), and abroad within various consortiums. On the international market, the Group is positioned as a vital player in rolling out these technologies and making them available to the masses. Among the various land broadcast standards (DMB-T, DVB-H, Mediaflo), France Telecom concentrated on the DVB-H solution, applied to the UHF band, for a deployment that combines coverage and cost-efficiency. This solution is also the most popular one with

manufacturers, compared to [Mediaflo](#), which is the proprietary solution of [Qualcomm](#) (thus mainly developed in the USA), and DMB-T which is deployed in Asia.

### **Research on MBMS technology**

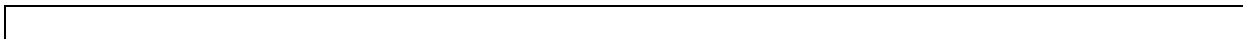
Beyond DVB-H, for porting TV services, France Telecom's r&d is also studying the development of 3G standards. MBMS (Multimedia Broadcast Multicast Service) technology for instance offers a broadcast system that is integrated in 3G and that makes it possible to use only one radio frequency channel to transmit the same content to several customers. Unfortunately, with international research on MBMS having started in 2001, forecasts at the time underestimated the amount of bit rate necessary for the proper functioning of these services. In the current version of the standard, integrated in current UMTS bands, bit rates that can be allocated for each cell range from 128 to 256 kbps, which is hardly enough to transmit a single mobile HD TV channel. To overcome this limitation, Orange is therefore testing the use of a proprietary version of MBMS in England, on frequency bands that are dedicated to 3G but not used. Such a solution will make it possible to meet the demand for unlimited TV services without having to roll out new land networks for mobile broadcasting. For the moment, it is still in a preliminary development stage (no mobile devices as yet). Over the longer term, France Telecom contributes within the 3GPP forum to the development of a standard that could reach performances that are much superior to HSDPA. In this respect, a radio-broadcast component that is more efficient than MBMS is being defined with the help, among others, of recommendations from Orange.

### **Broadcast by satellite**

Finally, Orange intends to use the satellite broadcast network to transmit TV contents. This solution in theory holds two main advantages: covering a large zone with a single built-in transmitter and making use of very high frequencies (so-called S band) reserved for satellite use. This could add to a DVB-H solution. In any event, the development of mobile devices that have the necessary power and sensitivity to receive a signal from a geostationary satellite 36 000 km away, present a number of challenges. In an urban environment, at least as many land bases are needed as for digital land broadcast solutions, since the high frequency band does not favour the propagation of radio waves. Besides, this resource being limited, seven national and 14 local mobile HD TV channels at most can be offered, which is hardly more than the 18 already potentially created by DVB-H today. This satellite solution is still being standardised and current tests on the technology are based on prototype devices that are meant to validate the overall engineering of the system. Orange is for instance taking part in a [CNES](#) (French space research institute) trial in Toulouse.

### **Various joint projects**

France Telecom's r&d is also associated in joint European Commission projects in the field of mobile TV. A Chinese-European project, [Mobiserve](#), for example aims to launch this kind of service to fall together with the [2008 Summer Olympics](#) in Beijing. France Telecom is also in charge of "Images and mobility" at the [Multimedia and Networks](#) competitive cluster and contributes actively to the cluster's Mobimages project. For the standardisation of services and techniques, France Telecom takes part in forums such as [DVB](#), [OMA](#) (Open Mobile Alliance), [3GPP](#) and [MPEG](#).



### **Mobile broadcast: first launches abroad**

The forerunner country in terms of mobile broadcast is South Korea with its S-DMB solution. This proprietary system is somewhat removed from the DVB-SSP proposal currently being standardised by Alcatel and other manufacturers. In May 2005, a hybrid satellite/land-broadcast TV offer was commercialised for mobile phone. Considering the thousands of rebroadcasting transmitters rolled out for the city of Seoul alone, the service seems hardly cost effective. Reception indoors and in rural areas also seems to pose problems. Besides, this pay offer that only includes the main national channels receives strong competition from an entirely free land TV service based on the DMB-T standard.

Closer to home, the Italian operator “3” on 6 June 2006 launched a mobile television service that uses the DVB-H standard. The other operators, [TIM](#) followed by [Vodafone](#), in turn “hired” capacity from [Mediaset](#) to launch a similar product. Success seems certain with “3” targeting half a million subscribers by the end of 2006, and TIM one million before the end of 2008. The operators have agreed to sizeable investments: “3” for instance bought a 1,000-transmitter network covering 2,000 Italian towns (75% of the territory), acquired the rights for first-league football as well as the world-cup matches, plus rebroadcasting rights for eight, then twenty TV channels, and ordered one million mobile devices... the bill could well reach half a billion euro!

Several other countries should follow Korea and Italy’s example in 2007: the UK, Germany, Spain and France. The suspense runs high.

### **New challenges for r&d**

For the time being, to change channels, one has to close the video player and go back to the Orange World Video, before starting up a new channel. But Orange has now developed an application embedded on the TV- and VoD-dedicated device. During a trial in 2006 on our commercial 3G network, the solution proved very successful, increasing use up to as much as 40% for some tester customers. Such applications that allow direct zapping by means of the keypad will be made generally available on the whole range of TV-compatible handsets, both for 3G and mobile broadcast. The next step will doubtlessly be to develop an application that lets the customer navigate seamlessly between any TV programmes, whether from a radio-mobile source or a radio-broadcast network. Subsequently, these applications could take more personalised functionalities on board: playlists, podcasts, self-produced content, TVoD, live control, automatic identification of preferences, etc. Facilitating access to all of these sources will do much to improve the customer’s experience and enhance content.

### **Innovating substance and use**

New formats for contents are making their appearance. In 2006, Orange started offering an editorial-content channel for mobile phone, called [LCI mobile](#). Orange World Video also fleshed out its VoD “mobisode” catalogue with summaries of the popular French soap opera [“Plus belle la vie”](#). This new format has pushed up

customers' consumption considerably, accounting for up to 4% of VoD. More in general, new functionalities could soon be on offer, such as "SMS TV voting" synchronised with image, ordering VoD via mobile phone to watch on your TV screen, remote programming of video recorder, looking from a distance at programmes received through your TV landline subscription, or even the possibility to start watching a programme on your TV set, and continuing it on your mobile phone, or vice versa, etc. The technologies for such uses already exist, and economic models are being put in place to develop them.

## **Landscape to be defined**

With the essence of standards and industrial solutions foregoing these developments still fresh, significant research and developments remain to be done in order to optimise their use and implementation. For this reason, but also to offer the group's customers the best possible solutions, France Telecom's r&d continues working on video and audio coding solutions as well as types of radio access (HSDPA, DVB-H, and in the longer term, Wimax, Wi-Fi, etc.). Soon new architectures and solutions will be put in place enabling us to offer mobile HD TV to as many people as possible, and in the best conditions, but also strengthen the convergence of customers' uses (TV, PC, mobile). It is also necessary to develop and enhance the content offer if TV on mobile phone is to become as common as traditional television.

## **Links**

[Forum Television mobile](#)

[Press release of 20 November 2006 entitled "Orange lance en exclusivité la TV HD mobile, une offre de TV/Vidéo en qualité haute définition"](#)

[Press backgrounder of October 2006](#) on [Orange Presents First - Autumn 2006 - Collection of Products](#) ( PDF file - 2 MB )

[Press release of 1 June 2006 on "L'Internet Multimédia Orange : Internet haut débit, TV et téléphone illimité à partir de 29,90 euros/mois !"](#)

[Hot topic of the month of January 2005: "Close-up on mobile TV"](#)

[Speech by Renaud Donnedieu de Vabres, French minister of Culture and Communication, and François Loos, minister of Industry, on: "La télévision mobile : enjeux et perspectives", Thursday 2 March 2006](#)

## **Glossary**

**3GPP**: *3<sup>rd</sup> Generation Partnership Project*. A collaboration agreement from December 2008, between the telecommunication standardisation bodies [ETSI](#) (Europe), [ARIB](#) (Japan), [CCSA](#) (China), [ATIS](#) (North America) and [TTA](#) (South Korea). The goal of [3GPP](#) is to produce technical specifications for 3<sup>rd</sup> generation mobile networks. It is

also in charge of the maintenance and development of technical specifications for the mobile standards GSM, GPRS and EDGE.

**DMB-T:** *Digital Multimedia Broadcasting Terrestrial*. This standard rolled out in Korea, is a spin-off of the European standard DAB (Digital Audio Broadcasting) for the broadcasting of audio-digital contents and data services to mobile receivers. Originally created to broadcast digital radio services and replace FM, DAB has in practice been rolled out in England only. DMB-T is proposed as an extension to the so-called European standard DAB.

**DVB-H:** *Digital Video Broadcasting-Handheld*. This European audio/video-broadcasting standard is a derivative of DVB-T (Digital Video Broadcasting-Terrestrial), destined for mobile receivers. Specially designed for mobile situations, it uses time-slicing technology to reduce power consumption for small handheld devices, and achieves a particularly robust signal that improves the quality of reception at head height.

**EDGE:** *Enhanced Data Rates for GSM Evolution*. An intermediate solution between GPRS (2.5G network) and UMTS (3G), hence the name 2.75G that is sometimes used.

**Forum TV mobile:** A French forum of over 50 companies in the mobile TV sector (mobile telephony operators, television channels, wireless and satellite broadcasters, device, network and software manufacturers, content designers, audience-rating institutes...). Founded in 2004 on initiative of the French ministry of Industry, the Forum contributes to the development of personal mobile television services in France. In 2005 and 2006, trials coordinated by the forum and authorised by [CSA](#) (*Conseil Supérieur de l'Audiovisuel*) successfully tested new broadcasting technologies with a large number of users.

**GPRS:** *Global Packet Radio Service*. An evolution of the GSM standard (which uses the same frequency range), this protocol adds a packet system to the GSM circuit network, thereby allowing data exchange. GPRS, or 2.5G network, renders transfer rates of around 40 kbps in optimal conditions.

**H.264:** A video-coding standard also referred to as MPEG-4 AVC (Advanced Video Coding), co-developed by the ITU-T Video Coding Experts Group (VCEG) and ISO/CEI Moving Picture Experts Group (MPEG). MPEG-4 AVC is the product of a partnership known as Joint Video Team (JVT). The ITU-T standard H.264 and ISO/CEI's MPEG-4 Part 10 are technically identical.

**HE-AAC:** *High-Efficiency Advanced Audio Coding* or AAC+. AAC is lossy data audio-compression algorithm that gives a better quality/compression ratio than the older MPEG-1/2 layer 3 format (better known as mp3). For this reason, it was chosen by various companies such as Apple or Real Networks. HE-AAC refers to the association of the AAC codec with a system called SBR (Spectral Band Replication) that improves the quality of compressed files.

**HSDPA:** *High Speed Downlink Packet Access*. Mobile telephony protocol also referred to as 3.5G or 3G+. With its upgraded software, its performance is ten times

higher than that of 3G technology (UMTS). High bit rates are possible in packet mode on the downlink. This development was standardised at 3GPP as part of release 5 between January 2000 and September 2003.

Il offre, grâce à une évolution logicielle, des performances dix fois supérieures à la technologie 3G (UMTS). Il supporte des hauts débits en mode paquet dans le sens descendant. Cette évolution a été normalisée au 3GPP dans le cadre de la release 5 entre janvier 2000 et septembre 2003.

**MBMS:** *Multimedia Broadcast Multicast Service*. Scheduled under UMTS Release 6, this service will transport services on radio channels shared by all users.

**Podcast:** A contraction of the brand iPod and the word “broadcast”, referring to the broadcasting of audio or video contents over the Internet. The user subscribes to a programme RSS feed via a content aggregator, and each new audio or video file is then downloaded automatically. After being transferred to a digital walkman, the content can be played any time, anywhere.

**QVGA:** *Quarter Video Graphics Array*. Display standard for mobile phones with a definition of 320 × 240 pixels, or 76 800 pixels. As for computer monitors, the proportion of the screen is 4/3, in other words the width is 1.33 more than the height.

**DTTV:** Digital Terrestrial Television, which is gradually replacing the current analogue wireless television. Its programme offer will be enlarged and eventually increase the current television capacity to more than thirty channels.

**UMTS:** *Universal Mobile Telecommunications System*. This so-called third-generation (3G) wireless communication standard allows peak transfer rates of 2 Mbps in its W-CDMA version (Release 99).