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# Structure and share of satellite TV channels and DTH platforms in Europe

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**ABSTRACT.** This work deals with the structure of TV channels that are distributed from satellite positions where DTH platforms offer their services in European countries. The structure is being considered via service availability (FTA and PAY TV), resolution (SDTV, HDTV and UHDTV), standards of broadcasting (DVB-S and DVB-S2), satellites and satellite positions, as well as market share of leading satellite operators at European market through which DTH providers do their services to the ultimate users. We also represent the market of TV channel distribution through the number of household which use cable, satellite, terrestrial and IPTV. Collected data are represented as a table and graph for the period from 1996 to 2020.

**Keywords:** Satellite operator; direct-to-home; SDTV (Standard Definition Television); HDTV (High Definition Television); UHDTV (Ultra High Definition Television).

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## Introduction

Direct-to-Home (DTH) technology refers to process of broadcasting satellite TV signal and other services and it is inclusively designed for TV reception in your home with personal antennas. This technology is previously marked as Direct Broadcast Satellite (DBS) technology (Alencar, 2009; Maral & Bousquet, 2009; Pattan, 1993). DTH technology is developed as a competition to TV services of cable operators broadcasting high-quality satellite signals with great number of TV channels. Satellite use in TV channel distribution when compared to distribution via cable of terrestrial transmitter, has significant advantages that reflect primarily in large coverage zone and unnecessary infrastructure construction.

Due to large frequency range of transponders, distribution of great number of HDTV (High Definition Television) and UHDTV (Ultra High Definition Television) channels is more suitable to achieve via satellite than through use of other forms of distribution. Thus, nowadays besides SDTV (Standard Definition Television) channels, the largest number of HDTV and UHDTV channels are being broadcasted via satellite (Jaksic, Petrovic, Milosevic, Ivkovic, & Bjelovic, 2015).

DTH services are broadcasted from a high-power satellites, so as their reception directly to homes is possible by using smaller-size antennas, from 60 to 90 cm. For distribution of DTH services in Europe Ku frequency range (11.7 - 12.2 GHz) is used. TV channels that are broadcasted via DTH are in digital format and mainly coded so as receptor/decoder of protected channels is needed (Valenti, 2011; Landeros-Ayala, Chávez-Cárdenas, & González-Sánchez, 2013).

To distribute digital TV channels DTH platforms use two standards: DVB-S (Digital Video Broadcasting - Satellite) and their second generation - DVB-S2. DVB-S2 offers about 30% of better performance than DVB-S (Tang, Zhang, Zhang, & Yue, 2017), which combined to MPEG-4/H.264 compression offers possibility that HDTV program could be broadcasted with the same rate that was previously needed for SDTV (Pechard, Carnec, Le Callet, & Barba, 2006). For video signal compression DVB-S standard mostly use compression MPEG-2 (Moving Picture Experts Group), while DVB-S2 use compression MPEG-4/H.264 for SDTV and HDTV, a HEVC/H.265 (High Efficiency Video Coding) for UHDTV (Wittig, 2014).

In (Jaksic, Miljkovic, Maksimovic, Petrovic, & Gvozdic, 2020) it is considered satellite TV transmission for the region of the world in various frequency range (C, Ku, Ka) with all satellite positions for the mentioned region. This work deals with structure of TV channels that are exclusively distributed from satellite positions

which broadcast some DTH platform for the region of Europe in Ku band. Represented data refer to each year from 1996 to 2021 at the day of December 31 using platform Wayback Machine (web.archive.org) and Lyngsat (lyngsat.com) Kingofsat (kingofsat.net).

## Market of TV distribution

Distribution of TV channels to ultimate users include: Cable TV, Satellite TV, Terrestrial TV and IPTV (Doyle, 2016; Evens & Donders, 2016). In Table 1 there is a number of households (in millions) worldwide which receive TV channels of various form of distribution for 2010 and 2017, as well as the estimation for 2023 (O'Halloran, 2018). Data are separated for TV (PAY) and free-to-air TV (FTA).

**Table 1.** A number of housholds (in millions) that use Cable, Satellite, Terrestrial and IPTV reception of TV channels.

| | 2010 | 2017 | 2023 |
|---|---|---|---|
| Analog Cable TV (PAY) | 335 | 90 | 2 |
| Digital Cable TV (PAY) | 193 | 462 | 523 |
| Satellite TV (FTA) | 139 | 194 | 210 |
| Satellite TV (PAY) | 142 | 222 | 253 |
| Analog Terrestrial TV (FTA) | 521 | 136 | 3 |
| Digital Terrestrial TV (FTA) | 85 | 294 | 429 |
| Digital Terrestrial TV (PAY) | 8 | 17 | 27 |
| IPTV (PAY) | 36 | 214 | 295 |

Analog transmission of Cable and Terrestrial distribution (Doyle, 2016) is lately eclipsed by digital transmitters with tendency of complete transition to digital broadcasting. When it comes to PAY TV, the greatest number of households uses Cable TV (462 million), then Satellite TV - DTH distribution (222 million), IPTV distribution (214 million) and Terrestrial TV distribution (17 million).

In Table 2 there is a number of households (in millions) worldwide that receive TV channels via different form of distribution, while in Table 3 there is a revenue in millions of US dollars in Europe by PAY TV. Satellite TV market (including FTA and PAY) is the largest in the region of Europe with tendency rate. Also, the greatest revenue comes from PAY TV more than Satellite TV, i.e. DTH. More than 40% of total revenue of PAY TV goes to DTH.

**Table 2.** A number of housholds (in millions) in Europe that use Cable TV, Satellite TV, Terrestrial TV and IPTV channel reception.

| | Western Europe | | Eastern Europe | |
|---|---|---|---|---|
| | 2010 | 2018 | 2012 | 2018 |
| Analog Cable TV (PAY) | 25.42 | 4.19 | 21.67 | 3.39 |
| Digital Cable TV (PAY) | 22.06 | 39.12 | 9.16 | 23.78 |
| Satellite TV (FTA) | 23.60 | 26.18 | 9.09 | 9.17 |
| Satellite TV (PAY) | 22.92 | 25.18 | 23.88 | 32.50 |
| Analog Terrestrial TV (FTA) | 9.34 | - | 37.17 | 0.04 |
| Digital Terrestrial TV (FTA) | 41.08 | 45.68 | 14.45 | 41.82 |
| Digital Terrestrial TV (PAY) | 7.86 | 4.02 | 0.55 | 1.46 |
| IPTV (PAY) | 11.93 | 30.57 | 5.86 | 12.63 |

**Table 3.** Revenue (in millions of US dollars) in Europe by PAY TV.

| | Western Europe | Eastern Europe |
|---|---|---|
| Analog Cable TV (PAY) | 589 | 232 |
| Digital Cable TV (PAY) | 8,926 | 2,750 |
| Satellite TV (PAY) | 12,234 | 3,124 |
| Digital Terrestrial TV (PAY) | 1,658 | 121 |
| IPTV (PAY) | 5,870 | 1,317 |

## Satellite and DTH operators in Europe

Satellite TV services for individual reception in Europe have been started at the late 80s using Ku band. In 1988, Luxembourg company SES Astra launched the first satellite of medium power Astra 1A (Jaksic, Maksimovic, Todorovic, Spalevic, & Petar, 2018) which was designed for signal reception by individual antennas of small range (90 cm). Before DTH service on digital format, in the mid-1990s signals from satellite was broadcasted in analogue format. The most famous DTH platform in analogue format was British Sky Analogue (1990-2001) which broadcasted over 30 coded TV channels from Astra satellites at the position

19.2° east. Besides Sky Analogue, 2 more significant analogue DTH platforms in Europe were Scandinavian: Canal+ and Viasat. Other analogue DTH services consisted of one or few coded TV channels for France, Germany, Spain, the Netherlands, Turkey and Russia (Jaksic, Petrovic, Spalevic, Milosavljevic, & Smilic, 2016). First digital DTH platforms in Europe started distribution of TV channels in the early 1990s in France, Germany, the Netherlands, Italy, Spain and Great Britain.

In Table 4 there id review of satellite positions which are used by satellite operators and DTH operators in the region of Europe (Abashidze, Chernykh, Mednikova, 2022; Masaoka et al., 2016; Spaliaras & Dokouzyannis, 2013). Satellite operators are the satellite owners at the given satellite positions, while DTH operators rent capacities from satellite operators and distribute TV channels to ultimate users. Table 1 show that all countries in Europe have DTH services. In some countries there are few DTH providers (Romania, Hungary, France, Bulgaria, Serbia, Croatia, etc). In previous years, it came to merging few DTH platforms into one, such was the case with Sky Italia, Moviestar +, Platform Canal+, etc (Jaksic et al., 2016). Some DTH providers offer services from more satellites, such as Canal Digitaal, TV Vlaandern and Bis TV.

**Table 4.** Review of satellite positions in Europe for DTH transmission.

| Position | Satellite operator | DTH operator | Start | Country |
|---|---|---|---|---|
| 45° E | Intelsat | Vivacom TV | 2010 | Bulgaria |
| 42° E | Turksat | D-Smart | 2007 | Turkey |
| 39° E | Hellas Sat | Bulsatcom | 2004 | Bulgaria |
| | | A1 BG | 2014 | Bulgaria |
| | | Dolce TV | 2006 | Romania |
| 36° E | Eutelsat | Tring Digital | 2008 | Albania |
| | | NTV Plus | 1999 | Russia |
| | | Tricolor TV | 2005 | Russia |
| 31.5° E | SES Astra | MagtiSat | 2012 | Georgia |
| | | Orange Sat Romnaia | 2013 | Romania |
| 28.2° E | Astra | Sky UK | 1998 | Great Britain |
| 26° E | Arabsat | FTA providers | | Saudi Arabia, UAE, Sudan, Lebanon, Oman, Kuwait |
| 23.5° E | SES Astra | Canal Digitaal | 1996 | The Netherlands |
| | | TV Vlaanderen | 2006 | Belgium |
| | | SkyLink | 2007 | Czechia, Slovakia |
| | | M Sat TV | 2018 | Serbia, Montenegro, Bosnia and Herzegovina |
| 19.2° E | SES Astra | Sky Deutschland | 1996 | Germany |
| | | Movistar+ Astra | 1997 | Spain |
| | | Canal Sat France | 1996 | France |
| | | Orange Sat France | 2008 | France |
| | | AustriaSat | 2010 | Austria |
| | | Canal Digitaal | 1996 | The Netherlands |
| | | TV Vlaanderen | 2006 | Belgium |
| | | Kartina Satellite | 2019 | Russia |
| | | Total TV | 2006 | Serbia, Croatia, Slovenia, Montenegro, Bosnia and Herzegovina, North Macedonia |
| 16° E | Eutelsat | Max TV | 2010 | Croatia |
| | | A1 HR | 2013 | Croatia |
| | | DigitAlb | 2004 | Albania |
| | | Antik Sat | 2015 | Slovakia |
| | | Orange Sat Slovakia | 2019 | Slovakia |
| 13° E | Eutelsat | Sky Italia | 1997 | Italy |
| | | Nova | 1999 | Greece, Cyprus |
| | | Platforma Canal+ | 1998 | Poland |
| | | Cifrowy Polsat | 1999 | Poland |
| | | Orange Sat Poland | 2008 | Poland |
| | | Orange Sat France | 2008 | France |
| | | Bis TV | 2007 | France |
| | | Xtra TV | 2016 | Ukraine |
| 9° E | Eutelsat | KabelKiosk | 2009 | Germany |
| | | Cosmote TV | 2012 | Greece |
| | | Xtra TV | 2016 | Ukraine |
| | | Joyne | 2017 | The Netherlands |
| 7° E | Eutelsat | DigiTurk | 2000 | Turkey |
| 5° E | SES Astra | Viasat | 1999 | Sweden, Norway, Denmark, Finland, Latvia, Lithuania, Estonia |
| | | Viasat Ukraine | 2008 | Ukraine |

| | | | | |
|---|---|---|---|---|
| 1.9° E | Bulgariasat | Polaris Media | 2010 | Serbia |
| | | Neosat | 2020 | Bulgaria |
| 0.8° W | Telenor / Intelsat | Canal Digital | 1998 | Sweden, Norway, Denmark, Finland |
| | | UPC Direkt | 2000 | Hungary, Czechia, Slovakia |
| | | Focus Sat | 2004 | Romania |
| 4° W | Spacecom | Digi TV | 2004 | Romania, Hungary, Czechia, Slovakia |
| | | T-Home | 2008 | Hungary |
| 5° W | Eutelsat | Bis TV | 2007 | France |
| | | Fransat | 2009 | France |
| 7° W | Eutelsat / Nilesat | Orbit Showtime Network | 2000 | UAE |
| 30° W | Hispasat | NOS | 2000 | Portugal |
| | | MEO | 2008 | Portugal |

The largest number of DTH platforms has been broadcasted from two most popular satellite positions in Europe (13° east and 19.2° east). Great number of DTH providers that are at the same satellite position exert mutual "exchange" of TV channels by including coding channels in more systems. Thus, it comes to saving in transponder capacity, i.e. multiplex.

## Review of DTH TV channels

In Table 5 there is review of a number of SDTV, HDTV and UHDTV channels available in Europe from positions where DTH platforms are being broadcasted. From 1996 on, first DTH platforms and first digital satellite TV signals have started broadcasting. Until then, there is evident growth of TV channels and services which DTH providers offer their ultimate users. In the past few years, number of SDTV channels has stagnated, so as in 2020 it comes to their decline. However, it comes lately to intensive growth of HDTV channels which will probably eliminate SDTV channels in the future. From 2014, broadcasting of first UHDTV channels has started with growing tendency rate in the next few years.

**Table 5.** Review of number of satellite TV channels.

| Year | 1996 | 1998 | 2000 | 2002 | 2004 | 2006 | 2008 | 2010 | 2012 | 2014 | 2016 | 2018 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SDTV | 336 | 1006 | 1918 | 2341 | 3245 | 4476 | 6243 | 6679 | 6954 | 7301 | 6950 | 6745 | 6045 |
| HDTV | 0 | 0 | 0 | 0 | 4 | 64 | 187 | 457 | 950 | 1361 | 1837 | 2510 | 2982 |
| UHDTV | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 30 | 46 | 58 |

TV programs could be classified into a group of those which may be watched freely without paying subscription - FTA (Free-to-Air) and coded ones that could be watched only via decoding system - PAY TV. At Figure 1 there is trend in number of FTA and PAY SDTV and HDTV channels. At Figure 2, Figure 3 and Figure 4 there is respectively a share of FTA and PAY SDTV, HDTV and UHDTV channels.

Those Figures show that more than 60% SDTV TV broadcasting channels are coded, while the percentage for HDTV is significantly higher (80%). In last few years, there is noticeable increase of HDTV channels in FTA form, which is expected in the near future, due to fact that an increasing number of SDTV channels turn into HDTV format.

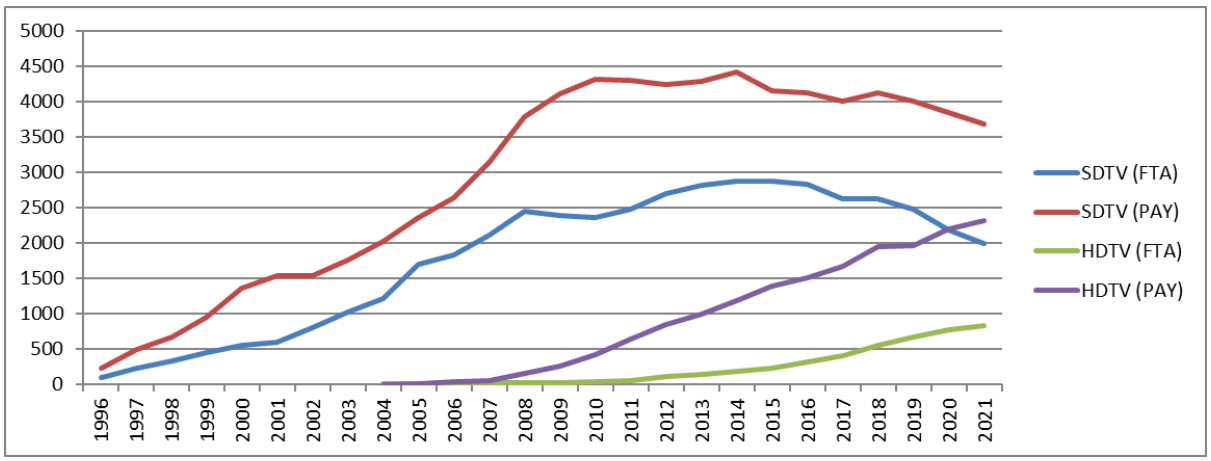


**Figure 1.** Trends in number of free and coded satellite TV channels.

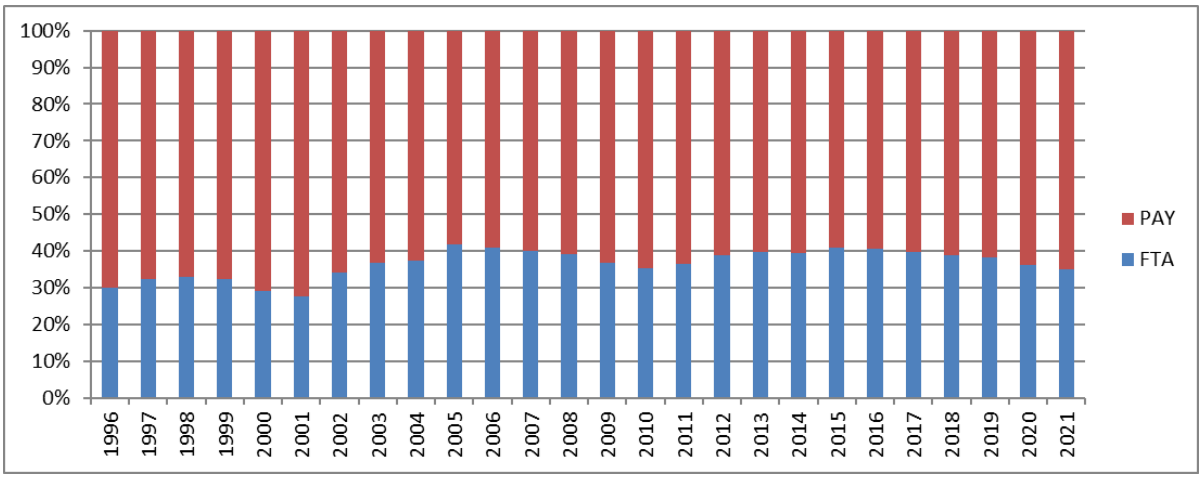


**Figure 2.** Share of free and coded satellite SDTV channels.

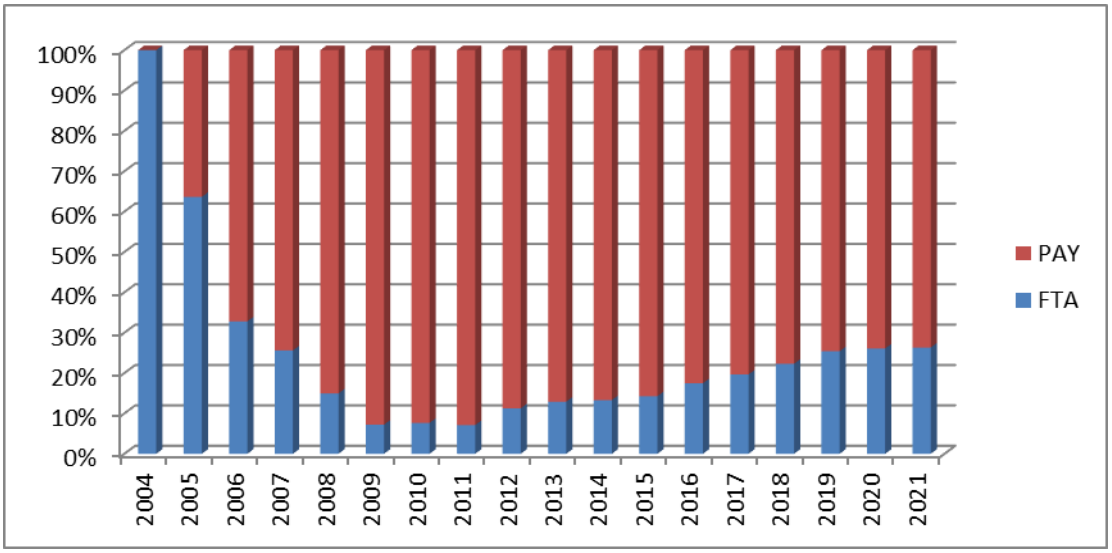


**Figure 3.** Share of free and coded satellite HDTV channels.

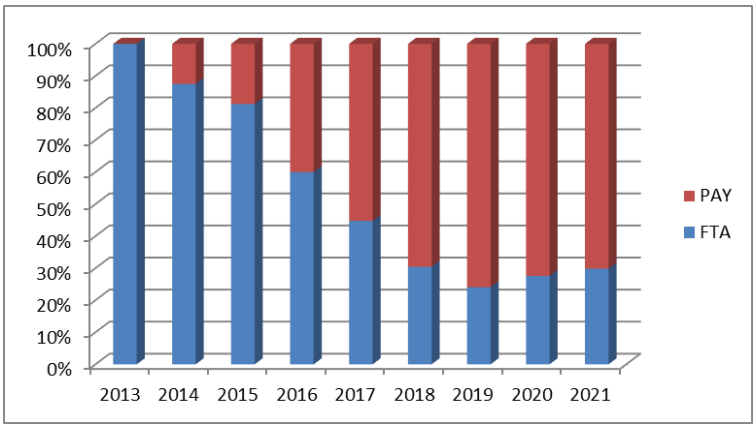


**Figure 4.** Share of free and coded satellite UHDTV channels.

At Figure 5 there is a trend in changing numbers of SDTV and HDTV channels that use DVB-S and DVB-S2 broadcasting standard. It shows that DTH operators have mostly used DVB-S standard of broadcasting SDTV channels. However, from 2015 onwards, the number of SDTV channels broadcasting in DVB-S standard has been increasing. DTH operators are switching to a newer standard DVB-S2 that emerged almost 10 years ago, while in 2017 the number of SDTV broadcasting channels is higher in DVB-S2 standard than in DVB-S standard. For distribution of HDTV channels, DVB-S2 standard has been mostly used, while particular number has been broadcast in DVB-S standard.

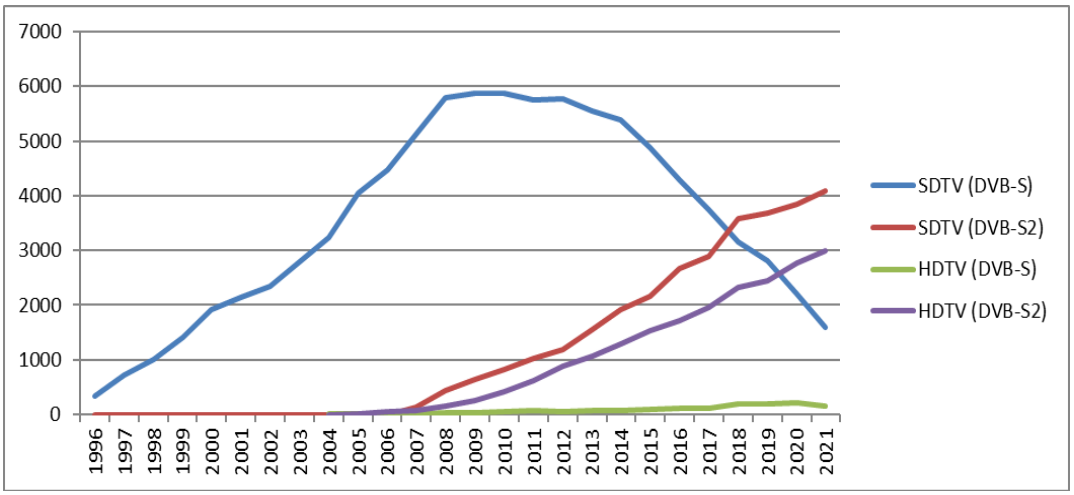


**Figure 5.** Trends in number of satellite TV channels according broadcasting standard.

## Satellite TV operators

More satellite operators are included in covering the Europe with satellite signal. Each operator has its own satellite position where the satellite has been placed. In Table 1 there is review of satellite positions and satellites from which DTH platforms are being broadcasted. However, the number of satellite positions used by operators is higher, but those positions are not used for distributing TV channels to ultimate users, but for other satellite or terrestrial service providers. In the region of Europe, the largest number of services is provided by international companies such as: Eutelsat, SES Astra and Intelsat, as well as national satellite operators: Telenor (Norway), Spacecom (Israel), Turksat (Turkey), Hispasat (Spain), Nilesat (Egypt), Arabsat (Saudi Arabia), Helass Sat (Greece) and Bulgarisat (Bulgaria).

In Tables 6, 7 and 8 there is respectively a number of SDTV, HDTV and UHDTV channels, which DTH providers broadcast using particular satellite operators. At Figures 6, 7 and 8 there is a share in percentage (%) of satellite operators for distribution of SDTV, HDTV and UHDTV channels, respectively.

**Table 6.** Review of number of SDTV satellite TV channels according to satellite operators.

| | 1996 | 1998 | 2000 | 2002 | 2004 | 2006 | 2008 | 2010 | 2012 | 2014 | 2016 | 2018 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eutelsat | 130 | 295 | 703 | 797 | 1078 | 1470 | 2216 | 2445 | 2817 | 3025 | 3051 | 2770 | 2287 |
| SES Astra | 160 | 454 | 754 | 941 | 1185 | 1579 | 2017 | 1868 | 1742 | 1844 | 1727 | 1801 | 1694 |
| Telenor | 5 | 54 | 85 | 114 | 145 | 186 | 261 | 440 | 404 | 404 | 355 | 428 | 429 |
| Intelsat | 2 | 29 | 34 | 20 | 82 | 100 | 153 | 230 | 245 | 263 | 255 | 174 | 144 |
| Turksat | 1 | 11 | 26 | 57 | 94 | 185 | 253 | 272 | 350 | 458 | 360 | 270 | 232 |
| Hispasat | 25 | 87 | 131 | 177 | 221 | 262 | 331 | 303 | 385 | 236 | 263 | 276 | 190 |
| Nilesat | 0 | 45 | 83 | 160 | 247 | 284 | 305 | 305 | 329 | 308 | 235 | 198 | 183 |
| Arabsat | 12 | 16 | 83 | 45 | 83 | 205 | 347 | 373 | 253 | 293 | 308 | 293 | 222 |
| Sapcecom | 1 | 15 | 19 | 30 | 69 | 121 | 197 | 234 | 244 | 270 | 183 | 152 | 151 |
| Hellassat | 0 | 0 | 0 | 0 | 41 | 84 | 163 | 209 | 185 | 200 | 213 | 316 | 377 |
| Bulgariasat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 67 | 136 |
| TOTAL | 336 | 1006 | 1918 | 2341 | 3245 | 4476 | 6243 | 6679 | 6954 | 7301 | 6950 | 6745 | 6045 |

**Table 7.** Review of number of HDTV satellite TV channels according to distribution of operators.

| | 2004 | 2006 | 2008 | 2010 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eutelsat | 1 | 20 | 68 | 168 | 356 | 441 | 540 | 656 | 781 | 910 | 1118 | 1150 | 1245 |
| SES Astra | 3 | 34 | 71 | 188 | 378 | 451 | 487 | 607 | 640 | 663 | 748 | 772 | 792 |
| Telenor | 0 | 7 | 14 | 38 | 56 | 76 | 95 | 122 | 133 | 167 | 196 | 193 | 242 |
| Intelsat | 0 | 1 | 1 | 0 | 9 | 12 | 15 | 16 | 22 | 20 | 23 | 30 | 19 |
| Turksat | 0 | 1 | 4 | 10 | 32 | 34 | 61 | 53 | 36 | 60 | 79 | 85 | 138 |
| Hispasat | 0 | 1 | 17 | 19 | 42 | 21 | 24 | 21 | 23 | 33 | 55 | 70 | 48 |
| Nilesat | 0 | 0 | 0 | 0 | 18 | 21 | 24 | 28 | 35 | 36 | 42 | 36 | 65 |
| Arabsat | 0 | 0 | 4 | 15 | 30 | 54 | 70 | 64 | 108 | 128 | 157 | 194 | 193 |
| Amos | 0 | 0 | 4 | 8 | 12 | 16 | 17 | 26 | 32 | 31 | 34 | 42 | 48 |
| Hellassat | 0 | 0 | 4 | 11 | 17 | 20 | 28 | 27 | 27 | 27 | 58 | 60 | 97 |
| Bulgariasat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 95 |
| TOTAL | 4 | 64 | 187 | 457 | 950 | 1146 | 1361 | 1620 | 1837 | 2075 | 2510 | 2637 | 2982 |

**Table 8.** Review of number of UHDTV satellite TV channels according the satellite operators.

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|
| Eutelsat | 0 | 3 | 4 | 10 | 13 | 21 | 28 | 29 |
| SES Astra | 2 | 4 | 10 | 15 | 20 | 19 | 20 | 20 |
| Telenor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| Intelsat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turksat | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| Hispasat | 1 | 1 | 2 | 3 | 3 | 4 | 4 | 2 |
| Nilesat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Arabsat | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| Amos | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hellassat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bulgariasat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 3 | 8 | 16 | 30 | 38 | 46 | 54 | 58 |

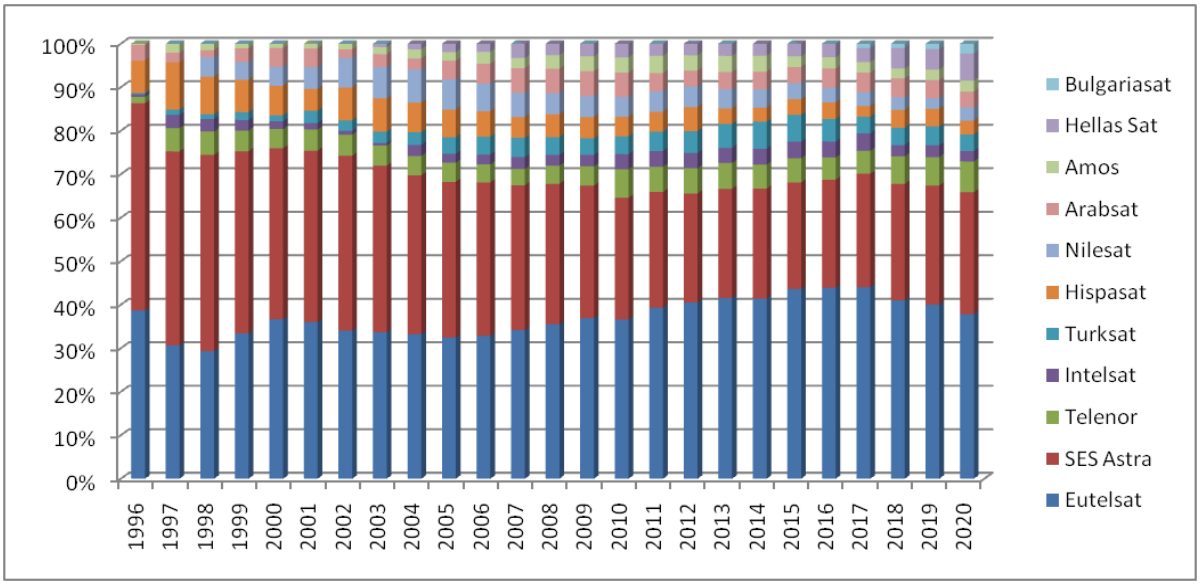


**Figure 6.** Share of satellite operators in distribution of satellite SDTV channels at DTH service market.

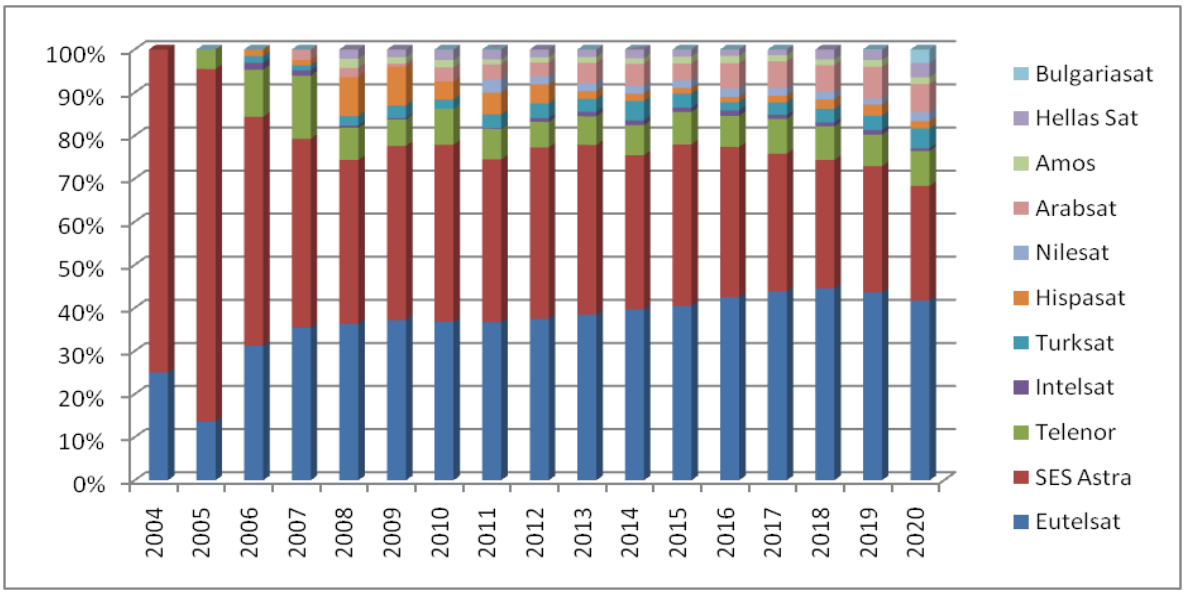


**Figure 7.** Share of satellite operators in distribution of satellite HDTV channels at DTH service market.

Based on the data, it can be seen that DTH providers mostly use services of operators such as Eutelsat and SES Astra, while the third one is Telenor. At the end of 2020, about 40% of SDTV and HDTV channels have been broadcast from Eutelsat satellite, about 30 % from satellite of company SES Astra, and less than 10% from satellite of Telenor. All other operators with about 20 % take part in TV channel broadcasting.

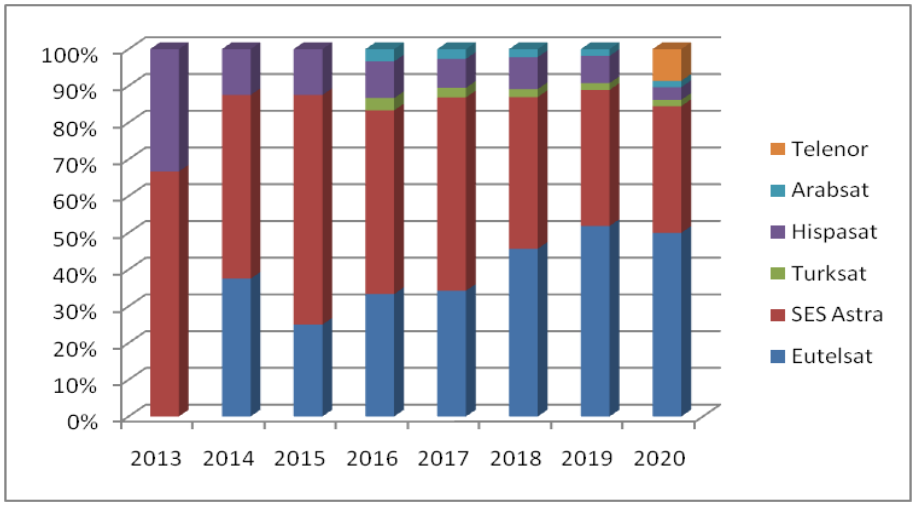


**Figure 8.** Share of satellite operators in distribution of satellite UHDTV channels at DTH service market.

The largest number of TV channels is being broadcast from 2 key positions 13° E (Eutelsat) and 19.2° E (Astra) where there is utmost number of DTH providers.

Besides their own SDTV and HDTV channels, DTH providers have in their offer FTA, SDTV and HDTV channels that are distributed from the same satellite. Such case is also with satellite positions 28.2°E, 19.2° E and 13° E from which large number of free-to-air SDTV and HDTV channels are being broadcast.

Operators Eutelsat and Astra use more satellite positions for giving their services to DTH providers. Eutelsat uses 7 positions: 36° E, 16° E, 13° E, 10° E, 7° E, 5° W, and 8° W, a SES Astra 5 positions: 31.5° E, 28.2° E, 23.5° E, 19.2° E and 5° E.

At Figures 9 and 10 there is a share of satellite positions of Eutelsat operator in distribution of SDTV and HDTV channels, respectively. It is shown that participation of 13º E position is gradually decreasing, while participation from other positions for giving services to DTH providers in SDTV channel distribution. Special growth is noticed at 16° E position and 8° W in distribution SDTV channels. Distribution of HDTV channels is still primary from 13° E position.

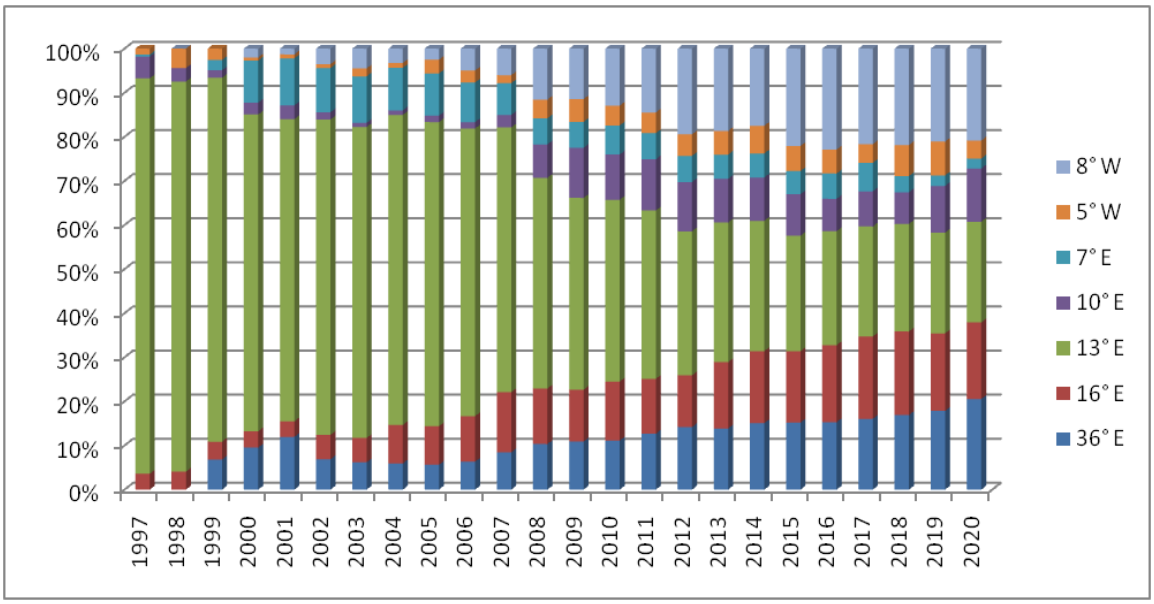


**Figure 9.** Share of satellite positions of Eutelsat in distribution of SDTV channels DTH service market.

At Figures 11 and 12 there is a share of satellite positions of SES Astra operator in distribution of SDTV and HDTV channels, respectively. Two key positions for distribution of SDTV channels are 28.2° E and 19.2° E. In last few years there is noticeable increase of participation of other satellite positions, too. The largest number of HDTV channels is being broadcast from 19.2° E position.

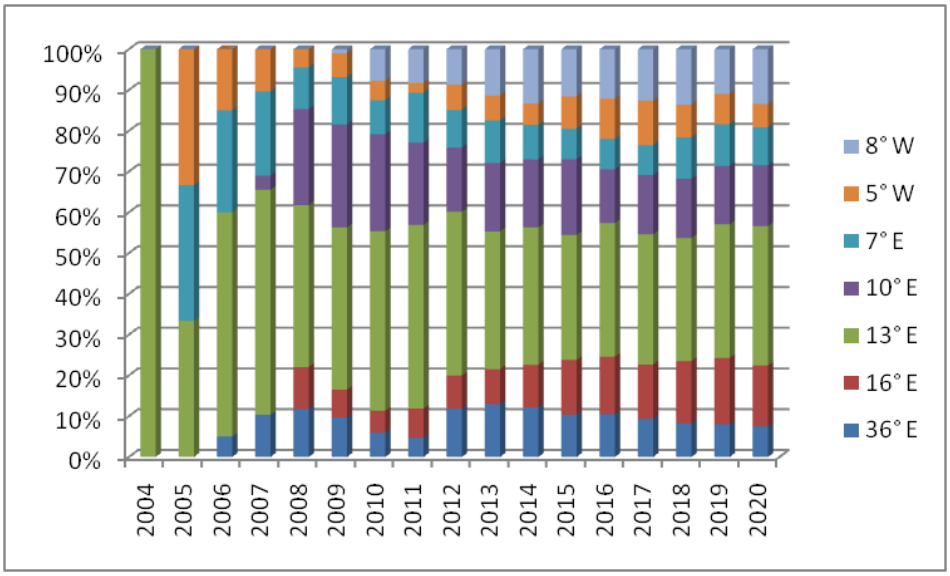


**Figure 10.** Share of satellite positions of Eutelsat in distribution of HDTV channels at DTH service market.

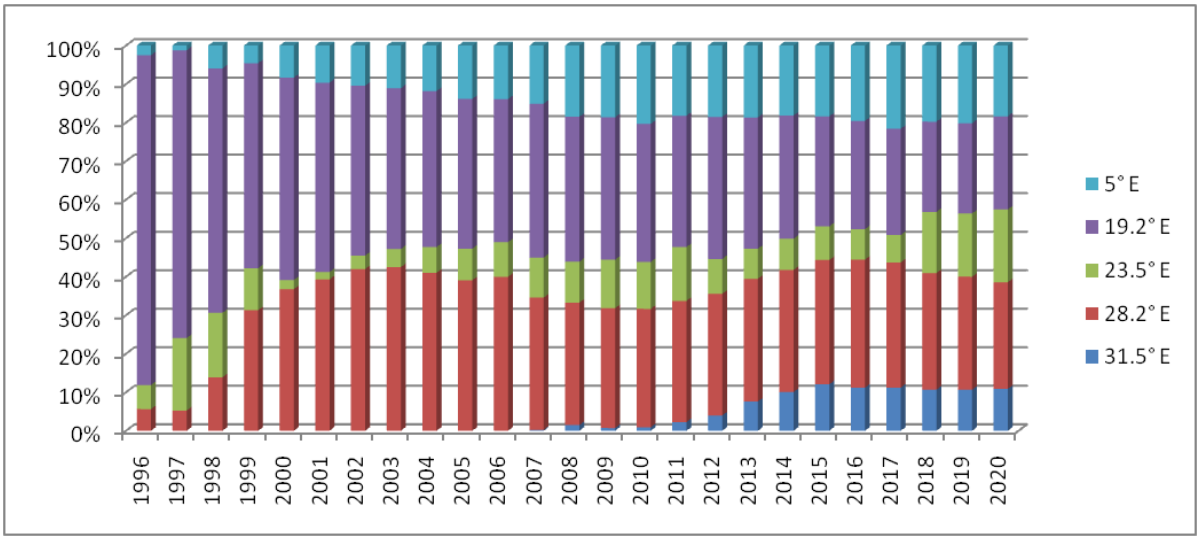


**Figure 11.** Share of satellite positions of SES Astra operator in distribution of SDTV channels at DTH service market.

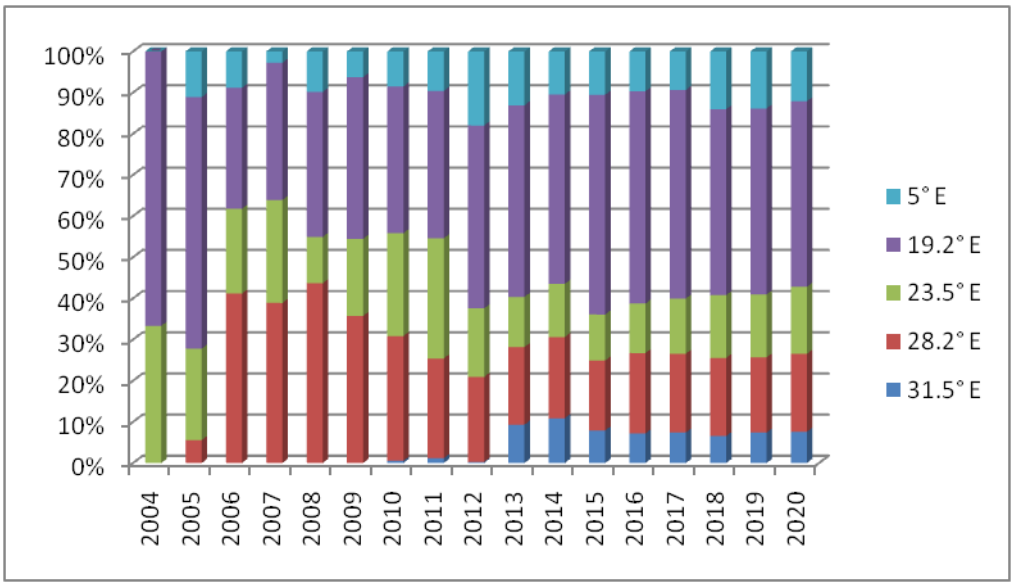


**Figure 12.** Share of satellite positions of SES Astra operator in distribution of HDTV channels at DTH service market.

## Conclusion

Direct-to-Home (DTH) refers to broadcasting TV program or other services where subscribers, i.e. ultimate users get signals directly from satellite in geostationary orbit. DTH services are popular in rural regions where conventional cable services are not available. Also, DTH services are used by users in urban areas who are not satisfied with quality and quantity of TV services available at cable operators. In the late 1990s in Europe the first DTH services in digital format emerged. During the 2000s they achieved rapid expansion, but recently it has come to expansion of HDTV channels, which soon will replace SDTV.

Lately increase of SDTV channels has stagnated, but, on the other hand, it comes to intensive growth of HDTV channels which will in the near future completely replace SDTV channels. Also, the complete transition of broadcasting of SDTV and HDTV into DVB-S2 standard is expected. Transition alone is the process that needs the most time to replace receptors at ultimate users. During 2018, testing of more advanced DVB-S2X standards has been started, so as in the future we could expect tendency of transition into the latest broadcasting standard, primarily HDTV and UHDTV channels.

Ten satellite operators take part in giving services to DTH platforms in Europe: Eutelsat, SES Astra, Intelsat, Telenor, Spacecom, Turksat , Hispasat, Nilesat, Arabsat, Helass Sat and Bulgarisat. DTH providers mostly use services from operators Eutelsat and SES Astra, more than 70 %. Utmost number of TV channels is being broadcast from 2 key positions 13°E (Eutelsat) and 19.2°E (Astra) where there is the biggest number of DTH providers. Recently there's been noticeable increase of participation of other satellite positions for giving services to DTH providers in distribution of SDTV and HDTV channels, as well.

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