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### STUDY ON THE SOCIO ECONOMIC DIMENSION OF THE UNAUTHORIZED USE OF SIGNALS: PART I: CURRENT MARKET AND TECHNOLOGY TRENDS IN THE BROADCASTING SECTOR.

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\* The views and opinions expressed in this Study are the sole responsibility of the author. The Study is not intended to reflect the views of the Member States or the Secretariat of WIPO.

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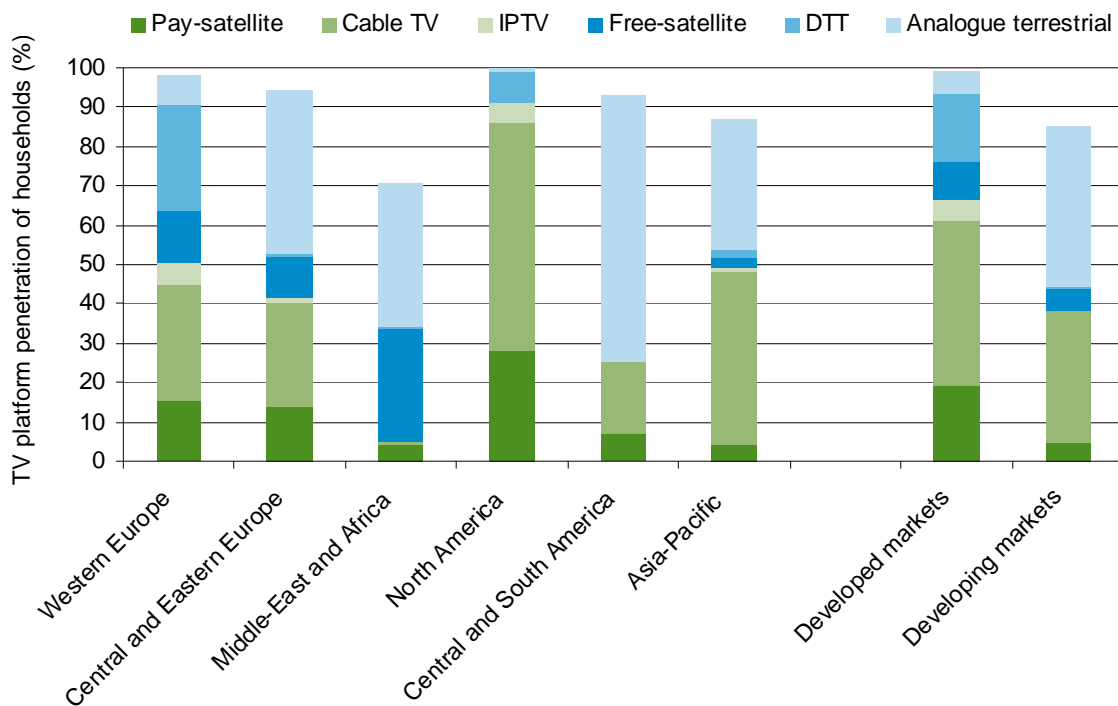
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EXECUTIVE SUMMARY

1. The global broadcasting market is facing an unprecedented era of expansion and challenge to its structure. Increasing affordability of TV services, stemming from the rise in disposable income in markets across the world has been paralleled by a growth in new distribution platforms and expansion of existing ones. Fuelled largely by upgrades to existing free and pay-TV services, coupled with the uptake of high-speed broadband Internet access and widespread use of mobile telephony, these changes are causing a shift in the way that companies – both broadcasters and content owners – view the television industry.

Fig 1. TV platform penetration of households 2009



CABLE-TV SERVICE COMPETITION

2. Cable TV services throughout Asia, Europe and the Americas are currently upgrading their broadcast infrastructure and customer reception equipment to cope with digital transmissions. Simultaneously, upgrades to their lines are allowing two-way interactive services such as video-on-demand to be rolled out.

3. Cable TV has been facing down ever-increasing competition from new platforms in established markets. In Western Europe, the threat of digital terrestrial services, combined with low cost IPTV platforms has been damaging the sector. While satellite TV services largely found their niche as premium content platforms, distributing sports and movies to high-spend households, leaving them in an uneasy but relatively stable relationship with cable, IPTV and DTT have largely been targeting the same lower spend households which cable serves.

4. At the very least, cable companies in Western Europe and North America have found their TV subscriber bases stagnant, with many seeing declines as customers churn to competitors. Western European cable is facing a 2.5 per cent decline in cable TV penetration of households by 2013, with North America looking at a nearly 6 per cent loss over the next five years.

5. In emerging markets, cable TV is facing a slightly more positive future. In Eastern Europe, cable TV penetration is looking to grow by 14 per cent over the next five years from 28 per cent to nearly 32 per cent penetration, in Asia by 15 per cent from 48 per cent and in Central and South America by 17 per cent. South America is, however, starting from a low installed base of having just 19 per cent of TV households equipped with cable TV services.

6. As a consequence of the heavy competition in Western Europe and North America, cable providers have been switching over their networks to cope with more advanced services. The digital upgrade allows for more channels, which in the US, for instance, is vital in maintaining competitive viability, with the cable companies already falling behind satellite providers in HDTV delivery. In Europe, the digital upgrade has been slightly less essential, particularly in terms of HD, but provides the opportunity for cable companies to increase the numbers of basic channels which they provide to consumers, defending their customer base against new digital terrestrial services and introduce multiple paid-for tiers, allowing them to enhance their per subscriber revenues.

7. The effects of the major Western European and North American cable companies beginning their switch over to digital transmission has had a downward effect on equipment prices. Consequently, technology required for digital services, particularly consumer premises equipment such as set-top boxes, has become more affordable for smaller operators and those in markets with lower per-customer revenues. This has allowed Eastern European, Asian and South American cable companies to start to deploy the same technologies.

8. The world's leading region for digital cable is US, with the more extensive pressures from HDTV demand forcing through uptake of digital. Over two-thirds of US cable households are now digitally enabled, compared to 30 per cent in South America and Asia, 40 per cent in Western Europe and just over 10 per cent in Eastern Europe. China's main digital push in preparation for the Olympics is one of the key contributors to Asia's relatively high digital cable conversion rate.

#### ON-DEMAND AND IPTV

9. True-video-on-demand services, allowing instant access to a catalogue of titles on a remote server, have been increasingly important assets for cable-TV companies in fending off advances from IPTV providers aiming at the same customer demographic. Roll-out globally has been relatively limited to date, with just 27m of Europe's 300m TV households forecast to be enabled for true on-demand services by the end of 2009. Close to 50m of North America's 126m households are due to be able to receive VoD in the same period. In Asia, however, under five per cent of TV households can currently use true video-on-demand content, with the proportion at less than 1 per cent in South and Central America.

10. In Europe, IPTV is the platform with the largest true-VoD reach, serving over half of on-demand enabled households at present. IPTV services delivered via broadband connections to the set-top box have been launched by practically all of the market incumbent

telecoms companies. Services are typically low cost, often bundled in for no extra fee with a broadband connection. Where basic TV packages have a dedicated monthly fee, price often undercuts that of local digital cable services.

11. Nonetheless, cable TV is catching up rapidly with European IPTV in on-demand delivery, as both digital conversion of customers on platforms with existing on-demand systems continues, and other cable TV providers launch on-demand for the first time. Importantly, cable TV providers often have the economies of scale that new IPTV services don't, allowing them to make more aggressive plays into bundling on-demand content within their existing TV packages. Cable TV will have surpassed IPTV in delivering on-demand to European TV households by 2013.

12. Cable already has the advantage in other territories however, with early cable on-demand system roll-out in North America providing it with the edge over the newer IPTV platforms. In Asia, telecommunications line quality is such that telecoms companies in many countries, such as India, have been struggling to launch IPTV services, although affluent territories such as Hong Kong and South Korea have seen IPTV systems rolled out to great effect. In South America, legislation aimed at preventing incumbent telcos from abusing their dominant market position has stymied IPTV uptake, as the main telecoms companies are prohibited from offering linear TV (i.e. on a fixed schedule) delivered via broadband. While companies such as Brazil Telecom attempted to launch an on-demand-only TV service, market consolidation resulted in the IPTV platform being abandoned.

13. Satellite TV services, which lack the one-to-one connection required for delivery of true-VoD content, have increasingly been turning to the Internet as a solution. New generation satellite boxes typically ship with an Ethernet port, allowing them to be connected via broadband to the Internet. This has been occurring most in Western Europe and North America, where rival cable and IPTV on-demand system roll-out has been strongest. Nonetheless, as IPTV services gain traction in Eastern Europe and Asia and cable upgrades its infrastructure, the trend is expected to spread.

#### THE UPGRADE TO DIGITAL TERRESTRIAL

14. Terrestrial TV services, as the basic access platform on which typically the more vulnerable members of society rely for their television reception, have had to deal with the switch to digital more carefully than cable services. Pay-TV platforms are largely governed by financial and competitive considerations, meaning that the decision to switch from analogue to digital is one of cash flow and return on investment; however, the main broadcasters which operate over, or run terrestrial services, have an obligation in most markets globally to provide near-universal domestic access to the basic public service channels.

15. As a consequence, in the push to more efficiently utilise spectrum currently used by analogue broadcasts, most terrestrial platforms in developed and developing markets have undergone or are preparing to undergo a lengthy switchover process, during which, all of the households using analogue terrestrial TV reception will be shifted over to digital reception. The process is typically aided by a variety of public awareness campaigns – normally the responsibility of the public service broadcaster. Government subsidies may be applied in order to improve the affordability of receivers to certain sections of the population.

16. The state of digital switchover varies considerably on a regional basis. Western Europe can be considered to be substantially ahead of most other markets in terms of DTT uptake. By the end of 2009, over 27 per cent of Western European households are forecast to be using digital terrestrial TV services as their main reception method, 86 per cent of the way to the 32 per cent uptake required for essentially complete coverage of households not using cable, satellite or IPTV, allowing analogue signals to be turned off. By the end of 2013, only Greece and Cyprus are looking to have households relying on analogue terrestrial TV services, with most countries switching off at the end of 2012.

17. Other regions have shown slower uptake. While in the Americas, the US, which enjoys massive pay-TV penetration, has already switched off its analogue terrestrial network, the South and Central American markets have only just begun their digital terrestrial rollout. So far, of the major South American markets, only Brazil has begun dissemination of DTT signals, with fewer than one per cent of households currently using digital terrestrial TV. In Asia, the more developed markets such as Singapore, Japan and South Korea are closer to digital switch-over, on par with Western European territories. Markets such as China, however, have adopted a fragmented approach to DTT rollout, leading to a relatively slow uptake of digital terrestrial, while countries such as India and Pakistan have not yet launched public DTT services. In MEA territories, the more affluent countries such as Morocco, Tunisia and Saudi Arabia have begun DTT transmissions, but the majority of territories, particularly sub-Saharan African markets (including South Africa), have yet to start broadcasts. In those countries which have begun transmission in the MEA region, most are planning to switch off the analogue broadcast TV network by the end of 2015 or later. South Africa has 2012 set as its switch-over date, but is unlikely to meet this goal given the current lack of roll-out and short time left for conversion.

18. The availability of digital terrestrial services has had an impact on commercial broadcasters. In many cases, the main commercial broadcasters have found themselves moving from a situation with two to three competitors to a situation with ten to twenty. As a consequence, viewing shares have begun to decline, impacting advertising revenues adversely. In just the two years following the launch of digital terrestrial services in France, for instance, the public broadcaster saw its collective core channel audience share decline by 6 per cent, with multichannel channel viewing shares up by 25 per cent. Furthermore, at the same time as broadcast fragmentation affects live viewers, the increasing availability of online video services is beginning to fragment the audience further.

## INTERNET TV SERVICES

19. This fragmentation through online content availability is being aided by the uptake of high-speed broadband services. In order for online services to be a viable alternative to broadcast TV, relatively rapid access to content is vital. Broadband services act as an access facilitator and are the pre-requisite for an online content industry.

20. By the end of 2009, over 57 per cent of Western European households will have high-speed broadband connections, forecast to rise to nearly 70 per cent by the end of 2013. A strict regulatory environment has enhanced competition between providers in Western Europe, fostering low prices and increased ease of access to services. Eastern Europe currently has a penetration of less than half that of Western Europe, at 25 per cent, but uptake is forecast to increase to 36 per cent by 2013. Russia is currently bringing the average down however, at just 17 per cent penetration at year end. With its exclusion, average broadband

penetration is forecast to be in excess of 50 per cent in the remaining Eastern European territories.

21. Many Asia-Pacific markets have shown an inclination towards rapid broadband uptake, with affluent markets such as Hong-Kong, Singapore and South Korea some of the most advanced in the world in terms of broadband subscriptions. China, although it currently only has a 24 per cent penetration, is seeing rapid growth and already represents the largest market in the world for broadband, having passed the US in terms of broadband-enabled households in mid-2008. Although broadband is becoming increasingly available in India, relatively low speeds and patchy line quality have hampered uptake. Nonetheless, consumer desire for broadband services will lead to a tripling in subscriptions by the end of 2013 (albeit from a 3 per cent subscriber base).

22. South and Central America is showing much the same trend regarding broadband services as Eastern Europe, with uptake at 22 per cent at year end 2009, rising to 33 per cent by the end of 2013. Broadband penetration varies dramatically in MEA territories, with some of the more affluent countries such as Qatar already having more than 50 per cent broadband penetration. Sub-Saharan African markets, however, suffer from poor uptake of Internet services, with less than one per cent of households in most markets taking an Internet connection (dial-up or broadband). In North Africa, rates are better. Egypt, for instance, registers over 15 per cent of households using Internet services, although only between 5-10 per cent of Internet users are broadband-enabled at home.

23. Online video services come in a variety of forms, but in terms of business model are largely split into rental or retail movie services, and advertising-funded or transactional services showing TV series. The main movie retailers/rental players in established markets such as the UK or US are computing software and hardware giants Apple and Microsoft. Apple's iTunes has cornered the online digital retail market in each territory it has launched in, for instance, achieving a market share of in excess of 80 per cent of the \$0.6bn US online retail market. iTunes, while dominant in rental as well, shares the online rental market with Microsoft's games console, the Xbox 360, which has found users able and willing to temporarily download movies via their Internet connection onto the console's hard disk.

24. For TV content in developed markets, despite the rise of portals and aggregators such as Hulu in the US, which act as the equivalent to traditional pay-TV platforms, it is the broadcasters which maintain a grip on online content streams. As a consequence the main broadcasters maintain a substantial share of online TV-advertising revenues. In the US, it is approaching 50 per cent, but in markets with a less well developed pay-TV channel business and weaker content portals, such as the UK, public broadcasters' share can be as high as 80 per cent of the market. Revenues are small, however, and currently insufficient to fill the gaps in falling broadcast advertising takings. One of the concerns which online video services have considered is that of the potential for decreased tolerance for advertising. While viewers of broadcast TV will frequently sit through several minutes of advertising every fifteen minutes, online video sites typically show fewer advertisements per show. However, a number of broadcasters, such as the UK's ITV, have been successful in increasing the available ad-load to improve the revenues each TV show can bring in. Total UK online TV advertising revenues came to just £12m in 2008, and while ITV is forecast to be taking £75m by the end of 2013 in online TV revenues, this does not fill the projected shortfall in linear broadcast TV advertising.



25. Clear frontrunners have yet to emerge in developing markets, and online distribution of video content is next to non-existent in emerging territories. Given that it is only in the last two years that online TV services have really sprung to life in Western Europe and North America, this is to be expected. It would be surprising in the mid to longer term, however, if broadcasters in developing markets were to fail to capitalise on the new distribution mechanism. Indeed in China, Shanghai Media Group's Broadband Broadcasting division has recently launched a trial version of an online catch-up TV service, dubbed Shanghai Online Television. Service has taken the same '7-day catch-up' approach as major European broadcasters for 10 of the group's channels and joins other major broadcasters CCTV and Henan TV's catch-up TV services.

## MOBILE TV IN EMERGING MARKETS

26. While PC and TV-based services relying on broadband delivery are increasing in number and accessibility in Asia, Europe and North America, markets such as Africa still have extremely low TV, PC and broadband penetration. As a consequence, online services are unlikely to gain traction in the next five years in the region.

27. While TV and PC penetration is low, mobile usage is high. Africa has a higher usage of mobile telephony services than it does fixed line telephony, with 80-90 per cent of all telephony customers mobile. Penetration is still low in Africa (in the region of 30 subscriptions per 100 head of population) compared to Western Europe, which sees roughly 30 per cent more mobile subscriptions than there are people, but is the most rapidly growing telecoms/media service in the region. With the low population densities and costs of rolling out fixed infrastructure making wired services less economical than in Europe, wireless services are typically more attractive for operators. This has been seen in the TV sector too, with cable TV virtually unheard of, and satellite TV the primary reception method in many markets.

28. This is beginning to extend to the mobile TV space as well. With the growing availability of handsets with video capability, operators have been looking to mobile TV. Africa was actually slightly ahead of Western Europe in terms of mobile TV launches in 2008, with eight launches across both Northern and Sub-Saharan Africa, compared to seven launches in Western Europe. Mobile will not replace traditional TV viewing in the region, but with TV set penetration still at between 10 and 40 per cent (depending on the country), mobile has an important role to play in television delivery in Africa.

## METHODOLOGY

### APPROACH TO DATA AND MARKET TRENDS

29. Screen Digest maintains a continuously updated database of technology and media market trends, collected using primary research methodology. Screen Digest employs over 40 analysts across three continents, devoted solely to tracking media market and technology developments. As part of their day-to-day research methodology, Screen Digest analysts regularly conduct interviews with market players and industry bodies, meaning that the majority of the information within this report is derived from direct contact with original sources.

30. To complement the approach towards data and trend collection, specific interviews have been conducted, where appropriate, with market players and industry bodies to gather and assess opinions on specific issues relating directly to concepts discussed within this report.

31. Unless otherwise stated, data and estimates in this report are derived from primary research conducted by Screen Digest.

## DEVELOPED vs DEVELOPING MARKETS

32. Screen Digest has used the World Bank definitions for the identification of developed versus developing markets. High income countries are classed as developed, with low and middle income countries classed as developing. Exact lists of territories and their classifications can be found at the following web address:

*<http://siteresources.worldbank.org/DATASTATISTICS/Resources/CLASS.XLS>*

## COUNTRIES INCLUDED IN FIGURES AND TABLES

33. Unless otherwise stated, data in the included figures and tables is from the following countries:

- Western Europe: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK;
- Central and Eastern Europe: Armenia, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, Ukraine;
- Middle-East and Africa: Algeria, Egypt, Iran, Israel, Lebanon, Libya, Morocco, Saudi Arabia, South Africa, Syria, Tunisia, UAE, Nigeria, Angola, Zambia, Namibia, Kenya, Ghana, Uganda;
- North America: Canada, USA;
- Central and South America: Argentina, Brazil, Chile, Mexico. Asia-Pacific: Australia, China, Hong Kong, India, Japan, South Korea, New Zealand, Singapore.

## TECHNOLOGY OVERVIEW AND DESCRIPTION

### DIGITAL TELEVISION

34. Traditionally, the distribution of audiovisual content to mass audiences relied upon analogue broadcasting. Audio or video recordings had the information contained converted on a one to one basis into a modulated radio wave signal. These signals were delivered via the air for the majority of markets, but as new distribution mechanisms appeared, also via cable and satellite TV systems. More recently, video has been increasingly available via high-speed broadband connections.

35. Digital encoding of television signals has been the first major change to the underlying technology of TV broadcasting since the switch from black and white to colour television. Digital technology provides an array of advantages in the broadcasting world. The main benefit of using digital signals over analogue ones for broadcasting is that, in theory, digital signals allow for an infinite number of copies to be made of them and distributed without any noticeable deterioration in quality. While analogue signals technically provide better

resolution, they are much more susceptible to noise and degradation, making them inferior to digital in practice.

36. The other main advantage of digital signals over analogue signals is that of compression. Compression works either by exploiting statistical redundancy in data (present at a lower frequency in analogue data), or by making approximations which remove unnecessary information. In broadcast TV, both of these methods reduce the amount of information required for transmission, meaning that a compressed digital TV signal takes up substantially less space than its analogue counterpart.

37. TV platforms across the world are currently switching from analogue transmission to digital. The improvement in quality is one reason for the switch, with digital video clear from the graininess which often afflicts analogue broadcast. The main reason, however, is due to space saving. Digital video is largely compressed by one of two different compression algorithms, MPEG-2 and MPEG-4. MPEG-2 is an earlier compression standard and in wider use at present for digital broadcasting, although MPEG-4 has increased substantially in usage over the past three years. MPEG-2 compressed video typically uses roughly one fifth of the space required to transmit the comparable analogue video signal. MPEG-4 can push this compression even further, to as low as ten per cent of the space that the analogue signal requires.

38. The advantages of this compression vary by platform. Satellite broadcasters, which rely on renting transmission capacity on communications satellites orbiting the Earth, can reduce the capacity they require, and as a consequence, the recurring transmission costs which they incur. Cable TV providers, which normally own their network, don't suffer from the same recurring transmission costs, but have finite channel capacity within their network. Switching to digital transmission allows them to vastly increase the number of channels which they can offer. For terrestrial platforms, digital allows this same increase in channels, but also permits the regulatory or governing bodies to reclaim spectrum previously used for television, and use it for other purposes, such as wireless broadband, mobile communications services and emergency service communications. IPTV, as the most recent TV platform to enter the global television market, is the only platform to rely entirely on digital transmission. Low consumer-end connection capacities mean that digital transmission, with its compressed signals, is the only feasible way for IPTV services to operate.

## TV PLATFORMS

39. In every country across the globe, there exist multiple methods for delivering both free-to-air and pay-TV services. Terrestrial broadcasting, cable television, satellite television and IPTV are the main platforms used for distributing TV signals:

### TERRESTRIAL TV

40. Terrestrial TV services rely on a network of transmitter towers spaced around a given region. These broadcast the TV signal through either VHF (very high frequency) or UHF (ultra high frequency) transmission. Both VHF and UHF are portions of the electromagnetic spectrum typically reserved for short-range communication. Signals may propagate a little further than line of sight (particularly for VHF), but do not generally travel far enough to interfere with communications in distant areas, making them ideal for usage in TV and radio broadcasting. The short range of the signals minimises overspill into neighbouring regions or

countries and prevents interference with alternative TV signals in such areas. Large geographical features, such as hills, mountains, or even large buildings can block terrestrial TV signals, meaning that a number of transmitter towers may be required to ensure that a given area has complete coverage.

41. UHF is increasingly preferred over VHF, as although the properties of UHF transmission mean that the tolerances in reception equipment must be tighter to enable clear reception, there are a greater range of suitable frequencies for transmitting TV. The range of usable frequencies has also effectively expanded as technology has improved and reception and broadcast equipment has become cheaper. In many markets, VHF TV transmission has been abandoned in favour of UHF. The UK dropped VHF terrestrial transmission in the 1980s, while Japan is planning to switch entirely to UHF broadcasting when it shifts over to digital terrestrial in 2012. Nonetheless, there are some markets, such as the US, which will continue to rely on the slightly more robust VHF transmissions for TV broadcasting.

42. The relatively short-range nature of terrestrial transmissions means that numerous transmitter sites are required. In a market such as the UK, this would be over 1,000 transmission towers to reach 99 per cent population coverage. In a market as large as China, in excess of 30,000 transmitter sites would be required for substantial population coverage.

43. Coverage may also vary at the channel level, depending on whether a channel belongs to a commercial or public service broadcaster. The public broadcaster channels are usually made available to the vast majority of a given country's population, at the 95 per cent plus level. Commercial broadcasters, however, which have budgetary constraints not necessarily an issue for a public service broadcaster, may use fewer transmitter sites. Use of 100 transmitter sites might provide coverage of 80-90 per cent of the population for a country the size of France or the UK - sufficient for a leading commercial broadcaster, and at a fraction of the cost, although lower than the coverage normally required of a public service broadcaster.

44. Digital terrestrial services are currently replacing the older analogue terrestrial TV services in many markets across the world, in an effort to recover inefficiently used spectrum. Coverage is largely intended to be the same, or similar to that of analogue, although some markets are planning on using free-to-air satellite TV to fill projected shortfalls in coverage. During the switchover from analogue terrestrial to digital, there is typically a lengthy dual illumination period, during which both analogue and digital signals are broadcast, providing the population with time to switch their reception method.

45. There are a number of standards at use in the digital terrestrial world at present, including European standard DVB-T, Japanese standard ISDB-T, Chinese standard DTMB and North American standard ATSC. These standards have various different specifications for transmission mechanisms, but all aim to provide a template for multiplexing and improving the efficiency of frequency use. The European DVB standard is the most widely used worldwide, with deployments across Europe, Asia and South America. It has also been selected by African and Middle-Eastern broadcasters. Different set-top box and transmission architectures are required for each different technology, meaning that, for instance DVB boxes are not compatible with ATSC transmission. Costs of reception equipment do vary as a result of the different scales of deployment. DVB-T boxes, for instance, are substantially cheaper than their ISDB-T counterparts.

## CABLE TV

46. Cable TV services were essentially the first non-terrestrial TV transmission mechanism. While relying on much the same methods of transmission as terrestrial TV services, using frequencies in the UHF range, the signal is instead propagated along a copper or fibre cable. Cable TV services were first used to provide TV signals to communities cut off from a terrestrial TV transmitter due to geographical features blocking the signal. A single large antenna would be used to receive the signal from a point which was within transmission range, and the households in the TV dark area connected via physical cable. For the early cable services, as the signal was essentially identical to that broadcast over the airwaves, no specialised equipment beyond a standard television set was required by the consumer to receive and watch TV distributed via this mechanism.

47. The fact that cabling shields the TV signal from interference from external signals, and also prevents the transmission being carried from leaking and affecting terrestrial communication, led to cable TV becoming more than a simple retransmission mechanism. Spectrum reserved for other uses in the terrestrial domain could be re-used via cable, allowing multiple additional TV channels and radio stations to be carried. As a consequence, cable was the first platform suitable for pay-television, as it allowed multiple different channels to those available via 'normal' analogue terrestrial TV to be received by a given household.

48. Cable services have evolved since their first inception, moving to digital encoding of their signals, accompanied by roll-out of two-way data services. Two-way data systems, at their base level, allow broadband Internet and telephony to be delivered via cable, but are also critical for enabling new generation interactive TV services. In order for interactive services to work, there must be a one-to-one connection between the consumer's set-top box or TV and the upstream parts of the cable network. This means that a consumer's remote control button-press can be conveyed up the network and enable a specific piece of content to be delivered to that one consumer. In a one-to-many system, such as terrestrial broadcast, the TV provider has little to no directional ability, meaning it cannot easily send specific pieces of content to any single end customer.

49. The disadvantages of cable largely stem from the fact that households must be physically connected to the network in order to receive the signal. Cabling large numbers of households is extremely expensive and necessitates vast quantities of up-front capital expenditure. Costs of cabling on a per household basis vary depending on population density and geographical or planning issues, but a typical cost in developed markets such as the US or Western Europe would be €500-€1,000 per home connected or greater, and in the region of €200 for developing markets, such as China. Bearing in mind that the average revenue per cable subscriber each year in Europe is just €11 per month, and given that not all homes connected by cable will subsequently subscribe to the service – typically in the region of 40 per cent of homes passed – it is clear that cabling is an expensive solution. Furthermore, the economics of cabling low-density areas is such that in the majority of cases, a return on investment is unlikely, making cable TV systems viable only for more heavily populated townships and cities. As a consequence of this, many markets, particularly developed countries, have seen the end of cable TV roll-out, with network coverage essentially as large as it ever will be. This means that much of the investment which cable companies are now ploughing into their infrastructure is aimed at improving and adding services, gaining as much incremental revenue from existing served households as possible.

## SATELLITE TV

50. TV was first broadcast via satellite in the 1960s, however it was not until the 1980s and 1990s that the platform really began to take off as a means for domestic television reception.

51. Satellite TV services transmit signals largely in the C-band or K<sub>u</sub>-band frequencies of the electromagnetic spectrum. These fall outside the VHF and UHF areas of spectrum used for terrestrial television and radio distribution, being at higher frequency. Such frequencies are typically ineffective for TV transmission from terrestrial transmitter masts or towers, as the signals are prone to interference from geographical features and buildings, causing them to attenuate rapidly. Delivering the signal in the frequency ranges from satellite, however, means that there will typically be no such obstacles in the way of reception, permitting C-band and K<sub>u</sub>-band frequencies to be an effective method of signal dissemination, with little interference with existing transmission.

52. Despite the lack of physical obstacles, however, the distance of the satellite from the Earth means that the signal is normally relatively weak by the time it reaches the point of reception. Consequently, reception necessitates specialised equipment – namely a parabolic satellite dish, which collects the signal and reflects it onto a central reception antenna. The process amplifies the signal and eliminates noise or interference. Unlike cable and terrestrial TV, analogue and digital satellite broadcasts always require a specialised satellite set-top box to decode the signal. This is largely due to the fact that analogue satellite broadcasts are encoded at different frequencies to broadcasts via terrestrial or cable TV.

53. The higher frequencies which satellite broadcasts rely on come with benefits over cable TV and terrestrial TV in terms of data transfer. Higher frequencies can encode more information, normally allowing satellite to carry more channels than equivalent cable or terrestrial TV services. Satellite services also have the added advantage of not requiring any network build-out, meaning that compared to cable TV or terrestrial TV services, start-up costs are lower, but equally importantly, an entire market or region can be covered, including both low and high population density locales, making satellite TV a more economical proposition in more sparsely populated areas.

54. The disadvantage of satellite TV services compared to those using physical cabling, such as cable TV or IPTV, is that there is no one-to-one connection. This means that it is very difficult to enable true interactive services via satellite TV. Any signal sent out will be picked up by all users of the satellite service. Increasingly therefore, satellite services have been turning to alternative connection methods for enabling interactive services. These normally take the form of a secondary connection to the set-top box – usually in the form of a broadband connection. This allows the delivery of content on a one-to-one basis to users, as well as allowing them to communicate with the platform, enabling interactive services. The current issue with this approach is that the satellite provider typically relies on a) the user having a broadband connection and b) the broadband connection being of sufficient quality to allow relatively rapid content delivery. As a result, satellite broadcast is still required for linear TV distribution. Furthermore, as a consequence of the variability of broadband connections, satellite ‘on-demand’ systems are largely less friendly to instant content access than those of cable or IPTV. As broadband penetrations increase and speeds rise, however, this is likely to become less of an issue.

## IPTV

55. IPTV is the only all-digital TV platform of those available and is the most recent entrant to the global TV market. IPTV services work in a different way to those using radio frequency broadcasts. Instead of encoding the signal directly into a radio frequency, the information is encapsulated within Internet Protocol, the communications standard used for computer network delivery of data. This is then delivered via a broadband connection to the consumer premises. One of the key differences between IPTV and radio-frequency broadcast services is that a consumer only ever receives a single channel at a time with IPTV. In cable, satellite or terrestrial transmission, all channels are broadcast and received simultaneously, with the unwanted channels simply filtered out. With IPTV, when the user switches channel, the signal is relayed up the network, the unwanted channel signal switched off and the desired channel then sent to the user. This essentially means that IPTV services are less constrained in the number of channels which they can offer compared to cable platforms, as the limiting factor, which is normally the small cable at the point of reception is no longer a major issue. IPTV services do suffer from other bandwidth related problems, however, covered below.

56. IPTV services should be considered distinct from online or web-TV services which are accessed via a PC or mobile device via the open Internet. IPTV services are delivered via a closed network, normally owned by the IPTV service operator, with the information conveyed inaccessible to those outside the network. This makes IPTV services analogous to cable TV operations. Only households connected up to the network can access the TV service. This is a contrast to online TV services, which are normally accessible through any Internet-connected network. The advantage of the TV service only being available within a specific network is that the quality of the signal can be controlled, something not typically possible over third party infrastructure.

57. While in theory, IPTV services should suffer from the same issues as cable in terms of network deployment and the expense associated, the infrastructure required for delivering IPTV is often already in place, or in the process of being deployed anyway. This is due to the fact that IPTV service providers are largely telecommunications firms and own their own telephony and broadband networks. In many cases, the largest IPTV providers are the incumbent telecoms companies, such as Singapore's Singtel, Hong Kong's PCCW, Germany's Deutsche Telekom, meaning that they will typically cover the entire country with their telephony and broadband network. While IPTV availability will normally be lower than this due to some consumer connections being of insufficient quality to carry a TV signal, service availability is often above 50 per cent of households.

58. One of the main problems which IPTV services face is that the infrastructure which they are operating over is not designed to carry TV signals. Traditional copper telephone lines cannot accommodate a great deal of data, meaning that in older networks, the bandwidths at the user end may limit what can be received. In general, standard ADSL lines are the minimum requirement for IPTV and will normally allow the delivery of a single standard definition TV channel if it is compressed using MPEG-4 to roughly 2Mbit/s. In order for a household to receive several channels (to watch in different rooms) or HD channels, the infrastructure will have to be upgraded to accommodate higher data throughputs. This can take the form of a more advanced DSL connection such as ADSL2+ or VDSL, or the form of a fibre-optic connection, which is especially suited to carrying large quantities of data.

59. The main advantage of IPTV over satellite and terrestrial in particular, is the two-way nature of the connection. As a consequence, all IPTV set-top boxes can communicate with the network. This makes the introduction of interactive functionality especially straightforward, with on-demand services available by default for most IPTV systems.

## MOBILE CONTENT DISTRIBUTION

60. TV content delivered to a mobile device can be distributed in a number of ways. It can be broadcast using a version of the DVB digital television standard (or one of the competing standards), streamed or downloaded via a 3G connection, or side-loaded onto the mobile device, after downloading via a fixed Internet connection. Of these three, the two most relevant to the mobile context globally are DVB and 3G. While side-loading from another device (e.g. PC) is an important consumption method for mobile content, it is enabled by the presence of a fixed broadband connection and largely follows the same trends as seen in Internet-based content delivery.

### DVB-H

61. DVB-H is the version of the DVB standard optimised for handheld mobile devices, and is used for broadcasting linear TV (i.e. on a fixed schedule). DVB-H services work in much the same way as a digital terrestrial service does, with the user picking from a range of linear TV channels. As DVB-H is a broadcast technology, it does not support on-demand access to content. While DVB-H can be combined with DVB-T multiplexes and broadcast from the same tower, typically this does not occur, with mobile operators preferring to use their own equipment.

### 3G SYSTEMS

62. Although 3G is often referred to as a single form of mobile technology, it actually refers to a range of standards used by mobile technology for speech and data communications. The term '3G' is used as the standards are the '3<sup>rd</sup> Generation' of mobile technologies, with 2G being digital mobile telephony, and 1G being analogue mobile telephony. 3G's standards, as well as coping with more efficient voice communications, also allow rapid data transfer via mobile networks. This has allowed for the direct streaming or downloading of video content to the mobile. Unlike DVB-H, as the connection is one-to-one, it supports on-demand viewing, rather than viewing of scheduled broadcasts. In theory, 3G systems can see download speeds reaching 14Mbit/s, as much as 100 times faster than 2G data transfer rates, although in practice, rates will typically be 10-20 per cent of this.

63. 3G networks typically use different sections of spectrum to those used for 2G systems, meaning that additional transmitter networks providing 3G coverage have been built by service providers. This is expensive for network operators, meaning that 3G availability will typically be lower than 2G mobile services access.

## INTERNET-BASED CONTENT DELIVERY

64. There are essentially two methods used to deliver video over the internet: download and streaming. Accessing the majority of Internet content involves downloading a copy of the content onto a user's computer. Text of web pages and images are typically downloaded, but with media files, they may also be streamed.



65. In the early days of the web, media files were encoded in such a way that the entire file had to be downloaded prior to playback, however, the currently widely employed 'progressive download' method allows playback to begin as soon as a specified initial amount of data (the buffer) is downloaded to the end device. At the completion of a progressive download, a copy of the file is left on the device unless software intervenes to remove it. By contrast, streaming media delivery method at no point in time stores the entire copy of the media file on end user's device.

66. Progressive download, which allows almost instant playback, is often confused with streaming. Although most services offering in-browser video playback are described as 'streaming', a number of them (e.g. YouTube) in fact deliver video using progressive download, which also allows a near-instant in-browser video playback, similar to streaming. However, strictly speaking, it is not the end user experience that defines the difference between the two delivery methods, but how the end user's device receives and stores media files.

67. The download method is designed to ensure 'reliable' data transfer. Should any data packet get lost en-route to the consumer, it is resent, which may result (in the case of progressive downloading) in playback interruption while lost data is buffered. By contrast, the streaming method of video delivery aims to ensure an uninterrupted real-time viewing experience, often at the expense of loss of data and/or fidelity. Due to this fidelity issue, the majority of online video services rely on downloads or progressive downloads, ensuring that the image is always at the set quality. Internet TV services, which show live broadcasts, typically rely on streaming, as all users are viewing content at the same point in time.

68. It should be noted that both streaming and downloading methods can use various network protocols to transfer the data, with both technologies able to work using peer-to-peer and TCP/IP and UDP standards. While peer-to-peer services have often been used for unauthorised distribution of copyrighted content, a number of services distributing authorised content use or have used P2P distribution. The BBC iPlayer, for instance, used a P2P software before moving to direct progressive downloads.

## ENHANCED TV TECHNOLOGIES

### ON-DEMAND SYSTEMS

69. On-demand systems come in a variety of forms, with on-demand content available via mobile, computers and also via TV services. For pay-TV platforms, there are several active forms of video-on-demand at present.

70. Near-VoD systems, or nVoD systems, are typically used by satellite operators, or cable providers which have yet to launch true VoD services. nVoD services rely on a single piece of content being broadcast on sequential channels with staggered start times. Customers can consequently begin watching the content at a time which suits them. nVoD is typically only appropriate for high value content, however, as it is bandwidth intensive and costly (for satellite operators) to run. Typically, therefore, content available on nVoD services is restricted to blockbuster movies, available on a PPV basis.

71. True VoD systems have replaced nVoD for many cable operators. True VoD (simply VoD hereafter) relies on servers being situated within a cable or IPTV network. When a customer to a VoD-enabled service wishes to access a content piece, the server streams the content directly to their decoder. Normally, VoD content can be rewind and fast-forwarded in the same way a DVD might be. VoD libraries typically complement a linear broadcast service, although historically, some providers have provided VoD as the sole means of accessing content, although this has rarely been a successful strategy.

72. Satellite providers, which typically lack the one-to-one connection normally needed for VoD have adopted a range of more sophisticated VoD-like technologies to attempt to keep up with cable and IPTV services. Push-VoD services use PVRs (discussed below) to store broadcast content and make it available in a VoD-like fashion, with instant access, rewind, pause and fast-forward. Newer, more sophisticated systems make use of consumer broadband connections to deliver content to the PVR via the Internet. Consumers can request particular videos, which will download to the PVR and can then be viewed on an on-demand basis. The downside with PVR-based services is that the numbers of videos available instantly will be substantially lower than those available on a VoD service, as capacity for storage is reduced.

#### PVRs

73. Personal video recorders, also known as digital video recorders, are becoming commonplace devices for both pay and free TV systems across the world. Allowing the scheduling and recording of content in a similar way to a VHS cassette recorder, they currently come in two varieties:

- Set-top box based PVRs: The most common form of PVR available, set-top box-based PVRs contain a hard-disk, allowing the storage of anywhere from 50 hours of standard definition programming plus. Set-top box PVRs are used by all TV platforms.
- Network PVRs: Network PVRs typically provide the same, or similar functionality to hard-disk PVRs, but instead of storing content locally on the set-top, recorded programming is stored remotely on servers within the pay-TV operator's network. Content is accessed in a similar way to on-demand content, being streamed from the server to the customer's location. Due to the fact that network PVRs require a two-way connection, only IPTV and cable operators provide them to customers.

74. Network PVRs may offer slight cost savings for the operator over set-top box based versions, but come with a variety of rights issues. As the content is stored by the operator, rather than at the customer's dwelling, some channels and content owners have stated that viewing network PVR recorded content constitutes an unauthorised rebroadcast. While certain markets, such as Finland have more clear provisions for this, certain markets such as the US have seen lengthy legal battles over network PVRs. One aspect surrounding network PVRs has been consistent across territories, however, that of personal vs network copies of content. Even in territories where network PVR systems are available, content is always required to be stored in partitions on the servers. For instance, if two customers record the same programme, that programme will be stored twice on the server, in separate instances for each customer.

## ADVANCED TV ADVERTISING

75. Traditional broadcast TV advertising in developed markets is under threat. The availability of Internet-based advertising methods and fragmentation of the traditional broadcast space has resulted in damage to the advertising revenue generation mechanisms of broadcast TV. Various technologies are consequently being looked at by broadcasters, channel groups and pay-TV operators:

## INTERACTIVE ADVERTISING

76. Interactive advertising relies on the interaction between a consumer and the advert. This can be as simple as a single button press to register interest, or learn more, or as complex as a game or story-telling device.

77. Interactive services can be made available via one-way or broadcast television, in the form of red or green button advertising. Red button advertising can rely on content delivered via broadcast, with the consumer pressing the red button on the remote control to find out more about a specific advert. Information for the advert is contained, but hidden within the broadcast stream. Red button interactive systems can be found around the world, with platforms including satellite service Sky in the UK and Astro in Malaysia making use of them. Green button advertising allows consumers to book an advert using the green button on the remote control, following the viewing of a short clip in the broadcast stream, to be recorded on their PVR. The expanded advert, which could be programme length, is then available to be viewed in full at the consumer's leisure.

78. More sophisticated technologies with two-way systems can take this sort of system to the next level. One of the criticisms of red-button advertising is that it typically takes the user out of the broadcast stream, which is obviously inconvenient for viewers. True, two-way interactive systems can, for instance, pause the live broadcast, allowing the customer to see the expanded advert or information without missing any of their show.

79. More advanced systems even allow the consumer to 'register now' or 'buy now' via their television service, providing the immediacy of online advertising, with the immersion of television, making such systems a very attractive proposition for advertisers.

## ON-DEMAND ADVERTISING

80. As consumption of on-demand content grows, both in the TV space and online, the opportunities for advertisers to reach consumers via the medium also grows. Online services have been more active in exploiting advertising opportunities to date, with the majority of online TV revenues in Europe and North America derived from advertising. This is a significant contrast to what has been seen in the closed-network on-demand TV space, where very little content has been coupled with advertising.

81. There are two methods for delivering advertising alongside on-demand content on pay-TV platforms:

- Hard coded: The content owner places advertising within the on-demand video before sending the package over to the pay-TV distributor. The advert is consequently the same, each time a customer views the video. In order to refresh the inventory, a new

advert has to be placed into the on-demand video by the content owner, and the package resent to the pay-TV operator.

- Ad-insertion: The pay-TV operator has a separate advertising inventory stored on an independent server. The basic video is sent once by the content owner, and the adverts streamed separately to the main content piece. The advert may differ each time the video is viewed, with inventory refresh simply a matter of uploading a new commercial to the advertising server.

82. Currently, the most common method used is hard coding of the adverts into the on-demand video. As a consequence of the time and costs of manually replacing the video, however, even this is not especially prevalent, with only a handful of examples of companies doing this around the world.

## TARGETED ADVERTISING

83. Targeted advertising is the ultimate form of TV advertising, with adverts being shown specifically to a target demographic specified by the advertiser, and not to demographics which would likely be uninterested in the product. For channels, allows them to better utilise their available advertising time, allowing them to sell multiple adverts for the same air-time. In theory, this should allow a significant boost in advertising revenues.

84. Targeted advertising relies on understanding individual specific customer situations – age, sex, interests etc. Two-way television platforms such as cable and IPTV are in theory able to use information provided by customers and inferred from their viewing habits to segment them into the demographics which advertisers require.

85. As in on-demand ad-insertion, targeted advertising relies on servers with a range of commercials or ad campaigns stored on them. When a given customer to the platform watches a specific piece of content, the demographic information collected by the platform is used to select an appropriate advert and show it to them. This can be done with both on-demand and linear TV, although practically, linear TV would have to have adverts stripped out first, to be replaced by the targeted adverts.

86. A less sophisticated form of targeted advertising is practised on some of the larger cable networks around the world, such as those in the US. Due to the size of the market and their coverage, some US cable companies act as the advertising sales house for a range of channels, often targeting adverts by locality (rather than demographics), but this is hard-coded into the broadcast stream rather than being inserted dynamically.

## MARKET TRENDS

### OVERVIEW

87. The global TV market can be divided at a base level between pay-TV and free-TV households. Pay-TV services require a monthly subscription, which can range from an access cost simply covering the maintenance of the TV connection to a significant monthly expenditure of €100 or more per month for access to a range of channels, including premium movies and sports. Pay-TV can be distributed via terrestrial, cable, satellite and IPTV. Free TV households, on the other hand, simply pay a one-off fee for the reception equipment to obtain access for as long as the signal is broadcast. Free TV is distributed via satellite and

terrestrial services. Although consumers in some markets, such as Germany, view much cable TV as free, in reality a monthly fee is still paid by households, but may be included in apartment rental fees or other fees to a landlord or housing association and consequently may go unnoticed.

88. Approaching half of TV households globally use pay-TV as their main method of reception, with the remaining half relying on free-to-air broadcasts. There are significant regional differences, however, in the breakdown of free and pay-TV reception.

89. The highest levels of pay-TV usage are found in North America, where just 10 per cent of households are reliant on free-to-air TV. The lack of a strong public service broadcaster in the US in particular has contributed to the success of pay-TV in the region. In Western Europe, however, where a number of the larger markets have prominent free-to-air broadcasters, reliance on pay-TV services is lower, at 52 per cent of TV households. Growth of pay-TV usage is likely to be minimal in Western Europe, reaching 59 per cent by 2013, while in North America, penetration of pay-TV services is likely to remain stable at roughly 90 per cent.

90. Pay-TV in Western Europe is split mainly between cable and satellite. Approaching 60 per cent of pay-TV households use cable TV, with satellite the main alternative platform at 30 per cent. Pay-terrestrial and IPTV services make up the remaining 10 per cent of paying households. The main platform for free-to-air TV in Europe is terrestrial TV. While free-to-air satellite is important in certain markets such as Germany, in general, terrestrial is the more significant distribution platform. Two thirds of the region's free-to-air households use terrestrial as their main signal source.

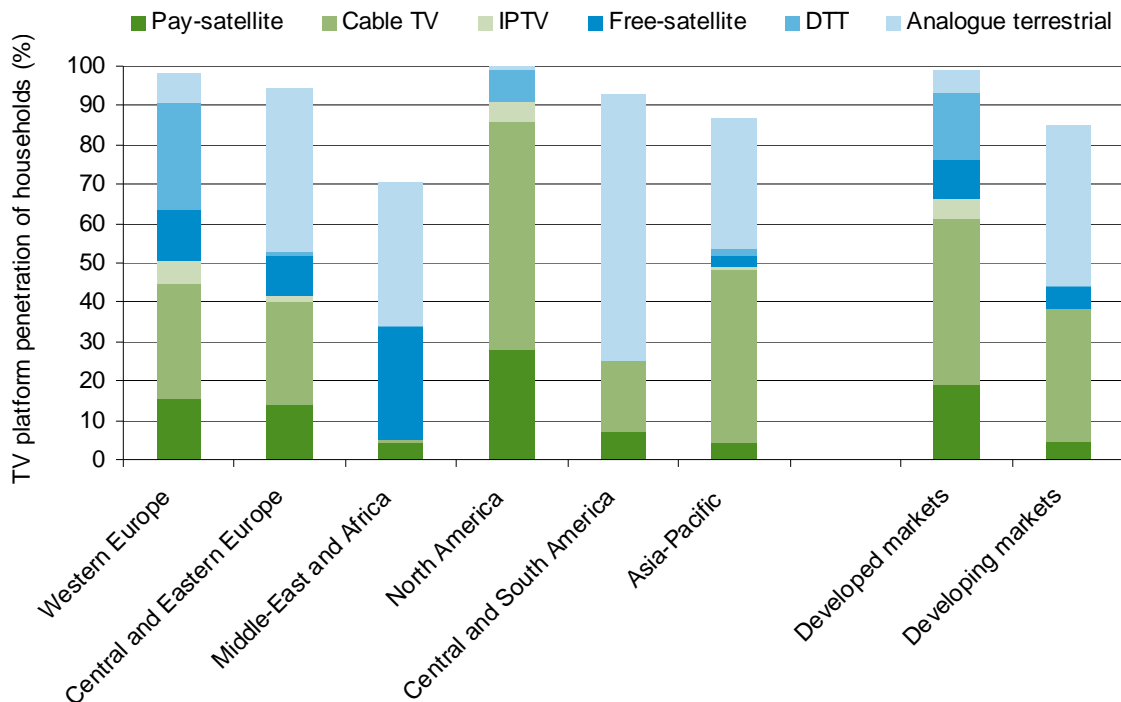
91. In North America, free-to-air TV reception is negligible, with most households opting for cable or satellite TV services. Two thirds of pay-TV households use cable services, while the remaining third use satellite. IPTV, although growing much more rapidly than cable, which is in decline in the US and relatively static in Canada, still makes up a tiny proportion of total pay-TV households.

92. In Eastern Europe, the lower household income and developing nature of the TV market means that currently, 60 per cent of households, on average, rely on free-to-air broadcasts. This is growing rapidly, however, with Eastern Europe forecast to fall in line with Western Europe in terms of pay-TV usage by the end of 2013. In Asia, pay-TV usage is increasing even faster, and from a point already in line with Western Europe. The rise of the middle-classes and the associated increase in disposable income in countries such as India and China has been aiding this. By 2013, nearly two-thirds of Asian households will be using pay-TV services.

93. Cable, for instance, is a preferable platform to terrestrial in India for consumers, as terrestrial distributes only the Doordarshan public channels. With cable-TV price caps from the regulatory body TRAI, affordability of cable has improved in recent years, with most households from the lower-middle classes and above taking cable (and more recently satellite services). In China, a similar trend is being seen. While terrestrial services distribute both the public CCTV channels and key local channels, cable provides a substantially greater selection of entertainment channels and is, as is the case in India, taken by most TV households in the more urbanised areas.

94. The Middle-East and Africa have some of the lowest usages of pay-TV in the world. In the Middle-East and North Africa, the two major pan-regional pay-TV satellite operators, Showtime-Orbit and ART, have just 2.2m subscribers between them, with national or local pay-TV operators barely present in all markets but Israel and the UAE. Even in the UAE, the primary business model of the local cable and IPTV providers is in reselling Showtime and ART packages. Fewer than 10 per cent of households in the more developed countries of North Africa and the Middle East use pay-TV services.

Fig 2. TV platform penetration of households 2009



95. A strong free-to-air satellite market is largely responsible for this, with a vast number of FTA channels creating a substantial barrier to access for new platforms. North African households, particularly those in Algeria, have also been able to piggy-back on overspill from French satellite broadcasts. Despite Middle-East and North African advertising rates being relatively low on a per spot basis, largely due to the lack of a consistent audience measurement system, the size of the audience helps to make up for this. A common regional language allows for many channels to be relevant to multiple different countries in the region. Indeed, while 13 per cent of TV users in Europe rely on free-to-air satellite TV, over 50 per cent of households in the Middle-East and North Africa use FTA satellite, with usage in some markets at over 90 per cent.

96. In South and Central America, the free-to-air sector is also strong, with only roughly a quarter of TV households taking pay-TV. Low disposable income in the majority of households has meant that pay-TV is out of the reach of many homes, although this is improving. As a consequence of the importance of free-TV to most households, in some countries in the region (such as Brazil), key sports content which might normally be found on pay-TV in other regions is available free-to-air on an ad-supported basis. Governing bodies support this majority access to content, with exclusive bids from pay-TV operators discouraged.

## DIGITAL TERRESTRIAL TV

97. The transition from analogue to digital terrestrial TV is at various stages across the world, varying by region and by country. Switchover has been considered by the majority of television markets globally, with a range of dates set for analogue black-outs. The International Telecoms Union (ITU) has set a global analogue switch-off date for 2015, meaning that countries should move to entirely digital terrestrial TV transmissions or risk interference with transmissions from neighbouring countries. It is unlikely, however, that all countries will meet this deadline, particularly developing markets, many of which have yet to even begin trialling digital terrestrial services.

98. Western Europe can largely be considered to be at the forefront of digital terrestrial transmission. Digital terrestrial TV has been launched in all of the Western European markets, with the exception of Greece and Cyprus, which are expected to begin DTT transmissions imminently.

99. By the end of 2009, over 27 per cent of Western European households are expected to use digital terrestrial TV services as their main reception method. While this is just over a quarter of TV households in the market, only 32 per cent of homes rely entirely on free terrestrial for their TV reception. This means that only 14 per cent of all homes using terrestrial as their main source of TV are still relying on analogue terrestrial TV. By 2013, the only countries which are not expected to have completely converted their analogue terrestrial viewer base to digital are Greece and Cyprus.

100. A number of Western European markets have already switched off the digital signal, including Luxembourg, the Netherlands, Sweden, Germany and Finland. A number of territories including Spain and Austria have scheduled 2010 for analogue switch-off, with France looking at 2011 for the transition. The UK will see analogue terrestrial transmission cease in 2012.

101. While Eastern Europe lags Western Europe in DTT rollout, firm plans are in place in most states for digital terrestrial launch, with a number more having already begun rollout. Due to the relatively recent nature of the launches, however, penetration is still at the 1 per cent level across the region, although it is expected to grow to 7 per cent of homes by the end of 2013. Although this figure sounds low, it belies the fact that 11 Eastern European markets will have switched off their analogue transmissions by 2013, with the major markets still to make the transition being Russia, Belarus and Ukraine.

102. Due to the relatively late rollout of DTT compared to Western European markets, a number of territories have been able to select the MPEG-4 compression standard to use. MPEG-4 provides superior compression to the MPEG-2 standard widely used in Western European digital terrestrial, but has only really become available for use in the last three years. This choice means that from launch, the Eastern European platforms using MPEG-4 can fit proportionally more channels into the allocated spectrum, while also making the platform more suitable for HD transmissions, which typically take up too much space to be viable on MPEG-2 DTT services.

103. Territories which have selected MPEG-4 compression for DTT include Hungary, Poland, Slovenia and Lithuania. MPEG-4 has not been selected across the board, however, with certain territories such as the Czech Republic and Serbia picking MPEG-2 compression

for cost reasons. HD MPEG-4 receivers are substantially more expensive than SD MPEG-2 receivers, which can be bought for less than €20. In order to aid DTT uptake and reduce the degree of subsidisation required, countries like the Czech Republic have stayed with the older standard.

104. As a result of the lack of a strong public broadcaster and the subsequent high penetration of pay-TV in the United States, very few households rely entirely on terrestrial broadcasts. Just nine per cent of TV households in the US are forecast to be using terrestrial reception as the primary TV service at the end of 2009. As a consequence of the low terrestrial usage in the US, an early 2009 switch off date was selected.

105. The US switchover came, slightly delayed, in June 2009, postponed from its original February 09 deadline, due to concerns that a significant number of households were still unprepared for analogue broadcasts ceasing. The delay allowed additional subsidies for DTT receivers to reach households yet to switch.

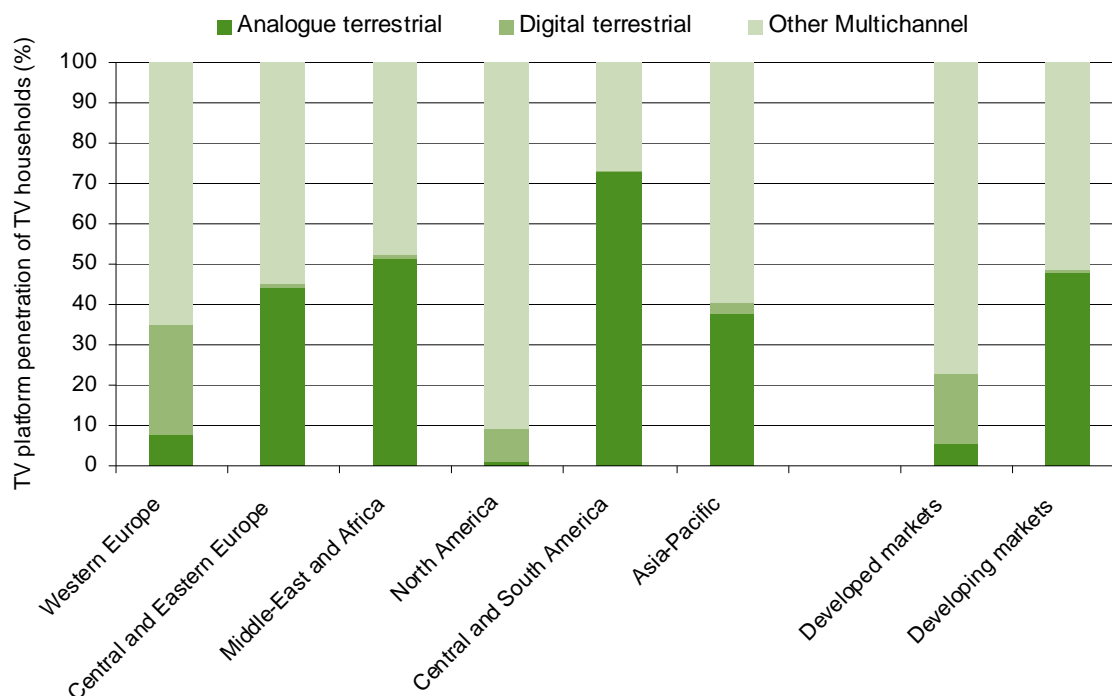
106. In Canada, a market-led approach was initially selected, with no firm analogue switch off date set, however, lack of roll-out and uptake of services led the regulator CRTC to set a firm switch-off date for all major population centres by the end of August 2011. 15 per cent of Canadian households currently rely on terrestrial broadcasts.

107. In Central and Southern America, free-to-air digital terrestrial services have been launched in just two of the major markets. Brazil saw the launch of terrestrial receivers in 2007, however, decoders entered the market at the price equivalent of over €100, making them an unattractive option for consumers. While prices were dropped to just under €70 in an attempt to increase demand, prices are significantly higher than those seen in European countries. This is primarily due to the adoption of the Japanese ISDB-T standard for digital terrestrial, combined with the processor-intensive MPEG-4 codec. Lack of scale of deployment of this combination of technologies globally has kept prices high relative to the more widely used DVB-T systems. Current market penetration of digital terrestrial TV is consequently less than one per cent in Brazil. A 2009 pronouncement by the Brazilian *Procuraduria General* suggested that the adoption of the ISDB standard was unconstitutional, which could have implications for other South American markets which have yet to launch DTT services. South American markets trialing ISDB currently include Peru, Argentina, Chile, Venezuela and Ecuador.

108. Although Argentina has a small-scale DVB-T pay-DTT service, Antina, Mexico is the only Central and South American market other than Brazil to have seen free-to-air DTT rollout. Television network TV Azteca runs the platform, which operates using the North American ATSC standard. Mexico's DTT transition is currently scheduled for 2022, substantially later than the ITU recommendations; however, the lengthy transition is aimed at giving the country time to transfer the two-thirds of households which rely on terrestrial over from analogue.



Fig 3. Terrestrial TV penetration of TV households 2009



109. In Africa, the only markets to have achieved tangible progress with digital terrestrial roll-out are the North African territories of Tunisia and Morocco. Morocco launched DTT in 2007, with Tunisia beginning extended public trial broadcasts in 2009. Currently, penetration remains relatively low in both territories, with a forecast 11 per cent of Moroccan TV households using DTT at year end 2009, and roughly one per cent of Tunisian TV homes receiving DTT. Analogue switch-off is scheduled for 2015 in Morocco, with a similar deadline likely to be set for Tunisia.

110. Algeria's digital terrestrial roll-out is set to commence in late 2010, with major cities the first areas to receive coverage. An additional 10 new TV stations are expected to receive DTT broadcast licenses. Algeria has a long scheduled transition period, despite high penetration of satellite TV, with 2020 currently set for analogue switch-off.

111. South Africa has the most aggressive deadline of African nations with regards to digital switch-off, with the transition scheduled for November 2011, but public launch of DTT has yet to occur, and is waiting for the regulator to finalise frequency plans and multiplex allocation. Consequently, it seems unlikely that a major DTT launch will occur substantially before the end of 2010, although small scale low-coverage soft-launch may occur before the 2010 World Cup. This will almost certainly result in the digital transition being pushed back to beyond 2012.

112. Of the remaining African countries, only Ghana has launched large scale digital terrestrial TV trials, with transition aimed for by the end of 2015. Nigeria's schedule currently has switchover proposed for June 2012, however in the absence of any full-scale trials, is likely to push back the deadline.

113. Digital terrestrial TV in Asia is in mixed position with regards to roll-out and uptake. Markets such as Australia, Japan, Singapore and South Korea have had digital terrestrial services since 2003 or earlier, while markets such as China, Hong-Kong and New Zealand are only just beginning rollout. Other territories still, such as India and Pakistan, have not yet launched public DTT services.

114. Penetration of digital terrestrial services as a whole remains relatively low, at under 2 per cent of the region's TV households. As with Eastern Europe, though, this low penetration hides the progress made in certain markets. Hong-Kong, Japan, South Korea and Australia are all on target to for analogue to be switched-off by the end of 2013.

115. China's analogue switch-off date is set for 2015, an ambitious target for a market where digital terrestrial is only being used by 1 per cent of the population, and is required by roughly 50 per cent before analogue switch-off. Various methods are being used to promote uptake, with government mandates requiring DTT tuners to be built into all new TV sets and subsidies reducing the consumer level set-top price point to below €20, aimed at ensuring the country does not miss the 2015 deadline.

116. While India has conducted a series of technical trials of digital terrestrial services and has chosen DVB-T as the broadcast standard, firm roll-out plans have yet to be put in place.

#### CABLE TV DIGITIZATION

117. As with digital terrestrial roll-out, cable-TV digitization is in a range of stages across the world. Very few cable companies have already shifted their entire customer base to digital, with the majority having a substantial way to go before they can turn off analogue signals.

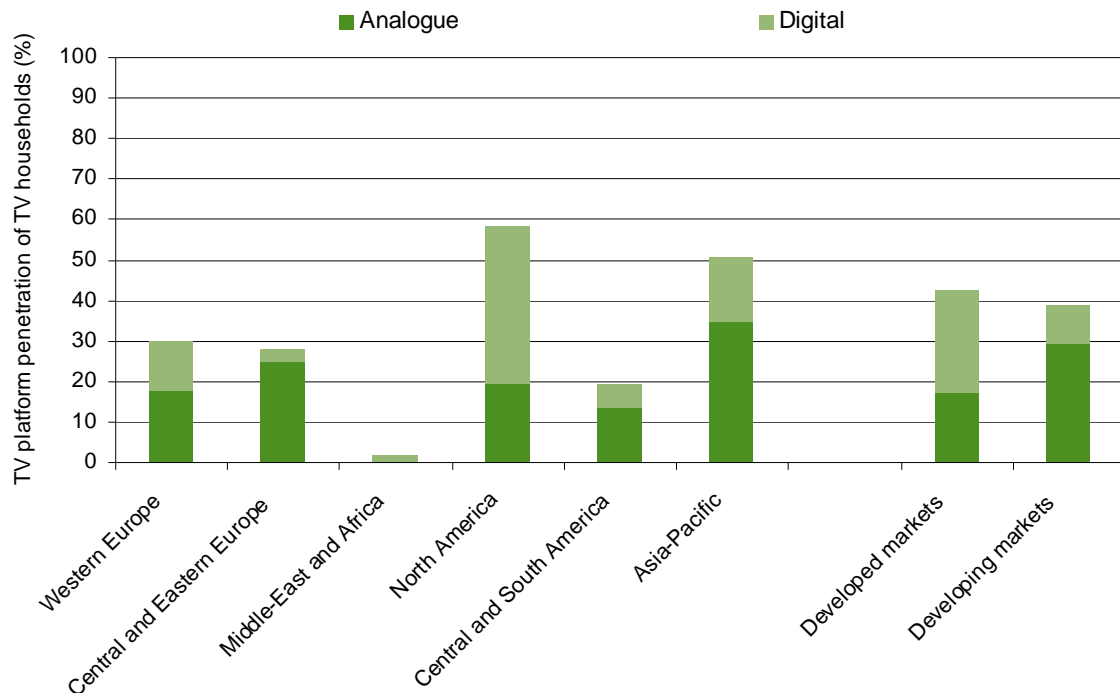
118. Cable TV is available in the majority of markets across the world, with very few countries having no cable at all. While roughly 30 per cent of European households (in both Western Europe and Eastern Europe) take cable TV, the platform is actually more prevalent in Asia-Pacific territories and in North America.

119. In North America, despite recent declines in cable subscriber bases as a consequence of increased competition from satellite and IPTV systems, almost 60 per cent of households still use cable TV as their main television reception method. In Asia, penetrations are a little lower, at 50 per cent of TV households, however, unlike the situation in North America, cable is still a growing platform. By 2013, the two regions will have very similar usage of cable services in proportion to their total TV household base, at a little over 55 per cent. Although various markets, such as India, will see cable TV households as a proportion of total TV households remain relatively static, overall growth in households and TV ownership will see Indian cable subscriptions increase from 85m to 99m over the next five years.

120. The regions with lowest cable TV usage are South and Central America and the Middle-East and Africa. South and Central America has a 20 per cent TV household penetration of cable TV services, with Middle-East and African cable TV usage rates at less than 1 per cent. Low population densities and widespread availability of satellite TV has led to cable being a largely uneconomical distribution platform in these markets. There are some exceptions in the Middle-East, such as Israel and the UAE, which have high levels of personal wealth and specific content requirements. In these two countries, cable is used by over 40 per

cent of households, however is certainly the exception for the region. Likewise, there is the occasional exception in Africa, such as Angola's Luanda-based TV Cabo, but the majority of countries in both regions remain devoid of cable TV.

Fig 4. Cable TV penetration of TV households 2009



121. Digitization of cable systems actually sees its highest rates in the Middle-East, with the majority of cable subscribers in the UAE and Israel already receiving digital signals, however, with the availability of cable in general low in the region (barring unauthorised analogue community networks in markets such as Lebanon and Saudi Arabia), overall access to digital cable is limited.

122. The leading market for digitization of cable can consequently be considered to be the US, which has already seen two-thirds of its customer base move to digital services. One of the main reasons behind this has been reclamation of bandwidth for use for HD channels. The use of the NTSC standard for US cable television resulted in a resolution and image quality typically inferior to that seen in PAL standard regions (such as Europe). As a consequence, the image quality and definition provided by HD content is seen by many US consumers as a necessity. A third of US households are forecast to be using HD by the end of 2009.

123. For cable TV, HD takes up substantial bandwidth, typically between 9 and 20 Mbit/s. A single analogue channel generally takes up around 25 Mbit/s, with the same channel in digital taking up roughly 5 Mbit/s. This means that a cable company with just five analogue TV channels could be losing out on carrying as many as 5 standard definition digital and 11 HD digital channels. With satellite providers and IPTV providers in the market operating all-digital services and not suffering from similar issues, cable TV has been driven to aim to reduce customer reliance on analogue channels. By 2013, there will be approaching 50m digital cable TV subscribers in the US, representing over three-quarters of the total cable household base.

124. Western Europe is a little behind North America in terms of analogue cable conversion, with the large utility cable markets of Germany, the Benelux region and Sweden and Denmark lagging much of the rest of the region. Fragmentation of the German cable access market has hindered digital upgrade to some extent, although recent investment, coupled with the introduction of low cost digital access packages have improved uptake. Finland is the only Western European market to have moved completely to digital cable, with the switch occurring shortly after 2007's terrestrial switch-over. The UK is likely to be the next market to move completely to digital, with Virgin Media's cable subscriber base containing just a few pockets of analogue customers.

125. It is worth noting that much of the recent emphasis of cable systems in developed markets has not been on the TV component of their offers, but instead on the newer cable broadband and cable telephony services. Incremental TV customers are significantly harder to attract in a market with pay-TV penetration of 70 per cent and above, meaning that a growth in business will generally have to come from encouraging existing TV customers either to buy additional TV packages, or to subscribe to additional telecoms services. Cable broadband services typically have a substantial advantage over competing telco-backed broadband services in much of Europe, offering higher peak download speeds than the largely DSL-based rivals. Even in Germany, where just 16 per cent of households have digital cable, and networks are still being upgraded to cope with digital, as much as half of Capex is being pushed into making networks two-way and upgrading to the latest DOCSIS 3.0 cable broadband standard.

126. China is actually the largest digital cable market in the world in subscriber terms, with approaching 65m households, representing two-thirds of the entire Asia-Pacific digital cable subscriber base. The digitization of the platform in the Asia-Pac region is nearly 30 per cent complete, with Australia, Hong-Kong and Singapore already converted fully.

127. The main Asia-Pacific market still requiring substantial conversion is India. Just 3 per cent of India's 91m-strong cable TV subscriber base is digital. Digital cable systems have been rolled-out across the market; all cities with 1m plus populations at least have a degree of digital cable. India's normally active regulator TRAI has left the cable digitization process up to the market, which at this stage, does not see the incremental revenues from digital stacking up against the costs. Consequently, unless a major regulatory change is pushed through, digital cable households will number just below 8m by the end of 2013.

#### IPTV ROLL-OUT

128. Alongside cable TV digitization, telcos across the world have been rolling out their own TV services. The majority of incumbent telecoms firms in developed markets have launched, or are preparing to launch, pay-TV delivered via their telephony and broadband networks.

129. IPTV launched first in Europe, with the UK seeing two small-scale services, Kingston Communications TV and Homechoice (now Tiscali TV), launched towards the end of 1999. While it was not until 2003 that other major European telcos began to follow suit, by the end of 2006, all of the major telecoms groups in Western Europe had launched TV services.

130. France, which saw its three main telcos launch IPTV services in 2003 and 2004, remains the world's leading market for IPTV in terms of absolute usage. By the end of 2009, there are forecast to be 7m French homes equipped with IPTV services, 28 per cent of TV households.

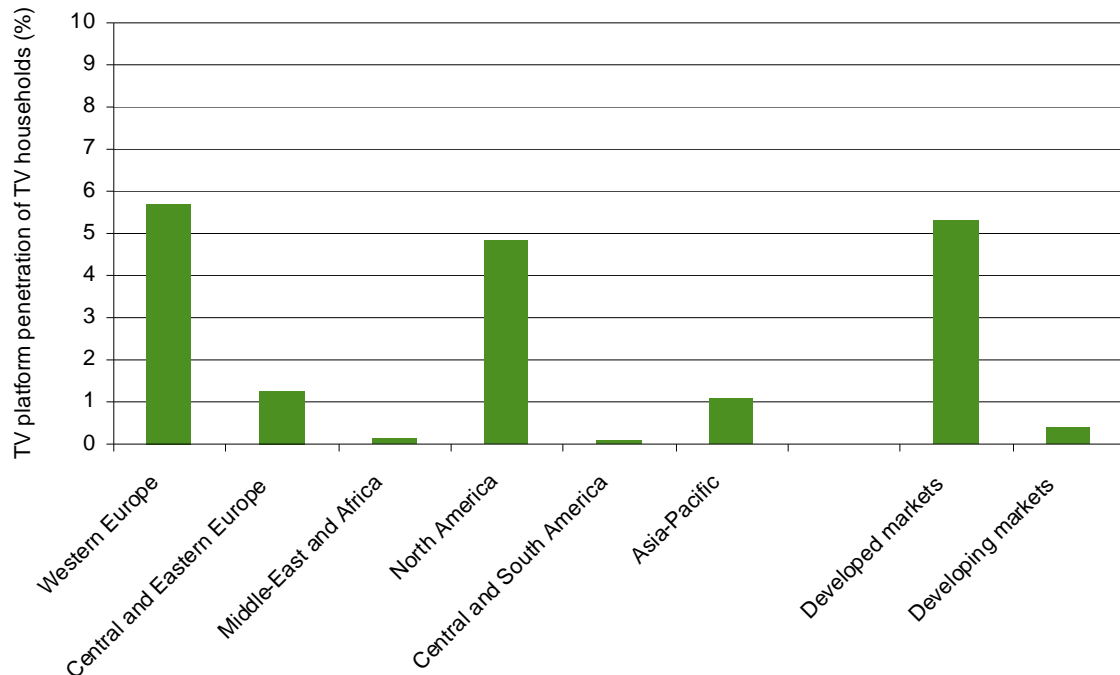
France is atypical for the region, however, with Western European usage of IPTV as the primary TV service at just 5 per cent. Each of the major territories of UK, Spain, Germany and Italy have penetrations of less than five per cent, with 3m IPTV households collectively across the four countries.

131. This low usage is symptomatic of the position that IPTV services have found themselves in. Providers have launched IPTV into markets with already established and entrenched pay-TV operators. While early commentators indicated that IPTV services could act as disruptive forces, with low cost digital TV with on-demand causing churn from cable providers and interactive features causing satellite providers to worry, the reality has been that in most markets, IPTV has struggled to find its niche. Cable companies have rolled-out their own on-demand services and have used bundled low-cost high-speed broadband to defend their TV base, while satellite providers have stayed with their premium content play and retained the high value customers interested in the content, not features. As a consequence, IPTV services in Western Europe have failed to make a substantial dent in the market, with actual uptake much lower than operators anticipated. In some cases, this has resulted in providers dropping prices to stimulate additions. Telecom Italia's Alice TV saw low additions until it eliminated its access prices in 2007 (with the only requirement for TV a broadband connection with Alice), with Telefonica aiming to stimulate additions by providing a €3 access package to its Imagenio IPTV service. As a result of this approach to market, currently a third of European IPTV customers are paying nothing for their TV service above the monthly fee that they pay for their broadband connection.

132. In Eastern Europe, IPTV services are largely less developed, with only one per cent of households taking them. In reality, this is due to significant differences between some of the larger markets and the smaller territories. One of the main issues that IPTV has had in Eastern European territories has been that of line quality. Infrastructure in a number of markets is such that IPTV availability may be extremely patchy within a single network. In Poland, for instance, Telekomunikacja Polska, the incumbent telecommunications provider, was not able to ascertain for customers whether they would actually be able to watch IPTV before the TV installer arrived at the customer's house. Similar issues have hindered take-up in a number of larger markets.

133. In some of the smaller Eastern European territories, however, IPTV has proved to be extremely popular. More developed telecoms infrastructure in markets such as Estonia, Slovenia and Croatia, has meant that IPTV has been extremely successful. Unlike in Western Europe, IPTV services have been marketed as a real cable TV alternative, with package prices typically set above those of analogue cable, but slightly undercutting digital cable prices. In Slovenia, nearly a third of TV households now use IPTV, just four years after first launch.

Fig 5. IPTV enabled TV households 2009



134. In North America, IPTV services have had some success. The US has seen launches of TV services from both of its major telcos; Verizon launching its FiOS TV service in 2005, AT&T launching U-Verse TV in 2006. IPTV subscribers in the US are forecast to reach in excess of 6m by the end of 2009. This has occurred despite the relatively limited availability of IPTV services. Currently, only a third of US households are able to take IPTV subscriptions.

135. Some of the success of IPTV in the US can be placed down to the relative non-exclusivity of content compared to that seen in Europe. While in a given European market, there will normally be a content gatekeeper, which has exclusive control over some, or all of the premium content, forcing a new market entrant to either bid in opposition for rights or target a different consumer demographic, the US situation is different. Popular sports or movies will be available via channels on all of the major TV platforms. This means that providing a new player can meet the carriage deal requirements of the channels with the key content, they can compete with similar pricings and offers. Revenue-wise, this fact means that the US IPTV industry is forecast to account for \$3.7bn in annual direct consumer level TV revenues by the end of 2009, compared to just \$2.9bn for the entirety of Europe.

136. Asian IPTV is estimated to contribute a forecast total of \$1.4bn dollars by the end of 2009, with Japan and Hong-Kong making up two thirds of the revenues. As with Eastern Europe, the state of the telecoms market has a significant influence on IPTV roll-out in Asia. Highly developed markets, such as Hong-Kong and South Korea, have large numbers of IPTV subscribers, with almost half of Hong-Kong's 2.3m households taking an IPTV service of some form. Regulatory barriers in South Korea looked set to hinder initial uptake of IPTV services in the country, as rules designed at protecting the pay-TV sector from a dominant telco prevented the offering of linear IPTV service. Despite such rules being in place, providers including Hanaro Telecom and Korea Telecom launched VoD-only IPTV services,

with a vast range of on-demand content. Companies achieved additions of 1.1m subscribers after just over a year of operation, lacking VoD competition from slow-to-react cable companies, and now that the regulations on linear TV via IP have been lifted, IPTV is set to be used by nearly 2m South Korean households at year end.

137. In other markets in Asia, however, IPTV has not been such a success. India is a prime example of the issues faced by new IPTV services. Line quality sees providers suffering from the same problems as those seen by Eastern European IPTV operators, preventing large scale roll-out and hindering the perception of the platform in consumer eyes. Consequently, despite several services being rolled out over incumbent telcos MTNL and BSNL's infrastructure, IPTV is barely even looking to register on the pay-TV chart.

138. Nonetheless, despite certain issues, Asia is currently a more favourable market to IPTV rollout than South and Central America. The majority of markets in the South and Central American region have legislation in place which prevents the major telecoms firms from rolling out linear IPTV via their telephony infrastructure. This meant that, for instance, Brazil Telecom was unable to launch a linear IPTV service, opting instead for a Korean-style on-demand-only platform. Uptake was limited, however, with the service roll-out being suspended following the company's merger with telecoms market leader Oi. Similar barriers to IPTV service roll-out are in place in Argentina and to a lesser extent in Mexico, meaning that availability of IPTV is unlikely to improve before regulatory change – not expected substantially before the end of 2011.

139. Africa remains a mostly unsuitable market for IPTV services. Although some of the North African territories, such as Morocco and Algeria have seen launches from the largest telcos, the lack of reliance on fixed line telephony, and low broadband uptake, means that the market enablers which have allowed the development of IPTV in other territories are simply not present. While broadband usage is expected to improve, driving network upgrades, IPTV uptake will lag the curve and is unlikely to be even a relatively minor feature of the African TV landscape in the next five years.

## HYBRID SYSTEMS

140. Hybrid systems, which rely on a dual delivery mechanism, are becoming increasingly common, as pure platforms seek to overcome the deficiencies associated with a single distribution strategy. Hybrid platforms mix distribution technologies, containing, for instance, IPTV and satellite decoders in a single box. Two inputs are required, but are blended into a single EPG, providing the consumer with the benefits of both platforms.

141. IPTV platforms were some of the first services to look for a dual delivery method, mainly due to issues surrounding retransmission of free terrestrial channels. Services, mainly in Italy and France, which encountered difficulties negotiating transmission for channels available on free terrestrial opted for this strategy. Neuf Cegetel (now part of the SFR Group) struggled to gain retransmission consent for French commercial channels TF1 and M6, without which, the service would likely have been a commercial failure. As a consequence, Neuf made the decision to provide hybrid set-top boxes, which would use the DTT signal containing the basic terrestrial channels (including TF1 and M6), as well as receiving pay channels delivered via IP.

142. The method has become increasingly popular across IPTV providers in Western Europe, helped by the profile and success of digital terrestrial TV in many regions. Almost 70 per cent of European households are now equipped with hybrid IPTV-DTT boxes. Outside Europe, however, hybrid IPTV-DTT services have been less popular, largely as a result of the lower DTT penetration and usage. Instead, hybrid services have been used to fill in technology holes in existing businesses.

143. In the US, both satellite operators, Dish Network and DirecTV, collectively responsible for 32m pay-TV households, have launched hybrid satellite-IP services. Satellite is used for the delivery of linear TV channels, while IP is used for interactive features such as on-demand. Currently, the on-demand experience is inferior to that of cable or IPTV, as the service is contingent on the customer's broadband connection speed, with videos downloading to the set-top box instead of streaming. As speeds increase over the coming years, however, the system will achieve performance closer to that of true IPTV or cable VoD services. Similar systems are being adopted by other providers across the world. Scandinavia's Viasat has launched a similar system, with the UK's BSkyB set to follow suit next year and Israel's Yes planning on-demand.

144. IP has not just been used by satellite companies though. Some cable operators have begun to use IP-cable hybrid systems, with IP providing the interactive component of their service. While cable providers can use cable modem technology to deliver on-demand, providing video in IP formats provides interoperability benefits which will become more important with a platform agnostic content solution. Cable operators in China, Russia, the US and various countries in Western Europe have begun to operate hybrid systems.

#### VIDEO-ON-DEMAND AVAILABILITY

145. Pay-TV closed-network video-on-demand services are available via cable and IPTV services, with open-network services being used to deliver on-demand via IP to satellite boxes by some providers.

146. Cable on-demand services are most prevalent in North America and Western Europe, with approaching 50m North American households using on-demand, and 27m European households using VoD services. Asia, by contrast, features 24m VoD users at present. Africa and the Middle-East have extremely low on-demand availability, mainly as a result of the lack of cable and IPTV platforms.

147. In Europe, IPTV services currently have the edge in VoD availability. Of the 27m VoD-enabled homes at the end of 2008, 15m were IPTV. However, cable on-demand is rapidly catching up, with 27m cable homes forecast to IPTV's 25m by the end of 2013. Digitization of VoD-enabled networks, for instance those in Belgium, Netherlands, Switzerland and Spain is one of the main contributing factors to cable's on-demand growth, with on-demand roll-out from some of the remaining major cable companies, such as Germany's Unity Media and KDG, another important consideration.

148. Although IPTV currently distributes to more homes in Europe than cable TV, collective cable TV revenues from on-demand are actually higher. The main reason for this is due to the difference in the consumer base which cable TV services target. Unlike IPTV services, digital cable services largely provide pay-TV packages as their minimum subscription option.



IPTV providers however, frequently offer TV as a bundled free option with their broadband services. As a consequence, the consumers which are attracted to IPTV have a lower propensity to buy on-demand videos compared to those opting for a paid-for cable TV option.

149. The majority of on-demand services in Europe concentrate on movie rental, with only the largest cable and IPTV services providing subscription and/or free on-demand. One of the main reasons for this is that providing movies on a PPV basis provides a direct and predictable (if small) return. Subscription on-demand entails an element of risk, with return on content investment not a certainty, while providing free on-demand may have an impact on churn and overall customer satisfaction, but currently many providers are not convinced that the degree of secondary benefits is sufficient to justify the initial expenditure on on-demand content and hardware.

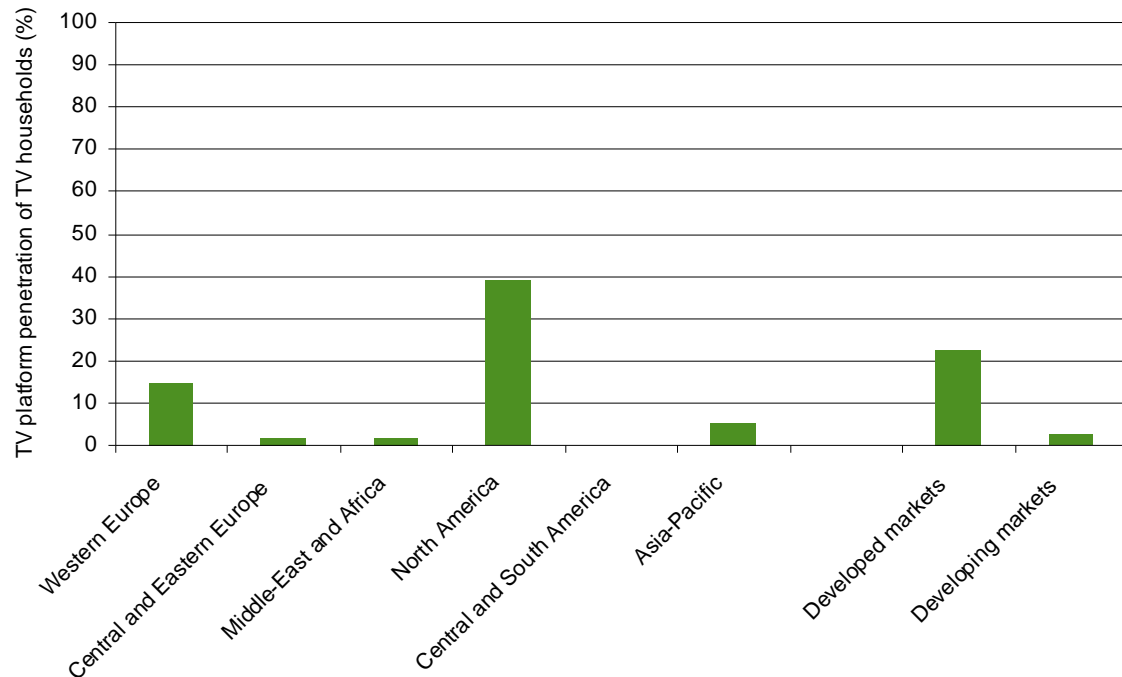
150. Of Europe's 27m VoD-enabled homes, just 2m are in Eastern Europe. Of these, nearly three quarters of homes are split between Russia, Czech Republic and Poland. Although a four-fold growth in on-demand homes is expected by 2013, availability of on-demand will remain substantially lower than in Western Europe.

151. The US is the largest single market for on-demand globally, with 38m homes enabled via cable and IPTV systems. The main cable providers began their roll-out in the two years following the turn of the century, and although availability of services was limited to begin with, the majority of digital cable customers on the major networks are now able receive on-demand. While the standard range of blockbuster movies is available on cable on-demand services in the US, VoD is largely included as value added service. Cable providers have been under increasing pressure from satellite and IPTV services in recent years, and offering large quantities of VoD is a way to provide a competitive differentiator. The majority of VoD is available via cable in the US, with IPTV still a small, if rapidly expanding platform. Canada has shown a similar trend to the US in terms of VoD availability, with 35 per cent of households able to watch VoD – largely through cable TV services. By 2013, this will have increased to 68 per cent.

152. In Asia, VoD is a growing phenomenon, and is already highly available in a number of territories. At year end 2008, 20m Asian households had access to VoD services provided by their pay-TV operator. Hong-Kong and Singapore have the highest availability, with 42 and 53 per cent of their respective TV households enabled. In Singapore, this is largely via the incumbent cable operator, StarHub, while in Hong Kong, PCCW's IPTV service NOW TV is the dominant on-demand provider.

153. Elsewhere in Asia, VoD is in a more mixed state. Although Japan's pay-TV space is very active and quite developed, the fragmentation of the market has meant that many of the smaller cable providers lack the cash to invest into an infrastructure overhaul. As a consequence, pay-TV VoD availability in Japan was below 10 per cent at the end of 2008. Conversely, the scale of China's cable operators and the recent upgrade status has had the consequence that many of the operators have begun, or are beginning their on-demand roll-outs already, meaning that as many as 40m households or more (10 per cent of TV households) will be on-demand enabled by 2013. The general lack of digital cable and small scale deployment of IPTV in India has meant that VoD availability is extremely low.

Fig 6. Video-on-demand enabled TV households 2009



154. In Africa and the Middle East, the fact that cable and IPTV are such rare platforms has resulted in extremely limited availability of VoD services. The two exceptions to this are Israel, where local cable operator HOT, offers an array of subscription and PPV videos to its 0.8m digital customers and in the UAE, where Etisalat's E-Vision cable service and Du Telecom's IPTV service both offer on-demand content. In other territories, however, true VoD availability will stay low, as new cable services are highly unlikely to be rolled out, and IPTV is suffering from both line quality issues and the general consumer reticence towards pay-TV in the region.

155. Although true VoD services are uncommon in Africa and the Middle-East, satellite providers are attempting to fill the niche left by the absence of physical network TV VoD systems. Showtime-Orbit has a push-VoD service, which provides a range of movies via its PVR boxes. Although uptake has been relatively low, at less than 100,000 households across the region, with pay-TV considered an unnecessary expense by most households, the nature of the satellite platform means that the push-VoD system is available for virtually any household desiring access. Sub-Saharan African pay-TV platform Multichoice already has over 400,000 PVR customers and is considering rolling out a similar push-VoD service.

156. In South and Central America, VoD is also of limited availability, although has better long term prospects than in the Middle-East and Africa. IPTV has struggled with regulation in many countries, meaning that unlike in Europe, the impetus for cable providers to roll-out their own VoD services has been missing. As a result, VoD is available only in small pockets in the region, where smaller telcos unhampered by regulation have been able to launch services and where some cable operators have begun commercial VoD trials. In Mexico, for instance, Megacable, which serves 1.5m homes with TV, launched video-on-demand in 2005. VoD service availability is limited to just 2 of the 32 cities it covers however, although expansion of availability is planned. Elsewhere in the region, cable operators have not even

launched limited availability VoD, relying instead on the staggered start-time near-VoD services typically favoured by satellite providers elsewhere in the world. As a consequence, fewer than 1 per cent of households in the region currently have access to true VoD.

## MOBILE CONTENT DISTRIBUTION

157. Paid-for broadcast mobile TV has been relatively unsuccessful in most regions across the world. In Europe, at year end 2009, just half a million broadcast mobile subscribers are expected, with only marginally more in the US. Asia registers over 2m, however, the majority of these are based in South Korea.

158. In Europe, which represents a significant addressable market for mobile TV, DVB-H platforms have struggled to gain ground, despite high penetration of appropriate handsets and historical willingness to pay for video content on other platforms. There are a number of reasons for this, caused by both industry and consumer attitudes. On one side, the current macro-economic climate has resulted in many operators being unwilling to deploy costly DVB-H technologies, while on the other, availability of mobile applications and 3G VoD stores has led to consumers shunning broadcast TV in favour of video on a more convenient schedule to them. While the availability of unicast 3G video services is becoming an increasingly important component of the mobile landscape, revenues are still limited, forecast to be at under €150m for the entirety of Europe by the end of 2009. Shorter viewing times, smaller screens and duplication of content available online and via pay-TV means that for most consumers, mobile TV will remain a complementary viewing experience and not a key leisure expense.

159. The story is similar for North America. Although the market for both broadcast and unicast TV is set to be larger than Europe's, revenues derived from mobile TV services will remain a small component of the North American video landscape, forecast to reach just €0.4bn by the end of 2013, compared to €75bn in pay-TV revenues. The Asian market has been even slower on the uptake of mobile TV services (South Korea being the exception). Infrastructure is still developing for 3G services, and as a consequence of investment being placed into the 3G systems, most mobile operators are not looking at deploying broadcast mobile infrastructure imminently. Consequently, in markets beyond South Korea, revenues barely register for mobile video services.

160. In Africa, mobile TV is potentially an important technology. While TV and PC penetration is low in the region, mobile usage is high. Africa has a higher usage of mobile telephony services than it does fixed line telephony, with 80-90 per cent of all telephony customers mobile. Overall penetration is still low in Africa (in the region of 30 subscriptions per 100 head of population) in proportion to other regions. Western Europe, for instance, sees roughly 30 per cent more mobile subscriptions than there are people in the region. Despite this, mobiles are the most available media/technology device in Africa, and also the most rapidly growing. With the low population densities and costs of rolling out fixed infrastructure making wired services less economical than in Europe, wireless services are typically more attractive for operators. This mimics what has been seen in the pay-TV sector, with cable services rare.

161. With the growing availability of handsets with video capability, operators have been looking to mobile TV. Africa was actually slightly ahead of Western Europe in terms of broadcast mobile TV launches in 2008, with eight launches across both Northern and

Sub-Saharan Africa, compared to seven launches in Western Europe. Services are present in markets such as Kenya, Namibia, Nigeria and Morocco, with additional launches planned for other markets such as Botswana, Mozambique, Cameroon and Angola through 2009 and 2010. In total, 15 markets have, or will shortly have, broadcast mobile TV services in Africa. With one of the main proponents of mobile TV being Multichoice's DsTV, mobile represents a cut-price way to access content normally reserved for expensive pay-TV. However, with handsets capable of broadcast mobile TV reception relatively expensive, there is a limit to the services' appeal at present. Prices are expected to decrease over the next five years however. Mobile will not be a replacement for traditional TV viewing, but it may represent a way into content for households and individuals with insufficient means to access premium content on standard pay-TV platforms, although until handset prices decrease, it will remain a preserve of richer households.

162. The majority of mobile TV services launched in Africa have been DVB-H broadcast services (which are cheaper solutions for TV-only distribution) rather than 3G streaming services. 3G networks typically require additional spectrum and substantial technology investment; however, with the demand for mobile Internet services increasing, the flexibility of 3G and greater range of compatible handsets, 3G services are likely to increase in prevalence even in Africa over the next five years.

163. Mobile broadband services, such as LTE or WiMax may be the route to providing widespread access to Internet content in Africa. With the low population densities and high costs of physically cabling areas of Africa, combined with the relatively low subscription returns, wireless broadband has greater potential than in developed markets, where fixed line broadband is already widely available. Indeed WiMax deployments have already occurred in over 15 African markets. In developed markets, WiMax is typically only being used to cover rural areas less suited to fixed line upgrades and is likely to be superseded by '4G' mobile broadband technologies, which require relatively inexpensive upgrades from existing 3G mobile broadband infrastructure.

#### ADVERTISING MARKET TRENDS

164. Advertising is the main source of revenues for free broadcasters and the only source of revenue for free commercial television whilst state-owned public broadcasters can generally benefit from a dual funding (public grants, often levied through a specific licence fee) and advertising sales. There is a regulatory and policy trend in Europe towards removing public broadcasters from the advertising market. Such decisions have already been made recently in Estonia (2002), France (2008) and Spain (2009). The model of an ad-free, tax-funded public broadcasting company, the model of the UK's BBC or Japan's NHK, seems to become prominent as commercial broadcasters criticize dual funding, supposed to distort competition on the ad market, and public broadcasters themselves in some case welcome a clarification of their remit and source of financing.

165. As a result of the organic growth of pay television in a number of markets, following the development of consumption and the rise of a middle class, pay TV subscription revenues have recently increased their share in the television economy as a whole. In Western Europe, a still-growing pay TV market has now superseded a mature advertising market as the main source of revenue in the television ecosystem. This gradual shift has been accelerated by the global recession of 2009, as most TV advertising markets collapsed two-digit whilst pay TV

proved more resilient. In the US the same phenomenon took place already two years ago and the gap in favour of pay TV revenues continues to widen.

166. Television is now the biggest media in terms of advertising revenues in most regions of the world, outgrowing the press. However the weight or market share of television on the advertising market varies greatly across the world. The global average was 42% in 2008 according to GroupM. Developed markets are generally below average as television faces a more diversified media landscape promoted by general economic conditions, literacy and lifestyles (magazines, upmarket out-of-home, internet): Western Europe's average stands at 30%; US and Japan are close to the global average of 42%. In emerging markets on the other hand, television advertising grows in a relative vacuum, benefiting from fast-growing audience, relative weakness of secondary media, liberalisation and relaxation of advertising regulation, growing competition between commercial broadcasters and a still-nascent internet sector. Television market share reaches 46% in the Middle-East-Africa region (MEA), up from 36% ten years ago. TV market share stands at 50% in Central and Eastern Europe (CEE), 59% in Latin America, 62% in China, 72% in Vietnam. There are however some emerging markets where the strength of press and/or the regulation of television keeps television advertising revenues at a much lower level: 20% in Egypt, 36% in India, Bangladesh or Nigeria.

167. Another interesting ratio is annual TV advertising spend per capita (fig. 4). Here, developed markets show a much higher TV spend, with the US standing at \$225 per year per capita and Japan at \$158. Western Europe TV advertisers spend half that amount, on average (\$80 per year) due to a more diversified media planning and more stringent regulation on television advertising. Among developing economies two tiers appear: a first tier stands between \$20 and \$30 and includes Brazil, Russia and South Africa. A second tier shows annual adspend below \$5 in populated countries like Egypt, India or Nigeria. Television advertising is a medium where the entry ticket (the minimal cost to advertise at all) is less scalable and generally higher than in the press or out-of-home sector. The entry ticket is all the more significant in some emerging markets with underdeveloped multichannel television – only national incumbent channels with strong but expensive audience are available for advertisers.

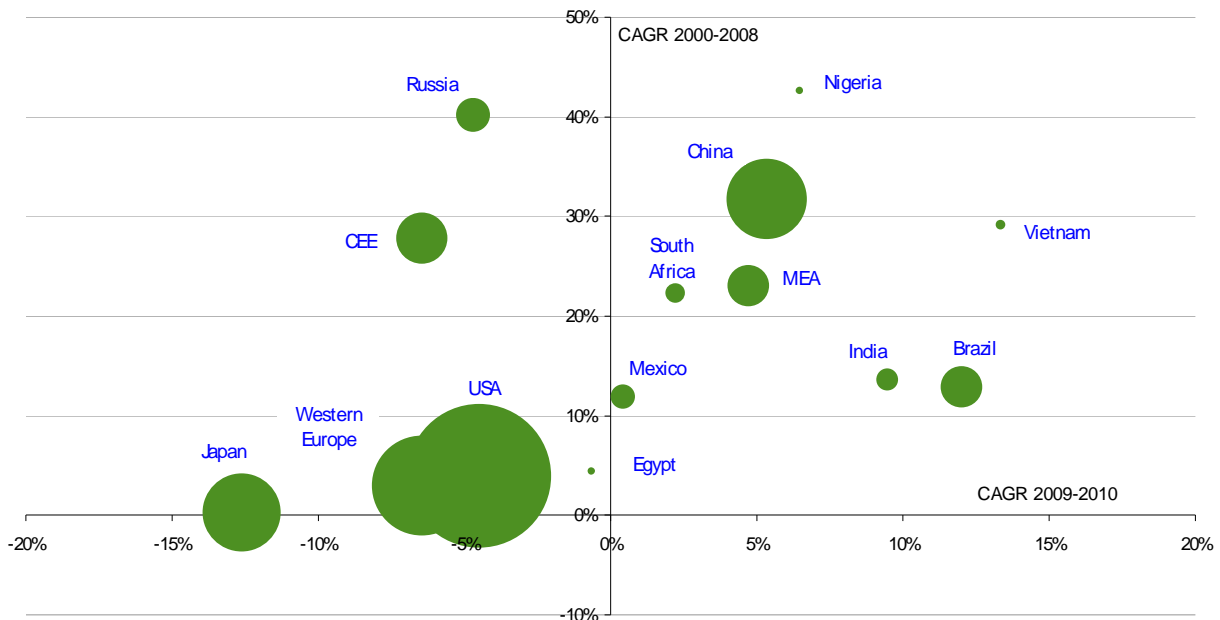
168. Only large companies can afford to advertise their products on television and it makes sense to do so only if and when they have nationwide consumer brands to push towards a relatively large middle class. Historically, television has been the key to building national consumer brands. To unlock this chicken-and-egg situation, international companies FMCG and modern retail sectors can play a key role. In China for instance, international FMCG and luxury brands start spending on television – and television only – as they gradually become available in the various provinces. As a result Chinese television currently stands at \$17 per year per capita, up from only \$2 in 2000.

169. With the economic recession of 2008-2009, television advertising revenues have been hit as strongly as other media, and the drop is, in many case deeper in emerging markets than in the more mature markets. In 2009, emerging markets have suffered from a more volatile advertising market, the sudden removal of some international advertisers and in some cases the burst of a strong yet unsustainable growth over the last five years that led to excessive CPT inflation (cost-per-thousands). Russia is a typical example of that 'bubble burst' or CPT adjustment element aggravating economic conditions.

170. Screen Digest currently forecasts a 14% drop in 2009 in Western Europe but a more pronounced 23% drop in CEE (-23% in Russia too) following a average growth rate of 20% per year in the 2002-2008 period. Record falls are predicted to hit Turkey (down 30%, source GroupM) and Ukraine (down 40%). GroupM forecasts MEA to be flat overall while South-Africa and Egypt TV markets will decrease by a single-digit. In Latin America Mexican television is predicted to fall by 3% whilst Brazil main grow by 11%. In Asia both China and India will slow down to 5% growth following the 18% growth of 2008.

171. The following chart compares the size of the TV advertising market across different regions (Central and Eastern Europe, Middle East and Africa, Western Europe) and key individual countries. It shows the strong of TV advertising over the 2000-2008 period, where emerging markets have enjoyed a two-digit average growth rate (CAGR) (40% in Russia, 32% in China, 12% in Mexico) whilst Western markets were already showing signs of maturity (3% in Western Europe, 4% in the US). Data: GroupM.

Fig 7. TV advertising market size and growth trends



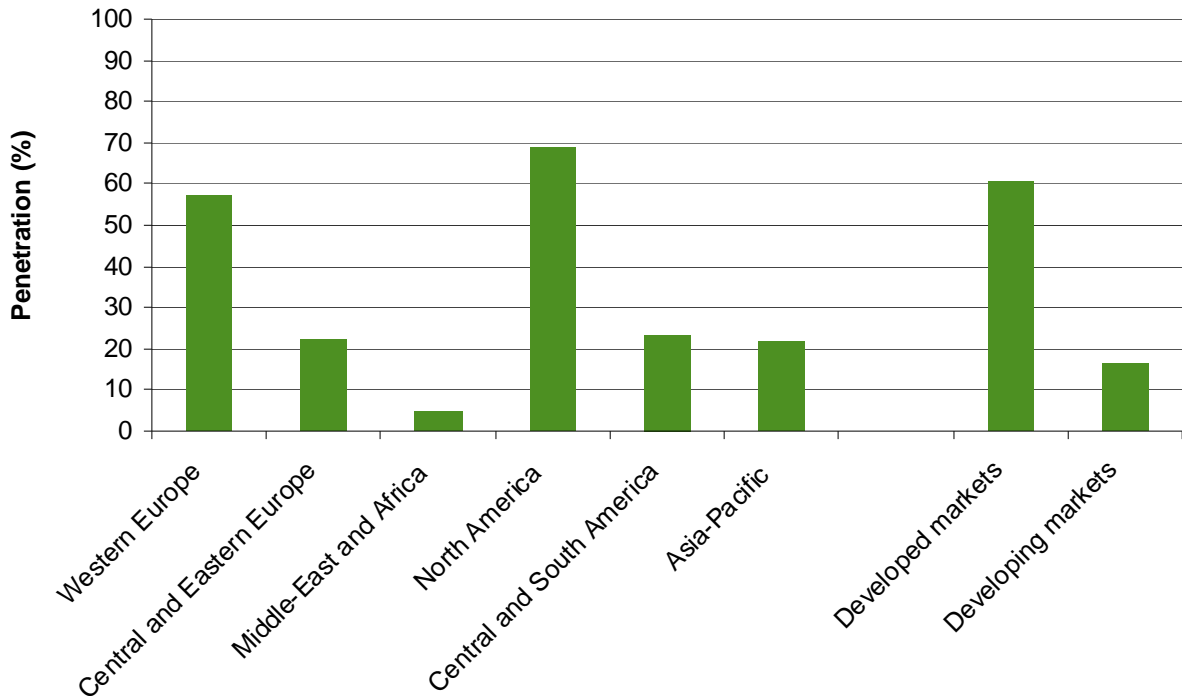
172. In 2009-2010, Central and Eastern Europe is being hit by recession just as Western markets. The 2010 recovery will not be as strong as the 2009 fall and most markets will remain smaller at the end of 2010 than they were in 2008. Other emerging markets (Mexico, South Africa and China) will still post some growth but experience an abrupt slowdown of growth rates to mid-single-digit number. Some of the less advanced markets (Vietnam, Nigeria) will still grow significantly throughout the period.

## INTERNET-BASED VIDEO SERVICES

173. Global online video consumption is growing rapidly, facilitated by increasing broadband penetration rates and the shift towards higher broadband speeds. In the US 74m households had a broadband connection at YE 2008 while in Western Europe the figure stood at 89m and at 138m in Asia-Pacific. The potential audience for online video has expanded significantly in recent years and a multitude of services looking to tap into this audience have developed. There are significant differences between markets worldwide, however, with broadband

uptake and the correlated online video consumption varying widely between countries and regions.

Fig 8. Broadband service penetration of households 2009



174. Eastern Europe currently has a penetration of broadband services of less than half that of Western Europe, at approaching 25 per cent, but uptake is forecast to increase to 36 per cent by 2013. Many Asia-Pacific markets have shown an inclination towards rapid broadband uptake, with affluent markets such as Hong-Kong, Singapore and South Korea some of the most advanced in the world in terms of broadband subscriptions. China, although it currently only has a 24 per cent penetration, is seeing rapid growth and already represents the largest market in the world for broadband, passing the US in terms of broadband-enabled households in mid-2008. Although broadband is becoming increasingly available in India, relatively low speeds and patchy line quality have hampered uptake. Nonetheless, consumer desire for broadband services will lead to a tripling in subscriptions by the end of 2013 (albeit from a 3 per cent subscriber base).

175. South and Central America is showing much the same trend regarding broadband services as Eastern Europe, with uptake at 22 per cent at year end 2009, rising to 33 per cent by the end of 2013. Broadband penetration varies dramatically in MEA territories, with some of the more affluent countries such as Qatar already having more than 50 per cent broadband penetration. Sub-Saharan African markets, however, suffer from poor uptake of Internet services, with less than one per cent of households in most markets taking an Internet connection (dial-up or broadband). In North Africa, rates are better. Egypt, for instance, registers over 15 per cent of households using Internet services, although only between 5-10 per cent of Internet users are broadband-enabled at home.

176. User-generated video sites continue to dominate consumption, accounting for 80 per cent of all online video streams and downloads in the US in 2008. However, there is also substantial demand for professionally-produced content in the form of online TV and movies.

According to Screen Digest legitimate premium online video generated €900m in the US and €70m in the UK in 2008, monetised through transactional, subscription and ad-supported business models. By 2013 these revenues are forecast to grow to €3.6bn and €490m respectively.

177. In general, online TV and movie markets in North America and Western Europe are more mature than those elsewhere. Widespread piracy in parts of Asia and Eastern Europe has led to content owners taking a more cautious approach to licensing their catalogues for online distribution in these regions, while the low broadband uptakes in regions such as Africa and parts of the Middle-East have resulted in the lack of development of a significant online content market.

178. One of the main drivers behind online consumption of both movies and TV is the ability to watch the latest premium content on demand. The majority of online movie transactions (digital retail and digital rental) are new release; consumers are less willing to pay to view library titles. Similarly, online television viewing is driven by catch-up, users going online to watch a show they missed on the traditional linear TV channel. All of the US networks and many major Western European broadcasters now distribute catch-up through their own websites, typically making content available for between 7 and 30 days post broadcast. In France, for example, around 80 per cent of M6 and Canal+'s programming is available through their web-based catch-up services.

179. Many broadcasters are opting to use an ad-supported model to monetise catch-up. Free-to-view video viewing accounted for over 99 per cent of all online TV streams and downloads in the UK in 2008. Consumption patterns in other Western European markets and North America demonstrate a similar bias. In most cases there are fewer ads per hour of online TV than on traditional channels. Broadcasters are, however, experimenting with increased online ad loads. UK broadcaster ITV has been one of the most aggressive, with ad levels approaching those found on linear channels.

180. Given the widespread availability of free content (both legal and illegal) online, most consumers are reluctant to pay for web-based video. However, there are some circumstances where a paid-for model can be successful. The first is the provision of access to TV shows prior to their linear broadcast. Viewers have shown that they are unwilling to spend money on PC-based catch up but the ability to watch shows pre-transmission holds more value. Some broadcasters, including five in the UK and ProSiebenSat.1 in Germany, are now delivering certain shows online up to a week before transmission on a rental basis in a bid to persuade users to pay a premium.

181. However, some content owners are developing a more radical approach to international windowing. In Germany Disney-ABC has signed a deal with Deutsche Telekom to distribute subtitled pay per view episodes from shows such as *Lost* and *Desperate Housewives* just 24 hours after their US broadcast. French broadcaster TF1 has similar deals in place for several US TV series. By offering shows in this early window service providers and content owners alike are hoping to capitalise on the demand for the latest episodes of high profile series while providing a legal alternative to the many piracy sites already making shows available online in this window.



182. Another instance where consumers are willing to spend money on online video is sport, particularly live games. In many cases broadcasters and networks acquire online distribution rights bundled with their core broadcast deal. Alternatively sports leagues may choose to deliver content direct to the consumer through their own websites. Live or delayed games are often monetised using a subscription model – in the US alone subscriptions to online sports video generated €133m in 2008, growing to €176m in 2009.

183. Although companies may convince some consumers to pay for access to sport or pre-transmission content, a more general way to produce meaningful transactional revenues is to enable videos to be viewed off the PC. Consequently, the most successful transactional online video stores are those integrated into a device.

184. A prime example of this store-plus-hardware strategy is Apple's iTunes/iPod/iPhone ecosystem. As of 3Q 09 Apple had sold 228m iPods and 34m iPhones worldwide. Over 73 per cent of 2008 portable video player users in the US were video iPod users, while in the UK the figure stood at 63 per cent. It is this ubiquity, combined with the ease of use of the iTunes store, which has helped Apple to dominate transactional online movie and TV markets in the limited number of countries where it is available. In 2008 the iTunes store was responsible for over 85 per cent of US digital retail movies transactions. In the UK and Australia Apple captured 87 per cent and 96 per cent of the 2008 digital retail movie market respectively, despite only launching midway through the year.

185. While Apple's range of devices provides users with portability, other platforms are focusing on delivering online video to the TV screen. Games console manufacturers are well-positioned in this regard; between them Sony's PS3 and Microsoft's Xbox 360 had a combined installed base of 43m consoles worldwide at the end of 2008. In the US alone Screen Digest forecasts there will be 10.2m broadband-connected Xbox 360s and 5.4m connected PS3s at YE 09.

186. Both Sony and Microsoft are expanding the territorial reach of their online video stores – by the end of 2009 the PlayStation Network store will be accessible in the US, UK, France, Germany and Spain while Microsoft's service will be available in 18 countries across North America, Europe and Asia-Pacific. Because of the substantial installed base of Apple, Sony and Microsoft's hardware it is typically the launch of a store from one of these three players which kickstarts a country's transactional online video market.

187. However, there are some local device plays which also show signs of gaining traction. In Japan manufacturers Sony, Toshiba, Sharp and Hitachi have co-operated to develop AcTVila, an over-the-top video service for connected TVs. Launched in 2007, AcTVila offers a library of high definition movies from both local and US studios.

188. A pan-European initiative, Hybrid Broadcast Broadband TV (HbbTV) is developing an open specification to allow broadcasters to deliver VoD and interactive features over-the-top to the TV screen. HbbTV members include French broadcasters TF1, Canal+ and France Télévisions, hardware manufacturers such as Philips and Sony and satellite provider SES Astra amongst others. The first HbbTV-compliant set-top boxes are due to roll out in Germany before the end of 2009. HbbTV's aims are not dissimilar to those of UK-based Project Canvas. Backed by the BBC, Five, ITV and incumbent telco BT, Canvas aims to launch an open web-based video platform before YE 2010. The proposals are currently under review by the BBC Trust.

189. The introduction of broadband-connected devices into the living room has led to the emergence of multi-screen strategies from a growing number of online video providers. Those without their own hardware ecosystem have begun partnering consumer electronics manufacturers to deliver their services not only to the PC but also to connected devices including Blu-ray players, TVs and standalone set-top boxes. In the US Amazon, Netflix and CinemaNow have all signed deals with several manufacturers to make their libraries available to as wide an audience as possible. Outside North America these deals are less common but notable alliances include Sky/Xbox and Five/Sony in the UK and Canal+/Xbox in France.

#### ADVANCED TV ADVERTISING

190. With the availability of increasingly sophisticated online advertising mechanisms, and the stagnation of the TV advertising market in many developed nations, more sophisticated methods of delivering advertising to consumers are being considered. In less developed markets, interactive cable and IPTV infrastructure is typically currently insufficient to allow these methods to grow.

191. The story for advanced TV advertising is largely one of potential, but little movement so far. Very few providers worldwide have active commercial advanced TV advertising deployments. While the technology exists for on-demand advertising, targeted advertising and interactive advertising, the business models have, in most cases, yet to be developed.

192. Interactive advertising solutions have been around the longest, and some actually have relatively low demands on the platforms on which they operate. Systems such as 'red-button' interactive advertising can be operated via a satellite platform with minimal back-channel capability. As a consequence, operators such as Sky in the UK and Astro in Malaysia still use red-button advertising. The market is small for red-button, however, with the main issue being the fact that consumers deliberately have to engage with the advert, making the systems of niche use. As a consequence, estimates place the UK red-button advertising market at just €10m-€20m annually.

193. Targeted advertising solutions for broadcast TV have yet to be adopted in commercial settings, beyond the basic locality targeting systems used by some cable operators. BSkyB in the UK is one of the most advanced operators as it is about to implement a system called SmarTV allowing 'live broadcast targeted spot substitution'. The obstacles to overcome are partly a result of the fact that the value chain has to adjust to the role of a new player, generally a cable or satellite platform operator, that would deal with the broadcaster's ad sales house and/or the advertiser. Another significant issue is that of data privacy, with many consumer rights bodies concerned about the use of personal data in serving advertisements. Consequently, operators are being cautious about the way in which they approach targeted advertising. Furthermore, as many pay-TV providers are looking to use targeted advertising systems as a revenue generation mechanism, no clear trend has yet to emerge as to whether they will be willing to act simply as a technology provider, covering the hardware and processing aspects of the advertising insertion, taking a cut of the advertising revenue, or take a more active role in ad sales. As a result, developed markets will see experimentation with different sales methods for targeted advert insertion into broadcast TV over the next few years.

194. VoD advertising is likely to see the most rapid growth over the next five years, because it is not undermining any existing sales model, it clearly brings incremental revenue and it can mimic or complement the already-successful online VoD advertising business model. Advert insertion systems are being trialed by a number of providers in developed markets across the world, including cable operators Virgin Media (UK) and Comcast (US). Project Canoe in the US is aiming at aggregating and marketing on-demand inventory from big cable operators, offering a nationwide platform to advertisers and agencies. Virgin Media has already seen advertising available alongside on-demand content on its platform, with UK broadcaster Channel 4 selling advertising to accompany its content on Virgin's service. The market is currently small, with total UK on-demand advertising revenues estimated to be worth just £3m by the end of 2009. Nonetheless, as use of VoD grows, VoD advertising will become a more attractive revenue source.

195. Currently, there is very little free TV content available on most VoD services run by cable and IPTV operators. This is largely due to the fact that for broadcasters, the only revenue source for VoD is from a form of carriage fee, which many pay-TV operators are unwilling to pay, lacking an obvious return on investment. On platforms which do have free TV content available on-demand – typically in markets such as the UK, France and the US, where it is used as a competitive differentiator – consumption is heavily skewed towards free VoD. Using advertising to fund VoD removes the content cost burden from the pay-TV operators and provides an additional revenue stream for broadcasters, making it an attractive move for both parties. As with targeted advertising, one of the main barriers to adoption is the lack of clarity on whether the pay-TV operator or the broadcaster will retain control over ad-sales, although this is a surmountable obstacle, and with precedents being set by the major UK and US pay-TV operators, a VoD advertising market is likely to develop rapidly over the next five years.

196. Beyond being the necessary currency for advanced TV advertising formats, 'advanced audience measurement' or Return-Path-Data (RPD) audience metrics provided by advanced set-top boxes and return-paths can become a business in itself. With broadcasters and advertisers eager to get ever more granular and immediate data on viewing behaviours, IPTV operators and digital cable operators can hope to generate incremental revenues. Many large scale operators have already made alliances with audience measurement specialists such as Nielsen and TNS Media Research.

## CASE STUDIES

### INDIA

197. With a population of nearly 1.2bn, India is the world's second most populous country, and a TV market of significant scale. GDP per capita is currently low, at \$1,017 per annum, according to IMF 2008 data. With household income low by international standards, TVs are still largely too expensive for a significant section of the population, with less than 130m of the total 220m households owning a TV.

198. India is largely a cable TV market, with two thirds of TV households taking a cable TV service. Considering cable TV was introduced only in the early 1990s, it is considerable that it has managed to permeate so many households in such a short time. The main reason for this is the non-availability of commercial channels on terrestrial TV, which shows only the

3-5 (depending on region) Doordarshan public service channels. In order to access other content, some form of multichannel TV is required. Indian cable ARPUs are also among the lowest in the world, at Rs 150-Rs 200 (\$3.50-\$4.60) a month, making them affordable for most households which are wealthy enough to own a TV. Digital terrestrial TV, with a range of additional FTA channels could make terrestrial a viable alternative to cable, but while India has conducted a series of technical trials of digital terrestrial services and has chosen DVB-T as the broadcast standard, firm roll-out plans have yet to be put in place. Broadband penetration is minimal, at approximately 3 per cent of households, meaning that a significant market for online content has yet to develop in India.

199. The Indian cable TV distribution business, though massive in terms of both size and revenue generated, remains highly fragmented and disorganized. Services are split between MSOs (multiple system operators), which own the head-ends and make channel carriage deals, and LCOs (local cable operators), who essentially own the last mile and the customer relationship. Of the 50,000-60,000 cable operators in India, approximately 4,000-5,000 fall into the MSO category. Cable subscription fees are collected by individual LMOs from their subscribers, and a share of subscription fees is passed on to MSOs that supply the signal. However, the absence of widespread conditional access deployment via set-top boxes, and the subsequent lack of clear and transparent reporting standards has resulted in the under-reporting of subscriber figures by LCOs. MSOs generally estimate that they are paid for approximately 10-20 per cent of the homes they claim to be connected to.

200. Cable TV services are still predominantly analogue. Digital cable is currently taken by less than three per cent of cable TV homes in India and will remain low, with forecasts for 2013 at less than ten per cent of households. Some factors which may enhance the roll-out include HITS (Headend In The Sky) systems, which preclude the need for costly local physical head-ends; however, lack of clear directions and policies from the government has resulted in the delay in digital roll-out, although policy on HITS-related foreign investment has now been approved, which will help to speed up the process. Digital cable roll-out is currently on a voluntary basis, with larger MSOs funding set-top box purchases and seeding it through their LCO networks. With price-caps in place, in many cases the economics of digital roll-out do not stack up, meaning that there is little incentive for digital cable to be rolled-out.

201. Satellite is the main challenger for cable at the moment. Satellite pay-TV first launched in 2004 in India, with Essel group's Dish TV, followed in subsequent years by five other services. By the end of 2009, over 14 per cent of Indian households will be using satellite TV. Due to the larger range of channels on satellite (400 plus, compared to cable's 80 channels) and the better quality reception, digital satellite services are popular with the growing middle classes, and by 2013, the platform is expected to be taken by over a fifth of Indian households. Free-to-air satellite, despite a substantial range of channels, is not especially popular as a result of both high set-up costs and technical issues. Due to FTA satellite being at a different orbital location to pay-satellite, churning from pay-satellite to free-satellite is too technically complex to have allowed a major market for free satellite to have developed since the introduction of satellite services.

## CHINA

202. Although a larger nation than India, China is also wealthier on a per person basis, with a GDP per capita of \$3,259 (IMF 2008). TVs are affordable for most households, with only a few per cent of the 400m Chinese households not owning a TV.

203. Terrestrial TV is the most popular platform for TV reception in China, with terrestrial transmissions containing the main CCTV public channels as well as a range of local entertainment and news channels. As a consequence of the wider availability of commercial free -to-air channels in China, there is a slightly lower incentive for households to subscribe to pay-TV services, than for instance, in India. Nonetheless, low prices for cable TV services, combined with the ubiquity of cable in urban areas, has resulted in over 40 per cent of households taking cable TV services.

204. Roughly a third of cable TV households in China are now receiving digital cable services. The main push for digital came before the 2008 Beijing Olympics, with the regulator SARFT aiming to convert substantial numbers of households over to digital prior to the event. Although the conversion rate was lower than had been initially hoped, it set in place a trend, and by 2013, almost two thirds of Chinese cable households are expected to be digital. Cable TV services have been trialing on-demand systems, with some of the larger providers, such as Oriental Cable Networks, already having rolled out VoD. In general, however, the relatively fragmented nature of the cable TV space has resulted in relatively low VoD availability, with just 11m homes forecast to be on-demand enabled by the end of 2009.

205. Satellite TV is not legal in much of the market, being used to provide TV services to more rural areas not covered by cable TV services or terrestrial transmitter networks. As a consequence, there are negligible numbers of authorized satellite households, although the grey-market for satellite TV, particularly in the Southern regions of China, is sizeable.

206. Although broadband usage amounts to a little in excess of 20 per cent of Chinese households, the sheer scale of the market means that China is the largest broadband market in the world, and this provides a substantial base for online content delivery. In February 2009, regulator SARFT issued a policy intended to promote the building of online video platforms for major Chinese TV channels. State broadcaster CCTV and provincial broadcaster Hunan TV are the first two channel groups to have launched their own online video platforms. CCTV.com, the online platform of CCTV, offers programming from 16 CCTV channels, covering news, films, TV series and sports. Viewers can visit the website to watch live broadcasting of CCTV channels as well as seven day catch-up programming. Hunan TV's on-line video platform, Mango TV, features programmes from the four channels of Hunan TV with a special focus on directly commissioned or owned entertainment programming.

207. China's analogue switch-off date is set for 2015, an ambitious target for a market where digital terrestrial is only being used by 1 per cent of the population, and is required by roughly 50 per cent before analogue switch-off. Since 2007, China has been rolling out DTT services step-by-step throughout the country. By the end of 2008, DTT has reached 37 large cities, and by the end of 2009, the aim is to cover 360 medium and small cities and 485 villages. Frequency planning has been completed in 100 cities already. SARFT will target more than 2,861 towns by 2011 and more than 2,000 cities by 2012, with the aim to raise the technical penetration rate above 90 per cent before the end of 2015. In order to encourage uptake, China is heavily subsidizing DTT boxes. The cost of a DTT installation is typically Rmb600 (\$88) but users only need to pay Rmb200 (\$29) initially as the rest is currently subsidized by the government. The low installation cost ensures that DTT is an attractive choice in less densely populated areas.

UAE

208. The United Arab Emirates is one of the richest nations on a per capita basis worldwide, with the IMF placing them seventh globally in 2008, with annual GDP per capita at \$55,000. This is largely due to substantial oil revenues. Population estimates for the market vary, due to the large numbers of foreign workers in the Emirates, but typically place the territory on between 4.8 and 6m people. Below 20 per cent of the population is native Emirati.

209. As a TV market, the UAE is highly developed, with two competing fixed line services, Etisalat's E-Vision cable system and IPTV service Du, as well as the two regional satellite providers ART and Showtime-Orbit. Broadband usage is high for the region, with roughly 40 per cent of households taking a connection, although prices are elevated by European standards, with lack of sufficient competition in the sector contributing to this. Etisalat's 0.5Mbit/s connection costs 189 AED per month (\$51), with the 8Mbit/s costing 499 AED (€136) per month. As a consequence, despite the market's developed status, broadband penetration and average household access speeds are lower than the majority of Western European markets.

210. High household wealth, combined with desire for non-local content, means that unlike many other Middle-Eastern nations, free-to-air satellite TV is not the platform of choice for most households. The free-to-air satellite channels in the Middle-East unsurprisingly cater largely for a local Arabic audience, while a substantial proportion of UAE residents are of Asian or European origin. Consequently, the content distributed via pay-satellite and via the fixed pay-TV services is more attractive for many consumers. For instance, the ART sister channels on the Pehla package cater for an audience from the Indian subcontinent.

211. As a consequence of the relatively high personal wealth in the market, pay-TV is affordable for most households, with packages starting at 30 AED (\$8) per month for basic channel access, with additional pay-TV packages from 69 AED (\$19), ranging up to 279 AED (\$76) per month. Over 50 per cent of households subscribe to pay-TV in the market, with the majority of these on cable and IPTV. Telecoms company Etisalat's E-Vision is the largest provider of access to pay-TV in the UAE, and has over 400,000 subscribers to its services. Its nearest competitor is Du Telecom's new IPTV service. Du began IPTV roll-out towards the end of 2007 and now covers the majority of the region's households with its service. Over 60,000 households now take IPTV in the UAE, with over 10 per cent of households expected to take IPTV by the end of 2010.

212. Both E-Vision and Du, while they provide access to a range of channels through their own basic packages, are primarily retransmitters of content from the two pan-regional satellite providers ART and Showtime-Orbit. Showtime-Orbit has a significant proportion of its subscriber base in the UAE, due to its high package prices (Showtime's Family package costs 195. AED per month compared to ART's 85 AED, or Pehla at 65 AED) hindering uptake in some of the less wealthy Middle-Eastern markets. The main reason for this reliance on retransmission is that the majority of premium content is held by the two satellite providers on a pan-regional basis. Competing without premium content would be difficult, with bids in opposition to the companies an expensive prospect.

213. The vast majority of households without pay-TV services in the UAE rely on the free satellite broadcasts which blanket the region. Over 90 per cent of households consequently have access to some form of multichannel TV, which makes the switchover of public

broadcaster terrestrial TV from analogue to digital less of a priority than in neighbouring countries. As a result, the UAE has yet to confirm a digital switchover timetable, although has conducted DVB-T trials and is likely to conform to the ITU's 2015 deadline.

## EGYPT

214. Egypt is North Africa's largest market, with 79m inhabitants, and 18m households. The country is relatively poor in comparison to other North African territories, with a GDP per capita of \$2200 per annum, compared with Algeria's \$4600 and Tunisia's \$4000 per annum (IMF 2008).

215. Despite low household income, TVs are used by the majority of Egyptian homes, with roughly 17m TV households predicted for the end of 2009. Approximately half of TV households are multichannel-enabled, following a rapid increase in the use of satellite TV from 2003 onwards. Before 2003, below 10 per cent of households had access to satellite services, with a combination of falling technology prices, increases in disposable income and rising local channel numbers responsible for the uptake. Free-to-air satellite broadcasts are now an important component of the TV landscape in Egypt, with a range of both Egyptian and Middle-Eastern channels broadcast – primarily via Nilesat's satellites. Terrestrial broadcasts are used for the delivery of the public broadcaster channels, of which there are two national and six local.

216. Internet usage is moderate in Egypt, with over a third of households having some form of access to either dial-up or broadband connections. The Egyptian National Telecommunications Regulatory Authority (NTRA) placed DSL subscribers at close to 850,000 at the end of the second quarter 2009, an increase of nearly 40,000 from the first quarter. With high incidences of households sharing DSL connections with neighbours, actual household broadband usage is undoubtedly higher.

217. Egypt has seen extremely high levels of unauthorized pay-TV access. More than 40 per cent of urban Egyptian households paid for TV in 2008 (Arab Advisors Group), and while pay-TV services such as ART are available and popular in Egypt, even if a high estimate of two-thirds of ART's 1.5m-strong subscriber base were to be based in Egypt, this would still mean that substantial numbers of households were accessing pay-TV broadcasts outside copyright. With approximately 45 per cent of Egypt's population in urban areas, representing 8m households, rates of unauthorized access would be at minimum 2.3m households, with figures more likely to be in excess of 3m households in 2008. Many of the services are actually originally obtained legitimately, but then redistributed unencrypted locally to other households. One of the reasons for such high levels of unauthorized access is the cost associated with pay-TV in Egypt. Packages from Showtime-Orbit (starting at roughly \$36 per month) are out of the reach of most households in the country, despite being cheaper than the same packages in the Gulf region. ART packages, which are the most popular pay-TV packages in Egypt, still have low distribution, despite Egypt being the main market for ART in the Middle-East and North Africa. Piracy is partly to blame for this, although even the \$10 per month ART subscription fee is too much for many households. Legal pay-TV access in Egypt is consequently low and currently estimated to be at under 5 per cent of TV households.

218. Egypt has adopted the DVB-T standard for digital terrestrial transmission. The road-map for the digital transition is currently being assessed, however the switch-off has

already been scheduled to fall in line with the ITU's 2015 deadline. Although there have been no confirmed plans regarding the addition of channels to digital terrestrial over analogue terrestrial, the National Telecommunications Regulatory Authority has stated that the efficiency gains would allow for the launch of new channels on the platform. This could mean the addition of commercial channels to terrestrial TV – something missing from the platform at present, and a potential boon to the terrestrial platform.

## BRAZIL

219. The largest market in South America, Brazil has a population of 189m people and over 55m households. GDP per capita is at \$8,295 per annum (IMF 2008), with TV sets affordable for the majority of homes in the market. Nonetheless, free-TV services are the dominant form of TV access in Brazil, with just 10 per cent of homes subscribing to a pay-TV service.

220. The pay TV industry in Brazil is dominated by cable, which accounts for over 60 per cent of the 7m pay TV homes. Satellite is also an important platform, accounting for the remaining third of households. Three large players dominate the pay television landscape, controlling 80 per cent of the total subscription base. Cable operator Net Servicos accounts for 47 per cent, satellite operator Sky Brasil 28 per cent and Telefónica, which owns an MMDS and satellite pay TV operation, controls six per cent of the market.

221. Broadband penetration is relatively low, but is rapidly increasing, with 20 per cent of households (11m) expected to have broadband by the end of 2009. As a consequence, an online content market is developing, with major channels such as TV Globo already showing clips and longer form content on its website.

222. There are 48 cable operators in Brazil serving approaching 5m households. Cable television services are licensed and regulated by Anatel, which issues licences for a period of 15 years, renewable for successive 15-year periods. Roughly two-thirds of Brazilian cable TV households are still taking analogue services, although digitization is progressing rapidly. On-demand services are unavailable, even on digital cable, at present, however are likely to be rolled out by the major networks in the near future. Net Servicos, for instance, is currently testing on-demand, although significant roll-out before the end of 2010 is not expected. Nonetheless, cable growth in Brazil is still strong overall, with a further 3m subscribers expected over the course of the next five years.

223. Satellite services represent just over a third of the Brazilian pay TV market, with two main players: Sky TV and Telefónica. Sky TV is backed by US satellite provider DirecTV and local media conglomerate Globo Comunicações. Sky is by far the largest satellite operator in the country with 1.7m customers and more than 70 per cent of the satellite market, and is the second largest pay TV operator in Brazil after Net Servicos. There are other small satellite operators in the Brazilian market, such as Tecsat, which launched in 1998, but the most significant players in the space are newer operators such as Telefonica, Via Embratel and telco Oi's satellite TV service Oi TV.

224. Oi TV is the most recent entrant into the market, and supplanted the nascent IPTV system run by Brazil Telecom. Brazil Telecom launched its IPTV service Videon in Brasilia in 2007; however, due to regulations designed at ensuring fair competition, the service could not show live, linear TV. Consequently, uptake was limited, and following the merger



between Brazil Telecom and Oi, the Videon platform was placed on hold, with the combined company's focus shifted to satellite TV services.

225. Digital terrestrial television was launched in December 2007 in the state of São Paulo. Service runs with the Japanese ISDB-T standard, using MPEG-4 compression. As a consequence of the combination of technologies chosen, decoders were launched starting from the price equivalent of €100 each. Despite subsequent price drops, equipment is still substantially too expensive to allow mass-market adoption without significant subsidies being applied.

## CHILE

226. Chile is one of the smaller South American countries with 4.6m TV households. This compares to 51m TV homes in Brazil, 22.3m in Mexico and 10.2m in its neighbour Argentina. Despite this, Chile is a wealthier market than Brazil and Argentina on a per capita basis, and on par with Argentina at \$10,200 per annum (IMF 2008). TVs are consequently common, with the vast majority of households having a TV. Pay-TV is slightly more ubiquitous than in Brazil, with a third of households subscribing to either cable or satellite services. Of those which do subscribe, approximately 60 per cent are cable, with the remainder via satellite.

227. In the cable sector, one operator, VTR GlobalCom, has approximately 98 per cent of the cable market with 0.9m TV subscribers. VTR started offering cable services in 1993 and in that year bought the only Chilean wireless MMDS cable operator Maxivision. VTR has acquired many smaller cable operators across the country over the past fifteen years, including larger competitors Cablexpress (1994) and Metropolis Intercom (2003). The second largest cable operator in the country, Cable Central, has just 15,000 subscribers and has been struggling to compete with the larger cable and satellite players, steadily losing customers in recent years.

228. In the satellite space there are three big players: DirecTV, Telefónica Multimedia (part of Spanish Telecoms group Telefónica) and Zap TV (part of Mexican Telecoms group Telmex). A fourth satellite service, Visiontel launched in mid 2009. At the moment, satellite represents a little under 40 per cent of the pay TV market in Chile, but as a consequence of higher household availability and lack of new cable launches, is forecast to overtake cable in terms of market share in the next two years.

229. The only IPTV operator in Chile is Telefónica del Sur, part of the Luksic Group. Luksic had previously been a major shareholder in VTR. Telefónica del Sur launched IPTV at the end of 2007 and currently has fewer than 30,000 subscribers. IPTV is typically driven by broadband uptake, and although Chile's broadband subscribers are higher than average for South and Central America, at 28 per cent of households forecast for year end 2009, they are still low by Western European or North American standards. As a consequence, IPTV is unlikely to gain a foothold in Chile for a number of years.

230. With terrestrial services used by two-thirds of Chilean households, conversion from analogue is likely to be a time-intensive process. Chile has currently set its analogue switch-off for 2018, three years after the ITU deadline. Chile is to adopt the ISDB standard used by Japan and Brazil, aiming to piggy-back on the scale of production required for the two larger countries, and the associated downward price trend of reception equipment. The

communications regulator Subtel has stated that the falling equipment prices for ISDB receivers did factor into the decision. Public DTT roll-out has yet to occur, with trials currently ongoing.

## GHANA

231. West-African nation Ghana is one of the more populous African countries, with over 23m inhabitants. GDP per capita is low at \$739 per annum (IMF 2008). Persons per household is average for the region, with approximately 3.6m households in the country.

232. Due to the relatively low GDP per capita, household ownership of TV sets is low by international standards; however, at 60 per cent of homes, is in line with that seen in Nigeria and higher than markets such as Kenya and Uganda. Broadband usage is minimal in Ghana, with ITU statistics placing penetration at 0.1 per cent at the end of 2008.

233. The vast majority of Ghana's circa 2m TV households receive and watch free-to-air terrestrial TV stations. Roughly 5 per cent of these homes watched pay-TV at the turn of 2009, split between several pay-TV providers, including pan-regional operators Multichoice's DsTV and Gateway's GTV, as well as local pay-TV operators Skyy TV and TV Agoro. With the forced closure of GTV at the beginning of 2009 due to financial issues, the market saw a loss of about 30,000 pay-TV subscribers.

234. Multichoice's DsTV acts as the gatekeeper for the market, with access to premium movies and key international sports leagues available primarily via DsTV. DsTV has historically been typically too expensive for most households in Ghana though, with even the basic 'Family' package from DsTV costing close to \$20 per month (32 per cent of monthly GDP per capita), putting it out of reach for the majority of households in the market. As a consequence, there were only approximately 24,000 DsTV customers at the end of 2008. GTV, instead, with lower monthly rates and flexible access plans had proved to be popular (indeed was popular throughout sub-Saharan Africa, accruing over 100,000 customers within just a year and a half after launch, before its closure). DsTV, however, has aimed to move into the space previously occupied by GTV, with a new low-cost \$10 'Access' package, launched in June 2009. The Access package offers a similar number of channels to the Family package, although does not include the key M-Net Action channel. Nonetheless, the launch of basic low-cost packages in other sub-Saharan African markets has proved popular with households, and has the opportunity to improve pay-TV usage in Ghana.

235. Of the remaining pay-TV platforms, TV Agoro provides localized terrestrial pay-TV services to the capital Accra, with a small bouquet of basic TV channels, while Skyy TV has an 8-channel bouquet with a range of local and international news, entertainment and films. Skyy's offer is available on a pay-as-you-go basis, and currently has over 25,000 customers in Ghana.

236. The majority of the remaining non-pay-TV homes rely on free terrestrial reception for their TV services, and can gain access to public broadcaster's channel Ghana TV, commercial channels Metro TV, TV3 and TV Africa as well as one of two local channels. Scandinavian media group MTG also recently launched channel Viasat 1 in Ghana. The only channel with coverage beyond the major urban areas however, is the public channel Ghana TV. Despite this, the commercial channels have typically gained higher viewing shares, with urban

audiences preferring their content. Recent MTG research has suggested that the top three channels in terms of viewing share were TV3, Viasat 1 and Metro TV.

237. Due to the importance of terrestrial to the general population, Ghana has already specified its plan for digital switchover. The three main population centres will be covered by high power DTT transmissions, with trial broadcasts in Accra started in late 2008. Channels currently involved in the trial include Ghana Television, TV3, TV Africa and new channel Net 2 Television. Lower power transmitters will be placed outside the main cities. Transmissions will be in MPEG-2 in order to minimize set-top box costs. As it stands, the \$20+ required for an MPEG-2 set-top is already a significant barrier to adoption, making the higher cost MPEG-4 boxes an unfeasible option. Government subsidies are likely to be applied to ensure sufficient uptake. Digital transition is currently scheduled for 2015, in line with ITU recommendations; however, Ghana has noted its preference for a 2020 switch-off.

## NIGERIA

238. Nigeria is the world's 8th most populous country and largest African nation, with over 150m inhabitants. Households were placed by government census figures at just over 25m, of which roughly 60 per cent currently own TVs. Although TV ownership in urban areas is high, roughly two-thirds of the population is currently rural, dropping the overall percentage of homes owning TV sets. Annual GDP per capita was placed at \$1400 by the IMF in 2008.

239. Nigeria presents one of the most dynamic markets for pay-TV in Sub-Saharan Africa, with five satellite TV providers: DsTV, HiTV, DaarSat, MyTV and Infinity TV. Whilst Multichoice is the dominant pay TV provider in the market, newcomer Hi-TV, launched in 2007, has been providing stiff competition for the incumbent. At the end of 2008, Hi-TV had close to 200,000 customers, just shy of the 205,000 with which Screen Digest estimates Multichoice ended the year in Nigeria. There are a number of factors behind the success of Hi-TV in the market. The first reason is that Hi-TV successfully bid for the pay TV rights to three key UEFA football competitions (the UEFA Champions League, the UEFA Super Cup and the UEFA Cup in Nigeria), along with rights to the majority of matches from the English Premier League (EPL). The EPL is an important event throughout Africa due to the large numbers of African players taking part in the competition. The second reason for the rapid uptake is the pricing: Hi-TV's full premium offer costs 4,000 naira (€20) a month, compared with DsTV's 9,000 naira (€45 – and over half of GDP per capita per month). As with Ghana, DsTV has introduced new basic access packages to Nigeria starting at 1500 naira to help stimulate uptake, although these target a less sports-focused audience than Hi-TV's offer. Daarsat is keeping clear of premium content, and basing its service around entertainment channels, although with a monthly price of over 5,000 naira (€25), is likely to find gaining subscribers difficult. Short-mid term target for Daarsat is 50,000 subscribers. Infinity TV is the newest market entrant, having launched in September 2009, and targets a similar customer base to that of Daarsat, being an entertainment play, rather than attempting to compete in an increasingly crowded and competitive TV sports market.

240. Aside from satellite, local MMDS (Microwave Multipoint Distribution System – often referred to as wireless cable) providers do offer a basic range of pay-TV channels in a number of the larger urban areas, but satellite still holds the main content and will control the pay-TV market for the foreseeable future. Despite widespread availability of pay-TV, prices are still relatively high, with even DsTV's entry-level packages a significant proportion of monthly household income. Unauthorised use of broadcast signals is consequently highly prevalent,

with Hi-TV estimating that as many as a third of TV households have an illegal connection. Viewing centres (typically pubs or bars with a TV service) are also popular for premium material, allowing consumers access to content such as football matches, without their necessarily having a TV at home. As a consequence, overall penetration of legal pay-TV remains low, at 5 per cent of TV households.

241. Nigeria is Africa's largest mobile market, with over 60m mobile subscribers, and with low pay-TV penetration, is an attractive target for companies looking at mobile TV. DsTV has already launched a DVB-H service featuring 12 channels. Content is currently free, with DsTV and MTN, its mobile service partner, aiming to build a user base before introducing charges. Mobile broadband is also a key feature of the market, with Nigeria being the largest market in sub-Saharan Africa, with 3.6m subscribers at the end of 2008 according to the ITU. This is important, as it allows the development of web-TV services without the presence of a significant fixed line broadband base.

242. In October 2008, Nigeria set the deadline for analogue terrestrial switch-off for June 2012. With current terrestrial coverage of the public broadcaster NTA stations currently at 95 per cent of the population, analogue switch-off is a major task. While Nigeria has selected the DVB standard for terrestrial broadcasting, trials of any scale have yet to commence, and with no roll-out likely before mid to late 2010, the chances of the country meeting the 2012 deadline are looking slim. One of the barriers cited as being a reason for the delay in roll-out has been the lack of inclusion of the major commercial broadcasters in the switchover process.

## SOUTH AFRICA

243. South Africa is the most developed major nation in Africa, and also one of the largest, with a population of nearly 48m. South Africa is also the wealthiest nation in the region on a per capita basis, with GDP per capita of \$5,685 per annum (IMF 2008). TVs are widely available, with most households owning a TV set.

244. South Africa currently has essentially one pay-TV provider, the Naspers-backed satellite operation Multichoice DsTV. An analogue terrestrial service, M-Net does exist, however has largely shared ownership with DsTV and a declining subscriber base.

245. DsTV services are taken by just over a fifth of South Africa's nearly 10m TV households and have been growing rapidly in recent years. In 2005, DsTV introduced a basic lower cost package called 'Compact', which was stripped of some of the premium MNet channels, but was priced at R199 (\$26) per month, less than half of the price of the main DsTV package at R440 (\$58). Following the launch of the compact package, subscription rates increased substantially. Nearly 50 per cent of the 2.4m DsTV customers are now subscribers to the compact package. Free-to-air satellite is not a popular platform in South Africa, with Sentech's Vivid service largely used for universal access to public broadcaster SABC's channels. One of the issues surrounding Vivid is its availability in territories outside South Africa. e.TV has encountered issues when selling advertising on its channels in neighbouring countries such as Botswana, due to Vivid signals being picked up outside its domestic territory, and has consequently withdrawn its channels from the platform. As a result, the lack of a major local commercial broadcaster significantly diminishes the appeal of Vivid to South African consumers.

246. Broadband usage in South Africa is relatively low, at just over 10 per cent of households forecast to be using broadband at the end of 2009. As a consequence, a significant online content market is yet to develop.

247. In 2007, South African TV regulator ICASA issued pay-TV licences to a number of potential new providers including Walking-on-Water TV, a niche religion themed pay-TV provider and potential market challengers ODM TV and Telkom Media. ODM TV is looking to launch a satellite platform aimed at attracting customers to entertainment and premium content packages in direct competition with DsTV. While market conditions and transmission licensing issues prevented the planned early 2009 launch, platform is still expected to begin services by the end of 2010. Telkom Media, originally a subsidiary of incumbent telecommunications company Telkom, has long planned an IPTV service launch. Concerns surrounding the viability of IPTV in South Africa nearly saw the company liquidated early in 2009, however, Chinese company Shenzhen Media Group bought Telkom's majority stake in Telkom Media and reestablished the IPTV plans.

248. Digital terrestrial roll-out plans have been confirmed by ICASA, with analogue switch-off set for November 2011, and coverage set for 92 per cent of the population. However, there have been a number of delays in digital terrestrial rollout, with no launch as yet. Some of the issues with DTT rollout include a lack of clarity on set-top box subsidies and a need to finalise the multiplex allocation and frequency plan. Currently, the DTT multiplexes are assigned as follows: multiplex one to SABC, multiplex two to commercial broadcaster e.TV, with room for additional commercial broadcasters and 50 per cent of multiplex three to MNet. MNet is currently lobbying for full ownership of multiplex three.

249. As a consequence of the delays, it is unlikely that DTT will be launched before the 2010 World Cup in South Africa, and it is looking increasingly likely that the November 2011 switch-off date will be pushed back in favour of a later date.

## RUSSIA

250. Russia is the 9th largest country worldwide, with a population of 142m and 53m households. GDP per capita is \$11,300 per annum (IMF 2008), and TV sets are present in most households.

251. Over half of Russian households are currently reliant on analogue terrestrial TV services, although this has been declining rapidly with the growth of satellite and cable TV. In 2004, just 25 per cent of households subscribed to some form of pay-TV, but by the end of 2009, 45 per cent of homes will be taking pay television services.

252. Cable TV is currently the dominant pay-TV platform in Russia, with close to 15m subscribers. There are approximately 1,500 different cable TV operators in Russia, but with the top eight providers accounting for 10m subscribers, most cable companies are small in size. The majority of cable customers in Russia are analogue, with just five per cent of subscribers taking digital services. There is only one operator, Akado, which has networks in Moscow and other major cities, with a significant digital subscriber base. Following the improvement in market conditions expected in 2010 and 2011, the majority of major cable companies are anticipated to begin pushing digital services to customers.

253. Satellite TV has been the major success story in Russia in recent years. While satellite provider NTV+ has been present in the market since 1996, it was not until 2005 that satellite began to grow its subscriber base substantially. The launch of low cost platforms TriColor and Viva TV in 2005 and 2007 boosted digital satellite subscriptions, with pay-satellite share of TV households increasing from 1 per cent to 11 per cent in the years following 2005.

254. IPTV remains a low-distribution platform in Russia. Although there are over 10 IPTV operators in Russia, the combined IPTV subscriber base is at just in excess of 300,000 customers. Availability is patchy, with IPTV typically more expensive than cable TV or satellite services, limiting potential uptake. The recent economic downturn has affected the IPTV market, with providers such as Comstar's Stream TV losing 12,000 customers in six months. Even by 2013, IPTV is not expected to take much more than 2 per cent of the TV market.

255. Digital terrestrial TV services have been launched in some localities by private commercial companies and in public tests; however, the main roll-out is expected to begin in 2010. The full roll-out, which is expected to cover over 90 per cent of the population, will replace existing FTA test services, meaning that some of the few current DTT households will have to buy new equipment, although pay-TV services may be accommodated. Russia has selected the DVB standard with MPEG-4 compression to be used for transmissions. Equipment subsidies are likely for some households; however, the predicted rate of pay-TV expansion is likely to mean that by analogue switch-off, only a relatively small proportion of households will require DTT reception equipment for their main TV set.

#### UNITED STATES OF AMERICA

256. The US is the largest TV market globally in revenue terms and one of the most highly penetrated by pay-TV. Historically, the US was a cable-TV market, and while cable is still the largest platform in the country, the advent of satellite TV broke the cable monopoly. Cable TV services are taken by just under 60 per cent of households in the US, with pay-satellite companies accounting for nearly 30 per cent of US households. Newer services, such as IPTV, account for below 5 per cent of TV households.

257. In the absence of a strong public service broadcaster, a dominant pay-TV market was able to develop. US consumers pay some of the highest prices worldwide for pay-TV, with the average price paid for pay-TV access at \$65 per month. Due to the early emergence of cable services in the US, the channel market developed differently to that of Europe, with more emphasis placed on exclusive content at the channel level than at the pay-TV operator level. As a consequence, channel offers are similar between the major providers, and package prices comparable.

258. Comcast, the number one US cable TV provider, with 24m TV subscribers, is actually the largest single-market pay-TV provider in the world. Its footprint covers 44 per cent of US households. Other major US cable companies include Time Warner Cable (13m TV subscribers), Cox (5.4m TV subscribers) and Charter (4.9m TV customers).

259. Approximately a third of US cable households are still taking analogue services, however digital cable systems in the US are highly advanced, with large numbers of HD channels and VoD systems in place with as many as 15,000 titles per month. VoD is one of

the key assets of US cable companies. By the end of 2009, almost 45m US households will be enabled for true VoD services by their cable or IPTV service provider.

260. The satellite operators, DirecTV and Dish Network, while unable to offer VoD access in the same way as cable or IPTV systems, have been investing in comparable technologies. Push/pull IP-enabled satellite decoders allow viewers to download content via their broadband connection to their set-top box and then view in an

261. On-demand fashion. Current usage of satellite on-demand services is limited, with neither provider having more than 1m IP on-demand enabled homes, despite having a combined subscriber base of 32m (DirecTV 18.3m, Dish Network 13.7m). In the absence of much competitive ability in the on-demand business, satellite providers have been marketing other assets – such as HD.

262. Due to the lower resolution of the standard definition NTSC system in the US, combined with its poorer colour definition compared to the European PAL system, HD is a more attractive technology to US consumers than their European counterparts. As a consequence, HD has taken off in a way only just beginning to occur in Europe, with hundreds of channels in the US already available in HD. As US cable companies still devote considerable bandwidth to analogue channels, the satellite providers have a bandwidth advantage and can offer more HD channels than their cable competitors. As a consequence, much of satellite's marketing has concentrated on HD availability.

263. Digital switchover has already occurred in the US, with the country moving to all analogue transmissions in June 2009. The low number of households reliant on terrestrial TV allowed an early switch-off compared to many European nations. Deadline for switch-off was pushed back from the original switch-off date of the end of February though, following concerns that a number of households were unprepared to receive digital terrestrial TV. The delay allowed additional decoders and digital converters to reach the market and extra discount coupons to be provided to the households which needed them. The US uses the ATSC standard with

264. MPEG-2 compression. Decoders are more expensive than comparable DVB-T boxes, starting at \$40 for a basic box.

## JAPAN

265. The Japanese pay-TV market is relatively highly developed in technology terms, but also highly fragmented, with the country boasting more than 500 separate cable TV operators and multiple competing satellite and IPTV providers.

Cable TV is the largest platform in penetration terms, reaching close to 50 per cent of Japanese households, followed by free satellite TV services at just over 20 per cent. The remaining pay-TV platforms, IPTV and pay-satellite, have a TV household penetration of just over 15 per cent.

266. Despite cable's market dominance in Japan, no single cable TV provider shows significant control over the pay-TV market, as is normally seen in many developed markets. The largest provider is Liberty Global's J:Com, which has taken an aggressive approach to expansion, successively buying multiple smaller operators. J:Com currently has 2.6m cable customers, just 11 per cent of the total Japanese cable TV market. Nonetheless, the company is relatively advanced in digital penetration, with 85 per cent of its customers on digital

services. J:Com also operates a video-on-demand service offering the usual array of PPV content, as well as a subscription karaoke on-demand system, a common feature of Asia-Pacific on-demand services. VoD services were launched in 2004, with network-wide availability in 2005. Due to the fragmented nature of the cable market, however, on-demand services are not especially common, with true VoD available to roughly a quarter of Japanese digital cable TV homes.

267. The satellite market is more consolidated than the cable TV market, with two satellite pay-TV providers: Sky PerfecTV and Wowow. Sky is the larger of the two providers with 3.6m customers, making it the principal pay-TV player in the market. Wowow, which has 2.5m customers, is unusual amongst satellite pay-TV providers in developed markets, in that a quarter of its customers are still on analogue TV. Wowow only began digital broadcasts in 2000, substantially later than most other pay-satellite providers, although is expected to have completed its migration by the end of 2011.

268. Digital terrestrial roll-out began in 2003, and is the main source of television for 6m households. Analogue switch-off is scheduled for mid-2011, with the transition currently on track. Just five per cent of households currently use analogue terrestrial on their primary TV set. By switch-off, 15 per cent of homes will use digital terrestrial TV as their main TV service.

269. IPTV is the smallest of the pay-TV platforms in Japan, however, has been growing relatively rapidly. Just under three per cent of households are forecast to be using IPTV by the end of 2009. Telco NTT's platform is the largest in the market, and is forecast to reach 0.9m subscribers by the end of 2009. Overall, IPTV is looking at a growth to providing TV to nearly 6 per cent of households by 2013.

270. The online content market is well established even compared to many other developed countries. High broadband speeds have contributed to this, with over half of broadband connections fibre-optic, although at 55 per cent, the overall domestic broadband penetration in Japan is on par with that of Western Europe. Aside from PC-based online video portals, Internet-delivered content ventures include acTVila, a partnership between the major TV set manufacturers. Almost all HDTV sets sold in Japan can be connected to the Internet and browse the acTVila content portal, allowing consumers to directly stream TV and movies. Awareness is still relatively low though, with current connection rates at only 15 per cent.

#### DEVELOPED VS DEVELOPING MARKET SUMMARY

271. Overall, the differences between developing and developed markets in their TV distribution infrastructure are stark.

272. TV set ownership is lower in developing markets. While developed markets have a near 100 per cent household ownership rate of TV sets, developing markets across the world, have on average, 85 per cent household ownership of TV sets. In markets such as sub-Saharan Africa, these rates are considerably lower, at between 10 and 50 per cent. In such territories, community TV set availability, such as a shared TV set or a public house TV subscription is important in providing television access to consumers.

273. Multichannel and pay-TV availability is also lower in developing countries, resulting in lower exposure to non public service channels and premium content. Multichannel TV in



developing markets is used by roughly half of TV households, compared to approaching 100 per cent in developed territories. Digital terrestrial roll-out is typically much more advanced in developed territories, with many developed nations having already switched off. By contrast, many developing markets, despite having high household reliance on free analogue terrestrial, have yet to even commence digital terrestrial roll-out. By 2012, the majority of developed nations will have transitioned entirely to digital terrestrial, with many developing nations looking likely to struggle to meet the ITU 2015 deadline.

274. While the difference in pay-TV usage is not quite so stark, with much of the multichannel divide due to the lack of digital terrestrial roll-out in developing countries, developed territories still have, on average, a 50 per cent higher pay-TV penetration than developing markets, with the contrast being most noticeable between the North American territories of the US and Canada (91 per cent penetration) and Southern and Central America (27 per cent penetration) and Africa and the Middle-East (8 per cent penetration). High costs of access relative to personal wealth are largely to blame for this, and despite low cost access services being available in a number of Asian markets, low degrees of cabling in the Middle-East and Africa and South America have resulted in low consumer uptake of pay-TV. Pay-satellite services have yet to fill the niche in such countries.

275. Advanced television services such as video-on-demand are also much more available in developed regions than developing markets. Close to a quarter of households in developed markets are enabled with a true video-on-demand system, with the availability in developing regions at just 3 per cent of TV households.

276. In summary, while there are substantial differences even within categories of countries, with, for instance, the uptake of pay-TV being lower in Western Europe than in North America, developed markets typically exhibit a higher degree of service availability than developing regions. Cable TV penetration is normally higher, digital TV penetration substantially more advanced and new services, such as VoD, more widely accessible. Services relying less on fixed infrastructure are more available and apparent in developing markets. Mobile broadband and satellite TV are two of the areas in which many developing markets are seeing rapid growth.

## GLOSSARY

**ARPU:** ARPU is an acronym for Average Revenue per Unit and is equivalent to the average revenue generated by each subscriber in a given period (usually monthly or yearly).

**Basic pay-television:** the lowest level of service available for which the customer has to pay a monthly fee.

**Broadband Internet:** High-speed Internet generally taken to be Internet offered at speeds greater than 150Kbits/second. The term cable Internet generally refers to broadband Internet offered over cable (as opposed to DSL or fibre).

**Cable telephony:** A telephony service offered by a cable company. May also be used more specifically to mean a telephony service offered by a cable company over a separate copper telephony twisted pair wire – directly equivalent to a telecom company's standard telephony service.

**Churn:** Churn is an expression of the number of customers leaving a network (cancelling their subscription) in a given period calculated as a percentage of the average number of customers to that network during the period.

**CPE:** Means Consumer Premises Equipment and refers to a piece of hardware within the consumer's home used to access a service. A CPE device would commonly be a set-top box, modem or PVR.

**CPM/CPT:** Cost per thousand impressions. Used in advertising to indicate the price required to reach one thousand viewers with an advertisement.

**Digital TV:** A television service delivered in digital form and requiring a digital set-top box or integrated digital television set to view.

**DSL:** Stands for Digital Subscriber Line and refers to a set of technologies used for digital data transmission over a local telephony network. Several generations of technologies are in use at present, including the common (in order of data transfer speed) ADSL, ADSL2+ and VDSL.

**DTT:** Digital Terrestrial Television is a platform for television delivery that makes use of over the air transmission in digital format. Digital Terrestrial Television has been launched in the UK, France, Italy, Spain, Netherlands, Finland, Sweden and Germany. DTT may be offered on a free-to-air or pay TV business model.

**Double-play:** Double play describes a company offering two separate services in a single bundle, or refers to a customer taking two services from their TV or broadband provider.

**Extended basic television:** channels or packages of channels which would in the past have been packaged in the basic tier but which have been split off and are now offered as an add-on to the basic service. Extended basic services are often themed mini-groupings of channels, thus in situations where a small and large basic option are offered, the larger basic would not be considered to be an extended basic package. Instead, both would be considered basic.

**Free-to-air:** Television programming requiring no monthly fee to access (although a one-off set-up fee may be required). Programming is normally funded through advertising, or through public subsidies.

**Gatekeeper:** In relation to content, refers to the company or organisation owning exclusive rights to key content like major Hollywood movies or top-league sports. May also refer to a pay-TV operator with exclusive rights within a given country or market.

**HDTV:** Stands for High-Definition Television and refers to a broadcast signal with a higher resolution than current standard-definition television. The greater resolution is a factor of the number of active lines of display resolution which commonly in HD formats is either 720 or 1080 with the transmission method being either progressive frames (p) or interlaced fields (i).

**Homes passed:** Homes passed is the number of homes passed by the physical infrastructure controlled by a given cable company. It represents the number of potential customers to a cable service or the number of homes that could take the cable services if they chose to do so.

**IPTV:** Internet Protocol Television IPTV is the delivery over a broadband connection of television content using Internet Protocol within a ‘walled garden’ environment. IPTV has been widely used by telecoms operators to offer TV over their ADSL networks. IPTV can also be used by cable companies both within their own network infrastructure and as a means of expanding their service reach outside their areas of operation over unbundled third-party DSL networks.

**Linear TV:** Linear TV has a specific content schedule which viewers must conform to, in contrast to on-demand TV (below), which has fewer restrictions on viewing times.

**Multichannel TV:** TV showing more channels than those available on free-to-air analogue terrestrial TV – includes both free and pay satellite, terrestrial, cable and IPTV services.

**On-demand TV:** On-demand television is the delivery of TV content on request. Content is usually selected from a menu of available material and viewed one or more times within a period of time. There are a number of related terms and acronyms associated with this form of television as follows:

- **PPV:** Stands for “pay-per-view” and refers to the business model used for on-demand television, where a charge is made for each piece of content viewed;
- **nVoD:** Stands for “near-Video-on-Demand” and refers to an on-demand television system in which multiple channels are used to show the same piece of content at staggered start times. The gap between each available viewing time is a factor of the number of channels dedicated to the service and the amount of content on offer, but would commonly be 15 minutes or half an hour. nVoD systems are used by satellite pay television operators like BSkyB which lack a broadband back-channel allowing true Video-on-Demand and by cable companies that have yet to fully upgrade their networks;
- **VoD:** Stands for “Video-on-Demand” and sometimes for clarity referred to as ‘true Video-on-Demand’ refers to an on-demand television system in which content is stored on a server and streamed in real time to the viewer. VoD systems allow the customer to start viewing the content at any time as well as to pause and rewind the content.

**Penetration:** Proportion of households with a particular service. Typically used to refer to the percentage of TV households with a TV service, although may also be used to refer to proportion of households with a broadband connection.

**Premium television:** Single or packaged of high-value channels that contain premium content and command a high customer subscriber fee. Typically refers to recent movie or top-level mainstream sports content.

**PVR:** A Personal Video Recorder (commonly known in the US as a DVR or Digital Video Recorder) is a type of set-top box that contains a hard disc onto which content can be recorded and stored. The PVR gives the end user VoD-like functionality and can also be combined with an nVOD service to give local access to content that is sold on a PPV basis. They have proved popular with satellite operators unable to offer VoD, but PVRs are also being rolled out by operators that have true VoD services because of the added viewing benefits that they bring (like capacity to pause and rewind ‘live’ TV).

**RGU:** Means Revenue Generating Unit and is an individual service contract. A single unique subscribing home may account for up to three RGUs in a triple-play household. Triple-play refers to television, telephony and Internet.

**Set-top box:** A cable set-top box is an analogue or digital receiver and decoder that converts the signal received to one suitable for a standard television set. The set-top also performs certain conditional access functions and may run the software that enables interactive television services. Set-top boxes are widely used in digital terrestrial, cable, satellite and IP television, but less widely used for analogue services.

**Subscribers:** A subscriber is an individual cable customer, the important distinction being that a subscriber is a single unique unit and thus differs from a subscription or RGU.

**Subscriptions/RGUs:** A subscription represents an individual service contract and thus a single subscriber can represent several subscriptions (for example one each for TV, telephone and Internet). An equivalent term widely used in the cable industry is Revenue Generating Unit (RGU). One RGU represents one service contract.

**Triple-play:** Triple-play describes a cable operator offering three different services (television, Internet and telephony) or a cable customer taking three services from their cable provider.

**TV via broadband:** Television content delivered via a broadband connection to the consumer. May be delivered via the open-Internet, or via a specific ISP's network. If the content is delivered to a set-top box via a specific ISP's network, with guaranteed quality of image, service is known as IPTV.

[Appendix follows]

APPENDIX

Fig 9. TV penetration of households 2009

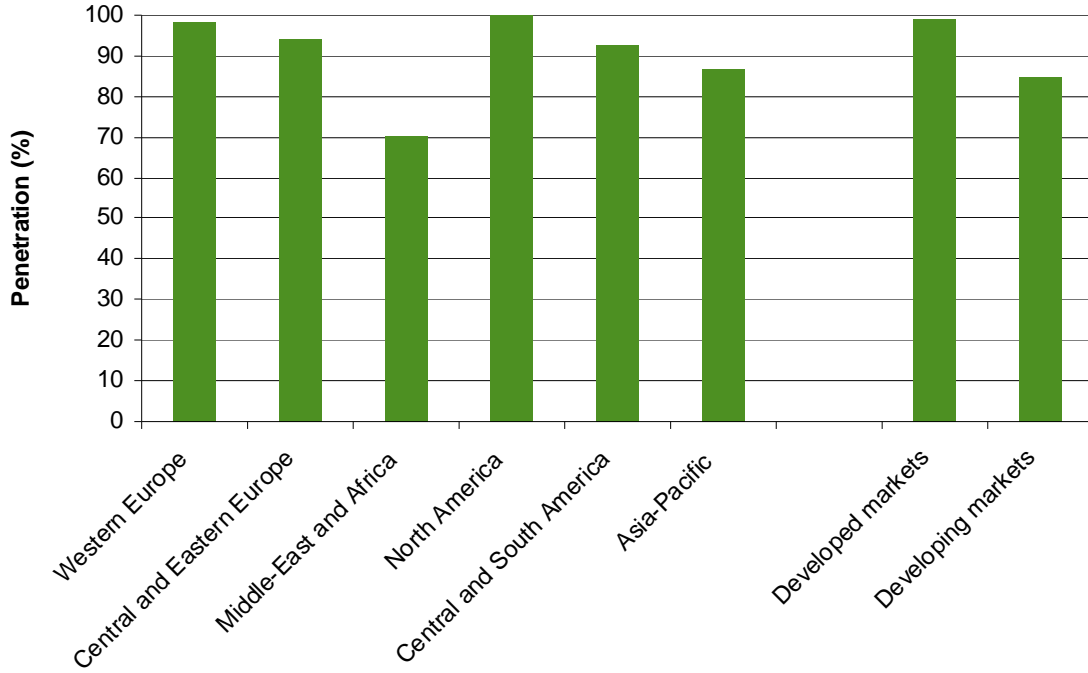
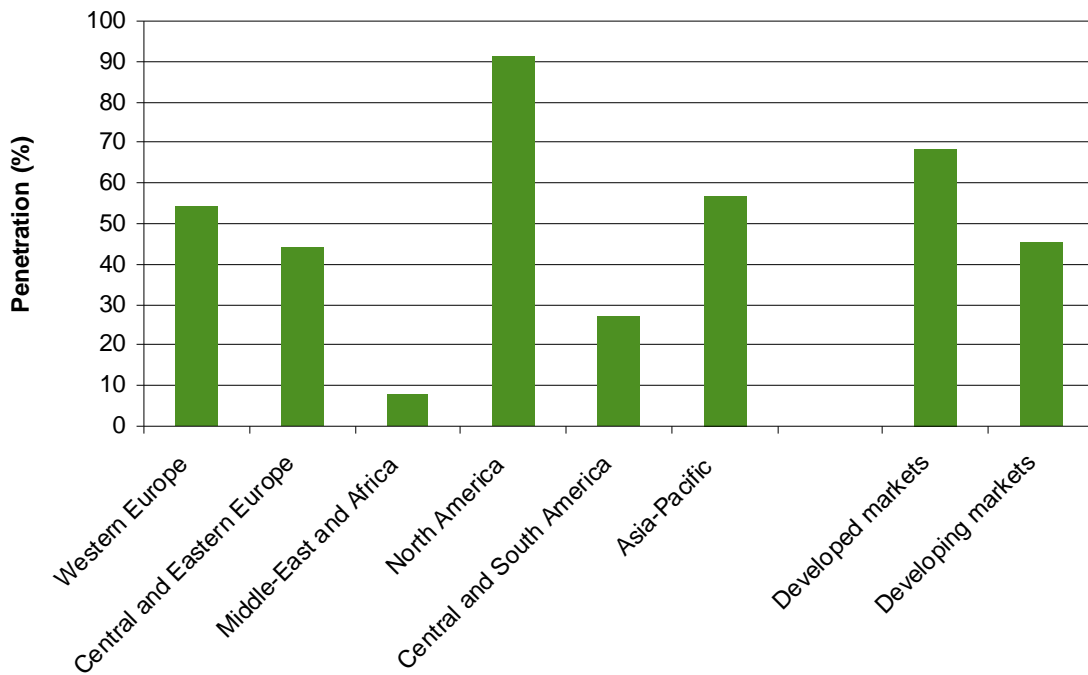
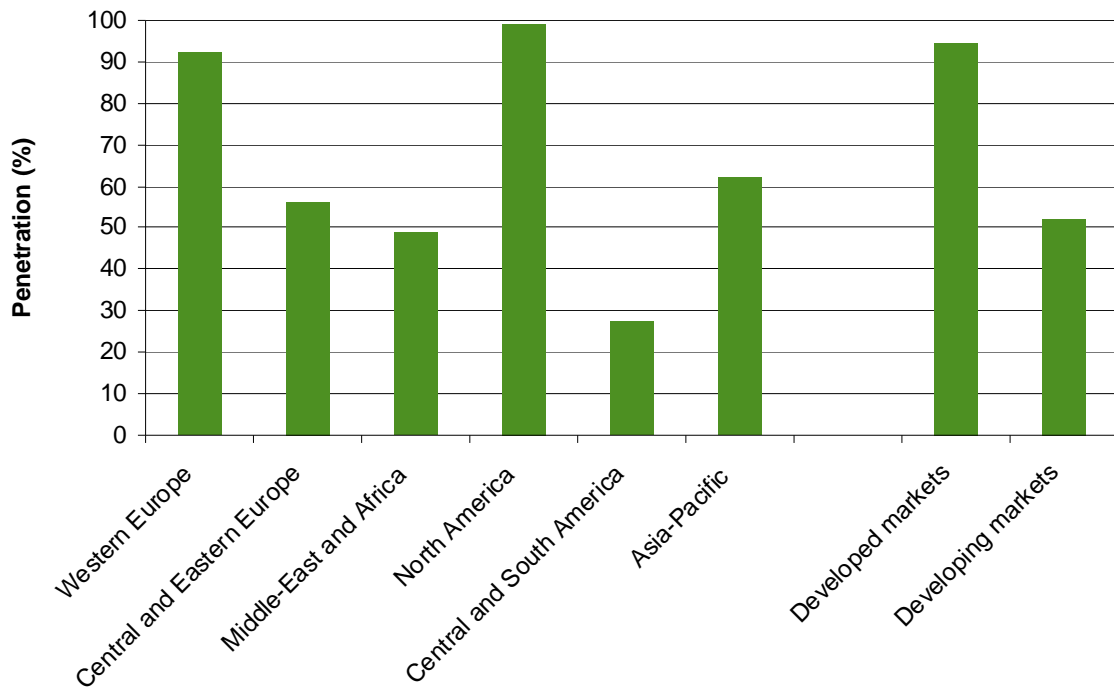


Fig 10. Pay-TV penetration of TV households 2009



10.1.1. Multichannel TV penetration of TV households 2009



10.1.2. Digital TV penetration of TV households 2009

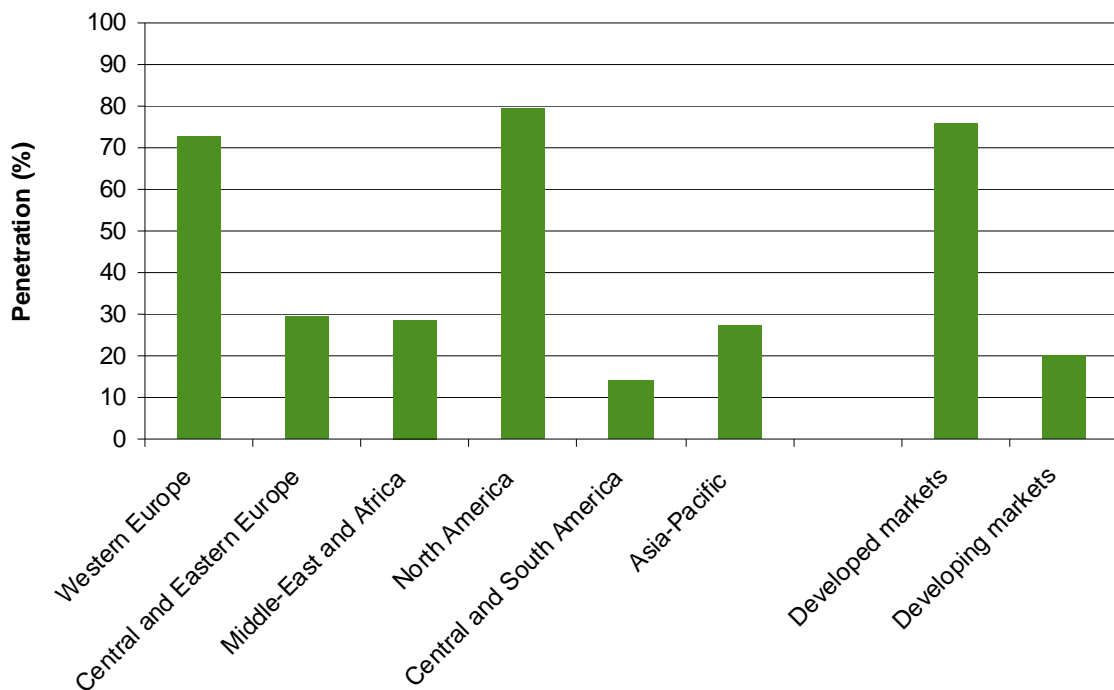
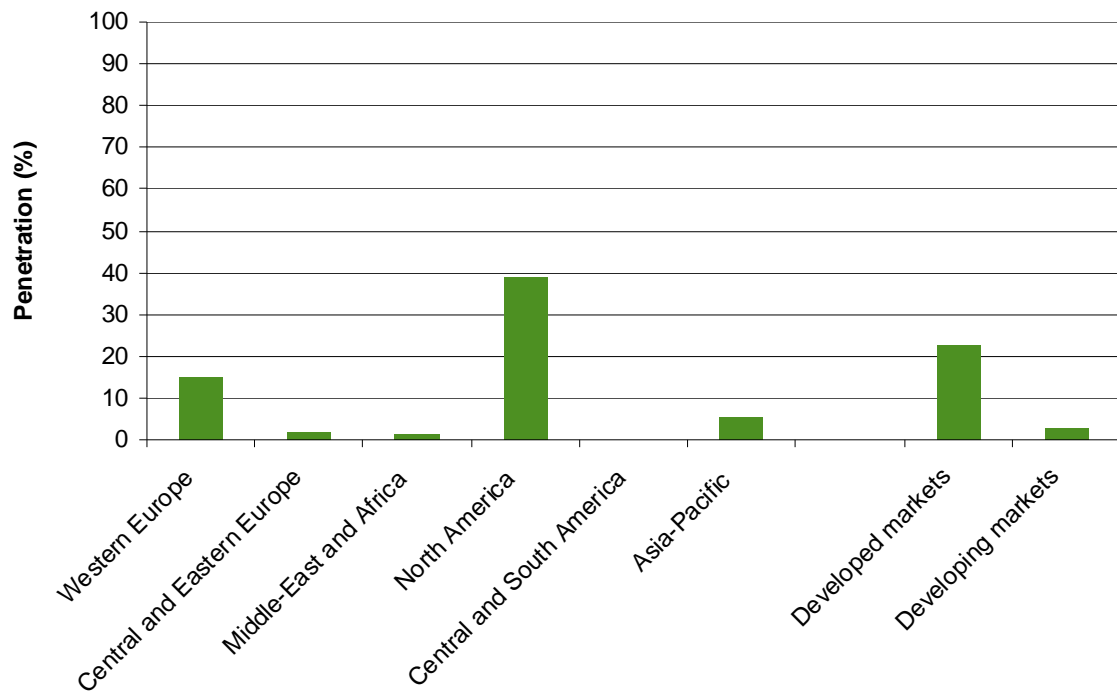


Fig 11. VoD service penetration of TV households 2009



[End of Appendix and of document]