Doctoral School of
Social Communication

SUMMARY OF THESIS

Péter Vári's

The Introduction and Future of Digital Terrestrial Television in Hungary

PhD thesis

Supervisor:

PhD Ágnes Jenei
Associate Professor

Budapest, 2016

Institute of Behavioural Sciences and Communication Theory

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Contents

I. Topic

The objective of the thesis is to reconstruct the milestones of the introduction of the Hungarian digital terrestrial television and to analyze them in a concrete period (2006-2013) seeming to be of key importance. The thesis applies an approach which takes into consideration economic, social, cultural as well as technical aspects. The digitization of television is a complex process, which took place in every country in line with local idiosyncrasies and it cannot be separated from the given economic and social context. This process influenced households and the institutional (governmental and service) sector as well. Before the Hungarian introduction of Digital Terrestrial Television, (abbreviated and henceforth DTTV) several renowned researchers studied the possible ways of digital switch-over and its expected social and economic impact. The dilemmas about regulations and gene models of the deployment of DTTV, the results of pilot broadcasting, the expectations toward the new platform, the expeditions about its social usefulness were analyzed by Mihály Gálik and his research group (BKTE) in the years following the millennium for the Government Commissioner's Office. That time media researchers were mainly interested in the the possibilities of regulation. Mihály Gálik, Gábor Polyák, Judit Bayer looked at the question from a legal aspect, LILLA Juhász from the aspect of information society policy and István Hazay researched its technical aspects. Ágnes Urbán and Mihály Gálik added the analysis of new, interactive public service program types and services (T-Government) to the dominantly legal courses.

My study supplements former researches, it has **definite relevance** for communication and media science from various aspects. I describe the Hungarian history of digital switchover, analyzing its most intensive period (2006-2013). For the analysis of the period 2006-2013 I used a retrospective methodology using past data and former researches.

I would like to analyse the introduction of DTTV as a new technology using Rogers' diffusions of innovations theory[1]. During my analysis I would like to find out to what extent the Hungarian introduction could be considered as an organic development and to what extent it was due to a Rogers type of authority decision,

The other objective of my thesis is to see whether the existence of DTTV is justified in the future, whether it becomes a competitive or a complementary platform in the field of audiovisual media or it will be phased out as a service in the coming years. For this purpose I find it useful to

[1] Rogers, E. M. (1995 [1962]) New York, Free Press., *Diffusion of Innovations.* 4th Edition

analyse national and international future visions attempting to find connections between the technical, social, economic impacts and the formation of the future vision.

Applying the system of aspects used during the research of the future vision of Hungarian DDTV (economic impacts, infocommunicational and media political aspects, politics of informational society) and analysing the international trends I would like to draw conclusions about the scenario for the second digital switchover. I participated personally and actively in the process of the Hungarian digital switchover, I followed every phase of the process (preparation of frequency plans, the Strategy of Digital Switch-over, legislation, tendering, installing the network, switching off analog networks, international discussions of digital dividend). I actively participated in the creation of certain documents and I also appeared as a protagonist in the film series which educated households about the switch-over in a popular way. Over the 12 years of research I have had the opportunity to try more research methods in order to reach the appropriate results in every case. It mostly meant the status of an observer, domestic and international semi-structured interviews, the analysis of documents and public opinion polls with questionnaires. It was of the highest importance for me to follow the results of theoretical work in practise as well as a researcher maintaining my neutral scientific aspect of observation.

II. The findings of the thesis

Television has changed a lot since its beginnings until now. The way of transferring signals did not change until the 1990s, both picture and sound were transmitted in an analog way. The development of the production of integrated circuits, the improvement of memory capacities made it possible for television to become digital.

II.1. The digitization of signal transmission

Information and technology were closely and exclusively connected to each other. Due to the analogue world view the social embeddedness of this bond became a lot deeper. (See 96.4 Roxy Radio: in this case the number 96.4 in the name refers to the frequency where the program content can be found.) Digitization brought a basic change to signal transmission technologies. The fact that any information (sound, picture, video, text etc.) can be expressed by the mathematical sequence of 1s and zeros results in the fact that the time for traditional frequency management, where separate frequency bands are allocated to transmitting different type of information, is up.

Digitization has created new grounds; numbers are still present in this world, simply intelligent communication systems make it possible for us to directly search for names, contents or

addresses. Digital television and radio broadcasting networks also changed this way. The function of correspondence between frequency and content is called multiplexing. In the 1990s the principles and international standards were created along which the digital evolution began.

II.2. Television Receiver Systems and platforms

These days audiovisual contents can be reached by the households in various ways. I study television platforms – including DTTV as well – according to the following points:

a) Technical basis
b) Utilization of limited resources
c) Functionality
d) Accessability
e) Quality

Points a) and b) are general technical aspects, points c), d), e) are aspects which are important for that households, i.e. for society.
Platforms to be studied:

- Analog terrestrial television broadcasting
- Digital terrestrial free-to-air television broadcasting (DTTV)
- Digital terrestrial pay television broadcasting (DTTV)
- Satellite free-to-air analogue broadcasting
- Satellite free-to-air digital broadcasting
- Satellite pay broadcasting (DTH)
- Analog pay broadcasting provided on cable television network
- Digital pay broadcasting provided on cable television network
- IPTV (Pay TV)
- Digital pay broadcasting provided on microwave network
- Mobile broadcasting service provided on 3G networks

During the analysis I tried to find the answer to the question whether:

- The applied technology and technical background define the terrestrial platform as a competitive or as a complementary one?
- Regarding its social position will it become „the television of the poor”?
- Does the deterministic approach actually exist?

II.3. The impact of digitization on the value chain

After the overview of the platforms I studied the impact of digitization on the value creating process which describes television from an economic aspect. It is visible that the different transmission of the same digital program signal is possible in the frame of a completely different economic model. Digitizations did not basically change the operation of the value chain but it opened new opportunities for mainly the advertising market. The subscriber did not have a new device in their hands with which they could have an impact on the value chain.

In the course of my research I came to the conclusion that terrestrial television broadcasting still preserves its role in disaster management and in acts of war or air raids[2]. Based on this secondary role of terrestrial television broadcasting it is not a question of media economy that the national DTTV network should be deployed but rather that of defense politics.

II.4. Standards of television

In the second half of the 90s, as a sign of globalization, the theory appeared in telecommunications that different services should be accessed all over the world along the same united technical standards. It is a historical opportunity to end the former technical divide. It is historical in the way too that if the united technical background is not created now then it will only be possible in decades again. This historical moment has passed! Following interviews and research I have done in African, Caribbean and European countries I have come to the conclusion that the technological choice a country makes depends on its geopolitical, cultural bonds and traditions. During my research I was trying to choose a country (Trinidad and Tobago) which does not manufacture devices and is an island, therefore the choice of their neighbour or their own industry could not influence their choice. Trinidad and Tobago, due to its European bonds from the colonial times, commenced its DVB-T based digital television broadcasting. In the case of non-isolated countries - during my personal research - I came to the conclusion that countries make their decisions independently but always considering the ideas and aspirations of their neighbouring countries and finally opt for the same system.

II.5. The relative advantages of DTTV according to Rogers

Following the detailed analysis of the platforms the relative advantages of Rogers' which digitizations created can be identified. The four advantages are the variety of programs, interactivity, quality and mobility. Due to digitizations the **variety of programs** enhanced

[2] 290/2011. Kormányrendelet XIII. fejezet

significantly for terrestrial broadcasting as well. The limitedness did not disappear but significantly more programs can be transmitted. 50 % of households also find it important the access to more, even thematic programs. Even before the introduction of DTTV households undertook a significant financial burden and bought HD TV sets providing excellent picture **quality**, although in the beginning such service was not available. Seemingly households made an irrational decision when buying devices. Following the introduction of the service the service providers are actually offering more and more HD content for to viewers. **Interactive** television started with high hopes and great expectations but did not live up to them and brought no real breakthrough. For networks based on two-way networks interactivity did change significantly the viewers' habits. This effect could not be seen at DTTV due to the one-way nature of the network. Although television promising **mobility** started with high hopes and great expectations it did not become the breakthrough point of DTTV. The basic reason for this is that broadcasting and mobile companies could not find the suitable joint business model. Nevertheless, mobile service providers did not stop their developments, their own solution will bring the success of mobile television by the implementation of broadband mobile internet networks. But in order to be able to realize this development they need to take a bigger cut from the limited resource, i.e. frequency.

During my investigation I observed relative advantages one by one. The problem with this system is that it does not take the synergies between certain points into consideration. In order to eliminate this error I studied the relative advantages of digital television not only within the platform but between different platforms too. When conducting research between last firms I have to mention hybrid systems as well. In this case traditional broadcasting technology is combined with another technology, e.g. IpTV. The convergence of already implemented networks makes it possible to define interactivity again along with considering the needs of viewers at a higher level.

II.6. The diffusion of DTTV in Hungary

Rogers was willing to creates general theory of diffusion and was examining the introduction and adaptation of innovations. It is a question that to what extent in how long time does the development of technology change the attitude of consumers, which can be critical during the introduction of a given or a later innovation. The change in consumer behaviour does not take place even in a given sector like telecommunications along the same principles and amount of time.

Relative advantages of digital technology replacing analogue terrestrial broadcasting:

Growth in the variety of programs

Instead of the former three channels now seven free-to-air and more pay TV channels can be accessed.

Quality

Three public service channels out of the seven available free-to-air channels were accessible in HD quality from the very beginning.

Mobility

There was no relative advantage in this field.

Interactivity

The HbbTV service has been accessible since 2013, which can hardly be considered a relative advantage until 2016. Following the nationwide deployment of broadband Internet (2018-) interactivity could become a relative advantage for the households.

Regarding the **compatibility** of DTTV as innovation, the majority of Hungarian society have experience about its usage via their existing TV set. This accelerates acceptance, the only difficulty was the parallel use of the two remote controls (existing TV, set top box). Regarding its **complexity**, for single senior citizens separate communication channels were created which helped them utilize innovation.

The level of **trialability** is low in the case of DTTV. For Barcs and Sopron pilot systems we cannot talk about trialability for the households. The ones who changed for digital could not return to the former analogue reception. The **observability** of DTTV was limited for the households.

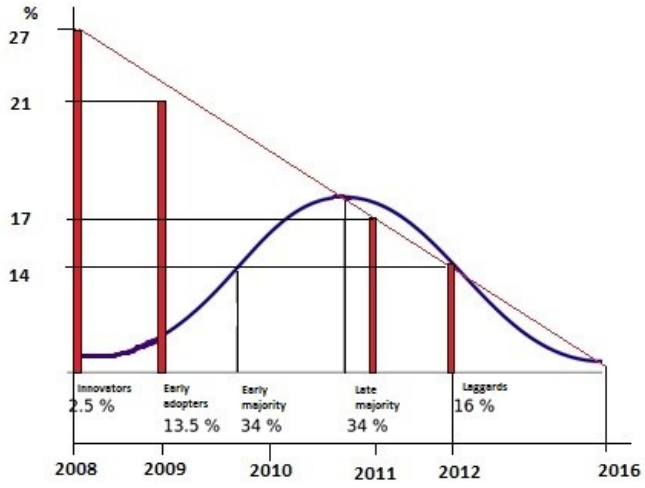
Communicational channel

In the first phase mass communication channels dominated confirming Rogers' theory. The communication campaign included TV and radio commercials, web pages and call centres. **In the second** phase interpersonal channels we focused on as the most important local communication channels of gaining information. To illustrate this a whole survey was done questioning the households. I actively participated in the planning of the survey making questions myself and I also took part in analysing the responses.

Time

Digital terrestrial broadcasting started in Hungary in December 2008 as a commercial service. We can consider this date as the initial date of Rogers' bell curve. In the course of timing we did not register the number of people switching to digital technology but the number of people abandoning analogue terrestrial broadcasting. This as not solely due to technical reasons of measurement; the original objective was that households should abandon analogue terrestrial reception.

1. Figure Curve bell of the diffusion of people abandoning analogue terrestrial TV[3]



The red columns indicate the number of households having analogue terrestrial reception in the proportion of all the households. Unfortunately, data from 2010 was not available in the public database of NMHH (formerly NHH). The decrease of analogue terrestrial reception is not necessarily linear, but the tangent drawn clearly shows the tendency that as time passes more and more people switch from analogue reception to the digital platform. We cannot determine it by the exact day but by the end of 2012 14 % of the people remained with analogue terrestrial reception as households in the group of laggards. The Digital Switchover Monitoring Survey of the Arios Kutatópont examined the households in the spring of 2012 whether they were concerned in the switchover currently or later. As a result single, older households with lower qualifications "got stuck" with the terrestrial reception, mostly in the countryside. In our case we can identify Rogers' laggards criteria; mostly people with the lowest social status and their financial condition is critical, they are mostly senior citizens.

[3] Source: own figure

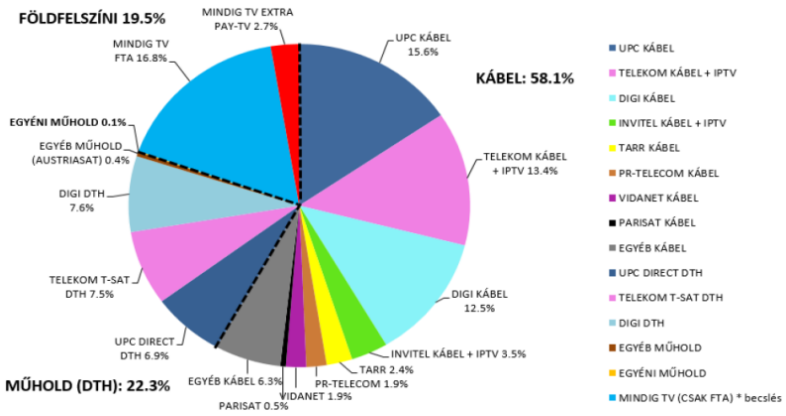
Decision-making mechanism

Certain sections of the diffusion model can be observed well in the field of digital terrestrial broadcasting. The static nature of the technology and "the authoritative innovation decision" could have made the success of the adaptation of digital terrestrial television as innovation. The introduction of an innovation which involves the replacement of reception devices can only be done after some time has pressed since the previous innovation. This condition was absolutely met as analogue terrestrial transmission was introduced in 1958 and the digital in 2008. According to Rogers even in this case it is advisable that this decision should be offered to the individual as an "optional innovation decision ". During the period between December 2008 and March 2013 we can talk about an optional innovative decision for the households. For the lagging households there was no chance of decision, they experienced it as a forced act when the analogue terrestrial network was switched off marking the end of the introduction of the innovation.

Ratio of acceptance

Using a retrospective research methodology I used this survey done earlier when I was analysing NMHH 's monthly rapid reports about the television market.

2. Figure Share of television platforms[4]



This shows that 19.5 % of households have digital terrestrial reception. Although former analogue terrestrial households do not correspond one-to-one with digital terrestrial households, but it can be said that DTTV was accepted beyond the laggards' group too.

[4] Source NMHH havi gyorsjelentések http://nmhh.hu/tart/index/601/Televizio_havi_gyorsjelentes

II.7. The milestones of the history of Hungarian DTTV

1999–2006

Antenna Hungária Plc started its trial broadcast in 1999 in Budapest and in 2002 in Kabhegy in order to determine the program parameters used later, the conditions of reception and for the test of interactive possibilities and also to demonstrate the possibilities of service. Set top boxes with basic functions appeared in some retail shops. Unfortunately, commercial channels were missing from the variety of programs the pilot offered, so the people who remained with the terrestrial reception did not find the variety attractive enough. The group of DTTV viewers was not formed, therefore no relevant domestic research was possible about their behaviour or about the acceptance of the new technology. In 2004 the government set the aim to commence to switch to digital terrestrial broadcasting. The Minister of Informatics and Telecommunications and the National Radio and Television Board was commissioned to carry out the task.

2006–2008

ITU's RRC06 meeting took place in 2006 where the frequency plan of digital terrestrial broadcasting was approved. In 2007 the Hungarian government approved the Strategy of Digital Switch-over and then the Act LVXXIV year 2007 about the rules of program distribution and digital switchover was passed. The Parliament then consisting of five parties passed the Act with a majority of 96 % (!) The National a Telecommunications Authority called a tender in 2008 for "obtaining the operational rights of the five digital television broadcasting network". The winner of this tender, Antenna Hungária Plc, signed the Authority Contract on September 5, 2008 and then it started its service in December.

2008–2013

The process of digital switchover gained another momentum in March 2012 when NMHH started its test program. Before the national switchover the aim of the program was to test processes and the efficiency of the supporting system needed for the successful realization of the final solution. Following the successful test in March 2013 the organization of the national switchover began. Analog terrestrial television existing in Hungary for 56 came to an end in 2013. It closed an important chapter in the history of Hungarian television.

2013–2015

Commissioned by NMHH Kutatópont Digitális Átállás Monitoring published a report in 2013, which showed that the general public perceived digital switchover as a positive process

2016–

Quo vadis DTTV? I have arrived at the second main pages of my research, at the conflict which had been lurking between mobile services and DTTV since 2007 but has become really acute recently. I am going to describe this conflict - known as digital dividend - in the coming chapters.

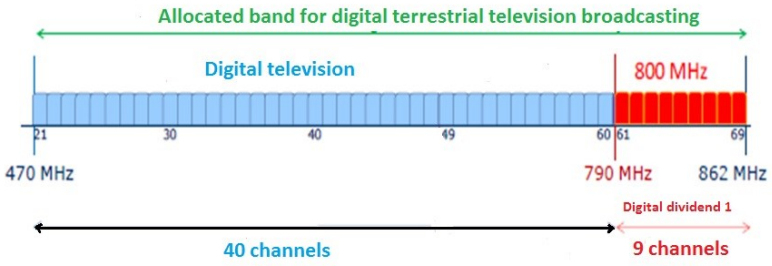
II.8. Digital dividends

The first digital switchover

Hungary switched off its national analogue terrestrial broadcasting networks and local analogue television broadcasting transmitters in two phases on July 31, 2013 and then on October 31, 2013 dividing the country into two geographical areas. Digital switchover was finished in November 2013 following a retuning act also done in two phases. The aim of this was that the digital transmission of television transmitters should be in the 470-790 MHz band leaving then 790-862 MHz band (see Figure 3 UHF band) By using digital technology which utilizes the spectrum more efficiently some part of the spectrum was liberated where earlier analogue television broadcasting was operating till it was digitally migrated. This liberated spectrum is called digital dividend. Digital technology made it possible to transmit 8-10 television signals instead of one television signal earlier. Considering the amount of former analogue signals it resulted in a lot lower use of the spectrum to transmit the same amount of television signals. Therefore digital dividend opens the way for transmitting more signals or introducing other services.

This way digital dividend can be established separately in every state in the frequency band allocated for broadcasting depending on the number of television signals they wish to transmit in the future. In terms of harmonization it was important to allocate a band in the 470-862 MHz frequency band for which the terms of use for telecommunication services other than broadcasting are set by all the European states together. Harmonization makes it possible that a service is not only available in one country and that the new service should not interfere technically with already working services. Without harmonization it would not be possible to receive Hungarian terrestrial signals in settlements close to the border or we would not be able to use our mobile phones abroad. According to international researches in Europe (CEPT, EU) the 790-862 frequency band was identified as the primary digital dividend band (hereafter 800 MHz band or digital dividend band number 1)

3. Figure UHF band[5]



The utilization of digital dividend band number 1

In the long term broadband strategy of the EU the support of the enhancement of broadband communication, satisfying the need for broadband electronic telecommunication services, the support of the convergence of mobile, cable and program broadcasting sectors all play an important role. In order to reach these objectives they were aiming to liberate the 800 MHz band before 2013 for electronic telecommunication services other than broadcasting, which makes it possible to create a market providing Paneuropean mobile broadband Internet access.

Following the inspection of the European Committee the European Parliament and its Council approved a resolution on March 12, 2012 about the establishment of a Radio Spectrum Policy Program (RSPP) [6]lasting for a few years. The RSPP made decisions about the utilization of the harmonized digital dividend (the 800 MHz frequency band i.e. the 790-862 MHz frequency band):

"The 800 MHz band (790-862 MHz) is optimal for the coverage of large areas by wireless broadband services. Building on the harmonisation of technical conditions under Decision 2010/267/EU, and on the Commission Recommendation of 28 October 2009 facility acting the release of the digital dividend in the European Union (1) calling for analogue broadcasting to be switched off by 1 January 2012, and given rapid national regulatory developments, that band should in principle be made available for electronic communications services in the Union by 2013. In the longer term, additional spectrum could also be envisaged in the light of the results of an analysis of technology trends, future needs and demand for spectrum. Considering the

[5] Source: own figure

[6] Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme

capacity of the 800 MHz band to transmit over large areas, coverage obligations could be attached to rights, where appropriate."[7]

In Hungary the tender at which the right to use the 800 MHz band was won by the mobile service providers in 2014. The service providers undertook to provide even the smallest settlements (under 1000 inhabitants) with broadband mobile Internet in the next three years. OpenSignal's (international market research organization) report for the third quarter of 2015 is a promising sign as it says that Hungary has the 20th position in the world as far as broadband Internet coverage is concerned and we have the 6th position as for the speed of downloading[8]. The telecommunications policy principle is enforced that the access to the service cannot depend on the location of the residence of users. It is of high importance that broadband Internet connection should give the opportunity to everyone to become part of the so-called digital ecosystem. In this way the positive influence of the accessible services which can be felt in the fields of employment and equal rights and which enhance competitiveness is ensured for everyone. These accessible services are present in more fields of community and private life whether it comes to arranging official issues or entertainment. According to RSPP in order to reach these goals more frequencies should be made available in the long run. In 2012 RSPP opened the theoretical possibility of identifying newer digital dividend bands in the future.

Digital dividend band 2 (700 MHz)

The European Council's strategy, called Digital Single Market[9], highlights that the 700 MHz band will be allocated for wireless broadband services, especially in the countryside. The necessary frequency coordination with the member states must begin also considering the the distribution of audiovisual contents. At the end of 2013 Neelie Kroes the commissioner of the European Council's responsible for Digital Schedule summoned a high level workgroup chaired by Pascal Lamy to study the future utilization of the UHF band (presently the 470-790 MHz band is used for digital terrestrial television broadcasting). The workgroup wishes to become the widest professional forum for the present and potential future users of the band, therefore the invited media and the representatives of the info communication market (among them the labour

[7] Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme

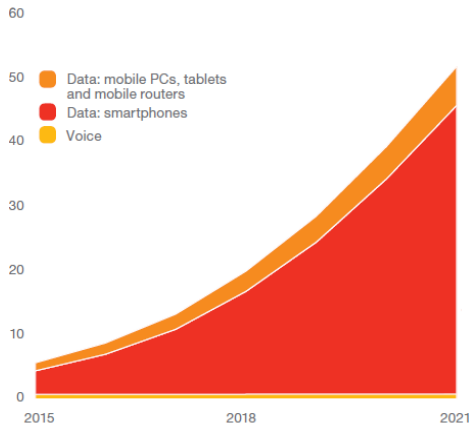
[8] Source: *OpenSignal report*: https://opensignal.com/reports/2015/09/state-of-lte-q3-2015/ (Last download: 2016. II. 15.).

[9] European Commission: *Digital Single Market strategy* http://ec.europa.eu/priorities/digital-single-market/index_en.htm (Last download: 2016. II. 15.).

union representatives of broadcasting companies and mobile service providers) participated in the discussions.

The forum would like to set objectives based on consensus but the underlying professional differences make it harder to create a state of balance. Frequency is a limited and scarce resource, it cannot satisfy all demands. For audiovisual media policy it is of high importance that public service contents should reach the widest layers of society. Free access makes IT all this possible. The present broadcasting users of the band have lost the access to digital dividend band 1. The opportunity was not given to them to use it to broaden their variety of programs. Their representative organizations (EBU and BNO) are trying to put pressure on European legislator to avoid another reduction of the band. We have no available data regarding the developmental need of information society but the soaring capacity demand of mobile services can clearly be seen in Ericsson 's report published in 2015 showing the international trend. (See Figure 4 Global monthly data traffic (in ExaBytes))

4. Figure Global monthly data traffic (in ExaBytes)[10]



The growing capacity need of mobile services can only be met by the use of newer frequencies. The international representative organization of mobile service providers (GSMA) is trying to put pressure on legislators to provide them with access to digital dividend band 2 as well.

The other dimension of professional differences is the differing level of development and progress of the infocommunication and audiovisual media markets of the member countries and also the different social demand. The audiovisual sector itself is changing too: new broadcasting (DVB-T2) and compression technologies (HEVC) and new business models have appeared; especially on-demand services have broken through in the past year. Therefore the European Committee will revise the rules in this field too. During the lengthy professional debate no

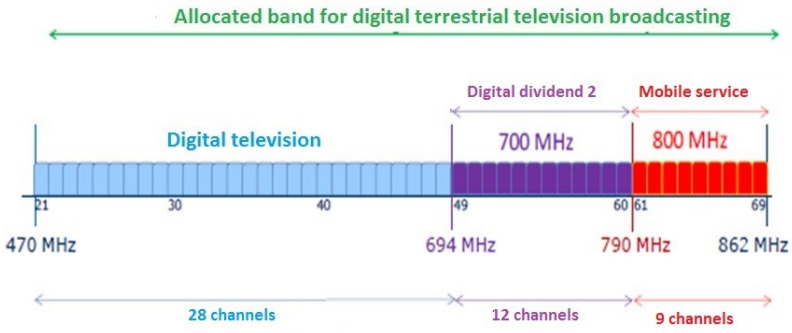
[10] Source: Ericsson Mobility Report 2015

consensus was reached. In the absence of this, Lamy proposed his recommendations in his own name about the future of the UHF band[11]. Thus this report published last year cannot be considered an official stance of the European Union but it is an important and outstanding document, which cannot be by-passed by the legislators of the EU.

Our thoughts about the Lamy report

Every need in the UHF band or in the 700 MHz band called digital dividend band 2 cannot be satisfied (See Figure 5 Allocation of the UHF band)

5. Figure Allocation of the UHF band[12]



The report makes it clear that the debate about the UHF band is not about sacrificing audiovisual culture on the altar of the development of the digital economy. The already formed audiovisual model makes it possible for the entire society to receive good quality, valuable audiovisual contents with free access. This ensures cultural diversity and media pluralism. Ensuring such access that makes the basic information that helps everyday life available for the more underprivileged groups of society is an especially important general political objective. Digital terrestrial broadcasting replacing the analogue one guarantees the accomplishment of this aim, linear television of excellent quality provides real time, universal and free access for the masses.[13] And this role will continue in the future too!

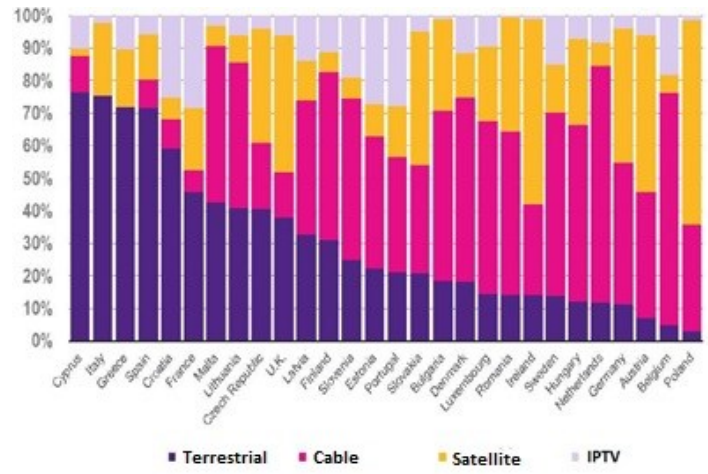
At the same time it is important for the mobile service providers too that they could use another band which satisfies data traffic need in the longer run while it requires less investment and

[11] Pascal Lamy: *Report to the European Comission results of the work of the high level group on the future use of the UHF band (470–790 MHz)* https://ec.europa.eu/digital-agenda/en/news/report-results-work-high-level-group-future-use-uhf-band (Last download: 2015. II. 15.).
[12] Source: Own figure
[13] The terrestrial broadcasting has still not return channel, and non-linear television is only of limited use.

applicable in larger geographical areas. Such a band is the UHF band in which favourable wave propagation characteristics guarantee that a base station can cover a substantially larger area than at a higher frequency. In this way broadband mobile Internet access with cost efficient deployment of network can be guaranteed in the countryside in line with the EU's political agenda, the Digital Schedule. The report looks into the future development of supply and demand both in the field of mobile and broadcasting. In both fields the spread of newer technologies is expected in the households serving the consumers' needs at a higher level. (mobile: LTE2, broadcasting DVB-T2, UHD) Nevertheless, the convergence of the two fields is not probable in the near future.

The most important area of research of the report is the appendix which describes another dimension of the aforementioned professional differences, which introduces us to the differing levels of development of the infocommunication and audiovisual media markets of the member countries and the social demand reflecting on the situation of terrestrial television broadcasting. (See Figure 6)

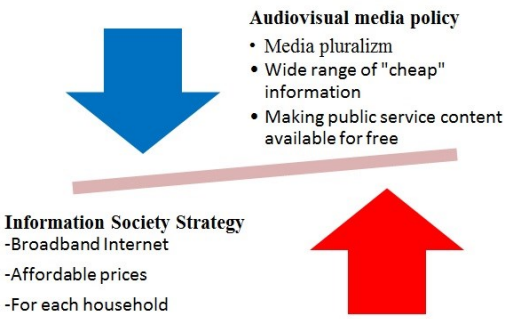
6. Figure Market share of different television platforms[14]



Naturally the data of different countries might have changed following the survey but it can be seen well that whereas in Belgium and Poland the ratio of households having terrestrial reception is nearly 4 % we can find Italy and Cyprus at the other end of the scale where the ratio is almost 80 %. This also shows on which end of the scale countries are placed while looking for the balance in policy (See Figure 7)

[14] Source: :Lamy Report Annex 3

7. Figure Policy balance [15]



Staying with the two extremes: Belgium cannot take advantage of the possibilities in the UHF band if it can only be used for television program broadcasting. In this case it handles its scarce and limited resource lavishly. It is more interested in the development of information society in the way that it provides wireless broadband Internet access in this band. Italy at the other end of the scale is a strong producer of audiovisual media content and it is a consumer at the same time, therefore it is more interested in the development of terrestrial television. This fragmentation makes the formation of a common European stance more difficult. However, the creation of a common market is an important aspect to preserve and improve the competitiveness of the Union.

On the basis of the result Lamy came to the conclusion that at the level of the European Union, as a short-term strategic step, first in the 700 MHz band terrestrial television broadcasting should be replaced by wireless broadband services including mobile services. The suggested deadline is 2020±2 years. The switch could be done in this period with the lowest risk and loss. In his opinion, as a long-term policy objective, the utilization of the entire UHF band remaining after the dividend bands should further be investigated and on the basis of this draft a long-term concept which would be valid for the utilization of the UHF band after 2030.

The realization of the second digital switchover

It is acceptable that we are before another digital switchover. Independent of the common policy the European Council will proclaim, every member country must think over at national level how the relationship between the building of information society and audiovisual policy should form after 2020.

[15] Source: Own figure

RSPG[16] approved an expert opinion in its session on February 19th, 2015 about the long-term European Union strategy of the future utilization of the UHF band (470-790 MHz). According to its recommendation the member states should make the 700 MHz band available as soon as possible for wireless broadband services. The suggested time of the switch is the end of 2020. Naturally they must take into consideration the frequency coordination questions between the countries. In the case of specific local circumstances derogation must be made possible for two years for the given member state. With the loss of the 700 MHz frequency new frequencies must be prepared at national level for terrestrial television broadcasting preferably by the end of 2017. According to the recommendation of RSPG the remaining 470-694 MHz frequency band must be allocated for broadcasting for the long-term, at least until 2030.

As a result of international events it must be thought about what role terrestrial television broadcasting should have among the television platforms. Nota bene: we must not sacrifice audiovisual culture for the development of digital economy and it keeps being a general political objective to provide access for the more underprivileged groups of society.

The amount of available frequencies for terrestrial television broadcasting keeps declining. The most important question for the second switchover is what contents (quantity) and in what quality (HD or SD) we want to broadcast, since this audiovisual media policy decision will determine the choice in the possible scenarios.

The possible scenarios for the second switchover:

Scenario	Aim	Cost
1	The present program variety or/and quality shrinks	The cost for the broadcasting network and the viewers is zero.
2	Maintaining the current program variety and quality	The broadcasting network needs development; PayTV viewers need to replace devices
3	Current program variety and the enhancement of quality	The broadcasting network needs development; every viewer needs to replace devices

[16] 2002 26 July 2002/622 / EC, established by Commission Decision on Radio Spectrum Policy Group of the Radio Spectrum Policy Group of (RSPG), an advisory capacity to the European radio spectrum strategy deals with the questions.

III. Summary of conclusions

Rogers' theory of diffusions can be observed and followed throughout the Hungarian introduction of DTTV. The theory can also be used when the introduction of the innovation is based on the use of a state-owned scarce and limited resource - frequency. The physical attributes of this limited resource determine which of Rogers' innovation decisions (optional, collective or authoritative) will be applied. In the period between December 2008 and March 2013 (the switch-off of the analogue network) the households made an optional innovation decision, they independently decided about the adoption of the innovation, i.e. to switch from analogue to digital terrestrial reception. Between March-November 2013 the authoritative innovation decision was the result of the two-phase switch-off of the analogue network. The final introduction of the innovation went down as a pressure, they had no choice of decision. In all, the combination of individual and authoritative decisions was successful, the audiovisual contents which were available earlier remained available.

At the same time the introduction of DTTV meant that a lot smaller spectrum had to be used to reach television program signals. The appearing digital dividend enables the transmission of even more program signals or the introduction of a other services. Digital dividend band 1 (800 MHz) enables the deployment of Internet networks thus strengthening the development of information society.

In November 2015 the world conference of the International Telecommunications Union (WRC15) approved the division of bands which makes the introduction of wireless broadband services besides the existing digital terrestrial broadcasting possible in the 700 MHz band. (Due to technical reasons both services cannot be introduced in the same geographical area in the 700 MHz band at the same time.)

Hungary, as a member of the European Union, is still before the second digital switch-over. Like other member states digital dividend band 2 will serve the building of information society by the deployment of broadband mobile Internet networks. Technical advancement (DVB-T2, HEVC) makes it possible by 2020 that audiovisual media policy objectives be fully realized by 2020. This might bring a state of equilibrium between the opposing policy aims. Besides the mentioned technological advancement it is important to exactly know the needs of society and the continuous study of their trends. Agreeing with Lamy: the improvement of broadcasting networks must be guaranteed but at the same time, while researching the trends, we have to make the decision at national and EU level too about the long-term future (2030-) of terrestrial television broadcasting.

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