Nokia Response

MDA Consultation Paper "Policy and Regulatory Framework for Mobile Broadcasting Services in Singapore"

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1. EXECUTIVE SUMMARY

The benefits of a single, open and standardized system are well known. The proposed method of not mandating any technology, but opening free competition may in the worst case means that there could be three (3) different standards used for Mobile TV broadcasting in Singapore especially when the two planned 1.5MHz bandwidths in VHF are applicable only to DMB-T technology (as of today). Fragmentation as a result of multiple technical standards may hamper the development of market and eco-system for Mobile TV services in Singapore.

There are already a number of service providers and network operators globally who have launched Mobile TV services using DVB-H technology, and a number of them are in APAC. To achieve economies of scale and flexibility of users (consumers), Nokia suggests that Singapore to adopt the main stream of world's Mobile TV and recommend DVB-H to be used together with service layer profiles specified by OMA BCAST (Electronic Service Guide, Service Purchase and Protection and adaptation layers). This approach has multiple advantages:

1. Allows Mobile TV eco-system to develop and expand below Singapore market as other countries are adopting the same standards will allow participants of Singapore Mobile TV eco-system to extend their reach

2. Ensure a broad range of devices and services to be made available at reasonable prices to consumers

3. Allows interoperability between services provides by different operators and hence ensures consumers need not purchase different devices for different operators. This will decrease fragmentation and the chances of market failure

4. Broaden the viability of service providers' business models as the network will enable visitors to Singapore to subscribe to local Mobile TV services as long as they have standard compliant devices. For example, this will allow service providers to provide special subscription and content packages during national events that attract inbound visitors, like Formula 1 racing, international file festival etc

Nokia warmly welcomes the idea of not requesting fees during the first five years of services. It provides bidders a financial incentive and improves their business model. It should enable service providers to get over the always financially difficult initial phase, acquire sufficient subscribers and stabilize the business before they start building in licenses fees into their business models.

2. COMMENTS ON REQUESTED ISSUES

2.1 Not to mandate any particular standard for MTVS in Singapore (Section 2.3)

Traditional regulation has concentrated on frequency issues leaving technology choice to the market to decide. Technology has been regulated mainly in areas of broadcasting. The world around mobile telephony has been less regulated. However there are several cases where additional technology regulation has proven successful. The example of the adoption of GSM by the European Commission for mobile communication has helped to place where today's mobile market is and has benefited both the consumers, and the industry as a whole. Such an example amplifies that when an open standards based technology is chosen or mandated, it helps to further consolidate the industry and eco-system towards a common goal and objectives, and is able to serve both the industry and consumers well.

On similar lines, to facilitate and accelerate the deployment of Mobile TV across Europe, the European Commission in November 2007 adopted a strategy to encourage the use of DVB-H as the single European standard for Mobile TV (Detailed release attached as Annexes 1 and 2).

The Mobile TV industry and eco-system, both vendors and service providers, should work together to emulate the success of GSM technology in the Mobile TV arena.

Open Standards

For any technology to enjoy broad adoption, industry traction and deployment, open standards must be implemented end-to-end i.e. Selected Broadcast standard, Service Protection and Purchase (SPP), Electronic Service Guide (ESG), Audio & video formats/codecs and all associated profiles and parameters.

When a technology is being preferred or mandated, care should be taken to ensure the selected technology is open, freely licensable and enjoys broad global industry traction (in terms of deployments and vendors & industry associations support).

Technologies like DVB-H have ensured that television can now fit into our pockets, be our constant companion and entertain us at all times. Mobile TV going main stream presents tremendous opportunities for the industry. It means new content formats, new avenues to monetize content, new viewing times, new prime times, greater interactive content and smart Mobile TV devices to highlight a few of the opportunities.

The industry has worked over a decade to arrive at the present status (growth and deployment) globally, and in the process DVB-H has clearly emerged as a standard that has found maximum acceptability. The reason is relatively simple as DVB-H belongs to the DVB family that is widely accepted for Digital Video Broadcast in most parts of Europe and several other countries around the world.

However, we have to be very cautious in nurturing this nascent industry. Success of Mobile TV critically requires a totally open and competitive ecosystem similar to the one that has led to the huge success of GSM based mobile telephony.

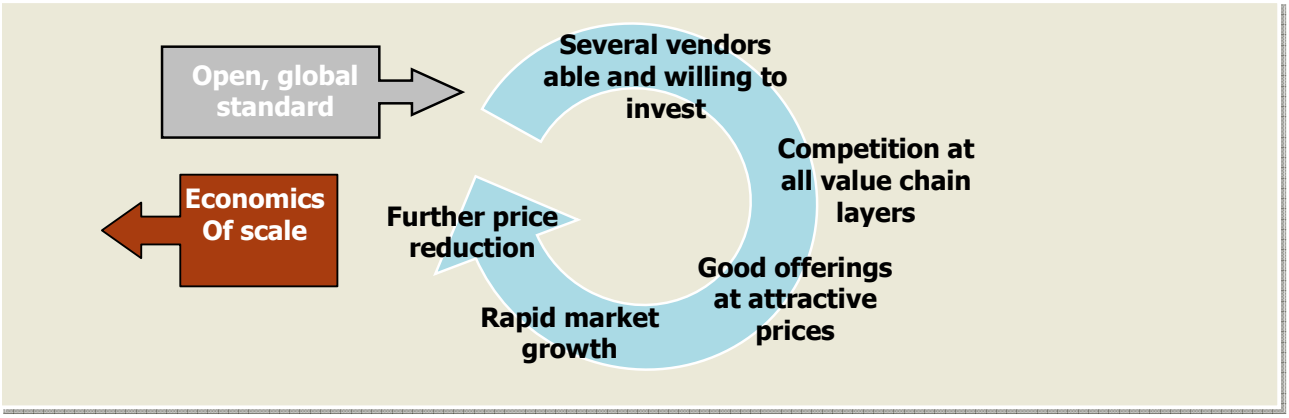
Open standards incentivise companies to invest in new technologies and since many countries and entities get involved in the development, it leads to competition and consequently the introduction of several good offerings at attractive prices.

Once customers in several markets start to accept the technology, the industry can leverage the benefits of economies of scale which in turn leads to competitive pricing. This is when the technology attains mass acceptance.

The classic example of this is the success and global adoption of GSM technology, which is based on open industry standards, in the cellular mobile arena vis-à-vis the marginal regional presence of competing proprietary or vendor locked technologies.

The main beneficiary of the adoption of and strict adherence to open industry standards is the end consumer as it results in a much wider choice of offerings, competitive pricing and most important of all ease of deployment, use and support - all of which are important for mass market adoption.

The benefit of industry adopting an open standard is well explained through the virtuous cycle highlighted in the figure below.



For this virtuous cycle to fructify in the Mobile TV arena, open industry standards must be implemented end-to-end:

- Selected broadcast standard
- Service Protection and Purchase (SPP)
- Electronic Service Guide (ESG)
- Audio and video formats and codecs
- All associated profiles and parameters

If technology is to be regulated, the technology of choice for broadcast Mobile TV should be DVB-H on account of its open nature and the broad industry traction it enjoys.

Standardization and Interoperability

The service-layer technologies that are currently considered for provisioning mobile TV broadcasts differ significantly. **Of the service level architectures, both Digital Video Broadcast Internet Protocol Datacast (DVB IPDC) and Open Mobile Alliance Broadcast (OMA BCAST) fully specify the mobile TV service, including provisioning, service guide, interactivity and various methods for service and content protection, in an open and standardized manner.** Both rely on an Internet protocol (IP)-based abstraction layer between the service and bearer technology. DVB IPDC and OMA BCAST provide an advantage over other technologies when considering a mobile TV broadcasting service.

DVB-H was standardized by ETSI in 2004 and is currently standardized at all levels (including Electronic Service Guide, Service Purchase and Protection and bearer technologies). It has additionally been standardized by the Telecom Industry Association (TIA) to be used in the US.

Making a preference and/or adopting a single standard of technology promote economies of scale and prevent market fragmentation in the cellular terminal industry. Furthermore, it fulfils an important precondition for consumers: to freely choose and switch between service providers with a single mobile TV terminal. At this point in time DVB-H is the most favourable because it offers multiple and completely standardized service layers, which allow for a standardized means of sharing broadcast content, while tailoring the service offering to the conditions of each individual provider, thus leaving room for service differentiation.

There are several leading international organizations like the BMCOforum (Broadcast Mobile Convergence Forum, http://www.bmcoforum.com), OMA (Open Mobile Alliance, http://www.openmobilealliance.org), etc. providing support for DVB-H introduction and interoperability. These bodies for example have defined implementation profiles for the Electronic Service Guide (ESG) and Service Purchase and Protection (SPP), two key elements of the Mobile TV platform, after much industry consultation in publicly available documents from OMA BCAST and profiled by the BMCOforum. Interoperability test fests are organized to ensure products from across vendors for the selected profiles are interoperable.

DVB-H also allows for co-existence with DVB-T thus enabling efficient use and cross leverage of infrastructure and frequencies (eliminating need for separate and dedicated frequency bands) where ever there is a need to have both DTT and Mobile TV services offered. This is particularly useful as DVB-H is a mobile broadcasting service complementary to DVB-T services.

The DVB organization has a working patent pool for DVB-T and according to DVB practices new parts, like DVB-H, will get their own IPR arrangement. All DVB IPR is granted on Reasonable and Non Discriminatory Licensing terms (RAND). Currently there are over 60 manufacturers with products for DVB-H.

Spectrum Allocation

Several studies have indicated UHF to be the optimum frequency band for mobile services. L-band usage implies that to reach proper indoor coverage the network investment cost is substantially higher than when using UHF.

The optimum frequency range for DVB-H is 470-750MHz. Spectrum from this range should be allocated for MTVS services. Reasons for the proposal are outlined below.

The practical upper frequency limit for DVB-H based broadcast Mobile TV is 750 MHz. Any channels below this limit can be used. Higher frequencies in the broadcast band would not be usable due to the interoperability requirements with cellular systems in 800/900 MHz band.

Studies have shown that the mid part (below 750 MHz) of the UHF BSB is the optimal from cost perspective for broadcast Mobile TV. Going to lower frequencies like VHF would be better from the propagation point of view, but integrated antennas in the terminal would have such a gain that the total link budget would be worse than in the UHF BSB.

Using higher frequencies like L-band would result in better terminal antenna gain, but the propagation is so much lower (also higher building penetration losses) that the link budget is again lower than in the UHF BSB.

Deployments and Market Development

Due to its open nature, standardization and broad industry traction (both in terms of deployments and vendor support), DVB-H is projected to have the dominant share of the global broadcast Mobile TV footprint.

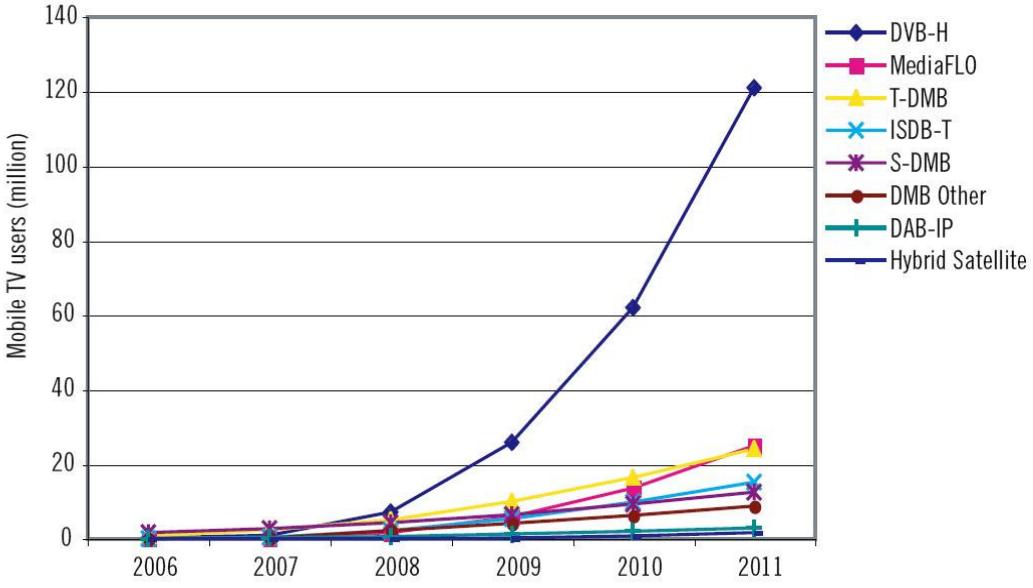
Two countries in the European Union – Finland and Italy – have released full-scale mobile TV offerings on DVB-H; and more than ten countries are conducting trials with DVB-H in preparation for a launch in 2008.

Similarly, four countries in APAC – Vietnam, India, Malaysia. Philippines – have launched mobile TV services using DVB-H, and more than six countries are conducting trials and pilots with DVB-H in preparation for a launch in 2008 as well.

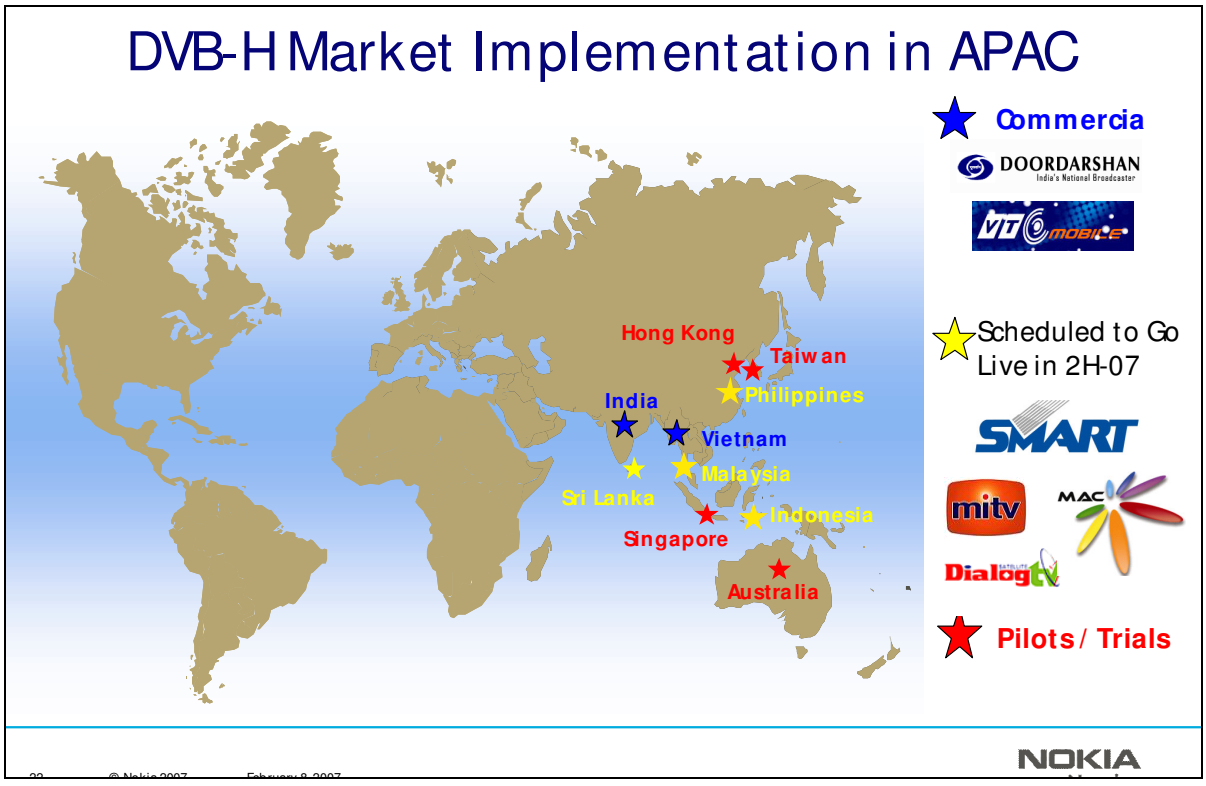
As more countries and markets are adopting and releasing mobile TV offerings on DVB-H, roaming to these countries and subscribing to the services in foreign networks could start to stir interests in both the consumers and service providers. Such a possibility will compliment well with both the service and network providers in Singapore as it means additional revenue stream.

DVB-H is a clear contender to become a leading standard in the market.

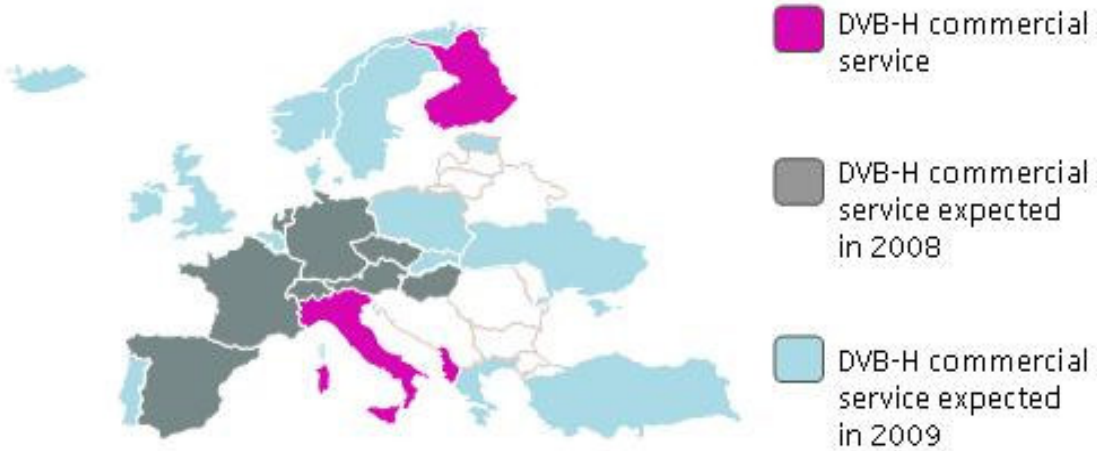
Figure 1.10: Worldwide broadcast mobile TV users by technology



Source: Informa Telecoms & Media



DVB-H and OMA BCAST is becoming the European choice



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Trials and Network Deployments in MEA

DVB H

LET'S CONNECT

DUBAI INTERNET CITY

etisalat

mobily

MTN

MULTICHOICE
Enriching lives

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2.2 To impose minimum network coverage requirements of 95% (outdoor coverage) on multiplex operators (Section 2.4)

For a country like Singapore, the selected figure 95% is well considered and gives high enough coverage for services. Nokia believes MDA's proposed approach to mandate a minimum requirement for outdoor coverage is appropriate.

2.3 Not to impose any quality of service on picture quality and indoor coverage at this instance but will reserve the right to do so when necessary (Section 2.4)

It will be appropriate for the service providers and network operators to determine the amount and level of network coverage to be provided for indoor environments that will best suit their service and business requirements. It is almost likely and certain that the service provider(s) and network operator(s) who can provide adequate indoor coverage at locations where such coverage is demanded or required to service the consumers, will have an advantage over their competitors who don't. As such, competition and the demand of better service coverage by the consumers will drive the network operators to provide indoor coverage at suitable locations.

As an additional note, the network operators may approach MDA to provide assistance in getting the necessary approvals and access to indoor locations like the Mass Rapid Transit (MRT) stations and tunnels, and the numerous road tunnels covering the Singapore island. In order not to duplicate network infrastructure and to create more efficiency, MDA and IDA could work together and provide the necessary guidance and possibly even infrastructure and incentives.

2.4 To require both MTVS and cellular Mobile TV service operators to obtain broadcast services licenses before transmitting TV services over their networks (Section 3.1)

Nokia acknowledges MDA's arguments for the above and has no further comments to add to it.

2.5 To adapt the two-tier IPTV framework to regulate the MTVS operators and cellular Mobile TV operators and to license the service providers under the niche broadcasting service framework (Section 3.1)

Nokia acknowledges MDA's arguments for the above and has no further comments to add to it.

It can be expected that broadcast and unicast services will coexist on the network side and will be integrated in the terminal. TV content which is of interest to large numbers of consumers will be broadcast, while content that is of interest to a smaller group of consumers can be offered on-demand via unicast networks. The user will ultimately be offered an integrated service of regular broadcasting and on-demand content.

2.6 To issue 10 year multiplex licenses, with an option to renew for a further five years, via a comparative tender process and to issue five year niche broadcasting service license (Section 3.2 and 3.3)

The proposed five year time period of no license fees is a welcome approach for Mobile TV services in their infancy. It allows market to grow to a sustainable level before such licensing payments are due. This approach should provide further incentives for the service and network providers, and in return, they could inject the savings into enhancing the infrastructure like indoor coverage provisioning and/or providing the consumers a wider and better variety of content and services.

The proposed licensing time frames are well selected and provide enough time for operators to get services to a truly commercial status.

2.7 To require multiplex licensees to offer capacity to third parties on fair, reasonable and nondiscriminatory conditions (Section 4.4)

Nokia supports open competition and MDA decision to propose that holders of multiplex licenses for MTVS should be obliged to make access to multiplex capacity available to third parties on fair, reasonable and non-discriminatory terms and conditions.

Section 4.3 mentioned that two (2) 8MHz bands on UHF and two (2) 1.5MHz bands on VHF will be available. Based on the spectrum allocated, it is likely that the 1.5MHz bands on VHF will only be suitable for T-DMB systems, and the 8MHz bands on UHF would be suitable for technologies like DVB-H and MediaFLO. In the event that a technology has not been mandated to be used, Singapore may end up in having three (3) different systems for Mobile TV. Under such a situation, coupled with a lack of general consumer awareness of services and technologies bound with them, it could lead to market failure problems such consumers' disgruntlement in services and devices non-interoperability, and high cost of devices and switching costs.

Such a scenario could deter third parties to lease capacity from the multiplex operators as they probably could not offer true competitive and comparative offers, and the general consumer market could not be addressed adequately.

2.8 Not to impose an advertising revenue cap (Section 4.5)

Nokia acknowledges MDA's arguments for the above and has no further comments to add to it.

2.9 To apply MDA's programming codes for fixed TV services (FTA content, subscription content, VOD and other kinds of content) (Section 5.2)

Nokia acknowledges MDA's arguments for the above and has no further comments to add to it.

2.10 Not to impose public service broadcasting obligations (Section 5.3.1)

Nokia acknowledges MDA's arguments for the above.

There are studies (e.g. from McKinsey) to show that FTA channels are important to Mobile TV service take up as they are the familiar channels that mass consumer market can identify with. Recent market data also shows that FTA channels in Singapore commands a large viewing audience in Singapore. The availability of FTA channels could spur the interest and increase awareness amongst the general consumers on Mobile TV services.

MDA could further explain if the service and/or network provider can charge the consumer for the access to FTA channels, and the ability to bundle FTA channels into their pay TV service and channels packages.

2.11 Not to impose must-carry obligations (Section 5.3.2)

See comments in 3.10.

2.12 To require Mobile TV operators not to block access by their users to any local FTA channels offered by MediaCorp using compatible technologies (Section 5.3.2)

Nokia acknowledges MDA's arguments for the above. There could be further questions from would-be service and network operators as to how local FTA channels could affect the viability and pricing of pay TV Mobile TV services especially when the industry is still in its development stage.

2.13 To apply the current framework for advertising regulation (as specified in the MDA TV advertising and sponsorship codes and voluntary SCAP code) (Section 5.4).

Nokia acknowledges MDA's arguments for the above and has no further comments to add to it.

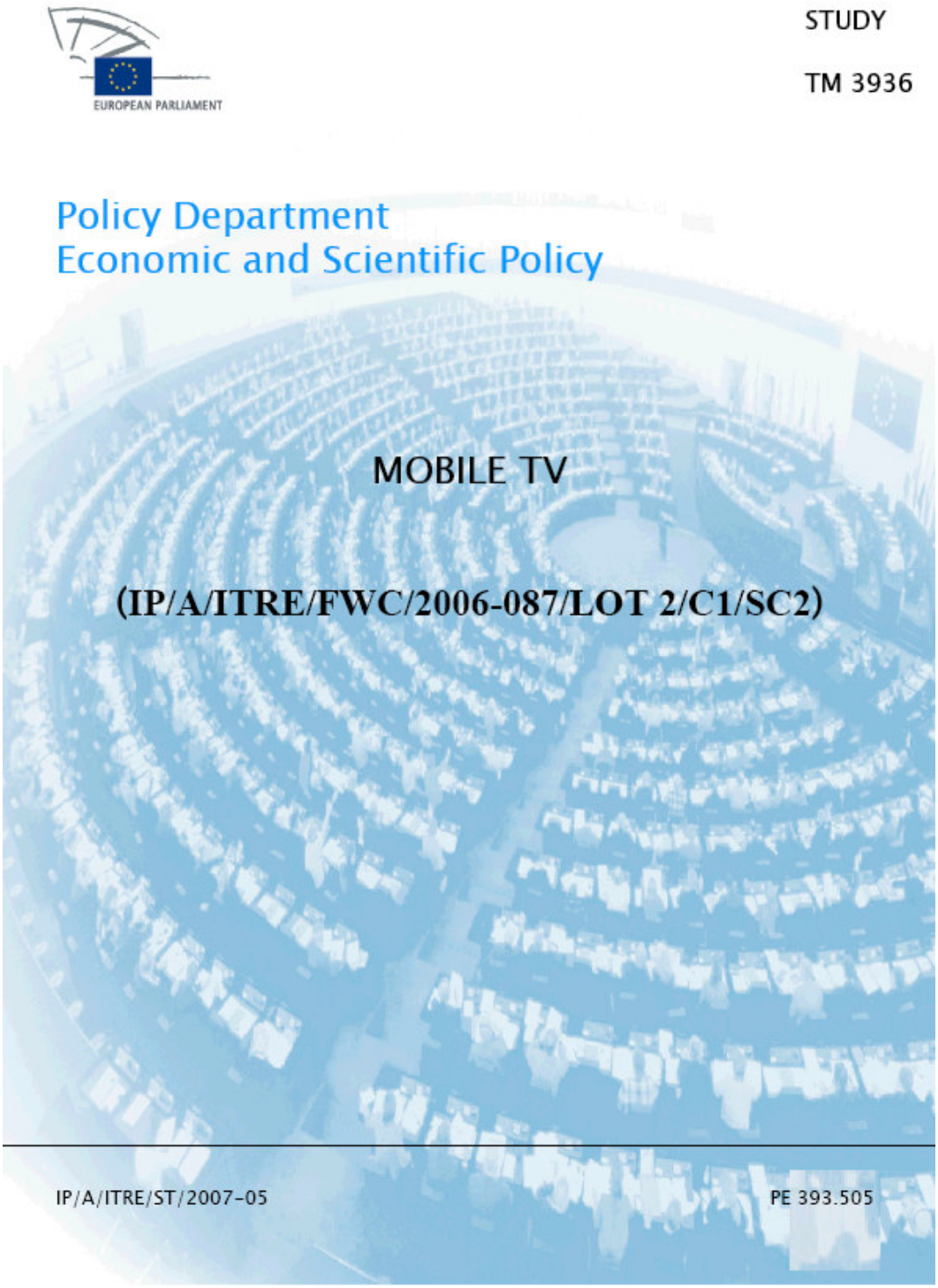
3. CONCLUSIONS

The promotion and adoption of a common technical standard for Mobile TV such as DVB-H could serve the public interest well when economies of scale and interoperability set the platform for competitive pricing, broad range of services and devices and international roaming (through compatible service layer implementation, and prepaid charging).

DVB-H offers backward compatibility to DVB-T and allows for the co-existence with DVB-T in the same spectrum and infrastructure. As Singapore is also adopting DVB-T for terrestrial broadcast, resources for DVB-T can be shared and utilized as well.

4. ANNEXES

4.1 EU Study results of Mobile TV (IP/A/ITRE/FWC/2006-087/LOT 2/C1/SC2) (see attached pdf document)



4.2 EU Press release from Nov 29, 2007

http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1815&format=HTML&aged=0&language=EN&guiLanguage=en

Today the rapid deployment of mobile TV services across Europe has taken a significant step forward as EU Member States endorsed the European Commission three pillar strategy presented in July: Next steps will now include the preparation of guidelines for authorisation procedures and the addition of DVB-H to the official list of standards whose use all 27 EU Member States have to support and encourage. This proactive European strategy for mobile TV aims at giving European consumers the benefits of television everywhere and anytime, as is increasingly the case in Asia and the US. It also gives content creators, broadcasters, service providers and hardware manufacturers the certainty they need to roll-out mobile TV services across Europe in 2008.

"*European mobile TV is a step closer to success following today's endorsement by the Council of the Commission's strategy for creating economies of scale in this important sector,*" said Viviane Reding, EU Commissioner for the Information Society and Media. "*This shows that political resolve and market developments are in tune to ensure this potentially multi-billion Euro market is on the right track by mid-2008. I welcome the support received today for the Commission's mobile TV strategy and, by a strong majority of Member States, also for DVB-H. At the same time, I call also on the minority of governments who are still reluctant, partly for internal reasons, to endorse DVB-H as European standard to join the majority quickly. The more Member States participate actively, the better Europe will be in achieving the required critical mass to become a world leader in Mobile TV. Europe must especially not miss the occasion of the European Football Championship in Austria and Switzerland in 2008. I therefore call on the Member States still lagging behind with their internal procedures to intensify their efforts. Watching mobile television should become for every European as easy, attractive and affordable as making a phone call. We the Commission, together with the industry, will make our contribution to the successful take-up of mobile TV in Europe and take all necessary action needed to boost this vitally important industry for Europe.*"

In July the Commission proposed a strategy for promoting mobile TV across Europe (see IP/07/1118, MEMO/07/298). It included the use of the open standard DVB-H – which has been developed by the European industry, partly with the support of European research funds – as the common standard for terrestrial mobile TV across Europe. This proposal has already led to an irreversible trend in the market towards DVB-H as the preferred European standard for mobile TV, while other parts of the world are also backing this open standard of the DVB family.

Following the Council meeting today, **DVB-H will be published by the Commission in the list of official EU standards**. As a result, all EU Member States will have to support and encourage the use of DVB-H for the launch of mobile TV services, thus avoiding market fragmentation and allowing economies of scale and accordingly affordable services and devices. In addition, the Commission intends to work closely with the Member States in the coming months on the authorisation and licensing regimes, and to look together with the industry at issues such as service layer interoperability and right management applied to mobile TV.

The Commission is strongly committed to the success of mobile TV which could be a market of up to €20 billion by 2011, reaching some 500 million customers worldwide. The Commission considers 2008 to be a crucial year for mobile TV take-up in the EU due to important sports events, such as the European Football Championship and the Summer Olympic Games, which will provide a unique opportunity for raising consumers' awareness and for the adoption of new services. Today, South Korea and Japan

alone have 20 million mobile TV customers, more than 30 times the number of users in the EU. These competitors have undertaken massive efforts to promote their own single standards around the globe, threatening one of Europe's most promising industries.

To date DVB-H has been commercially launched in Italy and Finland, with trials in Austria, Belgium, the Czech Republic, Denmark, Germany, France, Hungary, Ireland, Latvia, Lithuania, Luxembourg, The Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, and the United Kingdom.

Background:

DVB-H is an open standard developed by the open Digital Video Broadcasting (DVB) Consortium. It is part of a family of interoperable standards that dominate digital broadcasting around the world, together with DVB-S for digital satellite TV, DVB-C for digital cable TV and DVB-T for digital terrestrial TV.

4.3 Press Release of Industry support to BMCOforum and OMA BCAST

PRESS RELEASE

April 12, 2007

Leading mobile companies to endorse common mobile TV implementation based on OMA BCAST Common implementation profile defined within the Broadcast Mobile Convergence Forum ensures service interoperability and economies of scale for Mobile TV devices

Hague, the Netherlands - Digitenne, Ericsson, KPN, Nokia, Nokia Siemens Networks, NXP Semiconductors, Sony Ericsson, Telefónica, O2 Europe, T-Mobile, Vodafone and ZTE today announced their support for a Mobile TV implementation profile developed within the Broadcast Mobile Convergence Forum (bmcoforum). The profile simplifies the Open Mobile Alliance (OMA) Mobile Broadcast Services Enabler Suite (BCAST) specification for fast implementations ensuring interoperability and future proofing further developments.

The three main features supported by this profile are:

1. Advanced service and program guide (ESG) enabling a rich set of services
2. Support for multiple broadcast technologies
3. Support for content and service protection, using the Smart Card Profile (based on (U)SIM Card) or the DRM Profile (based on OMA DRM V2.0)

Support for DVB-H broadcast networks and cellular systems, as well as the 3G Mobile Broadcast Service (MBMS), are benefits of the OMA-BCAST specification. This allows companies to extend current business models and broaden current and future Mobile TV services. As a result, operators will be able to offer customers more choice in watching TV on their handset.

The bmcoforum OMA BCAST implementation profile ensures the best possible interoperability between the handsets and broadcast systems, providing customers with a smooth Mobile TV experience, and allowing large scale handset development.

It is the firm belief that such a profile will speed up large scale Mobile TV deployments in Europe

The profile defined by bmcoforum is the first implementation subset of the feature rich Mobile Broadcast Services Enabler Suite 1.0 (OMA BCAST 1.0) developed by the Open Mobile Alliance.

Quotes
"Digitenne aims to provide wholesale DVB-H services to the various mobile operators in The Netherlands" explains Marc van Dijk, head of Business Development for Digitenne, the provider of the commercial digital terrestrial TV services in the Netherlands. "We have

chosen bmcoforum's implementation profile for OMA BCAST so that the mobile operators have the flexibility to run their own Mobile TV business without losing interoperability. Furthermore the baseline profile of OMA BCAST will allow content providers to develop Mobile TV content that can be used for the whole market."
"Ericsson sees that TV is significantly changing as it evolves from linear TV to personalised and interactive TV. We support open solutions with a common approach for Mobile TV delivery across 3G networks over HSPA and MBMS as well as in other broadcast networks", says Claes Ödman, head of Multimedia Solutions at Ericsson. "Now, with the OMA BCAST enabler, this is possible in an interoperable manner, allowing the combination of Mobile TV based on Unicast and Broadcast services. The bmcoforum profile will help tremendously in accelerating the deployment and roll-out of such services."

"KPN very much welcomes the bmcoforum initiative to profile the OMA standard. Having an agreed baseline for Mobile TV technology will help us deliver a compelling interactive TV service to our customers. The Mobile TV market has had to wait for a clear technological direction. This important agreement should help all players in the Mobile TV market to speed up the delivery of attractive services on a growing range of affordable, high quality handsets," says Franklin Selgert, innovation manager KPN.

"Nokia warmly welcomes the industry agreement for the end-to-end implementation profile that caters for both DVB-H and 3G solutions," says Jouni Kämäräinen, Director, Multimedia, Nokia. "We see a strong parallel to the early days of development of GSM. The great commitment in the industry for a clear implementation profile will be followed by common test practices that will create a coherent and open market for successful worldwide DVB-H deployments. The bmcoforum implementation profile of the OMA BCAST standard is essential in launching Mobile TV services on a global scale."

"NXP Semiconductors, as a provider of complete 'TV on Mobile System Solutions', fully endorses the efforts of the bmcoforum and supports the production of the bmcoforum implementation profile based on OMA BCAST specification. We see clear industry and customer demand for such an activity and we welcome the opportunity to align our system solution development by combining our 3G mobile phone and integrated DVB-H TV on Mobile reference receivers with the bmcoforum derived OMA BCAST implementation profile," said Kees Joosse, Senior Director, Business Development, BL-Personal Entertainment Solutions, NXP Semiconductors.

"We at Nokia Siemens Networks believe that a fast and successful Mobile TV market requires timely availability of interoperable implementations," says Dr. Thomas Werner, Head of the Business Line Applications in the Business Unit Service Core & Applications at Nokia Siemens Networks. "Many operators use an incremental approach to introduce Mobile TV services. In this context, the bmcoforum profile of the OMA BCAST standard helps speed up implementation and interoperability testing. Starting with basic functionality and enabling more standardised features as the market develops, this profile has the potential to provide a future-proof path towards feature-rich Mobile TV services, delivered over DVB-H, MBMS and Unicast networks alike."

Dave Williams, CTO of Telefónica O2 Europe, said: "We have led DVB-H development in the UK, Germany and Ireland through customer trials and consortium activity. We believe that the OMA BCAST set of standards provides the best option for the implementation of integrated multi-media services using DVB-H broadcast technology in combination with 3G/MBMS packet data services and look forward to its deployment across Europe."

"T-Mobile supports all activities to finalise the specification of OMA Smart Card Profile and OMA ESG. We consider Smart Card Profile and OMA ESG to be the most future proof technologies which will support interactive services for a wide range of handset and provides the highest level of security," says Alexander Gedrovics, head of service platforms at T-Mobile International.

"Vodafone is committed to following the OMA BCAST standard for the implementation of future Broadcast-type multimedia services based on complementary Broadcast network technologies such as DVB-H and 3G/MBMS. Broadcast Service Protection via Smartcard and the Electronic Service Guide (ESG) are key elements of the OMA BCAST standard which will bring clear customer benefits," says Dr. Alfred Baier, Senior Programme Manager for Mobile TV Technology at Vodafone Group. "We actively support the development of dedicated OMA BCAST implementation profiles within the bmcoforum, as this will help us to provide compelling Mobile TV services and terminals that delight our customers across all of our markets."

"We have introduced the most advanced 3G DVB-H phone to the European market. With the partnership with bmcoforum, ZTE has the strong capability to deliver additional mobile TV phones based in OMA BCAST standard for the global customers" said MR. Li Yingfeng, General Manager of ZTE WCDMA mobile terminal products.

About each company

About Digitenne
Digitenne is the provider of Digital Terrestrial TV services (DVB-T) in the Netherlands. Digitenne provides a wholesale package of about 20 commercial TV channels to retail service providers like KPN and Tele2 for their subscription based digital TV services to Dutch consumers. Furthermore, Digitenne provides the free-to-air digital terrestrial services for the Dutch public broadcasters. The Digitenne free-to-air services provide nationwide rooftop aerial coverage which enabled analogue TV in the The Netherlands being completely switched of in December 2006. Coverage of the commercial Digitenne services with a simple indoor antenna is over half of The Netherlands.

About Ericsson
Ericsson is shaping the future of Mobile and Broadband Internet communications through its continuous technology leadership. Providing innovative solutions in more than 140 countries, Ericsson is helping to create the most powerful communication companies in the world. Read more at www.ericsson.com.

About KPN

KPN is the leading multimedia company in the Netherlands, providing consumers and consumer households with fixed and mobile telephony-, internet- and TV services. To business customers, KPN delivers voice-, internet- and data services as well as fully-managed, outsourced ICT solutions. Both nationally and internationally, KPN provides wholesale network services to third parties, including operators and service providers. In Germany and Belgium, KPN pursues a multi-brand strategy with its mobile operations, and serves multiple customer segments in consumer- as well as business markets. www.kpn.com

About Nokia
Nokia is a world leader in mobile communications, driving the growth and sustainability of the broader mobility industry. Nokia connects people to each other and the information that matters to them with easy-to-use and innovative products like mobile phones, devices and solutions for imaging, games, media and businesses. Nokia provides equipment, solutions and services for network operators and corporations.
www.nokia.com

About Nokia Siemens Networks
Nokia Siemens Networks is a leading global enabler of communications services. The company provides a complete, well-balanced product portfolio of mobile and fixed network infrastructure solutions and addresses the growing demand for services with 20,000 service professionals worldwide. The combined pro-forma revenues of 17.1bn in fiscal year 2006 make Nokia Siemens Networks one of the largest telecommunications infrastructure companies. Nokia Siemens Networks has operations in 150 countries and is headquartered in Espoo, Finland. It is a 50-50 joint venture combining Nokia's Network Business Group and the carrier related businesses of Siemens Communications.
www.nokiasiemensnetworks.com

About NXP
NXP is a top 10 semiconductor company founded by Philips more than 50 years ago. Headquartered in Europe, the company has 37,000 employees working in more than 20 countries and posted sales of EUR 5 billion in 2006. NXP creates semiconductors, system solutions and software that deliver better sensory experiences in mobile phones, personal media players, TVs, set-top boxes, identification applications, cars and a wide range of other electronic devices. News from NXP is located at www.nxp.com.

About Sony Ericsson
Sony Ericsson Mobile Communications serves the global communications market with innovative and feature-rich mobile phones, accessories and PC-cards. Established as a joint venture by Sony and Ericsson in 2001, with global corporate functions located in London, the company employs over 7,500 people worldwide, including R&D sites in Europe, Japan, China and America. Sony Ericsson celebrated the 5th anniversary of the start of the joint venture on 1st October, 2006.Sony Ericsson is the global title sponsor of the Women's Tennis Association, and works with the Association to promote the Sony Ericsson WTA Tour in over 80 cities during the year. For more information on Sony Ericsson, please visit www.sonyericsson.com

About Telefónica O2 Europe
Telefónica O2 Europe comprises mobile network operators in the UK, Ireland and Slovakia, along with integrated fixed/mobile businesses in Germany and the Czech Republic - all of which use 'O2' as their consumer brand. Telefónica O2 Europe also owns 50% of the Tesco Mobile and Tchibo Mobilfunk joint venture businesses in the UK and Germany respectively as well as having 100% ownership of Be, a leading UK fixed broadband provider. In addition, the group includes the Isle of Man fixed/mobile operator, Manx Telecom.

Telefónica O2 Europe, part of the Telefónica group, is headquartered in Slough, UK, and has more than 38 million mobile and fixed customers.

About T-Mobile
T-Mobile International is one of the world's leading companies in mobile communications. As one of Deutsche Telekom's three strategic business units, T-Mobile concentrates on the most dynamic markets in Europe and the United States. By the end of 2006, more than 106 million customers are served in the twelve T-Mobile markets. T-Mobile is a partner of FreeMove, an alliance formed by four of Europe's leading mobile companies - Orange, TIM (Telecom Italia Mobile), TeliaSonera, and T-Mobile - to help their customers communicate as easily while travelling abroad as they do at home.

T-Mobile is committed to offering its customers a broad range of easy to use services and products wherever they are. Considerable effort from approximately 50,000 employees focuses on the goal of delivering the best state-of-the-art mobile communications. High quality multimedia networks and continuing investment in the research and development of new ideas are reshaping the way in which people use mobile communications for information, for work, and for fun. Thanks to T-Mobile's innovative web'n'walk service the mobile Internet is currently conquering the mobile telecommunications markets with full vigour. Customers increasingly use their cell phones to surf the world wide web while travelling.

For more information about T-Mobile International, please visit www.t-mobile.net

About Vodafone
Vodafone is the world's leading international mobile communications group with operations in 25 countries across five continents and over 200 million proportionate customers by the end of January 2007, as well as 36 partner networks. For further information, please visit www.vodafone.com.

About ZTE
Founded in 1985, with global headquarters in Shenzhen China, and operations in more than 100 countries, ZTE is a leading global provider of fixed line and mobile telecommunications equipment and network solutions. ZTE's product range is covering virtually every sector of the wireline, wireless and terminal markets. ZTE offers its customers a unique range of services. The company delivers innovative, custom-made products and services to major operators in the world, helping them to achieve continued

revenue growth and to shape the future of the world's communications. ZTE commits around 10% of annual revenue to research and development and takes a leading role in a wide range of international bodies developing emerging telecoms standards. ZTE is the fastest growing telecoms equipment supplier in the world, and China's only listed telecoms manufacturer, with shares publicly traded on both the Hong Kong and Shenzhen Stock Exchanges. ZTE was the only Chinese IT and telecoms manufacturer listed in BusinessWeek's 2005 Top 100 Information Technology Companies.

For more information about ZTE Corporation, please visit www.zte.com.cn

About the bmcoforum:
bmcoforum (Broadcast Mobile Convergence Forum) is an international lobbying association, providing a discussion platform for companies and institutions dealing with the development of a worldwide open market for mobile broadcast services.

About the Open Mobile Alliance (OMA)
The Open Mobile Alliance (OMA) delivers open specifications for creating interoperable services that work across countries, operators, fixed and mobile terminals. Driven by users' needs and the expanding market for data services, the member companies of the Open Mobile Alliance stimulate the adoption of new and enhanced information, communication and entertainment services. The Open Mobile Alliance includes contributors from all key elements of the wireless value chain, and contributes to the timely and efficient introduction of services and applications.

4.4 OMA Press release: Open Mobile Alliance Releases Globally Interoperable Mobile TV standard

FOR IMMEDIATE RELEASE
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Open Mobile Alliance Releases Globally Interoperable Mobile TV Standard

Singapore, June 20, 2007 – The Open Mobile Alliance (OMA), an international specifications setting body, announces the public availability of its Mobile Broadcast (BCAST) Version 1.0 Candidate Enabler Release. The specification is an open global standard for interactive mobile TV as well as on-demand video services, and is adaptable to any IP-based mobile content delivery technology. Currently, OMA's BCAST 1.0 can be adapted to broadcast systems like DVB-H as well as cellular systems like 3GPP MBMS, 3GPP2 BCMCS and mobile unicast streaming systems.

Over 35 companies have actively contributed to OMA's new specification, setting the global market requirements of the end result. "The regulatory, cultural and network environments for TV are very complex around the world" says Jari Alvinen, Chairman of the Board, OMA. "Release of this specification demonstrates the effectiveness of OMA efforts in the introduction of globally interoperable mobile TV services. The OMA BCAST Enabler opens the door for all potential players in the Mobile TV Value chain to compete and differentiate their products and services."

"The OMA BCAST specification suite accommodates several bearer network technologies and supports multiple business models," says Sungoh Hwang, Chairman of the OMA BCAST Working Group. "The specification equally caters to deployments driven by broadcasters as well as those driven by operators. Users can now have both interactive and simple broadcast mobile TV, buffered infotainment content on-demand, and any of the many new services that are currently being developed in the market."

OMA BCAST 1.0 Candidate Enabler Release Features
- Highly functional Service Guide, allowing flexible deployments
- Service and Content Protection using OMA DRM 2.0 or 3GPP/3GPP2 Smartcard
- Distribution Solution for both real-time and non-real-time media content
- Service Interactivity enabling active user involvement with services
- Network agnostic for both IP-based broadcast and cellular bearers

About the OMA Release Program
To date, OMA has published 51 Enabler Releases. The OMA continuously operates an interoperability program to validate Enabler specifications, as well as the implementations

of member products and services. Using a clear working process, the Enabler Release Program is designed to deliver two key milestones for each enabler:

A ***Candidate Enabler Release (CER)*** delivers an approved set of open technical specifications that can be implemented in products and solutions, and then tested for interoperability.

An ***Approved Enabler Release (AER)*** represents Candidate Enabler Releases that have gone through the Interoperability Program (IOP) of OMA. The IOP tests interoperability between different member company's implementations – either within the OMA or through other means.

For more information, visit http://www.openmobilealliance.org/release_program/index.html

About the Open Mobile Alliance (OMA)
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4.5 MDTVA Press Release

News Release 2006, 1, 23

Industry Leaders Form Alliance to Foster Growth of Mobile Digital TV and Accelerate DVB-H Deployment in North America

Intel, Modeo, Motorola, Nokia and Texas Instruments Working Together to Drive the Future of Mobile Entertainment

Las Vegas, NV – NATPE Mobile++ 2006 Conference and Exhibition – Jan. 23, 2006 - Today, a group of the industry's leading wireless and entertainment companies announced the formation of a new organization created to promote the growth and evolution of Digital Video Broadcasting – Handheld (DVB-H), an open procedure standard for broadcast digital TV reception on mobile devices. The organization, called the Mobile DTV Alliance, includes representatives from Intel Corporation, Modeo [NYSE: CCI], Motorola [NYSE: MOT], Nokia [NYSE: NOK] and Texas Instruments (TI) [NYSE: TXN].

As mobile video entertainment gains increased awareness and achieves greater availability, the Alliance will focus on promoting the best practices and open standards that deliver premium-quality broadcast television to mobile devices for the North American market.

"The mobile TV market is heating up, with both trials and deployments accelerating over the next 12-18 months," said David Linsalata, Research Analyst for Mobile Markets at IDC. "The support of key industry players in promoting the advantages of the DVB-H standard will significantly aid mobile TV deployment efforts in North America."

An open procedure, industry-supported standard is expected to foster growth throughout the wireless market with more choices across the value chain from silicon, handsets, services and more. This should allow mobile DTV handsets and services to reach the mass market faster and at a lower cost to consumers.
Using mobile devices capable of decoding DVB-H signals, users will be able to receive live TV programming from the mobile TV function directly on their phone and other devices. In addition, users will benefit from on-demand and interactive programming that would utilize the cellular network, thereby increasing revenue opportunities for operators. The DVB-H standard benefits operators by preserving cellular network bandwidth for voice and other data services. Furthermore, mobile broadcast TV together with 2.5G and 3G networks offer an exceptional user experience and more efficient utilization of operators' spectrum and resources.

There are more than 10 DVB-H network trials that have either concluded or are currently underway around the globe, including Australia, Finland, France, Germany, Italy, the United Kingdom, the United States, and other countries. By 2007, most U.S. major markets are expected to have DVB-H infrastructure built out and ready for deployment.

Members of the Alliance will hold a panel session and DVB-H demonstrations at NATPE Mobile++ later today at the Mandalay Bay Hotel, Las Vegas, to discuss the Alliance and the DVB-H standard.

For additional information on the Mobile DTV Alliance, please visit: www.mdtvalliance.org

About the DVB-H Standard

DVB-H is an open procedure standard developed by the DVB Project and enjoys broad industry support with more than 100 companies working on DVB-H components, devices and services today. The open approach of the DVB-H standard nurtures flexibility of business models, competition and sales opportunities for the value chain. The DVB-H standard incorporates OFDM air interface technology with good spectral efficiency, immunity to multi-path fading and good mobile performance.

Mobile DTV Alliance Member Comments

"Consumers are demanding more content, such as live TV, from their mobile devices, and open procedure standards are key to delivering that content in a cost-effective way," said Kevin Jones, Director of Business Development for Intel's Mobility Group. "DVB-H is a very effective way to deliver high-quality, broadcast digital TV to mobile users, and Intel is a member of the Mobile DTV Alliance to help promote the standard and availability of this technology."

"Participation in the Mobile DTV Alliance by global leaders such as Intel, Motorola, Nokia and Texas Instruments indicates the significant market potential of DVB-H both in the United States and in other countries. With our unencumbered U.S. spectrum rights and significant broadcast experience, Modeo is well-positioned to deliver a DVB-H broadcast network that will give U.S. consumers a superior mobile television experience delivered through DVB-H-enabled portable devices," commented Michael Schueppert, President of Modeo LLC. Modeo is a subsidiary of Crown Castle International Corp.

"Motorola's extensive experience in video distribution and cellular tells us that Mobile TV is poised to be one of the next great consumer experience drivers," said Rob Bero, Director, Broadcast Technologies, Motorola Mobile Devices. "As a founding member of the Mobile Digital TV Alliance, we're pleased to be working with our fellow industry leaders to bring this experience to market faster and make it more accessible to subscribers everywhere via open standards such as DVB-H."

"Nokia is committed to the deployment of robust, scalable and interoperable DVB-H systems to ensure an exceptional experience with Mobile TV and related value-added services," said Juha Lipiainen, Director of Strategy & Business Development for Mobile TV, Nokia. "To this end, Nokia is pleased to be a part of this joint initiative to bring together technology, product and service leaders to ensure common implementation of DVB-H networks and terminals according to open industry standards."

"The Mobile DTV Alliance provides an open ecosystem for the mobile digital TV marketplace, greatly increasing revenue opportunities, innovation and services to consumers," said Yoram Solomon, Director of Strategic Marketing and Industry Relations for TI's Mobile Connectivity Solutions. "DVB-H is the most widely adopted standard in the world, and having an Alliance with members at every level of the wireless ecosystem, including partners and competitors alike, will ensure widespread adoption of DVB-H in North America."

Safe Harbor Statement

Statements contained in this news release regarding mobile digital TV product availability (including geographic scope and services to be offered), the growth of the mobile digital TV market and other statements of managements' beliefs, goals and expectations may be considered forward-looking statements as that term is defined in the Private Securities Litigation Reform Act of 1995, and are subject to risks and uncertainties that could cause actual results to differ materially from those expressed or implied by these statements. The following factors and the factors discussed in the parties' most recent Form 10-Ks could cause actual results to differ materially from the statements contained in this news release: actual market demand for mobile digital TV. The parties disclaim any intention or obligation to update any forward-looking statements as a result of developments occurring after the date of this news release.

Trademarks

All trademarks and registered trademarks are property of their respective owners.

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