

Target 8: Ensure that all of the world's population have access to television and radio services¹

Introduction

Target 8 specifically addresses the need to take advantage of broadcasting technologies — often referred to as “older” or traditional ICTs — to help countries move towards the information society. In some countries, broadcasting technologies will complement newer ICTs, while for others, especially those at early stages of ICT development, they might represent a valid alternative when newer technologies are not available or affordable.

Making radio and television (TV) services widely available is important for enhancing national identity, providing an outlet for domestic media content and informing the public about important news and information. The latter element is critical in times of emergencies. Broadcasting can also serve important educational purposes by transmitting courses and other instructional material (see Target 2). Radio and television programmes are a principal source of news and information for illiterate segments of the population. They complement the printed media and are particularly important in countries where few people use the Internet, or where local online content and content in local languages are limited.

Broadcasting is mainly referred to in WSIS Action Line 9 (Media). It is essential for promoting linguistic diversity and cultural identity, given its relatively high prevalence in relation to other ICTs. One of the elements of Action Line 9 is to: “Encourage traditional media to bridge the knowledge divide and to facilitate the flow of cultural content, particularly in rural areas.”²

Target 8 is also relevant to Action Line 2 (Information and communication infrastructure), since broadcasting constitutes an important part of ICT infrastructure and widespread access to broadcasting services is fundamental for reducing the digital divide. Broadcasting is also related to aspects of this action line concerning the availability of adequate and affordable ICT equipment, given that radio and TV sets are needed in order to use broadcasting services. Action Line 2 calls, moreover, for encouraging and promoting “traditional media.”³

Broadcasting can provide content relevant to local cultures and languages, thus linking Target 8 to Action Line C8 (Cultural diversity and identity, linguistic diversity and local content), one element of which is also to: *“Give support to media based in local communities and support projects combining the use of traditional media and new technologies for their role in facilitating the use of local languages, for documenting and preserving local heritage... and as a means to reach rural and isolated and nomadic communities... Enhance the capacity of indigenous peoples to develop content in their own languages.”*⁴ Broadcasting is arguably better placed than newer media to fulfill these roles, in view of the wider dissemination of broadcast devices in developing countries compared to Internet access.

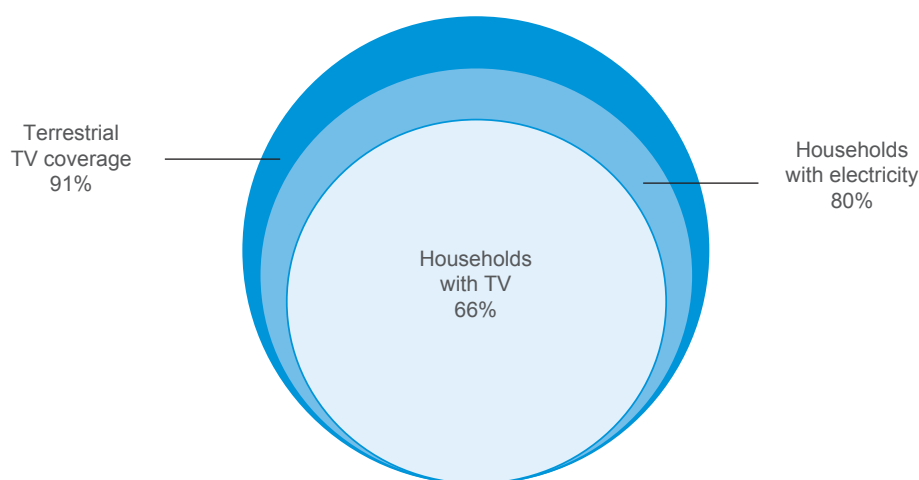
Although much of the discussion surrounding Action Line C3 (Access to information and knowledge) refers to newer technologies, traditional ICTs such as broadcasting are important for disseminating *“information and knowledge almost instantaneously.”*⁵

Measuring Target 8 — Proposed indicators

A literal reading of Target 8 presents three methodological challenges. The first is that television and radio service is a general term. In the past, it would have meant access to analogue terrestrial broadcasting transmissions using a traditional radio or television set. Today’s digital world has multiplied the possibilities. Some countries are migrating away from analogue, to digital terrestrial television, while in most developed nations and many developing ones a majority of households are receiving multichannel TV broadcasting via coaxial cable or direct-to-home (DTH) satellite networks (and more recently over broadband Internet connections). The ability to receive digital multichannel broadcasting has significant quality and content advantages compared to analogue over-the-air transmissions.

A second complication is the term access. Access implies the ability to receive a broadcasting signal and would be measured by the population within range of the signal. This has typically been measured on the basis of terrestrial access, but today satellites serve the whole world and provide ubiquitous coverage, and signals can be received by small satellite dishes. While coverage is important to determine if the prerequisite conditions for access exist, a radio

Figure 8.1: Television coverage and percentage of households with electricity and television, South Africa, 2007



Source: Adapted from SABC, Statistics South Africa.

or TV set is also essential to make use of the service. Furthermore, in the case of television, some form of electric current is also needed (e.g. minimally equivalent to the power of a car battery). Figure 8.1 illustrates the relationship between coverage, electricity and television set availability in the case of South Africa.

The third methodological concern relates to the unit of access. The target refers to *population*. While it can be useful to measure the percentage of the population who can listen to or view broadcasting, in practice this kind of data is not widely available across countries. While some broadcasting markets measure audience shares in terms of the number of people listening to or watching a service, this does not capture the total potential market.

A more common and almost universally available measure is the percentage of *households* that have a broadcast device. This information is typically asked for in censuses and household surveys. It has been a useful measure of access, since broadcasting is often a shared experience among family or friends. Furthermore, the existence of a broadcasting receiver in a household suggests that different family members have access. Having said that, the personalization of ICTs is resulting in more *individual* possession and usage of media devices. It is common in developed nations and high-income developing-country households to find more than one broadcasting receiver. What is now different is that individuals increasingly possess their own devices, such as mobile phones or laptop computers, which are also capable of receiving terrestrial broadcasting signals or streamed broadcasts over the Internet (Box 8.1).

Box 8.1: Broadcasting and the Internet

Broadcast-like services are continually evolving on the Internet. Some are extensions of traditional broadcasting, such as conventional radio or television stations with websites that feature streaming of audio or video programmes (i.e. webcasting). Others are unique to the Internet, such as Internet-only broadcast stations.

There are thousands of Internet radio stations. In 2008, some 33 million people in the United States listened to Internet radio stations at least once a week [Arbitron, 2008]. Many stations offer podcasts, providing users an opportunity to listen to the broadcast at a different time. Internet-only radio stations have been affected by copyright and licensing disputes with record labels, which have had an impact on their growth.⁶

A growing number of television broadcasters provide back episodes of popular programmes on their websites. Some broadcasters' websites also offer live programming, particularly for sporting events. Hulu, a US-based joint venture of several broadcasting companies, offers thousands of videos.⁷

There is also a lot of unique audio and video on the Internet that does not fit into the traditional broadcasting realm. One of the most popular is YouTube, which started as a peer video upload site but now also has mainstream broadcasters such as BBC posting content.⁸

While the Internet initially took ideas from broadcasting and applied them to the Internet, the reverse is now increasingly true. Some broadcasters flash their website across their programmes indicating where users can go for past episodes or more information about the programme. Multichannel TV operators have picked up on peer video such as YouTube by allowing subscribers to upload self-produced videos, which can be downloaded from on-demand channels.

The popularity of the Internet for watching video is growing. In Germany, for example Internet users watched 6.4 billion videos on the Internet in August 2009 alone.⁹ The leading site was YouTube, with 2.7 billion videos viewed. Half of the top ten sites were those of traditional broadcasters, including local TV companies SAT1 and RTL.

Traditional and new media synergies have expanded another step with the emergence of Internet-ready televisions. In addition to traditional TV, these new hybrids can also search the Internet for the viewer, and display Internet content such as YouTube videos.¹⁰ Users that do not have Internet-ready televisions can access films and videos from rental sites over the Internet using streaming devices.

So far, no Internet-only site has established a reputation for originally created news and information through their own network of correspondents around the world and professional studios. Traditional broadcasters are desperately trying to strengthen their web presence or strike collaborative deals with Internet sites in order to pre-empt this from happening. Inexpensive digital cameras and camera phones would make it easy to get content from collaborators around the world, but thus far Internet-only broadcasters lack the credibility that traditional media outlets enjoy.

Another consideration is community broadcast experiences in developing countries, where TV and radio access may be available in public institutions such as a community centre or school. Data at the household level may therefore understate the true reach of broadcasting in a country. However, data that would measure public access at a national level is practically non-existent.

The indicators and definitions that the international community uses to measure basic access to broadcasting service are the *proportion of households with a radio* and the *proportion of households with a TV*. These data are widely collected in censuses and household surveys. There are various nuances to the data that can affect their accuracy but at this time are not considered to cause serious comparability issues. For example, households may have televisions in areas without terrestrial broadcasting coverage and use them only to watch prerecorded material on video recorders or DVDs or to connect to game stations. Radio and TV reception chips can be embedded in electronic equipment such as mobile phones, computers or music players, or reception devices can be installed in the USB ports of computers.

It is important, however, to go beyond simple household ownership of a radio or TV, and to track the availability of multichannel television services. "Multichannel" refers to the ability to receive more than just analogue terrestrial free-to-air channels. Multichannel services can be provided by digital terrestrial television (DTT), cable television (CATV), direct-to-home (DTH) satellite or Internet-Protocol television (IPTV). Multichannel TV services are important because they provide higher-quality services and more content, important factors for increasing the demand for television services.

In some countries, these data are compiled from household surveys. In others, they are available from administrative statistics compiled by telecommunication and broadcasting regulatory authorities, industry associations or broadcasting operators. There are various nuances that affect the comparability of the data. For example, some countries consider only pay TV subscriptions, whereas there are a number of DTH systems that offer free-to-air channels and for which viewers do not need to pay a subscription charge. There are also inconsistencies in how multichannel multipoint distribution service (MMDS) (i.e. wireless pay television) subscribers are reported. In some countries, subscribers may have cable TV, but only for the rebroadcast of analogue terrestrial channels, or similarly may receive

Table 8.1: Indicators (and definitions) to monitor access to TV and radio services

Indicator	Definition
1. Proportion of households with a radio (Partnership indicator HH1)	A radio is a device capable of receiving broadcast radio signals, using popular frequencies, such as FM, AM, LW and SW. It includes a radio set integrated in a car or an alarm clock but excludes radios integrated with a mobile phone, a digital audio player (MP3 player) or in a computer
2. Proportion of households with a TV (Partnership indicator HH2)	A TV (television) is a standalone device capable of receiving broadcast television signals, using popular access means such as over-the-air, cable and satellite. It excludes TV functionality integrated with another device, such as a computer or a mobile phone
3. Proportion of households with multichannel television service, broken down by: <ul style="list-style-type: none"> • Cable television (CATV) service • Direct-to-home (DTH) satellite dish television service • Internet-Protocol television service (IPTV) • Digital terrestrial television (DTT) 	Multichannel television refers to services that provide additional programming beyond the free-to-air analogue terrestrial channels. Multichannel TV services should be broken down by CATV, DTH, IPTV and DTT <ul style="list-style-type: none"> • Cable television service refers to multichannel programming delivered over a coaxial cable for viewing on television sets • Direct-to-home satellite services are received via a satellite dish capable of receiving satellite television broadcasts • Internet-Protocol TV is the delivery of multimedia services such as television/video/audio/text/graphics/data delivered over an IP-based network • Digital terrestrial television is the technological evolution and advance from analogue terrestrial television, which broadcasts land-based (terrestrial) signals

only analogue terrestrial channels through a satellite master antenna television (SMATV) system. In a few cases, the number of subscriptions may be underreported by operators in order to avoid regulatory fees or payments due to content providers, or because they are not licensed to provide service.

The three indicators identified to monitor access to TV and radio services are listed in Table 8.1. The first two are part of the Core List of Indicators adopted by the *Partnership on Measuring ICT for Development* [Partnership, 2010]. At the international level, the data collection is under the responsibility of ITU.

Status of Target 8

This section analyses the current level of radio and television coverage and household penetration around the globe. It also examines the worldwide status of multichannel television (terrestrial digital, cable, satellite and IPTV) and the emergence of mobile TV, which is not included in the list of indicators to monitor Target 8 but could be considered a useful indicator in the future. Given that TV penetration is very high in developed countries, the primary focus is on developing countries.

In respect of access to broadcast signals, Target 8 has largely been achieved. Although recent data are not available, terrestrial analogue radio and TV coverage figures already stood at 95 and 89 per cent, respectively, in 2002. If satellites are taken into account, then practically the whole world is covered by broadcasting. For example, the WorldSpace system covers most of the world (except North America and Australia) with radio service through three geostationary satellites. The beam of its AfriStar satellite, launched in 1998, covers all of Africa and has 59 channels. There are numerous DTH satellite systems in operation around the world, offering both radio and TV channels.

Regarding the proportion of households with a radio, the majority of developed countries have stopped compiling this statistic, since penetration levels are very high (usually close to 100 per cent) and there is more interest in newer ICTs, particularly the Internet.

In the developing world, recent data on the proportion of households with a radio (Chart 8.1) show that, in the majority of countries, more than 75 per cent of households have a radio. Only few countries with available data, including Cameroon, India and Mongolia, have less than half of their households equipped with a radio.

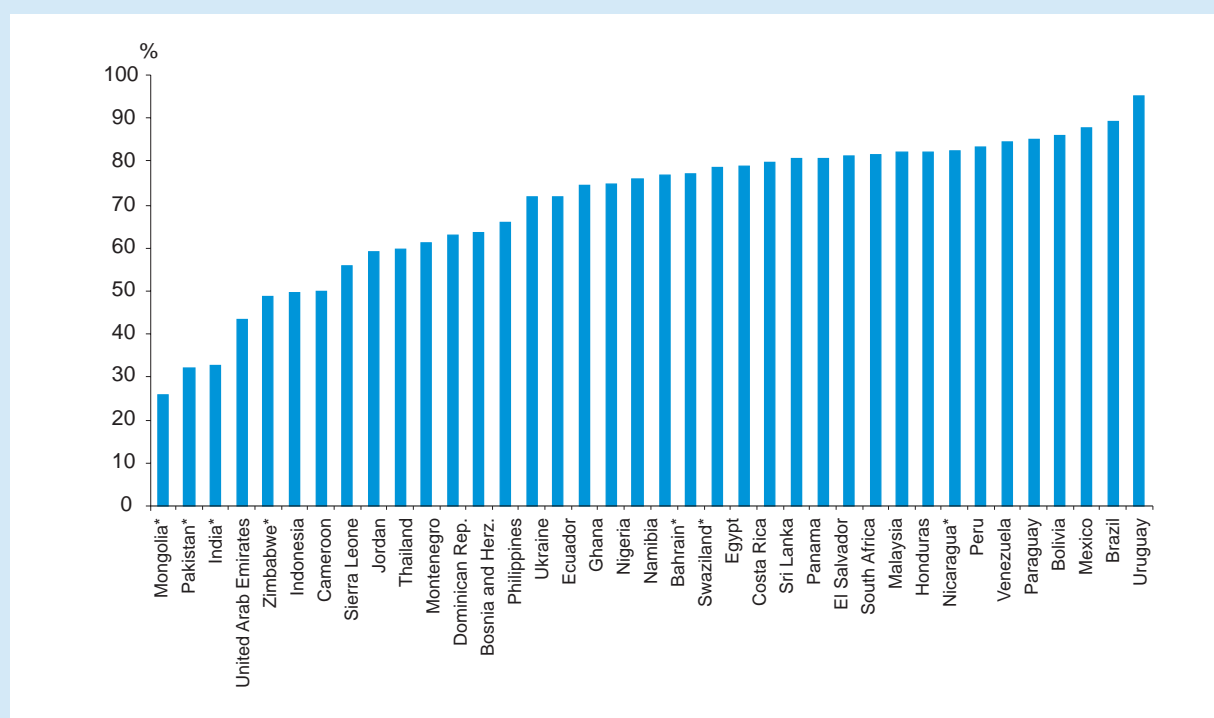
In some developing countries, the proportion of households with a radio is actually decreasing. This may partly be explained by methodological issues. While, according to the ITU definition, a radio is “a device capable of receiving broadcast radio signals...It includes a radio set integrated in a car or an alarm clock and digital audio player (MP3 player), but excludes radios integrated with a mobile phone or in a computer” [Partnership, 2010], some countries still collect data only on standalone radio devices.

The decline in radios for some countries may also suggest that, if the conditions are right in terms of affordability, coverage, content and electricity, then households may prefer TV viewing over radio listening. Radio service has often been cited as the most important medium for low-income developing nations, given that it does not require electricity and radio sets are relatively inexpensive. Yet television seems to be more popular when available. Data for the Philippines, for example, show that TV is the main medium for acquiring knowledge and information even though household radio penetration was higher.¹¹

The difficulty with radio statistics is illustrated by Bangladesh, a least developed country (LDC). As opposed to what may be expected, there are more households with a television in Bangladesh (30 per cent) than with radio (23 per cent) [NIPORT, 2009].¹² Adding to the confusion is the fact that more households have a mobile phone (32 per cent) than either a TV or a radio.¹³ According to a study, less than a third of radios worked and only around a fifth of the population listened to the radio, compared to over 60 per cent who watched television. The study notes that this may be explained by a “rapid increase in the opportunity to watch TV in the country and the failure of the public radio to attract people.” [Golam Nabi Jewel, 2006]

Despite the difficulties with radio statistics, radio continues to play an important role in many LDCs, particularly in rural areas where electricity is limited (see Box 8.2 and Chart 8.4).

Chart 8.1: Proportion of households with a radio, 2007-08



Note: *Data refer to 2006. Data in this chart are presented for all countries where data were available, except for LDCs since they are featured in Chart 8.4.

Source: ITU World Telecommunication/ICT Indicators database and OSILAC, ECLAC.

Box 8.2: Community radio

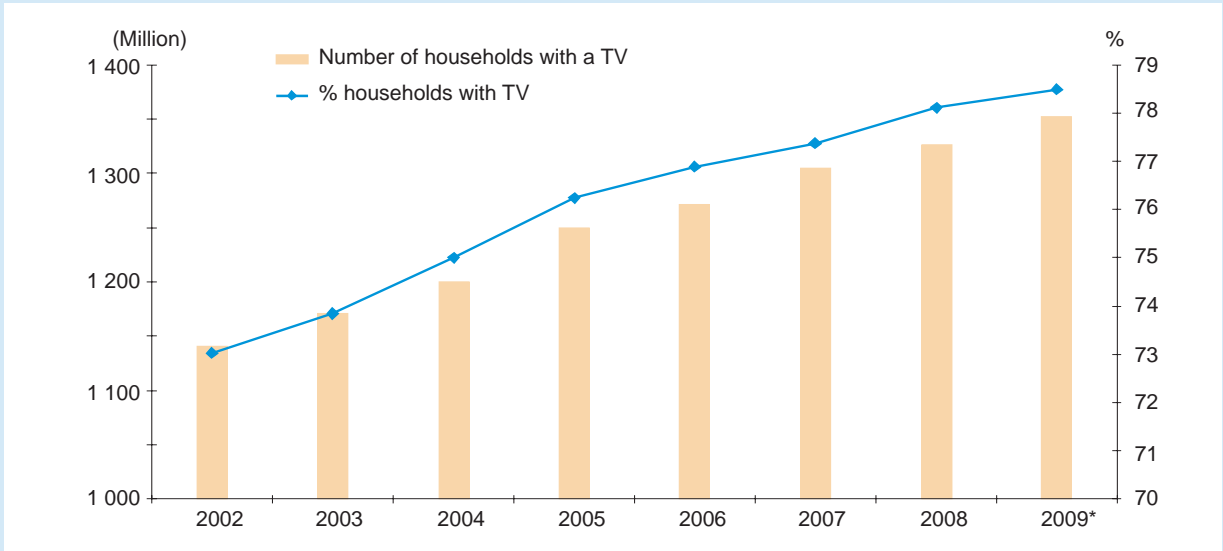
Radio remains the prevalent broadcasting device in many least developed countries (LDCs). A transistor radio does not require electricity and is cheaper than a television. There are initiatives to reduce the operating cost of a radio to near zero through devices that do not require batteries. According to Freeplay, manufacturer of a wind-up radio, people in LDCs spend on average six per cent of their income on batteries (USD 24/year).¹⁴ Freeplay has distributed over 400 000 batteryless radios to some 40 developing countries since 2003, directly benefiting more than six million people.

While radio devices have become more affordable for the developing world, users need something to listen to, particularly since conventional radio stations may not reach rural and remote areas. In some countries, community radio has been able to fill the void. Community radio is typically programmed and operated by local people, broadcasting informative content that is relevant to those that live in the area.

Advocates of community radio point to a measurable impact on the local population in terms of improving lives through the provision of important information such as agricultural advice, as well as the power to effect positive behaviour change. For example, the Population Media Centre has community radio operations in 15 countries in Africa, Asia and the Pacific and Latin America, and reaches people through soap-opera type programmes on topics such as gender, HIV and family planning. It found that the radio programmes positively influenced behaviour and were a more appropriate and cost-effective solution than other media. [CIMA, 2007]

While some governments have a lenient attitude towards community radio, others have been more restrictive, either forbidding it or imposing restrictive licensing conditions that include high spectrum charges for the use of radio frequencies or limit the coverage area of broadcasts.¹⁵

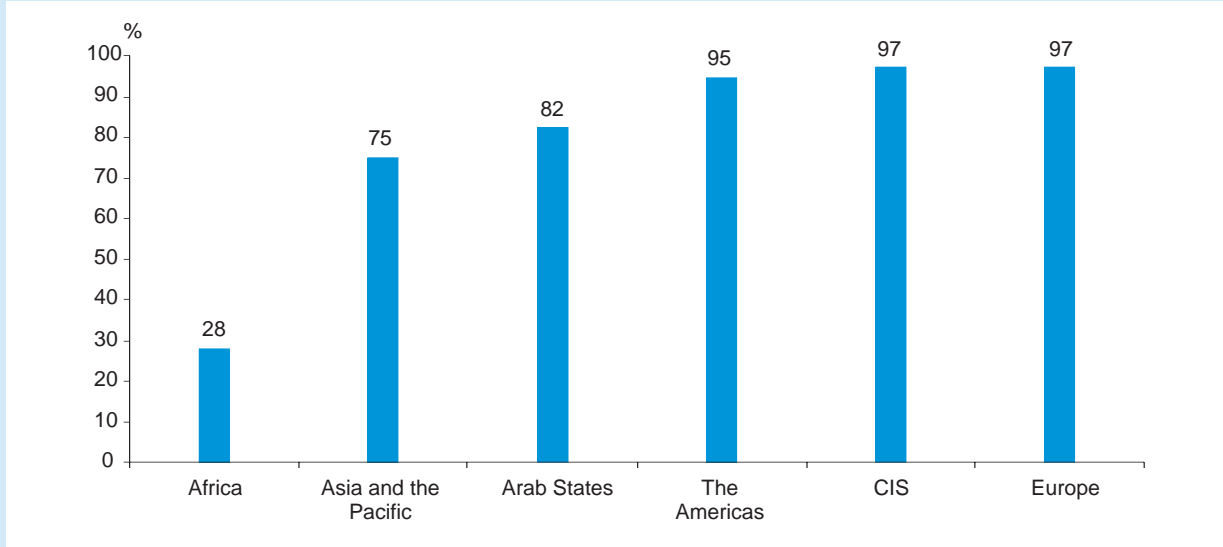
Chart 8.2: Proportion of households with a TV, 2002-2009



Note: *Estimate.
Source: ITU World Telecommunication/ICT Indicators database.

Data on the *proportion of households with a TV* are more widely available and comparable than radio data. By 2009, there were some 1.4 billion households with a TV around the world, providing some five billion people access to a TV at home.¹⁶ This resulted in a household penetration of 79 per cent, up from 73 per cent in 2002 (Chart 8.2). Europe, the Americas and the CIS all have a household television penetration of over 90 per cent, while in the Arab States and Asia and the Pacific penetration stood at 82 and 75 per cent, respectively. Africa, where 28 per cent of households have a TV, stands out for having the lowest levels of household TV penetration (Chart 8.2).

Chart 8.3: Proportion of households with a TV, by region, 2009*

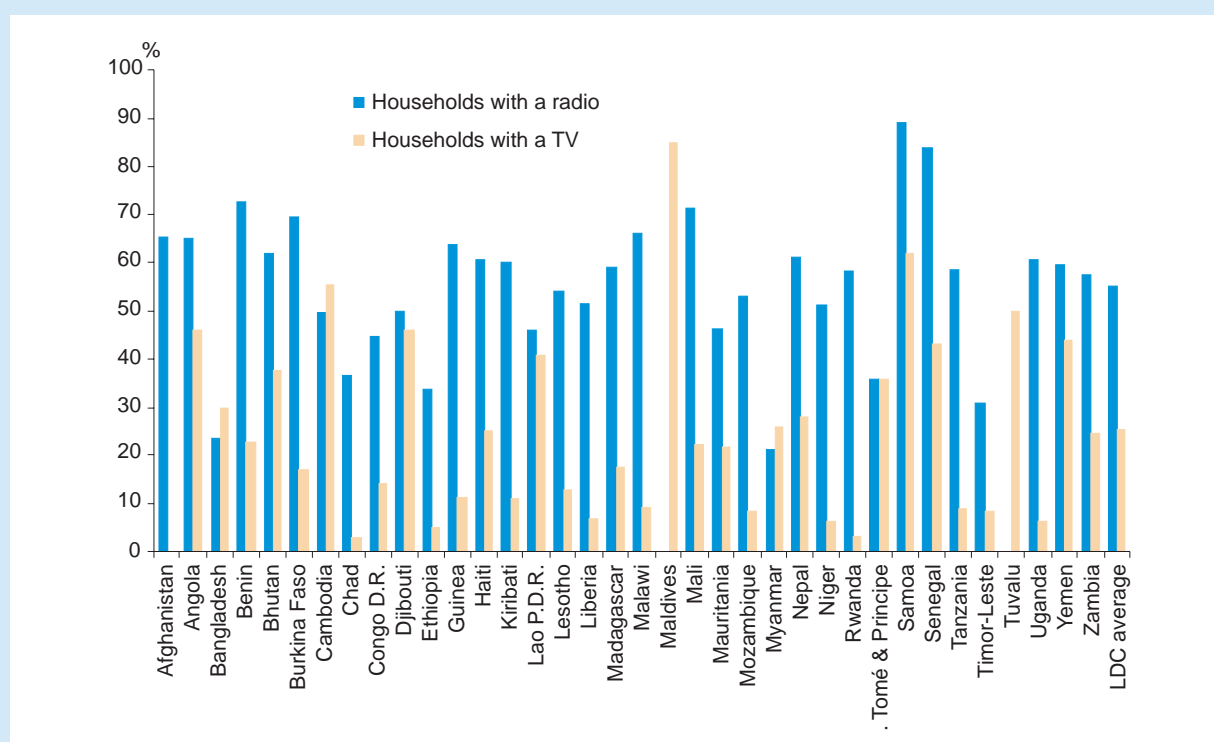


Note: *Estimate.
Source: ITU World Telecommunication/ICT Indicators database.

While many countries in the world have a higher proportion of households with a TV than with a radio, the contrary is true for most African countries and LDCs.

A comparison of the majority of the world's 50 least developed countries (LDCs) shows that radio is much more prevalent than TV. In addition, there are important differences in penetration rates among countries. They range from three per cent of households with a TV in Chad, to 86 per cent in the Maldives. The differences are smaller in terms of the proportion of households with a radio, which range from 21 per cent in Myanmar, to almost 90 per cent in Samoa, for countries where data are available (Chart 8.4). The LDC average shows that about one in three households has a TV, compared to two out of three households with a radio. Also, only ten per cent of LDCs have a

Chart 8.4: Proportion of LDC households with a radio and a TV, 2007-08 or latest available year



Note: For LDCs that are not featured in this chart, no data are available.
 Source: ITU World Telecommunication/ICT Indicators database and DHS.

Box 8.3: TV in .tv (Tuvalu)

Tuvalu's some 10 000 inhabitants live on nine islands in the south Pacific with a total land area of around 25 km², making it one of the smallest countries in the world. The nation's Internet country code top-level domain (ccTLD) is the catchy ".tv". Tuvalu struck a deal with Internet entrepreneurs to sell the domain name in 1999 in return for the payment of USD one million every three months.¹⁷ The idea was that television companies would be interested in having the domain. By January 2009, some 100 000 IP addresses had been assigned to the .tv domain name, including the music channel MTV and Liverpool Football Club.¹⁸

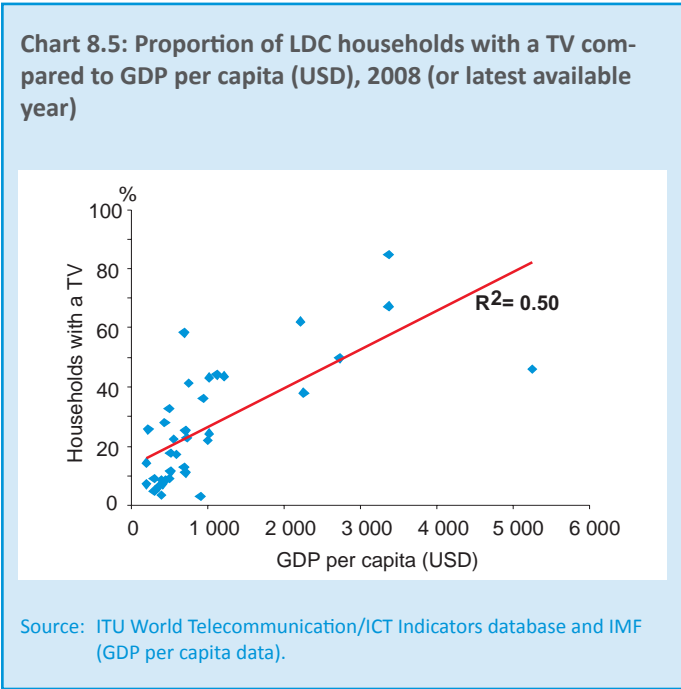
Ironically, there is no terrestrial television service in Tuvalu. Nevertheless, around half of households have a television [Tuvalu Government, 2006]. Some use satellite dishes to watch overseas networks.¹⁹ It appears that many Tuvaluans are also using their television set to watch pre-recorded material and play games. There were just as many households with a DVD player as a TV, and 14 per cent had a PlayStation.

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household television penetration higher than 50 per cent, as against half of LDCs with a household radio penetration higher than 50 per cent.

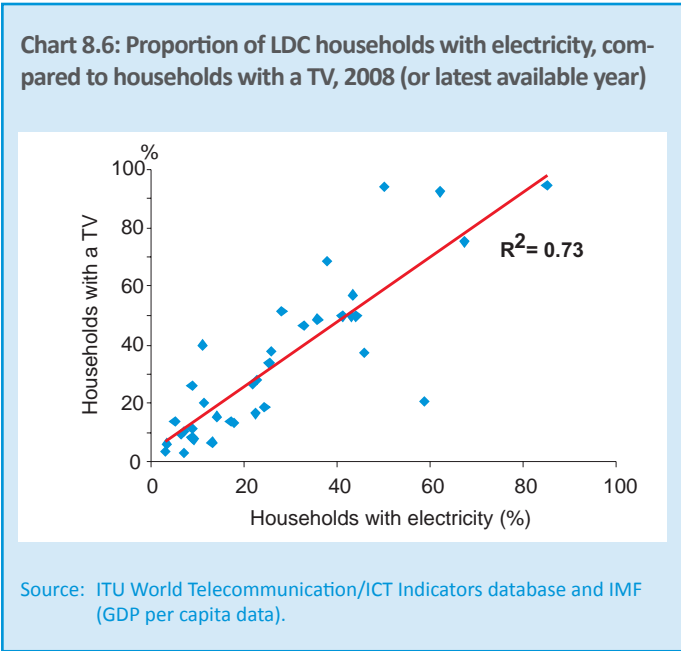
Although radio penetration is higher in LDCs, the inconsistency of the data makes it difficult to draw definite conclusions. In Laos, as household TV penetration goes up, radio — or at least possession of simple battery-powered radios — goes down:

“Household ownership increased from 31% to 41% for televisions... At the same time, ownership of radios ... went down. This should not be viewed as a sign of impoverishment. Rather, with higher income, households substitute radios with televisions...” [Schoenweger, 2006].



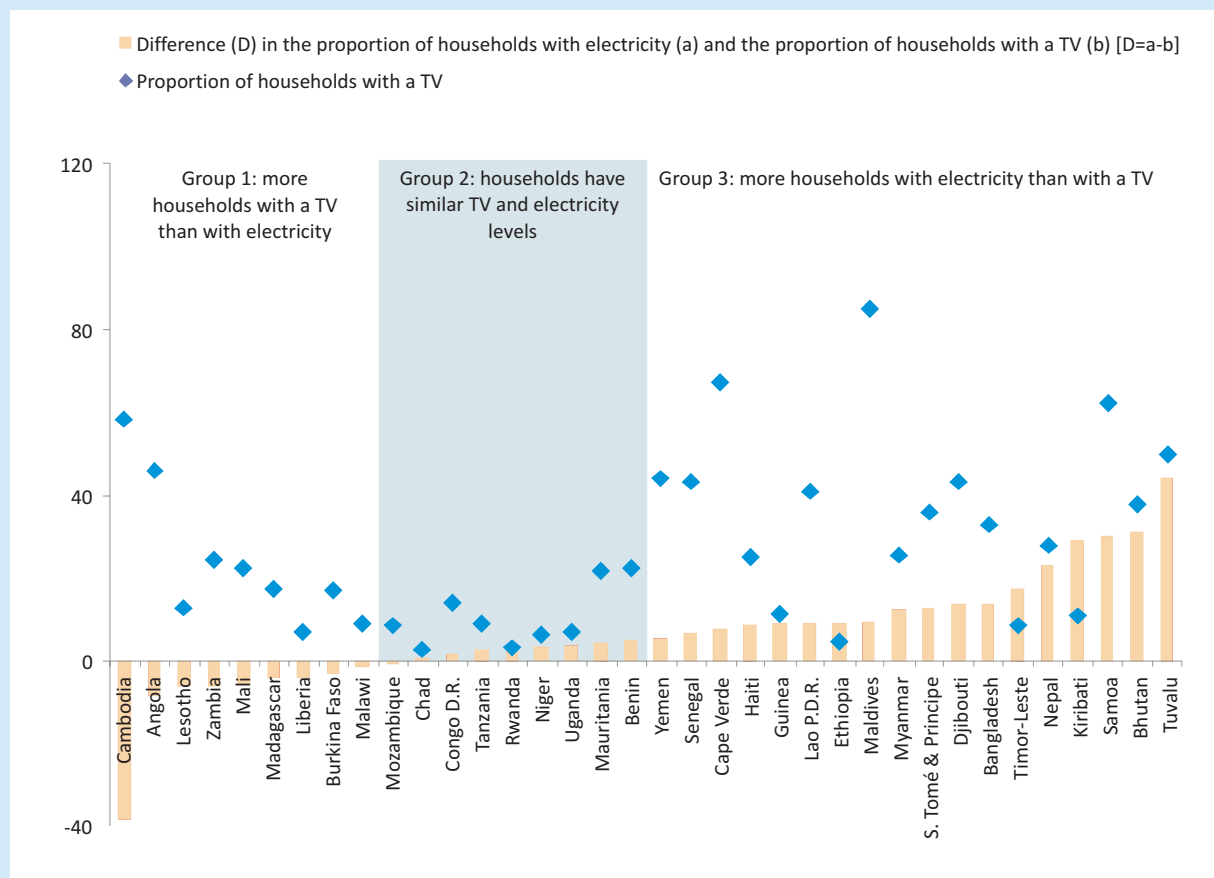
In Tuvalu, half of the households have a TV even though there is no terrestrial television (see Box 8.3).

Although LDCs are the world's poorest nations, it may be surprising that income alone does not significantly explain the lack of access to broadcasting, and seems to have less impact than other factors such as the availability of electricity and diversity of content. Statistically, there is less of a relationship between household television ownership and income in the LDCs than there is with electricity (Charts 8.5 and 8.6). The importance of electricity and its close relationship to TV is confirmed by numerous studies: TV is typically the second major reason (after lighting) that households opt for electricity.²⁰



Differences in household TV penetration at similar income levels reflect the uncertainty regarding the impact of income levels. Among the LDCs, Angola is richer than the Maldives (based on 2008 GDP per capita income). Yet the Maldives has a household TV penetration of 39 per cent, higher than Angola, mainly due to the availability of electricity. Household electrification is over 90 per cent in the Maldives, compared to just 38 per cent in Angola. Another example is Cambodia, Haiti and Kiribati. They all have similar per capita incomes, yet Cambodia's household TV penetration is over twice that of Haiti and five times more than Kiribati. What is interesting about this example is that Cambodia actually has a lower household electrification rate than Haiti or Kiribati. But TV content is much more abundant in Cambodia. The country has seven terrestrial channels plus a recently launched DTH service, compared to three terrestrial channels in Haiti and no domestic television service in Kiribati. This vastly greater amount of content has driven Cambodian households to overcome a lack of grid electricity by looking for other sources to power television sets, particularly car batteries.²¹

It is instructive to examine the gap between households with electricity and households with

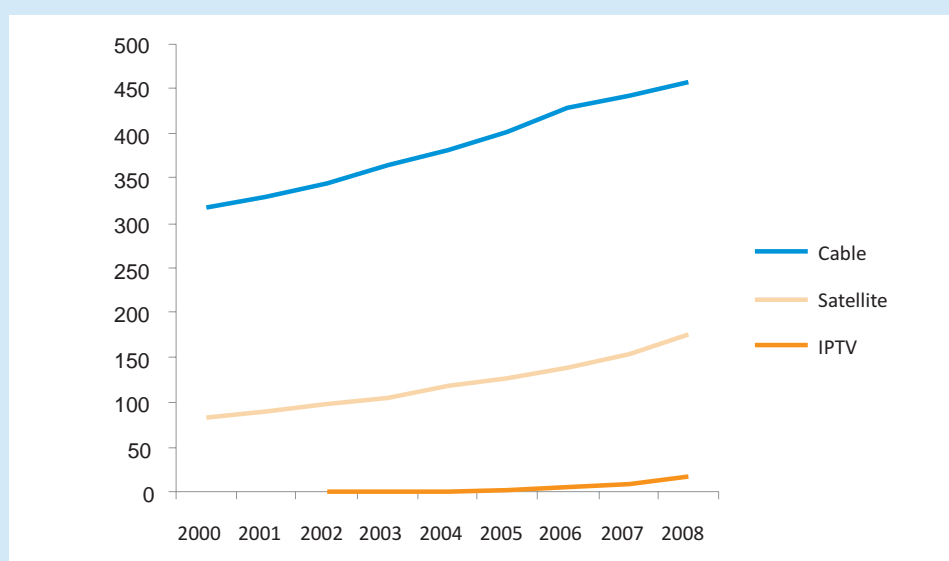
Chart 8.7: Gap between LDC households with electricity and households with television, %, latest available year


Source: ITU World Telecommunication/ICT Indicators database.

television in the LDCs (Chart 8.7). Many of the countries with the biggest gap — i.e. having a far higher level of household electrification penetration than household TV penetration — are in the Pacific, where there are few or no domestic terrestrial television stations (Group 3). Although households have the electricity to power television sets, there is not enough compelling content to encourage them to own a TV. At the other extreme are countries where household television penetration exceeds electricity (Group 1). It seems that compelling broadcast content is available to drive households to find other ways to power television sets. One such example is Cambodia, as mentioned earlier. A third group are those countries where television availability in households is close to electricity availability (Group 2). Here, the constraint seems to be both electrical and monetary. Household TV penetration rises with electricity availability, but either there is not enough compelling content, or incomes are too low to drive the demand for off-grid electricity or to raise television ownership above electricity availability. These insights about different barriers to TV uptake can help policy-makers identify barriers to higher TV penetration levels and thus make the right policy decisions.

In conclusion, it would be erroneous to assume that the broadcasting digital divide is attributable solely to income. Though income is indeed a barrier, particularly for the poorest of households (including in middle-income nations), data suggest that electricity is an even bigger barrier and that content, though difficult to quantify, also seems to play a major role. Steps to rectify the digital broadcasting divide must consider all these factors if they are to be successful.

Chart 8.8: Households with cable TV, satellite TV, and IPTV, millions, world



Source: ITU World Telecommunication/ICT Indicators database.

Multichannel television

A noteworthy trend over the last decade is the development of multichannel television. The number of households with multichannel TV rose from 400 million in 2000 to 650 million in 2008 (Chart 8.8). Around two out of five television households were multichannel in 2000, compared to almost half by 2008.

The increase in multichannel TV has contributed to an increase in content, which in turn has increased the demand for television services, as exemplified by a number of countries in South Asia (Box 8.4).

Cable, satellite, IPTV, terrestrial digital and mobile television are analysed in more detail below. While mobile television — because of its limited availability worldwide — is not included in the indicators to be tracked, it is an important technology that could be considered in the future.

Cable TV

Cable television (CATV) is the leading multichannel option, with 448 million CATV households around the world by 2008. The statistics are somewhat misleading, though, since in some instances CATV is used to retransmit terrestrial channels without adding any new programming. Also, in some of the biggest markets such as China and India, many cable subscriptions are analogue. However the cable industry has been reacting to increased competition from DTH satellite and IPTV by upgrading networks. The ability to provide broadband access has also spurred cable operators to make the necessary improvements to their technology.

China is by far the largest CATV market, accounting for some 64 per cent of the world's subscribers. Cable is well developed in the Americas, Asia and the Pacific and Europe regions, but virtually non-existent in the Arab States and Africa. There is scarce traction to invest in new cable television networks in the Arab States and Africa, given the high cost and the success of DTH satellite TV in those regions. One drawback to the non-availability of CATV is that competition is reduced in the multichannel TV market. This can result in higher prices for other options. The lack of CATV also means that high-speed Internet service deployed over cable modem will also be unavailable, which reduces inter-modal competition in the broadband Internet market.

Box 8.4: More multichannel, more content, more demand: examples from South Asia

Although the number of television households continues to grow in all developing nations, the South Asia region is particularly noteworthy. Most of the South-Asian nations were in the top ten in the absolute increase in household TV penetration between 2000 and 2008. From less than a third of households in South Asia with a television in 2000, today over half have one, including over 75 per cent in Sri Lanka and 85 per cent in the Maldives (see Table 1 Box 8.4). Factors behind this big increase in home TV availability include rising incomes in the region and the extension of electricity to more households. Another key parameter is an explosion of content that has driven household demand for television. Direct-to-home (DTH) satellite broadcasting in particular has witnessed explosive growth. Over half of the television homes in the region receive multiple channels through either cable or DTH.

India is a case in point. Although it is the world's second largest cable TV market, DTH has recorded impressive gains there. This is all the more striking considering that DTH only started in 2004. Today, the country has the most competitive DTH market in the world, with six licensees. There are 12 million DTH homes receiving digital broadcasting, compared to only one million digital cable homes (the rest are analogue systems). Some 61 per cent of India's television homes are multichannel. The government broadcaster Doordorshan has launched its own free-to-air DTH service, and all that is required to access it is a satellite dish.

Although Sri Lankan homes are second only to the Maldives in the region in terms of TV set availability, the nation has lagged behind in multichannel penetration.²² This is beginning to change with the entry of Dialog TV, a DTH service. Launched in 2007, it had some 120 000 subscribers by the end of 2008. The set-top box and antenna cost USD 130, but payments can be spread out over a year. The subscription for the basic service, which includes 27 channels, is one of the cheapest in the world at USD 4.35 per month. Users can also customize their channel selection through numerous plans for as little as LKR 50 (less than USD 0.50).

Multichannel TV has also been on the rise on other South-Asian nations. Bhutan has 52 cable TV operators and Nepal 152, whereas the Maldives has seen an impressive rise in cable and DTH homes, from less than 10 per cent of TV households in 2000 to around 60 per cent today. In Bangladesh and Pakistan, almost a third of television homes are multichannel.

The success of the South-Asian countries reveals that low incomes need not be a barrier to greater broadcasting access. All of these nations are low-income countries, including four LDCs. The South-Asian countries still have some distance to go to achieve ubiquitous television in their households. But they have made impressive progress in this decade, a major factor being liberalization of multichannel television leading to explosive growth in content which is driving demand.

Table 1 Box 8.4: Television indicators for South Asia

Country	Households with TV (%)			Multichannel as % of TV households, 2008
	2000	2008	Change (2000-2008, or latest available year)	
Bangladesh	18	30***	12	35
Bhutan	17*	38***	21	68
India	31	55	24	61
Sri Lanka	41	77***	36	2
Maldives	57	85**	28	59
Nepal	11	28**	17	19
Pakistan	40	58	18	31
Weighted average	30	53	23	55
Simple average	31	53	22	39

Note: *Data refer to 2003. **Data refer to 2006. ***Data refer to 2007.

Source: Adapted from Demographic and Health Survey (Bangladesh, Nepal), Zee TV (India), Department of National Planning (Maldives), BLSS (Bhutan) and CASBAA (Pakistan).

Satellite

Direct-to-home (DTH) satellite broadcasting covers the world and is growing in popularity. The number of households around the world with DTH satellite dishes rose from 82 million in 2000 to 177 million in 2008.²³

The most rapid growth has been in developing nations, where terrestrial channels are limited and cable TV is non-existent, or where cable systems are antiquated with limited channels and features. Digital satellite broadcasting also offers more channels, better quality and increased functionality compared to analogue cable. Satellite offers the possibility for most developing countries to provide nationwide broadcasting coverage. Where markets are large enough, it is cheaper to deploy DTH than to build out a cable network. Pan-regional satellite services, which are developing across the world (Box 8.5), help to achieve economies of scale and the large number of channels ensures that demand for local content is satisfied.

Though some developing countries may have too small a market to justify the launch of a national system, they could take advantage of existing regional systems. National broadcasters can arrange to have their channels made free-to-air via DTH. For example, Nilesat carries the national channels of almost all Arab countries. On the other hand, there are small markets which have been successful in launching DTH due to the economies of scale of incorporating a wider area. Fiji TV, for example, commenced analogue television operations in 1994. A decade later it had achieved 85 per cent population coverage and was catering to some 700 000 people. To cover the remaining 15 per cent would have been difficult due to their remote locations and the lack of electricity. Instead, Fiji TV launched a DTH service in 2004 called Sky Pacific, which today has 16 channels. Sky Pacific covers all of Fiji and most of the Pacific Islands, including Tonga, Samoa, Cook Islands, Kiribati, Tuvalu, Vanuatu, Solomon Islands, Nauru, Niue, Tokelau and New Caledonia. The potential market size is around 7.6 million people, over 90 per cent of the Pacific region. In one year, coverage increased from 700 000 to over seven million.²⁴

IPTV

A relatively new option for multichannel television is Internet-Protocol TV (IPTV). This service is delivered over a high-speed fixed ADSL or fibre-optic connection and provided by broadband operators, directly to consumers. IPTV is a managed service, which distinguishes it from video services delivered over the public Internet. The first IPTV networks were launched in 2002. At the beginning of 2008, IPTV was being commercially offered in over 40 countries with some 9.9 million subscribers.²⁸

Europe is the leading region for IPTV, accounting for half of all subscriptions at the start of 2008. IPTV currently has limited potential for wide market reach in many developing countries due to inadequate fixed broadband connections. However, the vast size of some developing countries such as Brazil or China suggests that even though relative broadband penetration is low, the sheer number of subscriptions is enough to generate interest. At the same time, although the number of broadband subscriptions may be small in other developing countries (apart from Brazil and China), IPTV has been successful in terms of take-up: Mauritius has low IPTV penetration due to the fact that only three per cent of households have broadband, but 56 per cent of those broadband customers are IPTV subscribers.

Digital terrestrial television

Digital terrestrial television (DTT) provides better quality compared to analogue broadcasting. Other benefits of DTT include additional channels, radio stations and interactive features.²⁹ In order to receive DTT, analogue television antennas are replaced with digital ones. Furthermore, consumers must replace analogue televisions with a DTT-capable television or purchase a set-top box. This distinguishes DTT services from cable, satellite television and IPTV, since subscribers to the latter services do not need to make a change if the service provider already transmits in digital format.³⁰ Given the expense of the conversion and the need to educate consumers, most governments that have adopted DTT are phasing it in over a period of several years. They typically launch an awareness campaign to inform consumers and in some cases also provide subsidies for some people to purchase DTT receivers.

At the 2006 ITU Regional Radiocommunication Conference (RRC-06), European, African and Middle Eastern nations agreed to phase in digital broadcasting. They signed a treaty agreement calling for a nine-year phase-in of digital broadcasting, beginning 17 June, 2006 with analogue broadcasts to cease in 2015. According to the press release issued at the conference:

Box 8.5: Pan-regional direct-to-home (DTH) systems targeted at developing regions

There are a number of regional DTH satellite services catering for several countries within the following regions:

- **Americas:** *DirectTV*, the largest DTH broadcaster in the United States, also offers its services in Argentina, Brazil, Chile, Colombia, Mexico, Venezuela and other Latin American countries through its *DIRECTV Latin America* (DTVLA) subsidiary, using three satellites. It has leveraged its US experience to launch features such as DVRs and HD in the region. At the same time, it has adapted to the circumstances in Latin America by launching a prepaid service, and prepaid accounted for 8 per cent of total subscribers in 2008. DTVLA had 5.6 million subscribers in 2008, including 1.6 million in Brazil and 1.8 million in Mexico. Spain's *Telefonica* and Mexico's *Telmex* also offer DTH service in some countries in the region.
- **Arab States:** There are several Pan-Arab DTH services. For example, Egypt's *Nilesat*, started in 1996, broadcasts over 450 digital TV and over 100 radio channels of which three quarters are free-to-air. One of the features of these systems is that they carry practically all of the main local terrestrial channels from the region. DTH service has proven very successful in the Arab States, with over 20 million homes (i.e. over half of all households with a TV) receiving satellite signals in 2008.²⁵ Factors have included a lack of cable television, synergy of a single language to leverage content and relaxed government regulation of the broadcasting industry.
- **Africa:** There are a couple of main pan-regional satellite operators in the region. Launched in 1996, South African-based *MultiChoice* provides digital broadcasting in 48 sub-Saharan countries. It operates through joint ventures in Botswana, Ghana, Kenya, Namibia, Nigeria, Tanzania, Uganda and Zambia and through agents in other countries. Its *Digital Satellite Television service* (DStv) features over 60 video channels and some 65 radio channels. It had around 700 000 subscribers in 2008 (excluding South Africa). The French *Canal+* group broadcasts around the world over several satellites, including to 23 of 29 countries where French is the official language, and is using the Eutelsat satellite for broadcasting services in sub-Saharan Africa. Direct-to-home broadcasting using 60-80 cm dishes is available in 20 western and central African countries, while programming is also available over MMDS networks or through MultiChoice in 40 African countries. There are more than 70 programmes and radio services broadcast with pricing between €8 - 65 per month. Canal+ has around 950 000 subscribers in French Overseas Departments and Africa.
- **Asia and the Pacific:** Unlike other regions, there is no major pan-regional satellite operator in the Asia and the Pacific region. One reason is that there is a greater variety of languages in the region. Another issue has been restrictive licensing policies for pan-regional operators.²⁶ Instead, there are a number of national DTH systems, some of which attract subscribers from neighboring countries.²⁷ One country where DTH has boomed is India. DTH has yet to make significant inroads into most of the predominantly Chinese-speaking economies in the region such as China, Macao (China) or Singapore.

Source: ITU research.

*"...digitization of broadcasting in Europe, Africa, Middle East and the Islamic Republic of Iran by 2015 represents a major landmark towards establishing a more equitable, just and people-centered information society. The digital switchover will leapfrog existing technologies to connect the unconnected in underserved and remote communities and close the digital divide."*³¹

European nations had already begun the switch to DTT before 2006. Some have completed the switchover and many will have ceased analogue transmissions before 2015. Practically all Middle Eastern nations are digital-ready, insofar as the majority of their households with TVs already receive digital television through DTH satellite.

Although the Africa region was a signatory at the RRC-06, it has the lowest analogue household television penetration rates in the world and some African countries are concerned about a lack of government action for meeting the deadline.³² The Americas and Asia and the Pacific regions have not entered into any binding treaty agreements regarding region-wide cutovers to DTT.

In Asia and the Pacific, the developed economies are on the way to full DTT migration over the next few years. China announced its DTT standard in 2007 and provided coverage in a few cities for the 2008 Olympics. In 2008, officials an-

nounced that the switchover would be completed in three to five years.³³ Although India adopted the DVB-T standard back in 1999, DTT is operational only in a few urban areas and no date has been announced for switchover. Instead, efforts seem to be focused on providing digital TV through DTH satellite.

In North America, the United States completed its DTT conversion on 12 June, 2009 when analogue terrestrial broadcasts ceased. In Canada, this is scheduled to happen on 31 August, 2011. In Latin America and the Caribbean, many countries are still in the process of selecting a DTT standard or have only recently done so. Brazil has launched DTT, with the end of analogue broadcasts scheduled for 2016.³⁴

Mobile TV

The ability to transmit live radio and television programmes to mobile handsets could eventually help to increase access to broadcasting. A growing number of mobile handsets have the capability to create and display video images. The video can be created from a camera built into the handset, downloaded from digital cameras or the Internet, or streamed over mobile networks. Mobile broadcasting goes a step further, by sending live programming to the mobile handset.

Mobile handsets with radio reception chips to receive domestic analogue broadcasts have been available for some time. A more recent phenomenon is the delivery of digital TV to mobile handsets equipped with a reception chip. Japan, the Republic of Korea and the United States are the trendsetters in deploying this technology.

The Republic of Korea became the first country in the world to offer mobile TV in 2005. The service is delivered via either terrestrial or satellite digital broadcasts, using Digital Mobile Broadcasting technology (T-DMB and S-DMB)³⁵, to mobile handsets with a reception chip. The number of mobile TV users in the Republic of Korea stood at 17 million at the end of 2008, of whom almost two million were receiving satellite broadcasts. Many other developed countries have followed suit. In Japan, the mobile TV service was launched in April 2006. The service is known as "1-seg" because it uses one of the thirteen segments that make up the Japanese digital broadcasting standard channel — *Integrated Services Digital Broadcasting-Terrestrial* (ISDB-T).

Mobile TV was launched in the United States in 2006, with some operators partnering with *MobiTV*, which provides broadcast signals either over the existing cellular network (thus expanding the number of handsets that can be used, since a reception chip is not required) or to handsets with reception chips. *MediaFLO* is another mobile TV service that uses spectrum freed up by the digital conversion in the United States. It provides the service to mobile operators, who in turn market it to their customers. There were an estimated 11 million mobile TV viewers in the United States in 2008. [Nielsen, 2009]

In Europe, a number of countries have launched mobile TV using *Digital Video Broadcast-Handheld* (DVB-H) technology, which provides broadcasts of live digital terrestrial television channels. Countries that have launched commercial mobile TV services include Albania, Austria, Finland, France, Hungary, Italy, the Netherlands and Switzerland.

Several developing countries have launched mobile TV services (see Table 8.2) and a number are conducting trials (e.g. Ghana, Indonesia, Libya, Malaysia, Peru, South Africa, Uruguay). Ironically, some countries have launched digital mobile TV before making terrestrial digital television available.

A key consideration for the mass take-up of mobile services in developing countries will be cost. The price of a TV-capable mobile handset will inevitably be higher than that of an entry-level handset on account of the need to support video and, typically, for a TV signal reception chip. The decision will likely be based on the price of alternatives (e.g. a digital television set or computer) and the desirability of mobility. Service pricing will also be a fundamental factor. In some countries, mobile-delivered television is free, while in others there are service plans. Options such as advertiser-sponsored programming or tiered pricing (making some channels free while charging for others) might be alternatives.

Since only a limited number of countries have started launching mobile TV services by 2010 (with even fewer monitoring subscriber numbers), no indicator has been proposed. However, the number of mobile TV subscriptions or the *proportion of mobile TV subscriptions as a percentage of total mobile cellular subscriptions* could be useful indicators in the future.

Table 8.2: Mobile TV deployments, selected developing countries, status as of 2009

Country	Standard	Provider	Channels	Price	Notes
Ghana	T-DMB	Black Star, One Touch	6 video and 4 audio	Monthly subscription charge GHC 4 (USD 3.95)	Accessories and the handset necessary for viewing, known as FonTV, cost GHC 350 (USD 345.66) and include free service for the first three months. ³⁶
	DVB-H	DStv Mobile (MTN and Multichoice)	Accra.
India	DVB-H	Doordarshan	8	Free-to-air	Launched in May 2007. Currently available in Delhi. Initial handsets were around INR 30 000.
Iraq	DVB-H	Alsumaria TV	20 audio and video	1 month validity for IQD 18 000 (USD 15.11)	Service officially launched nationwide on 28 May 2009. Pay TV based on monthly subscriptions. Based on scratch cards (prepaid). Broadcast business model: handset not "sponsored" by the Mobile Operator (uses MicroSD cards). Covers Baghdad, Basra, Al Mousel, Diwanieh, and the Kurdistan area in Northern Iraq (Duhuk, Erbil, Sulaymanieh). ³⁷
Kenya	...	DStv Mobile (Multichoice and Safaricom)	10	KES 1 000 per month (USD 12.68)	Covers Nairobi and Mombasa.
Mauritius	3G	Emtel	10	MUR 0.30 (USD 0.10) per 100 kB	Broadcasting over 3G network. ³⁸
	...	Orange	14	MUR 250 (USD 7.82)	MUR 2 per minute. ³⁹
Morocco	DVB-H	SNRT	5	Free-to-air	Launched May 2008 with coverage in Casablanca, Rabat, Oujda, Tanger and Meknès, with plans to eventually provide coverage to all areas covered by terrestrial digital TV. ⁴⁰
Namibia	DVB-H	DStv Mobile (Multichoice and MTC)	10	...	Covers Windhoek. Launched March 2008. Samsung P910 (NAD 2 499). ⁴¹
Nigeria	DVB-H	DStv Mobile, partnership between MTN and Multichoice.	10	Subscription fee NGN 1 500 (USD 9.85) per month,	Launched April 2008. Coverage in Abuja, Lagos, Ibadan. Uses ZTE F912 handset. ⁴²
Philippines	DVB-H	Mobile operator Smart with MediaScape	11 TV	Monthly subscription PHP 488 (USD 10.69)	Commercial launch in April 2008. Available in Manila, Baguio, Tagaytay, Batangas, Cebu, Davao. Approximately 20 000 DVB-H enabled units. Works with Nokia N92 offered free for postpaid. For prepaid, suggested retail price of the Nokia N92 is PHP 22 990. ⁴³
Viet Nam	DVB-H	Operator is VTC (Viet Nam Multimedia Corporation)	9 TV and 4 radio	Monthly subscription of USD 5	Available in Hanoi, Ho Chi Minh, Haiphong. Launched December 2006.

Note: "...": no data/information available.

Source: Adapted from <http://www.dvb-h.org/services.htm>.

Conclusions and recommendations

The availability of broadcasting in terms of coverage is nearly complete, with practically the whole planet covered by a signal. Although gaps remain in terrestrial coverage in some countries, these are filled for by global satellite coverage.

Coverage does not count for much, however, if it is not accompanied by the ability to purchase a receiver and listen to or watch broadcasts. Here, the constraints are economic and infrastructural, and some households in developing countries cannot afford even the cheapest of radio receivers let alone a TV set. This is all the more problematic in that many of the poor live in rural areas where there may be no terrestrial coverage and where people would have to pay an even higher price for a satellite receiver. For those who can afford the set, the lack of electric current is problematic in many rural areas of developing nations, particularly for TV reception. Nonetheless, once a set is purchased, then no other payments are necessary if there is free-to-air content available terrestrially or via satellite.

In terms of the availability of devices, the target has been achieved in developed countries, since almost all households have a TV and a radio at home. Globally, penetration levels are relatively high for the proportion of households with a radio, and exceed 75 per cent in the majority of developing countries except LDCs. Only few countries, even amongst the LDCs, have less than half of their households equipped with a radio. However, time-series data suggest that the number of radio sets is decreasing in many developing regions, except for Africa and the LDCs, where a radio continues to be a very important access device. The least developed countries also continue to have higher penetration rates for radios than for TVs, contrary to many other countries.

In terms of television devices, all regions except Africa have well over half of households equipped with a TV and the target has been largely achieved in the Americas, the CIS and Europe, where penetration exceeds nine out of ten households. It should be considered that not every household may desire a television even if they meet all of the other conditions for possessing one (e.g. income, electricity, coverage). Moreover, broadcasting reception chips are being embedded in devices such as mobile handsets and computers, so some households may not need a conventional TV set. A figure in the high nineties should therefore be considered as indicating that the target is achieved. Based on the 2005-2008 compound annual growth rate, Europe, the Americas and the CIS are expected to reach a theoretical 100 per cent household penetration of television sets before 2015, with the world average reaching almost 90 per cent. Both the Arab States and the Asia and the Pacific region would surpass 90 per cent penetration by 2015, while the household television penetration in Africa would reach around 40 per cent.

The delivery of multichannel television has spread rapidly over the last decade and by 2008 almost every second household with a TV had multichannel services, compared to around two out of five in 2000. Some countries have already made the transition to digital television, while others have established deadlines for some time in the next decade. For example, Africa, the Arab States and Europe have committed to switching to digital television by 2015. However, even if many developing nations were to meet digital TV deadlines, it is unlikely that terrestrial transmission coverage will be much more extensive than today's analogue coverage, since countries only have to switch over existing transmissions rather than build out new coverage. While terrestrial digital TV provides major improvements over analogue, therefore, it will not result in drastically increased coverage.

The biggest regional gap in broadcasting access is found in Africa. However, the high averages in other regions disguise significant differences in household broadcast availability across countries. In terms of development status, the LDCs have the lowest household broadcasting penetration. Of all countries in the world with a household television penetration of less than 50 per cent, all were LDCs or African countries.

It would be erroneous to assume that the broadcasting digital divide is due purely to income. Though income is a barrier, particularly for the poorest of households (even in middle-income nations), data suggest that electricity is an even greater barrier and that content, though difficult to quantify, also seems to play a major role. As the Asian Broadcasting Union highlighted:

*Viewers don't "buy" brands or technology — they "buy" content. Technology is simply the gateway to deliver entertainment services and programming.*⁴⁴

If they are to be successful, steps to rectify the digital broadcasting divide must consider all these factors, and a number of conclusions can be drawn and recommendations made.

In countries where there is a single government broadcaster and multichannel alternatives are either non-existent or prohibitively expensive or illegal, there is not much demand for television. On the other hand, where governments have adopted a liberal attitude towards broadcasting, content is more varied and households find ways to get round income or electricity constraints.

Countries could do more to encourage more content and more competition in the provision of content. In a number of countries, broadcasting stations are limited to government-run operators. Allowing the private sector also to operate stations will increase demand for broadcasting and encourage government broadcasters to offer more compelling content. Governments should also encourage more competition in the multichannel market segment. Competition is restricted in a number of countries, in different ways. Barriers include prohibiting satellite dishes and not allowing new pay-TV operators. These barriers raise the costs of existing multichannel platforms, inhibiting access for low-income population segments.

The transition to digital television offers potential benefits for consumers in terms of more available channels and special features. Although many governments are committed to moving to digital television and some have even completed the transition, it is unlikely that some developing countries will meet deadlines, in view of the cost of upgrading. At the same time, it is not clear why countries would want to build out terrestrial infrastructure given the ubiquity of satellite. In India, for example, the cost of expanding terrestrial coverage would be high and take at least a decade to complete. Satellite broadcasting appears to be a more reasonable option, and the national broadcaster Doordarshan has launched a free-to-air DTH service. Some 10 000 dishes have been distributed free to public institutions such as community centres and schools in areas not covered by terrestrial broadcasting.⁴⁵

Satellite offers the possibility for most developing countries to provide nationwide broadcasting coverage. Although some may have too small a market to justify the launch of a national system, they could take advantage of existing regional systems, or national broadcasters can arrange to have their channels made free-to-air via DTH.

Governments might also consider the use of subsidies and other options for increasing access to terrestrial digital and multichannel television, and a number of countries have subsidized digital terrestrial TV reception equipment. Multichannel operators can also contribute to making services more affordable by offering free-to-air channels, providing low-priced options and making prepaid services available.

The basic indicators proposed for measuring Target 8 — household radio and television set availability — provide a reasonable picture of access. However, there is also a critical qualitative aspect to this target. In a globalized world, it is insufficient to have access to local channels only. Therefore, the conversion to digital TV and the deployment and availability of multichannel television also need to be monitored.

Notes

- ¹ Substantial inputs to this chapter have been provided by Michael Minges.
- ² See WSIS Geneva Plan of Action, 2003, at: <http://www.itu.int/wsis/docs/geneva/official/poa.html#c9>.
- ³ See WSIS Geneva Plan of Action, 2003, at: <http://www.itu.int/wsis/docs/geneva/official/poa.html#c2>.
- ⁴ See WSIS Geneva Plan of Action, 2003, at: <http://www.itu.int/wsis/docs/geneva/official/poa.html#c8>.
- ⁵ See WSIS Geneva Plan of Action, 2003, at: <http://www.itu.int/wsis/docs/geneva/official/poa.html#c3>.
- ⁶ See: http://www.businessweek.com/technology/content/mar2007/tc20070307_534338.htm.
- ⁷ See <http://www.hulu.com>.
- ⁸ See <http://news.bbc.co.uk/2/hi/business/6411017.stm>.
- ⁹ See http://www.comscore.com/Press_Events/Press_Releases/2009/10/36_Million_German_Internet_Users_Viewed_More_Than_6_Billion_Videos_Online_in_August_2009.
- ¹⁰ See <http://online.wsj.com/article/SB123111603391052641.html>.
- ¹¹ In 2003, household radio penetration was 71.3%, compared to 63.1% for television. See: Philippines National Statistics Office (NSO) and ORC Macro. 2004. *National Demographic and Health Survey 2003*. Calverton, Maryland: NSO and ORC Macro.
- ¹² National Institute of Population Research and Training (NIPORT, 2007), Mitra and Associates, and Macro International. 2009. *Bangladesh Demographic and Health Survey 2007*. Dhaka, Bangladesh and Calverton, Maryland, United States: National Institute of Population Research and Training, Mitra and Associates, and Macro International.
- ¹³ A mobile operator in the country recently launched a mobile phone with an integrated FM radio as well as camera for BDT 3 199 (USD 45). "Grameenphone launches GP-branded handset," *Press Release*, 31 August, 2009.
- ¹⁴ See <http://www.freeplayenergy.com/aid-and-development>.
- ¹⁵ See id21insights, *Voices for change. Tuning in to community radio*, id21 insights, no. 58. November 2005. Available from: <http://www.eldis.org/id21ext/publications/index.html>.
- ¹⁶ See: http://www.itu.int/ITU-D/ict/material/Telecom09_flyer.pdf.
- ¹⁷ See http://archive.salon.com/tech/view/2000/07/24/dot_tv/index.html.
- ¹⁸ See <http://ftp.isc.org/www/survey/reports/current/report.byname>.
- ¹⁹ See <http://www.mediascape.ac.nz/cms/index.php?page=tuvalu-media>.
- ²⁰ See <http://go.worldbank.org/CBT6X32PL0>.
- ²¹ According to the Cambodian Renewable Energy & Rural Electrification project, "in 85% of the villages, car batteries are the most common sources of electricity. Almost 55% of households use a battery and about 32% of the households have a B/W TV set," see: <http://www.recambodia.org/energyoverview.htm>.
- ²² One reason has been a high number of free-to-air terrestrial channels with two main government-run and eight private TV stations. See BBC News. Media. Sri Lanka country profile. http://news.bbc.co.uk/2/hi/south_asia/country_profiles/1168427.stm#media.
- ²³ Based on ITU data and data published by ASTRA (<http://www.ses-astra.com>) and EUTELSAT (<http://www.eutelsat.com>).
- ²⁴ See http://www.cba.org.uk/conferences_and_events/2006_CBA_conference/documents/mesakenawari.pdf.
- ²⁵ The explosion of television channels in Arab countries is leaving some viewers bewildered. See <http://www.zawya.com/Story.cfm/sidZAWYA20090827040916/Ramadan%20ratings%20war%20grips%20Tunisian%20TV%20market>.
- ²⁶ For example, Skywave, a regional DTH subsidiary of AsiaSat, provides service in Hong Kong (China) and Macau (China) but business "...remained static in 2008, and is expected to do so for the foreseeable future, on account of the highly restricted market in which it operates." See AsiaSat 2008, Annual Report.
- ²⁷ See <http://www.dancewithshadows.com/tech/tata-sky-dishtv-dubai.asp>.
- ²⁸ See <http://www2.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/04-18-2008/0004795720&EDATE>.
- ²⁹ In the United Kingdom, users can receive 20 DTT channels (instead of only four with analogue television), ten radio stations and text services such as TV listings and interactivity. See http://www.digitaluk.co.uk/_data/assets/pdf_file/0008/19583/10-16-07_whitehaven_pre-switch.pdf.
- ³⁰ For example, Luxembourg found it easy to switch over to DTT since almost all of its households were already receiving digital signals through cable and satellite subscriptions. See www.mediacom.public.lu.
- ³¹ See http://www.itu.int/newsroom/press_releases/2006/11.html.
- ³² See: <http://www.postzambia.com/content/view/9929/61/>.

- ³³ See <http://www.hktdc.com/info/mi/a/bacn/en/1X002ILX/1/Business-Alert-China/Digital-Terrestrial-TV-To-Cover-Entire-China-In-Three-To-Five-Years.htm>.
- ³⁴ See <http://www.teleco.com.br/tvdigital.asp>.
- ³⁵ See <http://eng.t-dmb.org>.
- ³⁶ See http://www.pcworld.com/businesscenter/article/146267/ghana_is_now_home_for_digital_mobile_tv.html.
- ³⁷ See <http://www.mobision.tv/en/we-are-mobision-your-mobile-tv.html>.
- ³⁸ See <http://emtel-ltd.com/3g.php?category=19>.
- ³⁹ See http://www.orange.mu/mobile/mobile_tv.php.
- ⁴⁰ See http://snrt.wmaker.net/La-SNRT-deploie-le-reseau-de-la-Television-Mobile-Personnelle-DVB-H_a6986.html?print=1.
- ⁴¹ See http://www.mtc.com.na/cell_pop.php?page_id=25.
- ⁴² See <http://www.mtnonline.com/index.php/dstvmobile.html>.
- ⁴³ See http://smart.com.ph/gold/services/MyTV_FAQs.htm.
- ⁴⁴ http://www.wipo.int/edocs/mdocs/copyright/en/sccr_im_ge_09/sccr_im_ge_09_presentation5.ppt.
- ⁴⁵ "What is DD DIRECT+ ?," DDI News. <http://www.ddinews.gov.in/DTH/DDDIRECT> (accessed 4 September, 2009).

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