

STRATEGY OF THE REPUBLIC OF SLOVENIA FOR THE SWITCHOVER FROM  
ANALOGUE TO DIGITAL BROADCASTING



THE REPUBLIC OF SLOVENIA

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The project group appointed on 16 March 2005 by decision of the Minister of the Economy Andrej Vizjak prepared the starting points for the draft strategy of the Republic of Slovenia for the switchover from analogue to digital broadcasting. It operated in three subgroups.

The project group included representatives of the Ministry of the Economy, the Post and Electronic Communications Agency, the Broadcasting Council, the Electronic Communications Council, the Chamber of Commerce and Industry of Slovenia: print and media association, information technology and telecommunications association, electrical industry association, Faculties of Electrical Engineering in Ljubljana and Maribor and the Faculty of Economics. In May 2005, representatives of the Ministry of Higher Education, Science and Technology, the Ministry of Culture, RTV Slovenia – Transmitters and Communications, Sistem TV d.o.o., Telecommunications Institute and the PRO Plus d.o.o. company joined the project group.

Members of the project group were:

- Andreja Ivartnik Kanduč MSc,
- Dr. Boštjan Vlaovič,
- Damir Cibic MSc,
- Daniel Copot,
- Ivica Kranjčević,
- Dr. Janez Bešter,
- Jože Zrimšek MSc,
- Leopold Gregorač,
- Marjan Frol,
- Matej Zavrl,
- Miha Krišelj MSc,
- Rok Mencej MSc,
- Dr. Sandra Bašič – Hrvatin,
- Stanko Perpar,
- Tomislav Kalan.

The draft strategy was finally coordinated and designed at the Directorate for Electronic Communications at the Ministry of the Economy.

Those responsible for coordination and compilation:

- Matjaž Janša MSc,
- Mojca Jarc,
- Alenka Tepina,
- Smiljan Mekicar.

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## **1 INTRODUCTION**

The strategy of the Republic of Slovenia for the switchover from analogue to digital broadcasting is a document intended for industry, civil society, national bodies and bodies of the public administration of the Republic of Slovenia and all participants that will actively or passively, directly or indirectly, be involved in the switchover to digital broadcasting.

### **1.1 Purpose of the document**

The purpose of this strategy of the Republic of Slovenia for the switchover from analogue to digital broadcasting is to inform and prepare all those involved in the switchover in good time so as to implement it as efficiently as possible and to gain the resulting benefits as soon as possible.

Since modern society depends on advanced electronic communications, demand for radio frequencies is continually growing. The frequency spectrum is a basic companion of daily life, whether it involves mobile telephony, wireless Internet access or radio and television broadcasting. Traditional solutions to competing demands for frequencies are based on planning as to who is entitled to use the spectrum and how.

Today the rapid development of technology and the convergence of electronic communications, media content and electronic devices are creating a dynamic environment in which the spectrum is becoming an increasingly important resource. Its management has not kept up with this development, which has contributed to the increasing risk that the traditional method if left unchanged will prevent our society from enjoying the fruits of this new dynamic environment.

Although Europe has introduced mobile communications to the world, it is now in danger of becoming a mere user of technologies developed elsewhere instead of being an innovator. The member states have therefore concluded that more efficient use of the spectrum and realisation of the objectives of European Union policy, such as the development of the internal market, competition, innovation and growth, cannot be achieved by a fragmented analogue spectrum.

The European Union member states set themselves the objective of switchover to digital broadcasting and freeing up the frequency spectrum. This proposal enabled growth, jobs and actual use of the objectives of the amended Lisbon strategy. It also includes part of the strategy for efficient spectrum management as foreseen by Initiative i2020, which sets out a vision of joint and coordinated elimination of restrictions on the use of the spectrum in all member states in order thereby to promote an open and competitive economy. European citizens must gain direct benefits from this in the form of faster access to new technologies and lower prices for communications.

## **1.2 Content framework of the document**

The switchover strategy is based on the e-Europe 2005 action plan, which defined the Digital Switchover and provided instructions for the preparation of transparent instructions and conditions for its implementation; Report of the EU Commission on the switchover from analogue to digital broadcasting from 2003, COM (2003) 541; on the proposed deadlines for withdrawal of analogue terrestrial broadcasting throughout the EU; and on respect for the plans of member states for the switchover published in the framework of the e-Europe action plan and the final document, communication from the EU Commission COM (2005) 204 final.

The switchover will promote innovation and growth in the equipment market, and will help renew the Lisbon agenda. The benefits of digital broadcasting for consumers include enhanced image quality, better sound, better portable and mobile reception, more television and radio stations and more information services.

These benefits are derived primarily from the possibility of processing and compressing digital data, enabling much more efficient use of network capacities than analogue signals.

The switchover also enables better satisfaction of the special needs of older people and those with disabilities by ensuring ancillary services, such as improved subtitling, audio commentary and signing. Attention must be paid to incorporating requirements regarding user access to interfaces (e.g. EPG – electronic programme guide) and receivers.

In addition, the switchover also involves reducing future costs for operators of broadcasting networks. It also creates the possibility of increased sales of digital receivers and easier storage and processing of content. The market for digital TV-receivers (set-top or built-in) in Europe is estimated to be up to 20 million units per year. These effects could substantially contribute to growth and employment in ICT markets.

The second important benefit brought by the switchover is greater spectrum capacity, particularly due to the withdrawal of analogue terrestrial television. According to data provided by member states in their national switchover plans, digital terrestrial TV is 3 to 6 times more efficient in the use of the spectrum than analogue terrestrial TV.

This enables the possibility of reuse of highly valued part of the radiofrequency spectrum to introduce new convergence services combining mobile telephony and terrestrial broadcasting, and other new cross-border and pan-European electronic communications services.

The switchover strategy of the Republic of Slovenia was prepared on the basis of analysis of best foreign practice, taking account of consumer information strategies, financial aspects, network capacity aspects, transmission obligations and the state of broadcasting in the Republic of Slovenia as a whole.

The strategy takes account of the benefits of the switchover to digital broadcasting and research of various political guidelines and debates on EU policy guidelines on the value and future use of the spectrum made available by the withdrawal of analogue terrestrial television transmissions.

The strategy also takes account of the findings of studies conducted for services of the EU Commission in marketing the spectrum and relaxation of management of spare frequency spectrum.

### **1.3 Timeframe of the document**

The sooner the switchover from analogue to digital broadcasting begins on the national level, and the shorter the transition period, the sooner the benefits will be realised. The economic and social benefits for Slovenia and the EU as a whole will be realised fully once all member states have completed the transition.

The Republic of Slovenia adopted the Commission's proposal to set the start of 2012 as the deadline for final withdrawal of analogue broadcasting in all member states.

Through the present document, the Republic of Slovenia, defines the method and timeframe of compliance with European Union directives.

## **2 OBJECTIVES OF THE STRATEGY**

The objectives of the switchover strategy must as far as possible suit Slovenian users, and so the switchover to digital broadcasting must be non-discriminatory against consumers, content providers and content carriers (network operators).

One of the basic objectives is to create new added value for all actors compared to the current method of analogue broadcasting.

These are (separately for each group of participants):

#### **– Consumers:**

- enhanced image and sound quality (HDTV, Dolby Digital 5.1),
- greater choice of content and more television and radio stations,
- new services for people with special needs and the elderly,
- improved additional services (user-friendly interface, multi-lingual broadcasting, subtitles, special signs, customisable size, interactivity),
- mobility,
- convergence of services (all on one terminal).

#### **– Providers:**

- possibility of content differentiation (different programmes, target publics),
- extra options for content mediation (interactivity),
- providing content on demand (for payment),

- lower transmission costs,
- convergence of services (convergence of television, telephony and data services),
- new sales opportunities for equipment providers (transmitters and receivers).

– State:

- more efficient use of the frequency spectrum,
- use of the freed part of the spectrum for new services,
- market opportunities from releasing part of the spectrum,
- creation of new economic opportunities and jobs,
- promotion of development of new technologies,
- increased competition among providers and media pluralism,
- greater opportunities for establishing the creativity, language and culture of Slovenia.

All objectives of the switchover strategy must as far as possible enable the development and competitiveness of the broadcasting sector, which should be reflected in technical, systems, legislative, financial, economic, public and environmental coordination.

The Republic of Slovenia will strive to take full advantage of the switchover to new broadcasting technology to maximise media pluralism and diversity of programme content.

Once analogue broadcasting is switched off, part of the released frequency spectrum will be given over to pan-European content and new services.

The switchover must ensure the compatibility of appliances currently owned by the population with new appliances, and that the various providers are mutually compatible. The objective of the Republic of Slovenia is for the switchover to digital broadcasting to provide an affordable option for the largest possible majority of the population.

We must particularly ensure that those interested solely in receiving public radio and television programmes can access digitally broadcast programmes without disproportionate costs.

All objectives are defined on the basis of clear starting points, a logical procedure and specific objectives and effects, which will be reflected in the social, cultural, economic and political spheres.

### **3 ENVISAGED PLAN OF SWITCHOVER**

The envisaged switchover plan has been harmonised with the recommendations of the European Union and is harmonised at the EU level. It likewise respects the final deadline for withdrawal of analogue terrestrial broadcasting in all member states.



The Republic of Slovenia undertakes to require in the switchover to digital broadcasting technology that multiplex operators (network operators) ensure maximum coverage of the population by terrestrial digital broadcasting of public radio and television channels. At the end of the transition period, coverage must be as defined by legislation and criteria.

Other radio and television stations can decide for themselves on coverage based on options and criteria.

Envisaged timeframe for the switchover to digital broadcasting:

- from 2006 to 2007 (preparation of necessary legislation, regulations and implementation of public tenders for provision of digital broadcasting, start of public information campaign, start of digital broadcasting),
- from 2008 to 2012 (transitional period under the prepared strategy),
- start of 2012 end of analogue broadcasting.

In line with this planned dynamic for the switchover to digital broadcasting, the Republic of Slovenia undertakes to inform – in line with the timeframe and strategy of the digital switchover – citizens and other residents so that they can make their consumer decisions at a sufficiently early stage of the switchover on the basis of information available.

For rapid and effective switchover from analogue to digital broadcasting technology, it is vital that consumers are informed well and sufficiently early of the benefits of digital broadcasting and new services enabled by the switchover.

Given effective and coordinated operation of all those involved, the final date for the switchover and withdrawal of all analogue terrestrial television transmitters could be even earlier; this would significantly reduce costs and bring the benefits and added value brought about by digital terrestrial broadcasting earlier.

## **4 ANALYSIS OF ENVIRONMENT AND STATUS**

### **4.1 Summary of status in EU**

In September 2003, the European Commission published a Communication on the transition from analogue to digital broadcasting (from digital 'switchover' to analogue 'switch-off'), which set out the benefits of the switchover to digital broadcasting, researched various policy guidelines and triggered a debate on the guidelines of European Union policy on the value and future use of the spectrum released by the withdrawal of analogue terrestrial television transmission.

In November 2003 the Radio Spectrum Policy Group of the European Commission published an opinion on how the switchover to digital terrestrial broadcasting will

affect the spectrum. The report develops positions taking account of an analysis of the switchover plans of member states published in the framework of the e-Europe 2005 action plan, and the opinions of the RSPG. The communication also shows the findings of studies conducted for the EU Commission's service for marketing the spectrum and liberalisation, and on management of the spectrum in the area of broadcasting.

The communication was accompanied by commission staff working document SEC (2005) 661 with more detail on the switchover plans in member states and the consequences for spectrum planning, financing and digital radio.

Many suppliers of broadcast transmission services in individual countries have already switched to digital transmission or plan to introduce such measures in the near future. Where users have a choice, they increasingly opt for digital reception and abandon analogue.

Due to these trends in supply and demand, the United Kingdom has already achieved a 57% market share for digital broadcasting, and we can expect that by the beginning of 2010 Europe will mostly use digital broadcasting transmission, and that by then analogue transmission will have a small and shrinking role.

Public consultations carried out by RSPG indicated the following main obstacles to rapid switchover:

- in the political arena in the form of the absence of policy decisions, such as national withdrawal of analogue broadcasting, failure to set deadlines for the withdrawal of analogue broadcasting and a lack of European debate and policy;
- in the economic market arena, the need to set up many basic transmitters; low demand from consumers, based on a lack of incentives to change; resistance based on the financial risk on the part of investing operators.

Apart from the advantages on the national level, acceleration of the switchover procedure could also increase the learning effect and encourage positive examples among member states. Numerous new technologies and services depend on achieving a critical mass of users on the European level, and become more attractive with increasing installed basic technology in Europe.

Market actors are concerned that the development of new services could be hindered by divergent implementation in individual European countries. In particular they are demanding legal protection regarding the terrestrial spectrum that would be available, and a reduction in barriers caused by state borders.

Acceleration of the switchover on the level of member states, and cooperation in the transitional period and on the date of switch-off would enable a rapid switchover in Europe. The RSPG proposed the introduction of a limited number of schedules that member states could apply, and research into joint completion of the switchover procedure.

The spectrum of pan-European services and numerous cross-border services, such as traffic information and shipping management, mobile communications and various data services will after the switch-off in all member states be available only on the European level. Those member states that have already completed the switch-off will also be able to introduce cross-border services earlier. There are thus reasons to accelerate national procedures for the switchover and to strive to set a date by which analogue broadcasting will be withdrawn in all member states.

Such acceleration and deadline for the European Union for the switchover procedure would help overcome the current fragmentation of European digital television markets. This will enable European actors to compete with other global interest groups in all parts of the digital television value chain, which in turn will have positive economic consequences: increased exports and revenues, greater competition on content etc.

The pace at which Europe as a whole can move will depend on the pace of national switchover procedures on the one hand and the pace of the slowest member states on the other hand.

The high power levels of signals transmitted by analogue TV transmitters and the sensitivity of domestic analogue receivers to interference mean that the introduction of new services will also be hindered by the aforementioned continued use of analogue services in certain member states.

Consequently, each share of the spectrum on the national level will depend heavily on the number of neighbouring countries that have already achieved switch-off, and on the European level will only be achievable on the basis of full switch-off of analogue broadcasting in the European Union and neighbouring countries.

On the basis of data available to the services of the European Commission, a table of classes for the switch-off of analogue terrestrial TV in member states was prepared.

<b>Group</b>	<b>Member states</b>
<b>A</b> (switch-off date: end of <b>2010</b> or earlier)	AU, DE, DK, ES, FI, FR, IT, LU, MT, NL, SE
<b>B</b> (switch-off date: end of <b>2012</b> or earlier)	BE, CZ, EL, LI, LT, PT, <b>SI</b> , SK, UK, HU

Member states not listed in this table must announce their plans later or have yet to announce the switch-off date.

Due to the different debates and levels of progress of member states, and because of the advantages of a coordinated European view on the switch-off of analogue broadcasting, the European Commission proposed that a joint timeframe be set for the switchover to digital terrestrial TV.

Most of the member states that have already decided on the switch-off will do so by 2010. Other countries will do so by 2012 at the latest. On this basis, the European Commission expects that by the start of 2010 the switchover procedure will be well advanced throughout the European Union, and it therefore proposed that the start of 2012 be set as the final deadline for completion of the switch-off of analogue terrestrial TV in all European Union member states.

Status in neighbouring countries (October 2005):

#### **4.1.I. AUSTRIA**

Following initial studies carried out by ORF (Austrian public television), in 2002 the government established the DPA (Digital Platform Austria), which in 2003 prepared a strategy presentation and a plan for the switchover from analogue to digital broadcasting. It contained a schedule and an action plan for the switchover, and was published by the Austrian Regulation Agency. It focused primarily on how to ensure coverage of major towns and densely populated regions through the fastest possible switchover. The DPA – a working group with more than 300 members representing broadcasting, various other services, network operators, users, government representatives and producers – in addition to the switchover strategy also prepared a selection of criteria for obtaining a DDT licence.

In 2004 a trial project was carried out in the town of Graz; this helped in the implementation of further activities.

In May 2005, KommAustria (Austrian broadcasting agency) conducted a public tender for digital broadcasting. By the end of August 2005, only one interested party – ORS, the Austrian broadcasting operator, formally separate from ORF – had registered.

KommAustria expects that the digital operator will begin broadcasting DTT (digital terrestrial television) in 2006. It was awarded a 10-year licence for DDT-basic and, due to the limited number of frequencies, only one national multiplex and other regional ones, which will be activated in areas where this is possible.

Each multiplex will offer three to four channels (mandatory are ORF 1, ORF 2, ATV+) and data services. The operator (DDT licence holder), together with programme providers, is obliged to offer these channels free of charge and with enhanced image and sound quality. For data services, the operator has a free choice. Likewise, the operator has been instructed that it must provide digital added-value, such as interactive services (EPG) and super-teletext, and in densely populated regions also mobile indoor and/or outdoor reception.

The number of multiplexes to follow in Austria depends on the availability of frequencies, which will be released after the analogue switch-off and the results of discussions at RRC-06.

Analysis of conditions in Austria regarding reception of television signals shows that 47% of households receive television signals by satellite, but this method does not allow the reception of national and regional programmes. Consequently, a combination with terrestrial reception of television signals is common, while only 15% of household use only terrestrial reception.

The Austrian government set up the DF (Digitalisation Fund) with annual funding of 6.75 million euros from the money raised from broadcasting fees, supported by loans and financial incentives of trial projects, new services for digital broadcasting, testing of mobile services and coverage, and financing of the public awareness campaign for digital television.

The Austrian digital switchover strategy envisages the transition lasting approximately four years from the first start-up, and being completed in 2010. The switchover will be done regionally with 6-12 month transition periods. The analogue switch-off will be done once 90% of the population receive DDT services.

#### **4.1.II. ITALY**

The Italian Communications Agency in 1999 established the DDT National Committee, which brought together broadcast content providers, network operators, industry, universities and R&D institutes. The result of their work in four study groups, which each discussed specific areas, was the so-called white paper published in September 2000, which the Agency submitted to the Italian parliament. It also included financial incentives for local broadcasting providers to release frequencies.

In 2002, the Italian parliament adopted a law that envisaged complete switchover from analogue to digital terrestrial television by the end of 2006. Pursuant to this law, the Communications Agency in February 2003 published its plan Digital television broadcasting for the first level, followed by Digital television broadcasting for the second level in January 2004.

Public and private broadcasters all over Italy undertook considerable activity through coordination with the Ministry of Communications.

At present in Italy, more than 140 DVB-T transmitters are operating in all major towns within the context of RAI (public radio and television). 30 of these operate in the VHF frequency band, and 110 in the UHF frequency band in two multiplexes providing digital-signal coverage of more than 70% of the population. They have introduced many innovations to their services: EPG, superteletext, interactive advertising channel based on DVB-MHP open API-basis and T – government programme for public administration (for payment of fees and pension funds). The development of these new services within the DDT-committee is strongly supported by the Ministry of Communications.

Also being tested is DMA (Datacasting Multimedia Application) based on DVB-T technology in Rome, while tests are also underway in Turin to check the feasibility

of transmission and reception of diverse digital terrestrial television – portable and mobile DTT – to make DTT more successful than established satellite services.

MEDIASET (Italia 1, Rete 4, Canale 5 etc.), the largest Italian private communications and broadcasting group, part of the FININVEST GROUP owned by Silvio Berlusconi, also has a very active role in promoting DVB-T systems. They are involved in production, representation and sale of film rights, advertising and broadcasting signals. They already have more than 100 DVB-T-active transmitters covering a significant portion of the population with one multiplex.

All active transmitters began operating on existing analogue frequencies. In the near future, coverage is expected to increase through a doubling of the number of transmitters. They are testing the compatibility of the programme with MHP and investigating the level of interest on the part of users in the new services offered.

In addition to the two largest Italian TV networks, there are also many other private national, regional and local operators of DVB-T networks, offering their services to various providers of programming and other content. Thus individual areas have available four or even five multiplexes.

They are also testing time-sharing methods, where some providers use daytime broadcasting and others night time, which has proven to be very interesting and useful.

TELECOM ITALIA MOBILE and MEDIASET have announced that in 2006 they will begin introducing the DVB-H broadcasting system, offering three television stations and one special sports channel – football. This will be one of the first serious commercial attempts to offer television content on mobile telephones using DVB-H technology.

In 2006, the Italian government adopted a decision, allocating 110 million euros of the government budget to help households buy STB while reducing the level of individual subsidy from the current level of 70 to 50 euros.

Italy envisages that at the start of 2006, analogue broadcasting will be withdrawn for 70% of the population, and that the final analogue switch-off will take place on 21 July 2006.

#### **4.1.III. HUNGARY**

Hungary prepared a switchover plan in 2000, although coordination is still underway. Under the plan, three multiplexes should use 17 existing and 3 new transmitters. They will use channels in the 478-862 MHz frequency band.

They envisage future need for 7 DVB-T multiplexes in the UHF band and one in the VHF band.

ANTENNA HUNGARIA is undertaking test broadcasting in two places: four transmitters are operating in the capital Budapest (2 x 1 kW, 2 x 100 W), and one in the west of the country (1 x 2 kW). The multiplex includes only public television stations (MTV 1, MTV 2, Duna TV).

A decision on the introduction of DVB-T is currently in the government procedure, but the switchover to digital broadcasting is expected to start in 2007.

#### **4.1.IV. CROATIA**

Croatia began test transmissions of the DVB-T system in May 2002 from two transmitters (2 x 250 W), with the test covering Zagreb and the surrounding area. Test transmissions are being done by OiV (Transmitters and Communications) together with HRT (Croatian Radio Television) in order to test different methods of operation; in particular, they wish to test SFN network operation.

At present there is also a transmitter operating at Učka (channel UHF 28) covering the Rijeka region, and also extending into Slovenia and in part also into Italy. The next area due to be covered by DVB-T signal is the eastern part of Osijek. The multiplex broadcasts four programmes (HRT 1, HRT2, Nova TV and RTL Television).

It is expected that six multiplexes will be needed in future for digital broadcasting. At present there are no spare frequencies to plan the national high-power digital broadcasting coverage network, since a fourth national analogue network has been established. They plan to obtain digital networks by altering existing frequencies for analogue broadcasting to digital.

The Croatian government has not yet adopted an official document defining the introduction of digital broadcasting, the switch-off of analogue services and the allocation of licences.

#### **4.2 Summary of status around the world**

In the USA, the Federal Communications Commission is currently planning the withdrawal of analogue TV broadcasting and the reallocation of the released spectrum by 1 January 2009. A binding decision on the deadline for the transition to DTV was adopted in 2005 in line with the instructions of FCC chairman Michael Powell at the consumer electronics fair in Las Vegas in January 2005.

South Korea has announced that it will withdraw analogue terrestrial broadcasting by the end of 2010, while Japan will do so by 2011.

#### **4.3 Summary of status in the Republic of Slovenia**

In the Republic of Slovenia there is a clear need for local television and radio content. The main reason for this is the existence of the Italian and Hungarian national minorities and the cultural and social diversity of environments, which also required diversity in media treatment, which in future will have to be maintained.

It is important to ensure the right of citizens to freedom of expression and the right to information on the local level, through broadcasters based outside the capital of the Republic of Slovenia. Such programmes (programmes of special importance) are an important addition to national RTV programmes: they ensure media pluralism, more equal development of all regions in the country and the identity of the community for which the programme is intended.

Digital broadcasting can offer a wide range of high-quality programmes and services; the Republic of Slovenia will strive to exploit as far as possible the transition to new broadcasting technology to maximise media pluralism and the diversity of programme contents.

At present in the Republic of Slovenia there are 57 television and 96 radio outlets registered, of which 22 television and 84 radio stations are broadcast using analogue technology, while 14 television stations and one radio station use cable distribution networks or the Internet to transmit their programme content.

National coverage by analogue broadcasting covers five television stations. We have 26 stations with the status of programmes of special importance, of which 19 are radio stations – one not-for-profit – and 7 are television stations.

The public radio and television broadcaster RTV Slovenia uses satellite broadcasting to transmit two national television and six national radio channels on the Eutelsat Hot Bird satellite at position 13°E using the DVB-S system with conditional access using the Viaccess system. In addition to the public RTV, TV Pika also transmits by satellite on the Hellas Sat 2 satellite.

Cable distribution network operators in major towns offer digital packages via their cable networks using the DVB-C system; in addition, Ljubljanski Kabel uses the Point to Multipoint digital wireless system, named Lastovka.

Since 2001, RTV Slovenia has been test transmitting on channel 37 from the transmitter on Krim using a terrestrial digital television signal in order to measure and check the area of coverage. It uses the DVB-T system, version 64 QAM, code rate 2/3, guard interval 1/4.

Likewise, RTV Slovenia as early as 1997 began test T-DAB transmissions of radio signals on channel 12 from the transmitter at Krvavec.

The radio and television programmes of RTV Slovenia, as well as those of certain other broadcasters, can be received on the Internet. SIOL offers ADSL broadband subscribers the SIOL-TV service, which includes more than 100 digital television programmes.

Statistics show that there are 640,000 households in the Republic of Slovenia. Of these, roughly 50% can receive television and radio stations via cable access. In turn, more than 70% of these can receive digital television via cable (DVB-C).



#### 4.4 Evaluation of the media market in the Republic of Slovenia

In accordance with European criteria, a television market shall be deemed to have reached the most essential level of diversity and pluralism if on the national level there are at least three broadcasters whose signals reach the majority of the population.

In adopting the list of the most important events that must be available to the majority of the population, it was found that in the Republic of Slovenia, this condition is met by RTV SLO with two stations, POP TV, Kanal A and PRVA TV. Here we must add that in line with the recommendations for smaller countries, in which the advertising market is limited, it is acceptable if there is only one private broadcaster, since available foreign channels also contribute to pluralism. With regard to these criteria, the television market in the Republic of Slovenia is sufficiently developed.

The television market currently has the following range:

##### REVIEW OF TV CHANNELS – source APEK, 07 November 2005

No.	Channel name	Status	Holder	No. of decisions
1	ATV SIGNAL LITIJA	status of local television programme of special importance	ATV BABNIK & CO d. n. o., Pokopališka pot 8 1270 LITIJA	4
2	EPTV	no status of special importance	EURO 3 TV, d. o. o., Ljubljana Tivolska 50 1000 LJUBLJANA	1
3	K 10	no status of special importance	RTV Trbovlje, d. o. o., Savinjska 35 1420 TRBOVLJE	1
4	KANAL 10	status of local television programme of special importance	TV IDEA – KANAL 10, d. o. o., Staneta Rozmana 1c 9000 MURSKA SOBOTA	1

5	KANAL A	no status of special importance	Kanal A, d. o. o., Kranjčeva 26 1000 LJUBLJANA	12
6	LOKA TV	no status of special importance	Loka TV, d. o. o., Kapucinski trg 7 4220 ŠKOFJA LOKA	1

7	MOJ TV	no status of special importance	MOJ TV, d. o. o., Mariborska cesta 65 A 2352 SELNICA OB DRAVI	1
8	POP TV	no status of special importance	POP TV, d. o. o., Ljubljana Kranjčeva 26 1000 LJUBLJANA	33
9	PRVA TV	no status of special importance	Prva TV, d. o. o., Ljubljana Vojkova cesta 58 1000 LJUBLJANA	11
10	RTS	status of regional television programme of special importance	Tele 59, d. o. o. Meljska cesta 34 2000 MARIBOR	1
11	STUDIO AS – lokalni TV-program	no status of special importance	HI-FI VIDEOSTUDIO, d. o. o., Studio AS Slovenska 52 9000 MURSKA SOBOTA	1
12	TELEVIZIJA CELJE	status of local television programme of special importance	TV CELJE, d. o. o., Mariborska 86 3000 CELJE	2
13	TELEVIZIJA KOPER CAPODISTRIA /TV KC/: televizijski program	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	12

	za italijansko narodno skupnost in TELEVIZIJA KOPER CAPODISTRIA /TV KC/: regionalni televizijski program			
14	TELEVIZIJA MARIBOR – TELE M	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	3
15	TELEVIZIJA SLOVENIJA 1 /SLO1/	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	203
16	TELEVIZIJA SLOVENIJA 2 /SLO 2/	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	183
17	TV PIKA	no status of special importance	TELEVIDEO, d. o. o., Ljubljana Mala vas 23b 1000 LJUBLJANA	1
18	TV PRIMORKA	status of local television programme of special importance	VA VIDEO AUDIO FILM, d. o. o., POLJE 5 5290 ŠEMPETER PRI GORICI	2
19	VAŠA TELEVIZIJA	status of regional television programme of special importance	VTV Studio, d. o. o., Žarova cesta 10 3320 VELENJE	3
20	Vaš kanal	status of regional television programme of special importance	TELEVIZIJA NOVO MESTO, d. o. o., Podbevškova ulica 12 8000 NOVO MESTO	1

The criteria for protection of pluralism in the radio market vary greatly in different European countries, but the general principle applies that more broadcasters are necessary than in the television market.

This involves different combinations of rules due to different ownership, the populations covered by individual programmes and respect for regional and local diversity.

Slovenian legislation has until now ensured the conditions for the creation of an exceptionally wide range of national, commercial, regional and local programmes and programmes of special importance. We still do not have a final, sufficiently accurate picture of the position and the programme diversity of radio media in Slovenia, but one is being prepared and will be completed shortly.

From the available data based on a media survey, we can conclude that the radio market in the Republic of Slovenia is sufficiently developed and that the level of programme diversity is adequate.

Offer of radio programmes:

**TABLE OF RADIO PROGRAMMES – source APEK, 07 November 2005**

<b>No.</b>	<b>Channel name</b>	<b>Status</b>	<b>Holder</b>	<b>No. of decisions</b>
1	ALPSKI VAL	status of local radio programme of special importance	RADIO KOBARID, d. o. o., Gregorčičeva 20 5222 KOBARID	1
2	INFORMATIVNI VAL	no status of special importance	QUADRUM, d. o. o., Tomaj 33 6221 DUTOVLJE	1
3	KOROŠKI RADIO	status of regional radio programme of special importance	KOROŠKI RADIO, d. o. o., Slovenj Gradec Meškova 21 2380 SLOVENJ GRADEC	1
4	Mariborski Radio Študent –MARŠ	status of student radio programme of special importance	Zavod Mariborski radio Študent – Marš, Gosposvetska Cesta 83 2000 Maribor	1

5	MOJ RADIO	no status of special importance	MOJ RADIO BORIS SUŠIN, s. p., Kidričeva 2b 3320 VELENJE	1
6	MURAVIDEK MAGYAR RADIO	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	1
7	NOTRANJSKI RADIO	no status of special importance	NOTRANJSKI RADIO d. o. o., Logatec Tržaška 148 1370 LOGATEC	2

8	ONDA BLU RADIO CAPODISTRIA	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	2
9	RADIO 1	no status of special importance	FORCOM, d. o. o., Dunajska 106 1000 LJUBLJANA	2
10	RADIO 94	no status of special importance	Radio 94, d. o. o., Kolodvorska 5a 6230 POSTOJNA	3
11	RADIO ALFA	no status of special importance	ALFA KOMERCIALNI RADIO, d. o. o., Ronkova 4 2380 SLOVENJ GRADEC	2
12	RADIO ANTENA	no status of special importance	RADIO ANTENA, d. o. o., Ljubljana, Slovenska 15 1000 LJUBLJANA	1
13	RADIO BAKLA	no status of special importance	NOBLESSE, d. o. o., Rečica 22 3327 ŠMARTNO OB PAKI	1
14	RADIO BELVI	no status of special importance	RADIO BELVI d. o. o., ŠMARJETNA 6 4000 KRANJ	1
15	RADIO BELVI GORENJSKA	no status of special importance	BIROTEH, d. o. o., Jesenice Hrušica 175 4270 JESENICE	1
16	RADIO BREZJE	no status of special importance	RADIO BREZJE d. o. o., Ulica Borcev 1b 2000 Maribor	1
17	RADIO BREŽICE	no status of special importance	RADIO BREŽICE, d. o. o., Trg Izgnancev 12	2

			8250 BREŽICE	
18	RADIO CAPRIS	no status of special importance	RADIO CAPRIS, d. o. o., Ulica 15. maja 10/b 6000 KOPER	2
19	RADIO CELJE	status of regional radio programme of special importance	NT&RC, d. o. o., Prešernova 19 3000 CELJE	4
20	RADIO CENTER	no status of special importance	RADIO CENTER, d. o. o., Žitna Ulica 12 2000 MARIBOR	2
21	RADIO CITY	no status of special importance	RADIO CITY d. o. o., Slovenska Ulica 35 2000 Maribor	2
22	RADIO DUR	no status of special importance	RADIODUR, d. o. o., Žerjalova 8 1000 LJUBLJANA	2

23	RADIO ENERGY	no status of special importance	PUNTAR, d. o. o., Cesta krških žrtev 135 8270 KRSKO	1
24	RADIO FANTASY	no status of special importance	ŠPRAH, d. o. o., Škofja Vas 51/B 3211 ŠKOFJA VAS	1
25	RADIO FANTASY MARIBOR	no status of special importance	ŠPRAH, d. o. o., Škofja Vas 51/B 3211 ŠKOFJA VAS	1
26	RADIO FANTASY VELENJE	no status of special importance	ŠPRAH, d. o. o., Škofja Vas 51/B 3211 ŠKOFJA VAS	1
27	RADIO GAMA MM	no status of special importance	R GAMA - MM, d. o. o., Stegne 21c 1000 LJUBLJANA	1
28	RADIO GEOSS	no status of special importance	Mahkovec Š&D, d. n. o., Valvazorjev Trg 3 1270 LITIJA	1
29	RADIO GLAS LJUBLJANE	no status of special importance	RADIO GLAS LJUBLJANE, d. d., Ljubljana, Cesta 24. Junija 23 1000 LJUBLJANA	3
30	RADIO GOLDI PREBOLD	no status of special importance	MIDI-RADIO GOLDI, d. o. o., Dolenja Vas 182 3312 PREBOLD	1
31	RADIO GORENC	status of local radio programme of special	RADIO GORENC, d. o. o., Balos 4 4290 TRZIC	2

		importance		
32	RADIO HIT	no status of special importance	R Domžale, d. o. o., Ljubljanska 36 1230 DOMZALE	4
33	RADIO KOPER /RADIO KP/	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	7
34	RADIO KRANJ - GORENJSKI MEGA SRČEK	status of regional radio programme of special importance	RADIO KRANJ, d. o. o., Slovenski Trg 1 4000 KRANJ	1
35	RADIO KRKA	no status of special importance	RADIO KRKA Novo Mesto, d. o. o., Ljubljanska Cesta 26 8000 NOVO MESTO	1
36	RADIO KUM	status of regional radio programme of special importance	Radio Kum Trbovlje, d. o. o., Trg Svobode 11a 1420 TRBOVLJE	1

37	RADIO LASER SLOVENJ GRADEC	no status of special importance	LASER, d. o. o., Sejmiška 3 2380 SLOVENJ GRADEC	1
38	RADIO LJUBLJANA	no status of special importance	SODA, d. o. o., Pot na Goro 15 1211 LJUBLJANA - SMARTNO	1
39	RADIO MARIBOR	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	2
40	RADIO MAX	no status of special importance	Santi, d. o. o., Rozmanova Cesta 34 8000 NOVO MESTO	3
41	RADIO MAXI - PRLEŠKI VAL	no status of special importance	RECAL, d. o. o., Ul. Dr. Franca Kovačiča 22 9240 LJUTOMER	1
42	RADIO MORJE	no status of special importance	FORCOM, d. o. o., Dunajska 106 1000 LJUBLJANA	1
43	RADIO MURSKI VAL	status of regional radio programme of special importance	PODJETJE ZA INFORMIRANJE, Murska Sobota d. d., Arhitekta Novaka 13 9000 MURSKA SOBOTA	2
44	RADIO NET FM	no status of special importance	RADIO NET, d. o. o., Loška Cesta 13 2000 MARIBOR	1
45	RADIO NOVA	no status of special importance	NOVA NOVA, d. o. o., Ajdovščina Goriška Cesta 17 5270 AJDOVSCINA	1
46	RADIO ODEON	no status of special	ARTIST, d. o. o., Semiška Cesta 4	1

		importance	8340 ČRNOMELJ	
47	RADIO ODMEV	status of local radio programme of special importance	RADIO CERKNO, d. o. o., Platiševa 39 5282 CERKNO	4
48	RADIO OGNJIŠČE	status of not-for-profit radio programme of special importance	Radio Ognjišče, d. o. o., Trg Brolo 11 6000 KOPER	13
49	RADIO ORION	no status of special importance	INTERTEH, d. o. o., Požarnice 78 h, Vnanje Gorice 1351 BREZOVICA	1
50	RADIO PLUS MARIBOR	no status of special importance	B.&B. BELNA, d. o. o., Slovenska Ulica 11 2212 SENTILJ	1

51	RADIO PORTOROŽ	no status of special importance	ENIMAR, d. o. o., Cesta na Markovec 57 6000 KOPER	1
52	RADIO PRLEK	no status of special importance	ZAVOD ZA INFORMIRANJE Kolodvorska Ulica 9 2270 ORMOŽ	1
53	RADIO PTUJ	status of regional radio programme of special importance	RADIO TEDNIK Ptuj, d. o. o., Raičeva 6 2250 PTUJ	2
54	RADIO RADIO	no status of special importance	MEDIA TON, d. o. o., Trubarjeva Ulica 9 9252 RADENCI	1
55	RADIO RADLJE	no status of special importance	RADIO RADLJE, d. o. o., Mariborska 8 a 2360 RADLJE OB DRAVI	1
56	RADIO ROBIN	status of local radio programme of special importance	RADIO ROBIN, d. o. o., Tolminskih Puntarjev 12 5000 NOVA GORICA	1
57	RADIO ROGLA	no status of special importance	NOVICE, d. o. o., Mestni Trg 7 3210 SLOVENSKE KONJICE	2
58	RADIO SALOMON	no status of special importance	RADIO GLAS LJUBLJANE d. d., Ljubljana, Cesta 24. Junija 23 1000 LJUBLJANA	2
59	RADIO SAVINJA	no status of special importance	MOSKOTEVC MARKETING, d. o. o, STOPCE, Stopče 31 3231 GROBELNO	1
60	RADIO SEVNICA	no status of special importance	RADIO SEVNICA, d. o. o. Naselje Heroja Maroka 14 8290 SEVNICA	1



61	RADIO SLOVENIA INTERNATIONAL /Radio Si/	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	3
62	RADIO SLOVENIJA 2 - PROGRAMME VAL 202 /VAL 202/	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	36
63	RADIO SLOVENIJA 1 - PROGRAMME A1 /A1/	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	33
64	RADIO SLOVENIJA 3 - PROGRAMME ARS /ARS/	programme RTV SLO	RTV Slovenija Kolodvorska 2 1000 LJUBLJANA	19

65	RADIO SLOVENSKE GORICE	status of regional radio programme of special importance	RADIO SLOVENSKE GORICE, d. o. o., Trg Osloboditve 5 2230 LENART V SLOVENSКИH GORICAH	1
66	RADIO SORA	status of regional radio programme of special importance	Radio Sora, podjetje za informiranje, d. o. o., Kapucinski Trg 4 4220 SKOFJA LOKA	3
67	RADIO SRAKA	no status of special importance	SRAKA International, d. o. o., Valantičevo 17 8000 NOVO MESTO	1
68	RADIO ŠPORT	no status of special importance	OPTIMEDIA, d. o. o., Ljubljana Celovška 150 1000 LJUBLJANA	1
69	RADIO ŠTAJERSKI VAL	status of regional radio programme of special importance	RADIO ŠTAJERSKI VAL, d. o. o., Aškerčev Trg 21 3240 SMARJE PRI JELSAH	2
70	RADIO TARTINI	no status of special importance	SU & CO, d. o. o., Piran Trg 1. Maja 3 6330 PIRAN	1
71	RADIO TEMPO	no status of special importance	RADIO TEMPO MATJAŽ JERSIČ, s. p., Polzela 131 3313 POLZELA	1
72	RADIO TRIG LAV	status of regional radio programme of special importance	RADIO TRIG LAV JESENICE, d. o. o., Trg Toneta Cufarja 4 4270 JESENICE	4
73	RADIO UNIVOX	status of local radio programme of special importance	UNIVOX, d. o. o., Rožna Ulica 39 1330 KOCEVJE	2
74	RADIO URBAN	no status of special importance	RADIO URBAN, d. o. o., Merharjeva Ulica 3 1310 RIBNICA	1

75	RADIO VAL	no status of special importance	QUADRUN, d. o. o., Tomaj 33 6221 DUTOVLJE	3
76	RADIO VELENJE	no status of special importance	Naš čas, d. o. o., Kidričeva Cesta 2/A 3320 VELENJE	2
77	RADIO VESELJAK	no status of special importance	RADIO GLAS LJUBLJANE, d. d., Ljubljana Cesta 24. Junija 23 1000 LJUBLJANA	2

78	RADIO VIVA	no status of special importance	MEDIA INFO, d. o. o., Bakovska Ulica 2 9000 MURSKA SOBOTA	2
79	RADIO ZELENi VAL	no status of special importance	Alpe Adria "Zeleni val", d. o. o., Spodnja Slivnica 16 1290 GROSUPLJE	2
80	SLOVENSKI POSLOVNI KANAL IN POSLOVNI VAL	no status of special importance	FORCOM, d. o. o., Dunajska 106 1000 LJUBLJANA	1
81	STUDIO D NOVO MESTO	status of regional radio programme of special importance	Studio D, d. d., Seidlova 29 8000 NOVO MESTO	1
82	STUDIO ZOS	no status of special importance	SNOOPY-HOLC IN DRUŽBENIKI, d. n. o., Cesta Zmage 33 1410 ZAGORJE OB SAVI	1

#### 4.5 Economic aspects

The switchover procedure must be market-oriented while at the same time requiring joint coordination to achieve equal and market-based implementation (e.g. compatibility of schedules, joint presentations).

Member states that relied not only on market-based methods but also on clear measures of public policy to coordinate television broadcasters are quicker in adopting and switching to digital.

One important feature of coordination is the agreement on time coordination of different levels. This provides greater security for market actors who supply digital products and services, and supports them in fostering demand. National switchover procedures therefore have benefits from the advantages of well-focused coordination of all significant actors.

On the member-state level, rapid switchover brings immediate benefits.

Time coordination and the duration of the transition are decisive factors. The sooner the switchover procedure begins, and the shorter the transition period, the sooner the benefits will be realised. Public acceptance and understanding of the advantages of digital television, as well as general understanding of the additional benefits to be obtained after the withdrawal of analogue terrestrial television and the replacement of cable networks will be important in accelerating the transition process.

Retail prices for digital receivers have fallen considerably since the first European Commission report on the switchover. The price of integrated television receivers has also fallen. For most citizens, the purchase of equipment for digital television is no longer a problem.

No accurate studies have been carried out on the costs arising in the transition period and the extent of this increase compared to the current analogue broadcasting system. We can however conclude from examples of foreign practice that the rise in costs due to dual transmission is somewhere between 40% and 70%. Energy savings after the transition will be proportionately greater, since essentially one new transmitter will replace three or four old ones.

Following on from this, we must consider whether the variant with rapid transition, with the concomitant financing/subsidising of the purchase of set top boxes (STBs) by users, is more acceptable for providers in economic terms. Such measures have proven effective in Germany (Berlin), and they also show good effects in Italy. The problem that arose is that on the EU level there is no established practice and the legal options are not defined in sufficient detail.

European Union documents relating to policy on the switchover from analogue to digital broadcasting at present mainly focus on terrestrial basis.

The principle of technology neutrality emphasised in the regulatory framework of the European Union means that arrangements may not impose or disregard the use of individual technologies.

However, it does not prevent member states from adopting proportionate measures to promote individual technologies for digital television transmission as a means to increase spectrum efficiency.

The European Commission nevertheless warns that the transition to digital TV is a procedure covering various networks, business models and services, where each different treatment of market actors or technologies must be justified.

In proceedings before the European Competition Committee (led by Neelie Kroes), the Association of Cable Operators in Berlin launched a dispute, accusing MAAB (Berlin/Brandenburg Broadcasting Regulation Agency) of unjustified financing (compensation) of commercial broadcasting providers amounting to 4 million euros to cover the costs of digital terrestrial broadcasting in the city of Berlin. The decision in this case will strongly influence the ongoing switchover and the development of

terrestrial digital television. The denouement, which also involved the industry commissioner Günther Verheugen and the information society commissioner Viviane Reding, showed that the intervention was unlawful, and so the European institutions designed instructions on acceptable forms of public support. These are:

- Investment in transmission networks in areas of poor coverage and of less commercial interest to investors (rural regions, less populated areas)
- Financial compensation to public RTV for the cost of broadcasting using all broadcast technologies, thereby ensuring coverage of the whole population through public service provision;
- Subsidies for users to buy digital decoders, provided they are technology-neutral, and particularly if they encourage the use of open standards for interactivity;
- Financial compensation to broadcasters that have to switch off analogue broadcasting for specific interests before the expiry of their licences, if so doing would ensure capacity for digital broadcasting.

On the other hand, the USGAO (United States General Accounting Office) carried out a study on the success of the switchover to digital broadcasting in the Berlin case, which showed the most positive effects in the shortest time. The Americans conducted the study due to the difficulties that emerged in their switchover procedure, as they found that they would not achieve the planned completion of the switchover in December 2006.

They investigated the structure and arrangement of the German market as a whole, the progress of the Berlin switchover project and its critical components and negative side effects. They found that the organisation of the German television market is based on two levels.

The upper level is regulated throughout the country by state institutions responsible for the legislative framework and the allocation of frequency licences, while the lower level comprises regional governments with 15 media institutions responsible for implementation and regulation within the framework of their regions and competences. All are financed from mandatory RTV licences (16 euros per month per household). The latest data show that fewer than 7% of Germans receive TV signals terrestrially, with most receiving signals by cable (cost approximately 15 euros per month per connection) or satellite (cost of purchase and installation).

Following on from these data and facts, on the level responsible for media policy, industry and the economy, a detailed plan was prepared for a rapid switchover to digital broadcasting. Here the primary objective was to increase the importance, power and existence of terrestrial transmission of broadcast signals by introducing digital broadcasting. Gaining a frequency dividend was not the basic purpose (as in the USA).

Another very important finding was that a switchover in the framework of so-called islands or regions is more logical and reasonable than a one-off general and comprehensive switchover. This also concentrates transmission of broadcast signals more in terrestrial platforms.

The data that showed the successful transition to digital broadcasting in Berlin are the short transitional phase of parallel broadcasting (10 months), financial and other support to private programme providers, subsidies for low-income households, providing equipment to households with STBs dependent solely on terrestrial reception, and a very intensive public information campaign on the sense and benefits of digital terrestrial broadcasting.

Given that in America, a supply of digital signals (programmes) has already been ensured, it is already in the transitional phase of parallel broadcasting. The transition dynamic has slowed slightly, particularly among users, and so it is the task of Congress and the Federal Communications Commission to attempt to promote and further encourage households to purchase STBs or digital television sets, since until the majority have digital reception technology, analogue transmitters cannot be switched off and the frequency dividend cannot be exploited.

Based on the German and American examples, we can conclude that planning of the analogue to digital switchover strategy and its implementation must include and consider the advantages and disadvantages for all actors or stakeholders involved, and set out and emphasise the added value and new services (digital added value) brought about by digital broadcasting.

Economic impact on individual actors – stakeholders after the switchover:

IMPACT: ACTOR:	INVESTMENT:	GAIN:
CONTENT PROVIDERS	<ul style="list-style-type: none"> <li>– new studio equipment</li> <li>– new communications for signal transmission</li> <li>– new production method</li> </ul>	<ul style="list-style-type: none"> <li>– lower transmission costs</li> <li>– possible higher advertising revenues</li> <li>– new revenues</li> </ul>
NETWORK OPERATORS	<ul style="list-style-type: none"> <li>– new transmission equipment</li> <li>– new antenna systems</li> <li>– partly new connections</li> </ul>	<ul style="list-style-type: none"> <li>– lower energy consumption</li> <li>– rationalisation of equipment and premises</li> <li>– cheaper monitoring</li> </ul>
USERS – VIEWERS	<ul style="list-style-type: none"> <li>– new receiving equipment</li> <li>– partly new antenna systems</li> </ul>	<ul style="list-style-type: none"> <li>– less equipment needed (all in one)</li> <li>– lower energy consumption</li> </ul>

EQUIPMENT MANUFACTURERS	<ul style="list-style-type: none"> <li>– adoption of new technologies</li> <li>– new machines</li> </ul>	<ul style="list-style-type: none"> <li>– new jobs</li> <li>– sales opportunities</li> <li>– rationalisation of production and materials</li> </ul>
STATE, PUBLIC ADMINISTRATION	<ul style="list-style-type: none"> <li>– financing information campaigns</li> <li>– envisaged subsidised equipment and certain services</li> </ul>	<ul style="list-style-type: none"> <li>– greater competition and media pluralism</li> <li>– frequency dividends</li> </ul>

During preparation of the switchover strategy, a rough estimate was made of the cost of setting up transmission infrastructure for one network for one DVB-T multiplex.

The case led to the following conclusions:

1. multiplex (coders, MP, additional signals) SIT 100 m
  2. transmitters and converters
    - transmitters (10 stations, P = 2 kW)) ... SIT 600 m
    - converters (200 locations, P = 200 W) .. SIT 400 m
  3. Communications for transmission of modulation signals ... SIT 500 m
  4. Other costs – 20 % ..... SIT 320 m
- TOTAL: approximately SIT 2000 m

We must emphasise that in this case the necessary building work and investment in antenna systems, tower construction and power systems, which in individual cases in existing configurations will not be suitable for digital broadcasting, are not taken into account. These costs at present cannot be forecast, since it is necessary to carefully and precisely prepare a plan of coverage and transmitter network as well as calculations of mutual interference of individual transmitters.

For operators with several multiplexes or in the event of collocation for multiple multiplexes with a single antenna system, this cost would be much lower (see the figure on page 65).

If the transmission system included redundancy, the calculation of item 2 for transmitters and converters would be increased by roughly 40% – and thus SIT 1700 m – but such a system would ensure greater network stability.

Given the rough estimate, we can conclude that the cost of one multiplex would be in the region of SIT 2-3000 m, while other would have lower costs assuming that they are included in the same network and use collocation.

#### 4.6 Social-policy aspects

A decisive factor for the success of the national switchover procedure is an effective strategy of consumer information regarding the availability of digital programmes and the necessary equipment to receive such programmes.

The switchover can also help better meet the special needs of people with disabilities, and attention should be paid to including accessibility requirements in the user interface, e.g. EPG (electronic programme guide) and receiver.

Example of EPG:



The introduction of digital broadcasting in the transitional period will cause additional costs for all actors. However, the improved economics of digital broadcasting and reception will mean a long-term fall. Consequently a coordinated and rapid transition is required.

The strategy for the switchover to digital broadcasting envisages eight-fold coverage (eight equal networks) for the Republic of Slovenia and three regions. It is based on coordination with neighbouring countries.

The switchover strategy encourages the entry of new competitors in all areas and at different levels of the value chain, and contributes to increased competition in the market and promotes innovation, new television and radio broadcasters, developers of interactive programmes and competition among operators of electronic communications networks.

It ensures the right of citizens to freedom of expression and the right to information on the local level, using programmes produced by broadcasters based outside the capital city of the Republic of Slovenia. It enables greater media pluralism and diversity of programme contents.

After the end of analogue broadcasting, part of the frequency spectrum released will be allocated to pan-European content and new services.

The policy for the switchover to digital broadcasting further envisages that users will have a choice of equipment required to receive digitally broadcast programmes, from the simplest and cheap solutions for the easiest transition, to top-end equipment enabling a combination of multiple digital televisions services. Of essential importance are compatibility of equipment that users already own with new and mutually compatibility among different providers.

The objective of the Republic of Slovenia is that the switchover to digital broadcasting means affordable options for the greatest possible majority of the population. We must ensure that those only interested in receiving free-to-air programmes can receive these programmes in digital broadcasting without disproportionate costs.

## **5. IMPLEMENTATION OF THE STRATEGY**

### **5.1 Technological switchover**

The switchover strategy is based on technological requirements that as far as possible will enable and encourage the switchover to and later also the development of digital broadcasting.

It takes account of compatibility with neighbouring countries and the ability of domestic industry to sell existing and planned technologies.

It enables the best use and management of the available frequency spectrum and later trading in the frequency spectrum dividends and the introduction of pan-European and new services.

Given general trends around the world, it envisages the merging of network operators (GSM, UMTS, WiFi, WiMAX, ADSL ...) and content providers (TV, radio, data) in so-called hybrid networks.

After coordination with neighbouring countries at the second part of the RRC-06 radio conference, to be held in Geneva, Switzerland in May and June 2006, we envisage 8 television networks for the Republic of Slovenia; given current technological standards, this will provide 32 different channels, as well as 3 additional radio networks in the VHF band.

Network planning is based on coordination of areas, referred to as ALLOTMENT. The maximum number of networks operating on the same frequency (SNF) is envisaged. This represents a substantial saving of the frequency spectrum. It is a condition of planning regions that interference caused by such a network in the neighbouring region does not exceed a limit value.



Preparation of the digital plan required definition of territorial units. The proposal envisages dividing the country into three basic units. For the digital plan, APEK divided Slovenia into three units: Western, Central and Eastern. Such a division is comparable in terms of the size of regions with those in neighbouring countries, which is a precondition for a balanced digital plan based on equal access to the frequency spectrum.

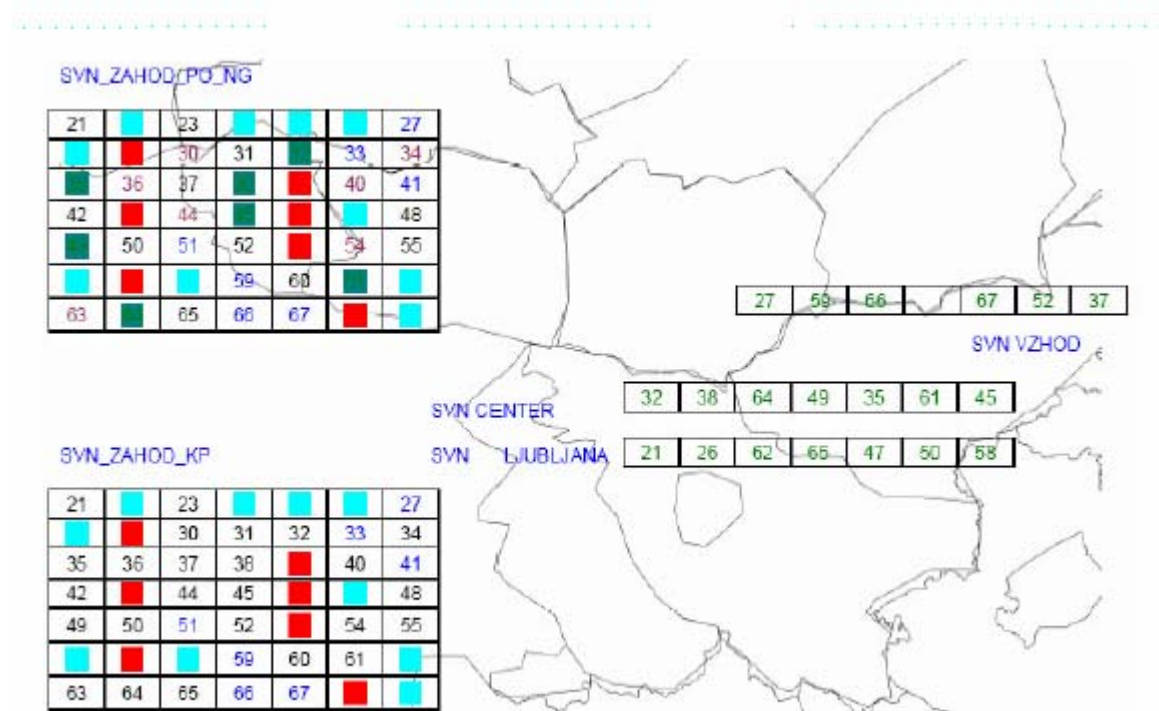
Digital transmitters will in addition to standard parameters (frequency or channel, location, radiation diagram, antenna orientation ...) also have the following additional parameters:

- modulation type COFDM (QPSK, 16-QAM, 64-QAM),
- code ratio ( $\frac{1}{2}$ ,  $\frac{2}{3}$ ,  $\frac{3}{4}$ ,  $\frac{4}{6}$ ,  $\frac{7}{8}$ ),
- guard interval ( $\frac{1}{4}$ ,  $\frac{1}{8}$ ,  $\frac{1}{16}$ ,  $\frac{1}{32}$ ),
- coding method (MPEG-2, MPEG-4)
- and other parameters linked to digital technology.

Digital networks can be planned for different reception methods:

- fixed reception (aerials on roofs),
- mobile reception (aerials built-into devices),
- portable reception (external aerial or built into device),
- portable reception in closed premises (external aerial, built into device of building fittings).

### Division of the Republic of Slovenia into territorial units:



The proposed division into territorial units – regions – which will be the final state after the switchover, envisages dividing the country into three basic units and two special units.

The Ljubljana unit follows from the fact that all capitals of European countries have their own special region and thus the possibility of dual coverage.

Division of the western unit into Nova Gorica and Koper units follows from the arrangement of bilateral relations with Italy, which formed a special region for the town of Trieste.

## **5.2 Basic starting points of the strategy**

The strategy for the switchover to digital broadcasting must be coordinated in terms of place and time, and must be adopted by all actors. The Ministry of the Economy – Directorate for Electronic Communications – and the Post and Electronic Communications Agency of the Republic of Slovenia will be responsible for implementation, coordination and oversight. It is based on clearly defined criteria and procedures and the following assumptions:

- Three switchover regions are defined.
- The Republic of Slovenia is divided into three units (EASTERN – V, CENTRAL – C, WESTERN – Z), with the WESTERN unit divided into two subunits, WESTERN – S and WESTERN – J.
- Criteria are defined for the “entry” of programme and content providers to the multiplex (division regarding type of programme and area of coverage).
- A frequency plan is prepared for the transition period for the first two multiplexes for DVB-T for each unit (MPEV-A, MPEV-B, MPEC-A, MPEC-B, MPEZNG-A, MPEZKP-A, MPEZNG-B, MPEZKP-B) and for the third multiplex for DVB-H in available urban regions (MPEV-C, MPEC-C, MPEZNG-C, MPEZKP-C).
- Multiplexes are inter-compatible in a national MPN-A, MPN-B and MPN-C (MPN-A = MPEV-A + MPEC-A + MPEZNG-A + MPEZKP-A).
- Subsequent multiplexes (including local) emerge in the third period or with regard to availability of the frequency spectrum in individual units.
- Basic programme channel for one MP and its capacity (general act of DTT) are defined.
- The switchover is implemented in line with the planned timetable.
- The start and end of the switchover for individual units/cells is determined

and coordinated.

- All actors are bound to coordinate their operation and respect deadlines set.

The basis for the launch of and transition to digital broadcasting is the availability of frequency space. It is already heavily used for analogue broadcasting, and so the Republic of Slovenia (APEK) has only a few analogue channels available (marked in green in the table) that are internationally coordinated under the Stockholm 61/Chester 97 agreements and not occupied by analogue technology.

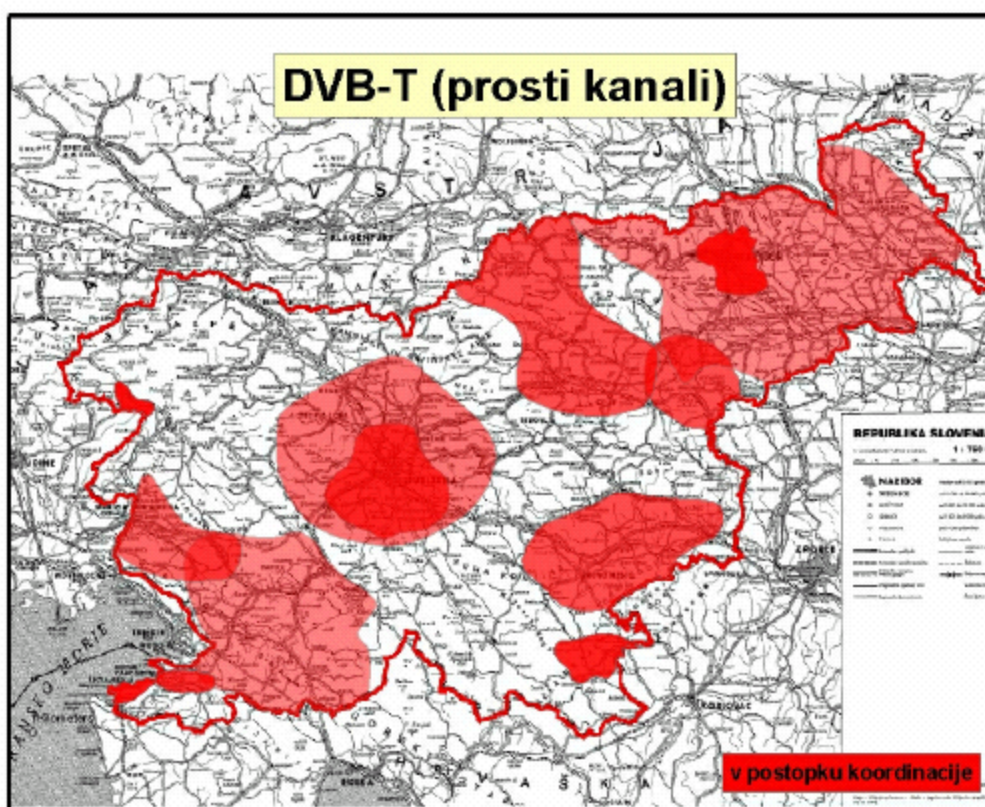
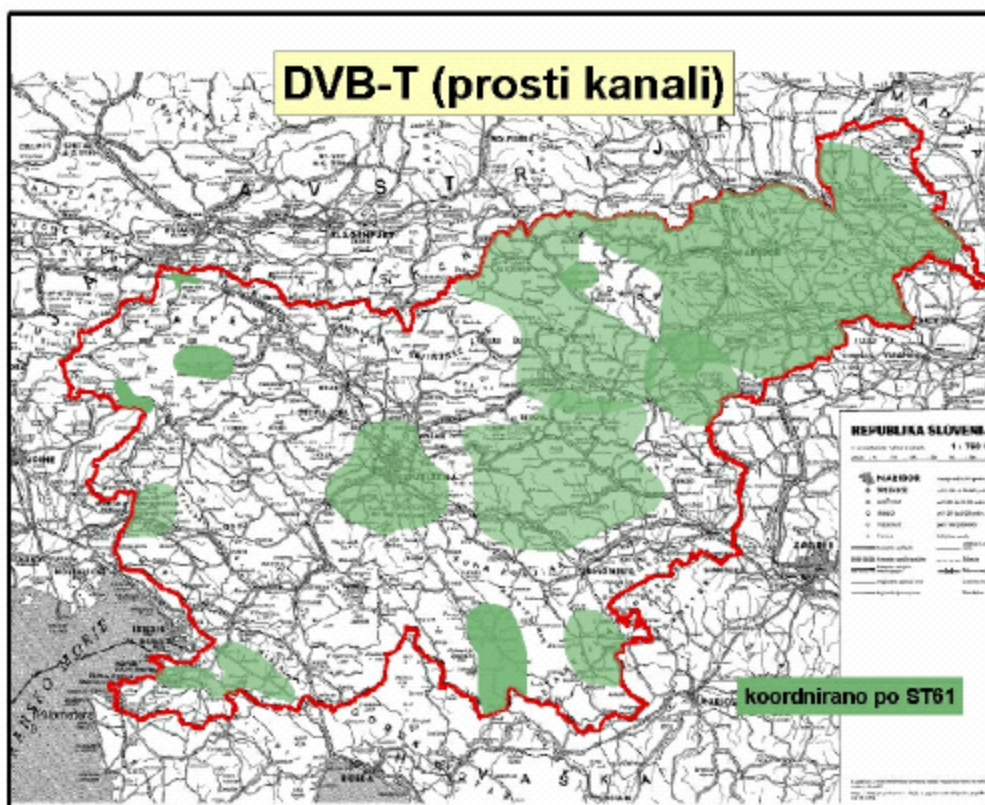
The CH 97 international agreement enables existing analogue channels to be changed into digital channels (with reduced power) without additional coordination with foreign countries.

**Table of channels, allocated to DVB – Source APEK (December 2005):**

<b>TRANSMITTER LOCATION:</b>	<b>CHANNEL:</b>	<b>AGREEMENT:</b>	<b>STATUS:</b>
TINJAN	K52	st61	
SKALNICA	K66	st61	
SLAVNIK	K67	st61	
KUK	K65	st61	
KUM	K64	st61	
KRIM	K37	st61	
POHORJE	K66	st61	
PLEŠIVEC	K67	st61	
BOČ	K42	st61	option K66,K67
MALA KOPA	K59	st61	
KRANJSKA GORA	K50	st61	
KRANJSKA GORA	K28	st61	
KOČEVJE	K53	st61	
KOČEVJE	K45	st61	
KUK	K57	st61 (Komna)	
KUK	K47	st61 (Komna)	
VOGEL	K57	st61 (Komna)	
VOGEL	K47	st61 (Komna)	
ČRNOMELJ	K61	st61	
TINJAN	K66		awaiting consent ITA
NANOS	K69		awaiting consent ITA
SVETI MIKLAVŽ	K45		awaiting consent HRV, AU
KRVAVEC	K63		awaiting consent HRV, BIH
KUK	K69		coordination required

KRVAVEC	K64		coordination required
KRIM	K64		coordination required
PLEŠIVEC	K66		coordination required
KRVAVEC	K37		coordination required
MIRNA GORA	K23		coordination required
MIRNA GORA	K27		coordination required
MIRNA GORA	K64		coordination required
MELJSKI HRIB	K42		coordination required
BOČ	K66		coordination required
KUK	K66		coordination required
TRSTELJ	K66		coordination required
BELI KRIŽ	K66		coordination required
POHORJE	K67		coordination required
BELI KRIŽ	K37		coordination required

**Coverage of channels allocated to DVB – source APEK:**





The channels mentioned can be converted and immediately used for the switchover to DVB-T networks. Since there are relatively few such channels and they cannot be used to construct two DVB-T networks, it is essential to use new digital channels that do not interfere with the currently operating analogue network. The coordinated channels can be supplemented in part by previous coordinated (marked in yellow in the table) and some new (marked in red) channels still awaiting international coordination. Such a range of channels allows the construction of two quality digital networks with national coverage and part of a third to cover urban centres, allocated to DVB-H.

Channels in networks A and B are selected based on two criteria:

- possibility of SFN operation,
- equality of networks A and B.

Thus networks A and B are comparable regarding coverage of the territory of the Republic of Slovenia, while network C consists of a set of channels not used in the other two networks. All three networks are designed so as not to interfere with the operation of existing domestic and foreign analogue transmitters.

Networks A and B can guarantee coverage of the majority of the population on the territory of the Republic of Slovenia, and later additional minor coverage with larger transmitter sites is also possible.

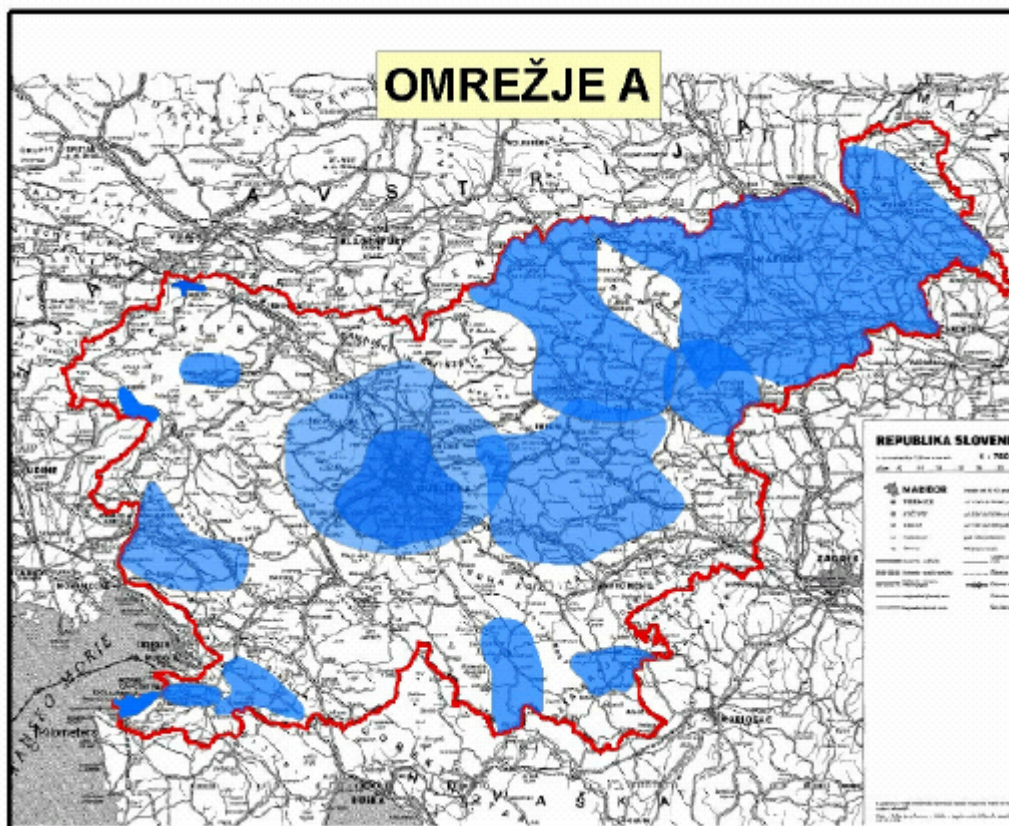
#### **Tables and diagrams of envisaged networks with statement of channels and transmitter locations – source APEK:**

##### **Network A – MPN-A:**

Internationally coordinated channels are marked in green, channels awaiting consent of one country are marked in yellow and internationally uncoordinated channels are marked in red.

<b>WESTERN – MPEZ</b>		<b>CENTRAL – MPEC</b>		<b>EASTERN – MPEV</b>	
KUK	66	KUM	64	POHORJE	66
TRSTELJ	66	KRVAVEC	64	PLEŠIVEC	66
TINJAN	66	KRIM	64	BOČ	66
BELI KRIŽ	66	MIRNA GORA	64		
SLAVNIK	67	KRANJSKA GORA	50		
		VOGEL	57		

##### **Coverage of network A – MPN-A:**

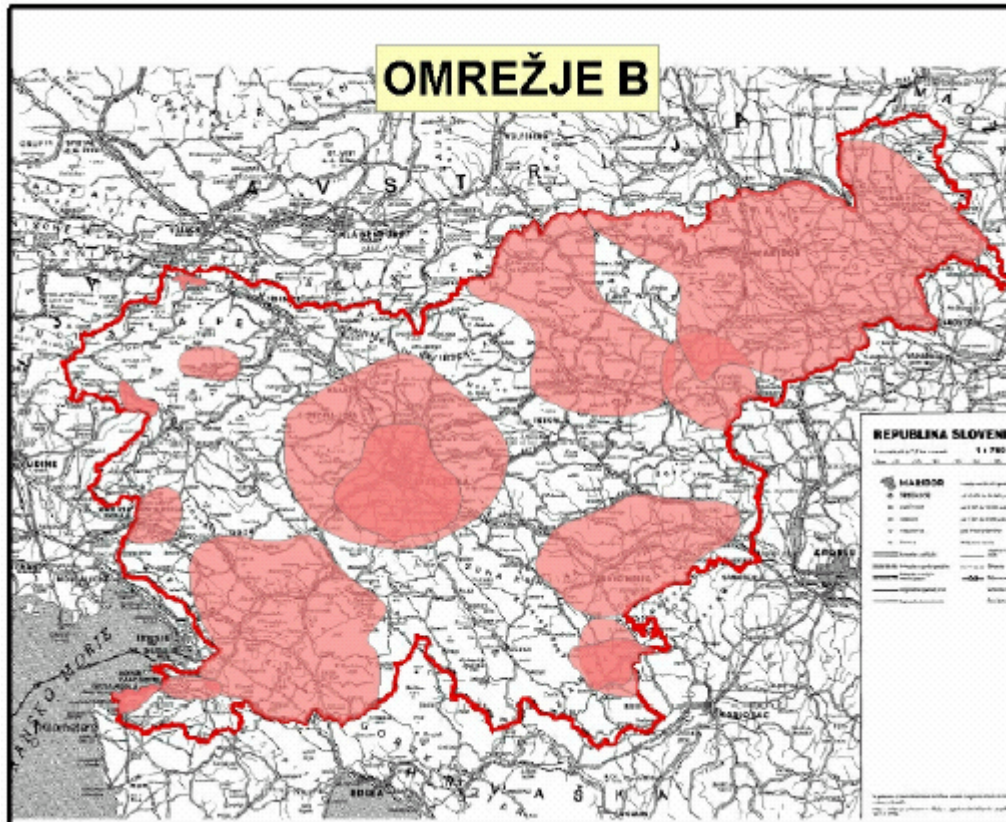


### Network B – MPN-B:

Internationally coordinated channels are marked in green, channels awaiting consent of one country are marked in yellow and internationally uncoordinated channels are marked in red.

WESTERN – MPEZ		CENTRAL – MPEC		EASTERN – MPEV	
NANOS	69	KRVAVEC	37	PLEŠIVEC	67
SKALNICA	66	KRIM	37	BOČ	42
KUK	69	ČRNOMELJ	61	POHORJE	67
TINJAN	52	KRANJSKA GORA	28		
BELI KRIŽ	37	MIRNA GORA	23		
		SV. MIKLAVŽ	45		
		VOGEL	47		

### Coverage of network B – MPN-B:



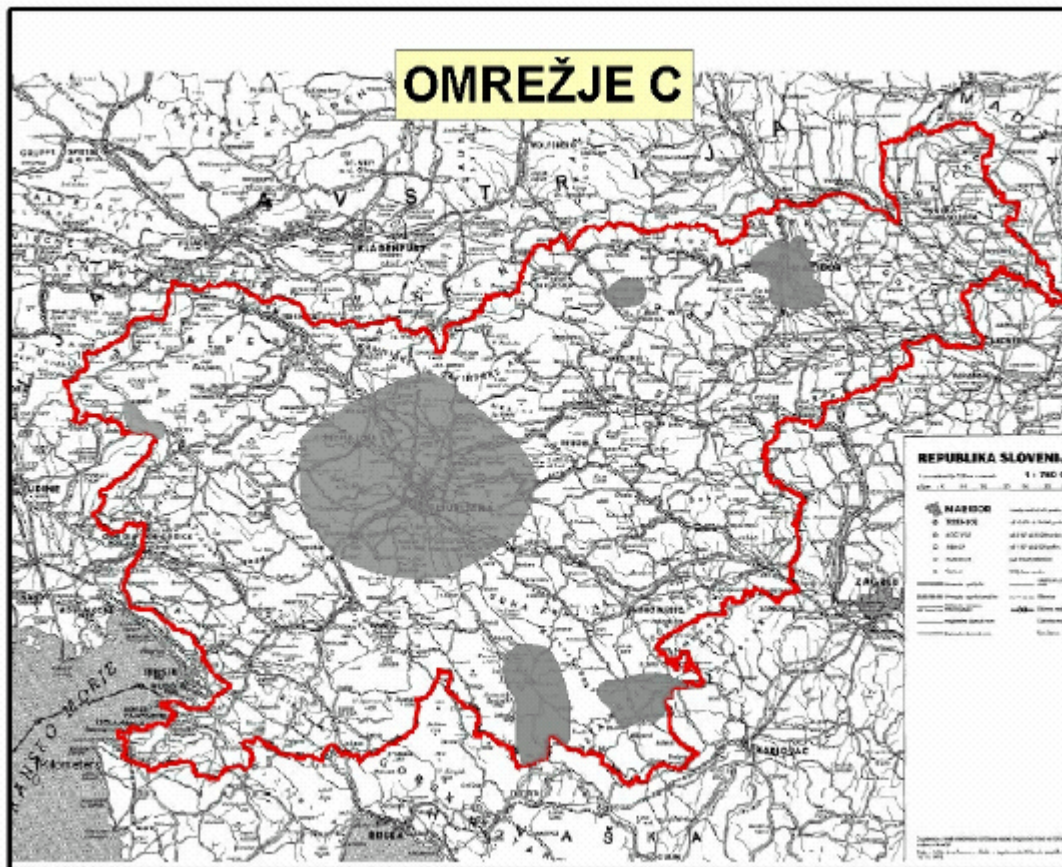
### Network C – MPN-C:

Internationally coordinated channels are marked in green, and internationally uncoordinated channels are marked in red.

WESTERN – MPEZ		CENTRAL – MPEC		EASTERN – MPEV	
KUK	65	KOČEVJE	45	MELJSKI HRIB	42
		KRVAVEC	63	MALA KOPA	59
		MIRNA GORA	27		

### Coverage of network C – MPN-C:





In digital broadcasting, multiple partners establish links (multiplex, group of companies, joint-stock company, consortiums), set rules and agree on mutual rights and responsibilities.

Multiplex operators apply to tenders for ODRF-D (digital broadcasting licences) under the conditions in the law and the criteria prescribed by APEK.

On acquiring an ODRF-D, the multiplex operator also becomes the operator of a multiplex. It concludes contractual relations with content providers/publishers for the preparation and production of programming and data content.

It is possible for the multiplex operator and the content provider/publisher to be part of a single legal entity (ownership links), but separate and transparent cost accounts must be provided and the most efficient use of the frequency spectrum or multiplex must be assured. This means that the multiplex operator must also include other programmes if it does not provide enough of its own to fully occupy the multiplex, or under the regulations and criteria stipulated by the law and criteria.

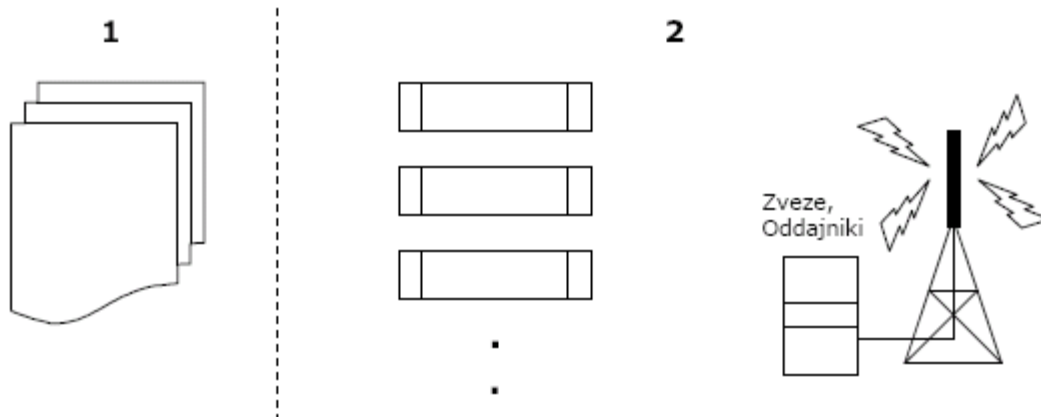
### **New definition of subjects in digital broadcasting:**

– **CONTENT PROVIDER/PUBLISHER – MEDIA – 1**

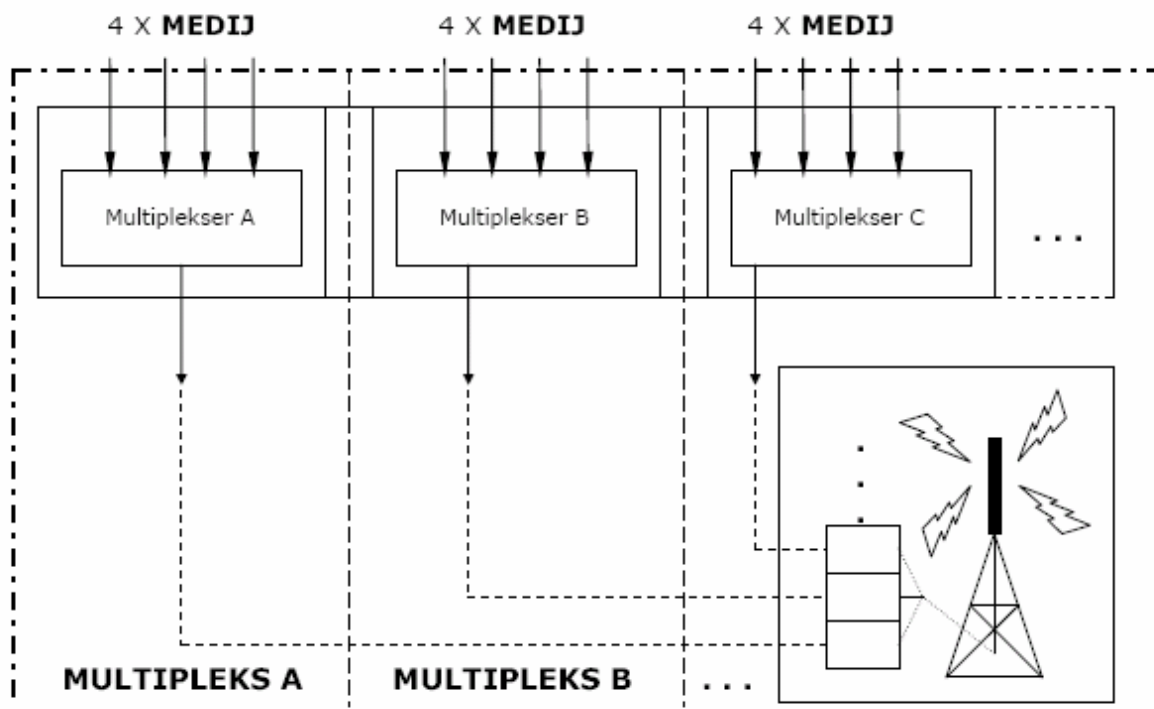
- (preparation and production of programme content, including data)

– **MULTIPLEX OPERATOR – 2**

- (multiplex management, obtained licence, ODRF-D)
- (distribution and transmission of digital signal)



**Links among subjects in digital broadcasting:**



The legal basis for the issuing of ODRF-D and the operation of digital broadcasting networks for MULTIPLEX OPERATORS (concession, licence) and competition of CONTENT PUBLISHERS – MEDIA to occupy programme space on MULTIPLEXES will

be regulated by the law governing digital broadcasting, and will be prepared in 2006.

With regard to the programmes of the public RTV, rights and obligations are regulated by the Radiotelevizija Slovenija Act (ZRTVS).

Implementation of the switchover strategy must primarily ensure that the switchover to digital broadcasting does not cause additional, unnecessary environmental impact, and so – as envisaged in Article 8 of the Electronic Communications Act – we will encourage shared use of existing facilities and capacities.

All national and regional programmes of the public RTV are expected to be placed on the first multiplex MPN-A.

The second multiplex MPN-B will include programmes matching the criteria set on the basis of the public tender on the principle of thirds or units. The criterion regarding existing analogue transmission represents a competitive advantage but is not a condition. A programme-type criterion is introduced.

The third multiplex MPN-C will include programmes and new service providers that meet the established criteria on the basis of the public tender.

The public RTV SLO has the basis for digital transmission in Article 13 of ZRTVS, and must ensure digital transmission of RTV SLO programmes under Article 3 and coverage of the territory of Slovenia under Article 8 of the same Act. As a public radio and television service, it must actively and creatively contribute to public information and the introduction of digitalisation in the Republic of Slovenia.

Multiplex operators can include in digital transmissions programme providers with a valid decision of an authorised body for such services. In addition, multiplex operators must also ensure the principle of “must carry” for programmes and services prescribed by law or APEK.

Multiplex operators will have to pay annual frequency usage fees as prescribed by APEK in the amount of its administrative costs.

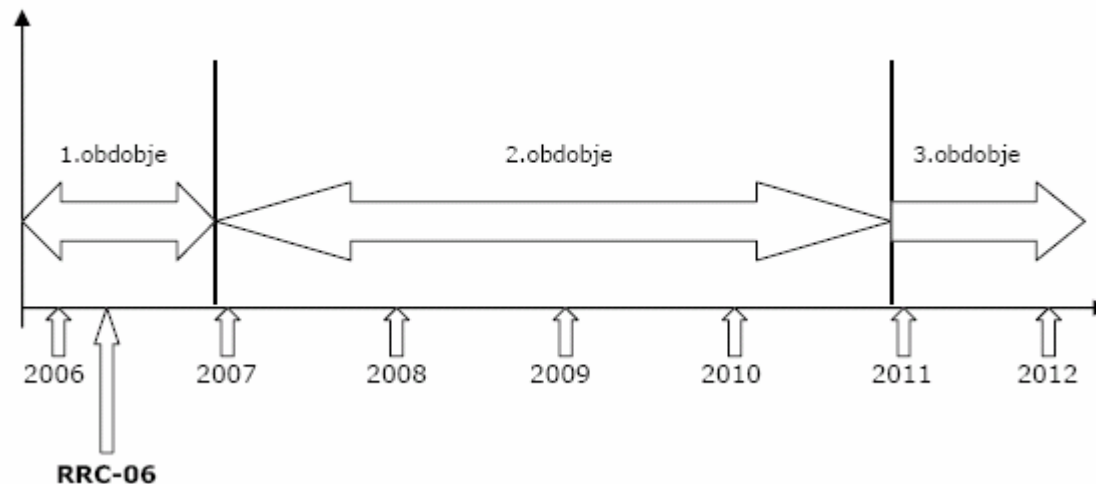
Multiplex operators will charge subscribers/users and content providers/media operating and management costs for the multiplex at a level proportionate to actual costs.

### **5.3 Action plan**

The action plan is based on the content and timeframe of European Union documents and the prepared switchover strategy. Its purpose is to achieve the objectives of this strategy and the maximum and fastest positive effects for participants and the environment.

It is divided into three periods:

### Timeline of switchover – **PERIOD 1:**



### **Period 2006–2007:**

Orientation		
Preparation of required legislation, regulations, acts, implementation of public tenders		
Objectives		
To ensure transparent, clear, incentive-based, competitive, pluralist, user- and environmentally-friendly transition to and development of digital broadcasting		
Measures	Providers	Deadline
Adoption of new Digital Broadcasting Act, general act on DTT, criteria for transmitting contents on DTT basis, implementation of public tenders, start of digital transmissions	MG DEK, APEK, RTV SLO	2005–2006

The key moment in this period and for the start of the switchover is RRC-06, a regional radio conference in May and June 2006 in Geneva, at which final coordination will take place regarding the frequency spectrum for digital broadcasting.

Activities to be undertaken prior to this will subsequently have to be coordinated with those agreed. It is advisable to prepare as soon as possible all necessary measures and procedures for the fastest and most efficient switchover (strategy, legislation, acts, criteria, measures, tenders) to allow immediate coordinated and effective action for the switchover from analogue to digital broadcasting.

**Period 2007–2011:**

Orientation		
Implementation of efficient switchover from analogue to digital broadcasting		
Objectives		
Coordinated switchover under the agreed plan, active and good public information		
Measures	Providers	Deadline
Preparation of material, implementation of information campaign for public and actors	MG DEK, APEK, RTV SLO, actors	2006–2010
Promotion and monitoring of progress of switchover	MG DEK, APEK	2006–2010
Gradual installation of three digital broadcasting networks, transitional period for units with simultaneous analogue and digital transmissions, gradual exclusion of analogue transmitters and release of frequencies for coordination of future multiplexes	MG DEK, APEK, RTV SLO, actors	2006–2010

This is the key period in which the dynamics of the process will unfold, and problems are to be expected arising from unforeseen circumstances.

Despite the well-defined plan and schedule for transitional periods, delays can arise due to difficulties in establishing the network of transmitters, complications in the supply of equipment (problems are expected in the global market), inadequate response from consumers to acquire reception equipment etc.

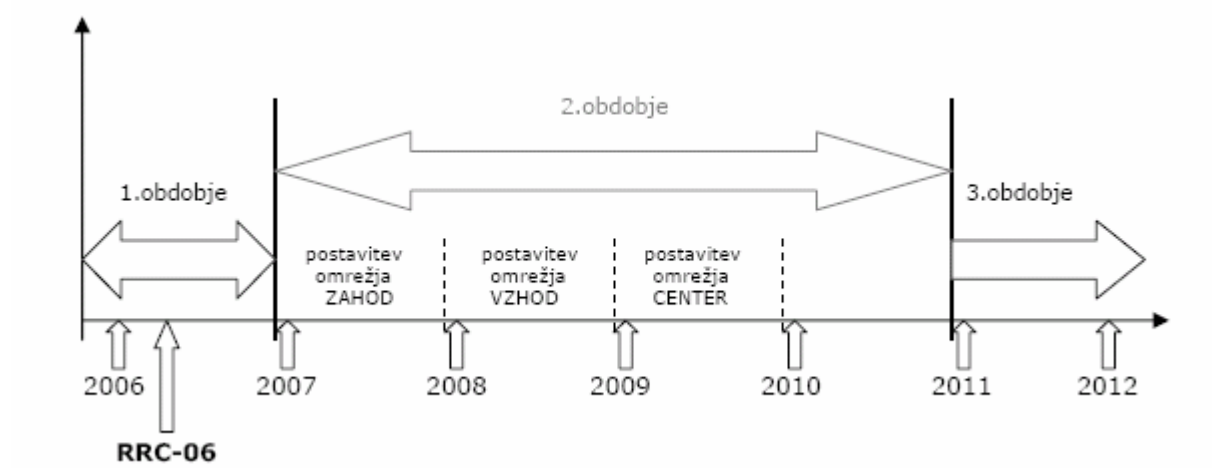
Regardless of external influences that in one way or another will block and hinder the switchover, the agreed strategy must be implemented, the switchover plan respected and all strength invested to implement the switchover as soon as possible.

It is anticipated that initial difficulties will over time and with the development of events reduce and/or eliminate themselves. The development of technologies and the already completed switchover in other European Union countries will also contribute to this.

This is a transitional period in which analogue and digital television will both operate, and so unused analogue channels will have to be used that will not interfere with the current analogue network. In addition to existing channels, additional new channels will have to be coordinated for the transition period. After

the transition period, analogue transmitters will be disconnected and the remaining digital ones connected.

### **Timeline of transition – period 2 ESTABLISHING THE NETWORK:**



Period 1  
2006 – 2007

### **RRC-06**

Period 2  
2007 – 2011

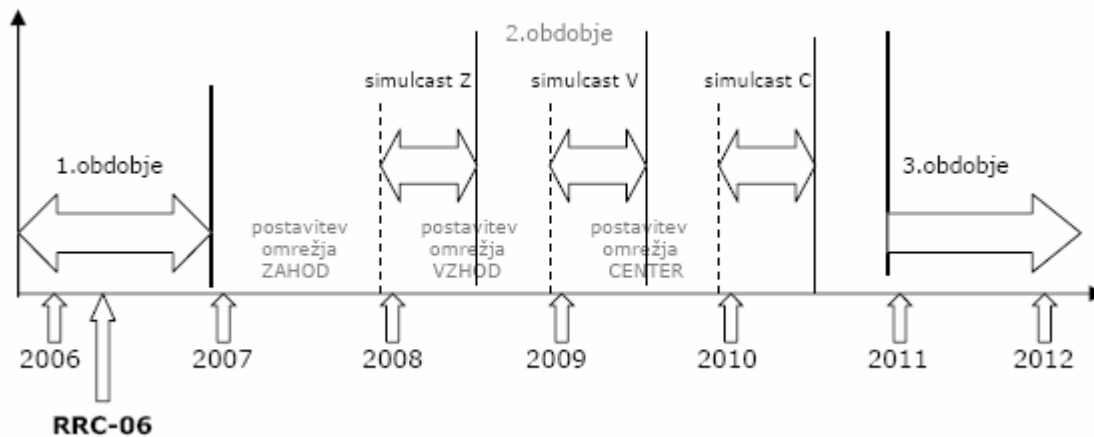
network installation WESTERN 2007 2008

network installation EASTERN 2008 2009

network installation CENTRAL 2009 2010

Period 3  
2011 – 2012

### **Timeline for transition – period 2 PARALLEL TRANSMISSION:**



Period 1  
2006 – 2007

### **RRC-06**

simulcast Z

network installation WESTERN 2007 2008

network installation EASTERN 2008 2009

Period 2

simulcast V

network installation CENTRAL 2009 2010

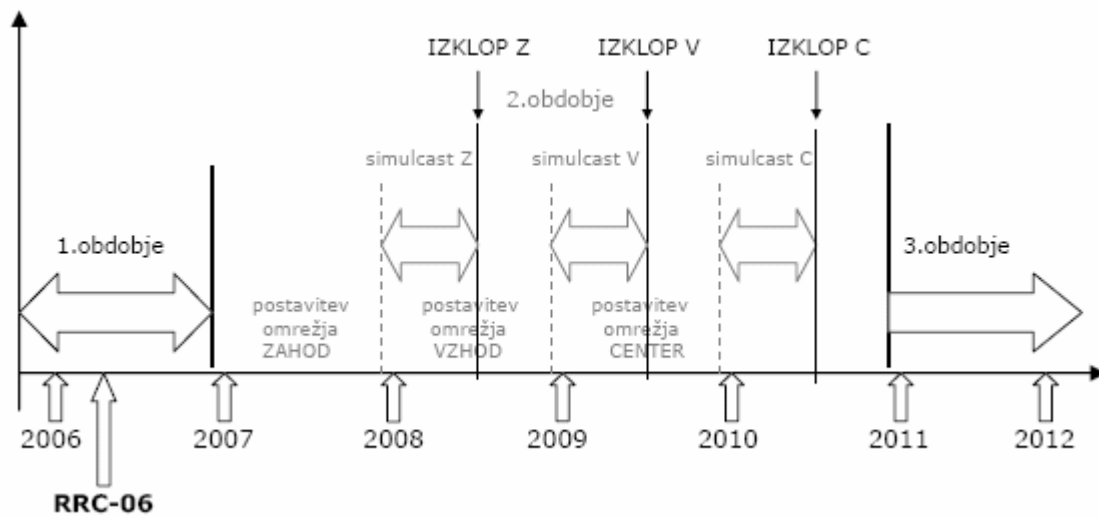
simulcast C

2010 – 2011

Period 3

2011 – 2012

**Timeline of transition – period 2 ANALOGUE DISCONNECTIONS:**



Period 1  
2006 – 2007

### RRC-06

DISCONNECTION Z

simulcast Z

network installation WESTERN 2007 2008

network installation EASTERN 2008 2009

DISCONNECTION V

Period 2

simulcast V

network installation CENTRAL 2009 2010

DISCONNECTION C

simulcast C

2010 – 2011

Period 3

2011 – 2012

**Period 2011–2012:**



Orientation		
New services, marketing frequency dividends		
Enabling digital broadcasting for new programmes (local, municipal, town), services, profits from frequency dividends		
Measures	Providers	Deadline
Establishment of third, fourth ... networks, digital coverage based on smaller units	MG DEK, APEK	2010–2012
Preparation of all necessary measures and coordination for efficient marketing of frequency dividends	MG DEK, APEK	2010–2012
Final withdrawal of analogue frequencies and cessation of transmission for all analogue transmitters	MG DEK, APEK	2012

During this period, the gradual withdrawal of analogue transmitters will release the frequency spectrum, and it will be possible to establish complete third, fourth and all other digital networks depending on supply and demand.

During this period, it will be possible to ensure several options for all the needs of local and regional programmes, programmes of special importance and programmes intended for various special types (special information, music, sports, youth, shopping, religious, pay TV ...).

This period will require final coordination of the national spectrum plan and – within the framework of European frequency-spectrum policy and on the basis of such new coordination – determination of the spectrum dividend. Joint coordination and agreement will be required with regard to use, since otherwise it will not be possible to develop new pan-European services and to market such spectrum dividends.

## 6 ACTIVITIES LINKED TO THE STRATEGY

### 6.1 Policy of obligations and incentives

Policy on the switchover to digital broadcasting, all activities undertaken and all documents arising in relation to the switchover are harmonised with European regulations and legislation.

The Republic of Slovenia expects – in the interests of a rapid transition – to contribute through some interventions (subsidies) to provide equipment to some (socially excluded) citizens with basic devices (STBs) to receive digital broadcasts. Those dependent on terrestrial television signals could be included; these are

mainly in less populated regions and the countryside, and are part of the socially deprived population.

Forecasts suggest there should be around 20,000 such households, which would require approximately SIT 250 m in funding to purchase basic STBs.

We also envisage the possibility of financing projects within the framework of the switchover strategy that could be achieved with the help of structural funds for technological development, rural development and development of underdeveloped regions. A precondition for this is the cooperation of the state, local communities, universities and research institutions.

Within the framework of European legislation, the Republic of Slovenia will encourage the participation of domestic industry and technology in the switchover and subsequently in digital broadcasting, since there are quite a number of companies in Slovenia that could provide the technology for DTT transmission and receiving equipment.

On the basis of the National Development Programme for 2007-2013, the Republic of Slovenia will likely allocate certain budget funding to encourage actors in the switchover to digital broadcasting in accordance with European law. This funding would be used to co-finance receivers for digital signals – STBs – in order to enable suitable reception of programmes by analogue television sets; part of the funding will be allocated to informing and encouraging users to switch as quickly as possible, and for coverage and construction of networks in less populated and isolated regions in which commercial investors would not see the economic justification.

The purpose of promoting the switchover is to improve reception of programmes, additional services, enhanced services and promote the provision of information to the public.

Measures will be undertaken across the whole country, with the emphasis on accelerated construction of networks in less developed regions. Measures will lead to more equal territorial development of electronic communications services.

Financial plan (funding planned in the NDP 2007 - 2013):

\* amounts in SIT million

Year:	2007	2008	2009	2010	2011
Project:					
Switchover to digital broadcasting					
Slovenian participation *:	200	800	800	800	800
European funds *:	400	1600	1600	1600	1600

In addition to direct state incentives, we expect that funding obtained from European sources and funds will also be used for the introduction of digitalisation in Slovenia.

## **6.2 Areas of cooperation with EU**

In addition to the advantages on the national level, acceleration of the switchover procedure could also increase the learning effect and promote positive examples among member states. Numerous new technologies and services depend on achieving a critical mass of users on the European level, and become more attractive as the basic technology increases in Europe.

Market actors are concerned that the development of new services could be hindered by divergent implementation in individual European countries. In particular, they are seeking legal protection regarding the terrestrial spectrum which could be available and a reduction of barriers caused by state borders.

Acceleration of the switchover procedure on the level of member states, and cooperation in the transition period and on the date of withdrawal could enable a rapid switchover in Europe. RSPG proposes the introduction of a limited number of time frames that member states could follow, and investigation of a joint declaration on the switchover procedure.

The spectrum for pan-European services and numerous cross-border services, such as traffic information and shipping management, mobile communications and new forms of data communication, will – after the cessation of analogue broadcasting in all member states – only be available on the European level. In those member states in which analogue transmissions have already stopped, cross-border use could also be introduced earlier. There thus exist reasons to accelerate switchover procedures in individual countries and to strive to set a date by which analogue broadcasting should be ceased in all member states.

Such acceleration and a European Union deadline for the switchover would help overcome the current fragmentation of European digital television markets. This will enable European actors to compete with other global interest groups in all parts of the digital television value chain, and will have positive economic consequences in terms of exports of technology, knowledge and products, increased revenues and greater competition on content.

The speed at which Europe as a whole can move will depend on the speed of national switchover procedures on the one hand and on the speed of the slowest member states on the other. The high capacity of analogue TV transmitters, and the sensitivity of analogue receivers to interference mean that the introduction of new services will also be hindered by limited continued use of analogue services in some member states.

Therefore each share of the spectrum on the national level will depend greatly on the number of neighbouring countries that have already withdrawn analogue

transmissions, and on the level of Europe as a whole, will only be achievable on the basis of complete withdrawal of analogue broadcasting in the European Union and neighbouring countries.

One of the main engines of the switchover to digital broadcasting is the interest of the European Union reflected in several areas. The emphasis is on new and pan-European services, marketing the spectrum dividend, development of new technologies, economic effects and increased competitive advantages compared to Asia and America.

A clear example suggests that 60-70% of the benefits accruing to individual states will come from their own transition, with the remaining 30-40% derived from the switchover in all European examples. Otherwise, each hindrance of the switchover at home could cause costs and harm to others.

### **6.3 Criteria for realisation of objectives, observation indicators, updating the strategy**

With a well-defined strategy and the correct switchover dynamic, the effects of the transition could be both positive and immediate. They will be reflected in direct and indirect forms.

Due to the complexity of the procedure and the involvement of various actors in the switchover from analogue to digital broadcasting and the impact of digital broadcasting on the daily life of each individual, a broad political, economic, public and private consensus is required.

All actors are actively included in the switchover under equal conditions, since the principle of technology neutrality – emphasised in the regulatory framework of the European Union – must apply, meaning that the use of individual types of technology can neither be required nor neglected; this does not however prevent member states from adopting proportionate measures to promote individual technologies for digital television transmission as a means of improving spectrum efficiency.

Another very important and necessary criterion for the switchover from analogue to digital broadcasting is environmental impact, since the introduction of digital methods must not cause additional and unnecessary impact on nature and the living environment. The end impact of the switchover will be positive, since digital broadcasting will use less energy, and the EMS burden on the living environment will also be lower.

The main criteria and indicators for monitoring the switchover strategy from analogue to digital broadcasting will be:

- speed of the switchover (meeting deadline),
- new value and content,

- lower transmission costs,
- regulation of the frequency spectrum,
- trading in frequency dividends.

## **7 SCHEDULE OF SWITCHOVER PERIODS AND COMPLETION**

- 2006-2007 (preparation of necessary legislation and regulations, implementation of public tenders for digital broadcasting, start of digital transmissions)
- 2007-2012 (transitional period under the prepared strategy)
  - unit WESTERN (2007–2008)
  - unit EASTERN (2008–2009)
  - unit CENTRAL (2009–2010)
- start of 2012: end of analogue transmissions across the whole of Slovenia.

## **8 SUMMARY**

The withdrawal of analogue terrestrial broadcasting across the whole European Union will – taking account of the plans of member states for the switchover published as part of the e-Europe action plan and the final document, i.e. European Commission Communication COM (2005) 204 final – is set for the start of 2012. The Republic of Slovenia accepted this proposal and set it out in its strategy for with switchover from analogue to digital broadcasting.

The switchover will foster innovation and growth in the market for equipment, and will contribute to a renewed Lisbon strategy. The benefits for digital broadcasting for consumers include better reception, improved picture quality, better sound, better portable and mobile reception, more television and radio programmes and more information services.

These benefits derive primarily from the possibility of processing and compressing digital data, which enables much more efficient use of network capacities than analogue signals.

One of the basic objectives is to create new digital added-value for all actors compared to the existing method of analogue broadcasting.

All objectives of the switchover strategy must as far as possible enable the development and competitiveness of the broadcasting sector, reflected in technical, systemic, legislative, financial, economic, public and environmental coordination.

The Republic of Slovenia will push to exploit as far as possible the switchover to new transmission technology to achieve maximum media pluralism and diversity of programme content.

By the end of analogue transmissions at the latest, part of the frequency spectrum released will be allocated to pan-European content and new services.

## 9 DIGITAL TECHNOLOGIES

### 9.1 DVB-T

In order to receive digital terrestrial television, users need technology similar to that used until now: aerial, receiver and television. The only change is that the new technology must enable reception and reproduction of a digital signal. Therefore all devices that enable this are marked with the DVB-T logo (for more information see <http://www.dvb.org/>).



Initially, all users of classic analogue televisions will need a set top box (STB) – an external digital receiver connected to an aerial (external, indoor) and a television. Prices range from 50 to 200 euros (October 2005) and will continue to fall.

Anyone in future choosing to buy a new television receiver will be able to buy an integrated digital TV (IDTV) and will not need an STB. The price of integrated digital TVs (SD or HDTV) starts at 500 euros (October 2005).

Anyone wanting to take full advantage of all the benefits of digital television, including HDTV-format (high definition TV) can already buy on the open market television sets with integrated digital receivers ready for HDTV-format (marked "HD ready"). Prices start at 1500 euros.

Equipment needed to receive and transmit digital terrestrial television DTT (devices must be marked DVB-T):

- **STB – Set Top Box** (receiver for digital broadcast signal, possibility of receiving videotext, VPS, dual channel sound, EPG, MHP, Dolby Digital):

- **external independent unit** (connected to one television and/or video recorder – Twin Receiver, may have additional

integrated decoders for various pay services)



- **Integrated Digital TV**, built into the television, no external unit required, portable versions also)

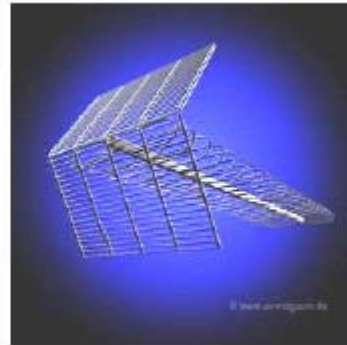


- **computer unit** (PC DVB-T, intended for personal and portable computers, built-in, PCMCIA or USB connections)



– **DTT aerials:**

- **fixed aerial** (installed on roof, possibility of joint reception, orientation and polarisation of the aerial are important; basically the same as analogue aerials; it is important that they receive in VHF and UHF bands or the channel of the digital multiplex, required field strength 30 dB $\mu$ V)



- **indoor aerial** (passive or active, used in regions with good reception, required field strength 38 dB $\mu$ V)



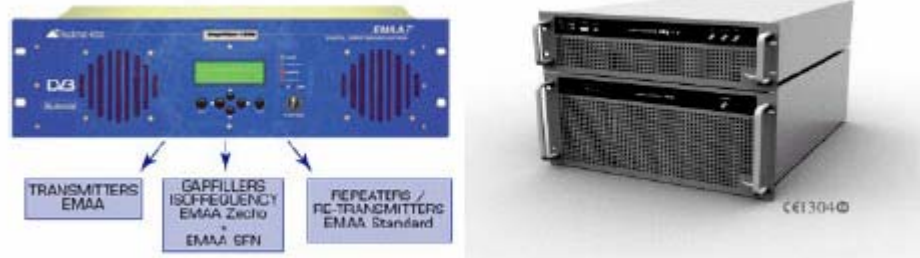
- **external aerials** (suitable for portable and mobile reception, required field strength between 30 and 38 dB $\mu$ V)





## – Transmitters for digital terrestrial television – DTT

- **transmitter** (transmission power 1-5 kW, used for DVB-T and DVB-H):



- **modulator** (modulation COFDM, QPSK 16-QAM or 64-QAM):



- **coder** (coders for MPEG-2 compression format enable capacity up to 50 Mbit/s, Interlace or Progressive system):



- **multiplex** (active merger, possibility of dynamic setting of channel capacity, GPS-synchronisation):



- **aerial** (similar to analogue, for VHF – Band III and UHF – Band IV and V):



**Example:** Transmission system in Salt Lake City in the US, where the existing eight analogue channels and antenna systems in three towers were replaced by one tower and one antenna system and two multiplexes. This shows that the switchover to digital transmission can

reduce the environmental burden, and on the other hand enable convergence of various providers at a single site. Such a system also enables independent transmission in different polarisations without interference but with the same area of coverage for two different programme providers.



## 9.2 DVB-H

In parallel with the DVB-T system, a DVB-H system will also be introduced, intended for mobile reception of terrestrial digital television on mobile devices. Mobile devices that can receive DVB-H are currently relatively expensive (due to limited supplies), but we can expect prices to fall and this market to develop very soon; this will enable many new methods for providing content and interactively involving users.

DVB-T and DVB-H systems can operate in parallel in a single multiplex using the division principle, or in a hierarchical operating method. The use of hierarchical modulation, which would allow DVB-T and DVB-H signals to be transmitted in a single network, is not very likely, since there are too many restrictions. The system is not the most suitable for any technology. To date this principle has only been used in Australia.

Equipment needed to receive mobile digital terrestrial television (devices must bear the DVB-H symbol):



### Models of DVB-H-capable mobile devices (October 2005):



### 9.3 T-DAB and DRM

The switchover strategy also takes account of the needs of digital radio T-DAB and DRM, but with the difference that the existing analogue frequency bands for radio programmes are not being withdrawn, which means that the switchover to digital broadcasting of radio programmes represents only an additional option to the analogue method. There is still no final deadline for radio programme providers and users by which they must replace and withdraw the existing analogue transmission and reception methods.

One of the key factors affecting the growth of T-DAB is the bit rate. High bit rates mean fewer radio programmes, and lower bit rates mean more programmes. A large supply of content is of key importance to establishing the T-DAB system. Instead of four stations, one multiplex can carry 10, if we decide not to transmit the programmes at the highest bit rate. However a compromise must be reached, since

the quality must not fall below a certain threshold (compared to FM). We must therefore ensure bit rates that will allow sufficient quality of audio transmission while at the same time fully exploiting the capacity of the whole multiplex.

T-DAB enables the creation of new themed stations, which hitherto in Slovenia, despite the wishes of some broadcasters have been impossible due to a lack of spare frequency spectrum. We will be able to receive stations dedicated to specific musical genres (jazz, classical, folk, children's ...) or other contents, such as radio stations to broadcast parliament, 24-hour information stations etc.

Comparing the data on bit rates with data on the spread of T-DAB and the number of radio stations, we find:

bit rate (e.g. 128 kb/s) => more stations => faster growth of T-DAB

By the end of 2004, 1.3 million T-DAB receivers had been sold in the United Kingdom. Since the UK also has the largest number of stations, we can assert with near certainty that this is a key factor in the growth of T-DAB.

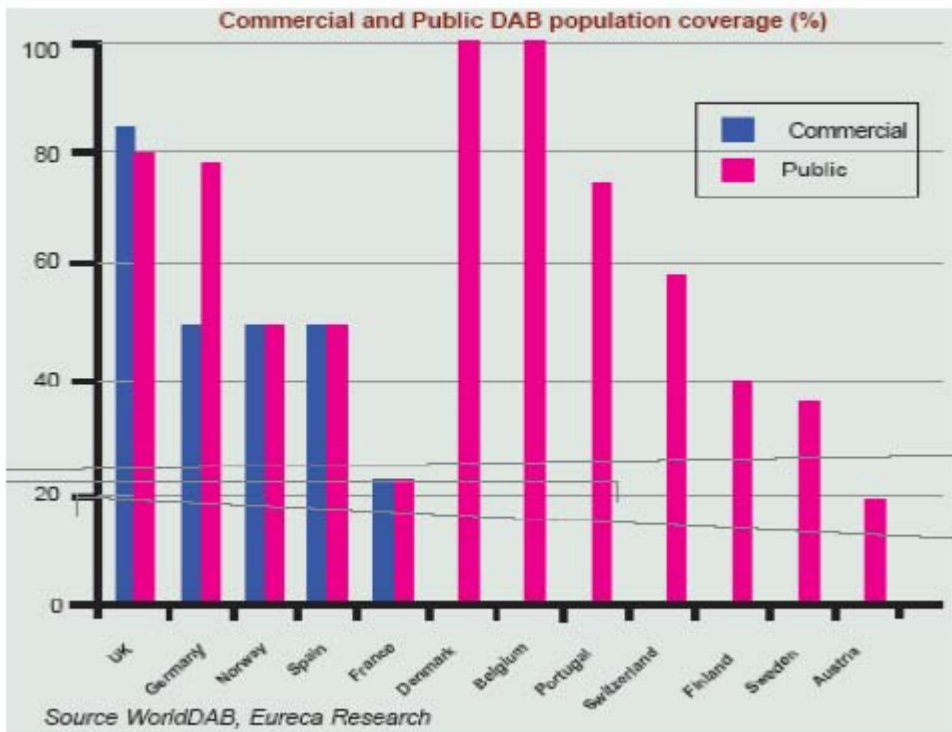
In various countries the T-DAB system also sets an upper limit for the percentage of the multiplex – channel capacity – that may be given over to data transmission and data services, for which special concessions are awarded.

Following from this, the DMB system is increasingly used; it is hoped in the near future to link it with the DVB-H system.

Limits on data transmission in various countries:

- Belgium: maximum 10 %
- Denmark: maximum 10 %
- Germany: maximum 20 %
- Italy: not specified
- Singapore: up to 35 %
- Spain: maximum 20 %
- Thailand: minimum 50 % for audio transmission
- United Kingdom: maximum 20 %

T-DAB presence in EU (shares of public and commercial providers):



With regard to frequency spectra dedicated to T-DAB transmission, the Republic of Slovenia has reserved enough spare channels so that terrestrial digital radio could be introduced today, but the lack of consumer interest and the inadequate supply of T-DAB receivers are a major obstacle.

We can expect interest on the part of Slovenian users to increase with the start of commercial broadcasts of T-DAB signals and the increasing number of new stations and services.

In addition to the T-DAB network on channel 12, which was agreed in Wiesbaden in 1995, two further networks are proposed in the VHF range. There would thus be three networks in the VHF range with national coverage and the local networks in the L-range, as agreed in Maastricht in 2002, available for radio.

Licences would be awarded under uniform criteria and procedures like those applying to digital broadcasting as a whole. The licensing and coverage procedures would operate on the basis of units – allotments, and would then be combined into larger regional and national coverage networks.

*Wiesbaden '95:*

- 12 B – eastern RS
- 12 C – western RS

*Maastricht '02:*

- LG – eastern RS

- LA – western RS
- LH – eastern RS
- LF – western RS
- LD – eastern RS excluding Prekmurje and the City of Maribor
- LC – western RS
- LI – eastern part of RS (only Dolenjska, Zasavje and Ljubljana)
- LE – western part of RS (only Gorenjska and Goriška)
- LM – Prekmurje
- LE – City of Maribor
- LO – Celje and Obsotelje
- LK – Koroška
- LJ – Zasavje
- LP – Dolenjska and Bela Krajina
- LM – Ljubljana
- LL – Goriška
- LN – Gorenjska

*RRC-06:*

- 2 networks with national coverage in the VHF range.

The position of DRM is still unclear, since there is very little user interest in this type of audio reception, since the range of stations and reception technologies is limited, and other methods (FM, T-DAB, Internet, DVB-T, DVB-H ....) already offer a much wider choice.

DRM could be used for special purposes, since its range is exceptional and it enables simultaneous dual transmission of analogue and digital channels, but it requires a great deal of transmitter power, which raises the question of the economic feasibility of this broadcasting method.

In Slovenia, the public RTV in Domžale has a modern medium-wave transmitter with digital start-up, which could be converted relatively quickly and simply to the new modulation method. As such it could be used to provide Slovenian and foreign public information at home and particularly abroad, as well as during emergencies.

Stopping transmissions would mean that this frequency would be lost forever, since it would be occupied by other stations, or existing ones would increase their transmission power.

As a result, almost all countries in Europe and around the world have at least one powerful medium-wave transmitter operating using digital broadcasting techniques.

## **10 GLOSSARY**

- **1080p/50** (HDTV scanning standard, means 1080 lines interlaced- in 50 frames a second, total 2,000,000 pixels on the screen)
- **720p/50** (HDTV scanning standard, means 720 lines progressive and 50

- frames a second, total 921,000 pixels on the screen)
- **allocation** (term used in planning digital broadcasting networks)
- **allotment** (term used in planning digital broadcast networks)
- **analogue terrestrial television** (operates in frequency bands VHF 174–230 MHz and UHF 470–860 MHz, video and audio are transmitted in analogue form in the same frequency band, each station requires a separate frequency band – channel. To cover a large area we need several different frequency channels, the efficiency of use of the frequency spectrum is low, interference in transmission and reception is high, standard formats used are SD and PAL system)
- **APEK – Post and Electronic Communications Agency of the Republic of Slovenia** (independent body regulating and monitoring the telecommunications market, operates and monitors the radiofrequency spectrum in the Republic of Slovenia, undertakes tasks in radio and television activities and regulates and monitors the postal services market)
- **API – Application Programming Interface** (programme interface providing different software systems access to the operating system)
- **assignment** (term used in planning digital broadcast networks)
- **COFDM – Coded Orthogonal Frequency Division Multiplexing** (method of modulation, processing signals for digital transmission, which protects data packets against errors and creates a protection ratio; such a method prevents multidirectional digital signal reception, packet errors and interference errors, uses 16-QAM or 64-QAM modulation method, depending on conditions)
- **COM (2003) 541-F** (European Commission document, Commission Communication to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions on the transition from analogue to digital broadcasting)
- **COM (2005) 204-F** (European Commission document, Commission Communication to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions on accelerating the switchover to digital broadcasting)
- **DAB – Digital Audio Broadcasting** (also called T-DAB, Terrestrial-DAB, upgrade of the existing FM system, standard digital transmission of audio signals, developed in the European Union between 1997 and 2000, operates in the 30 MHz–3 GHz range, intended for all types, terrestrial, satellite and cable, uses MUSICAM – MP2 coding method, 32–256 kbit/s transmission, COFDM–modulation, for broadcasting it uses channel 12 on VHF and L–spectrum, 1452–1492 MHz)
- **digital added-value** (new services enabled by digital broadcasting)
- **Digital Terrestrial Television** (DTT, system DVB-T or DVB-H, digital broadcasting method where the basic audio and video signals are converted, modulated and coded in a digital format and propagated as such; compression enables one frequency channel of width 8 MHz – VHF and 7 MHz – UHF – to carry three to five different programmes, the digital method has a transmission gain of 10 dB over analogue due to greater sensitivity of digital receivers and signal processing procedures (modulation, coding ratio, guard interval, coding), enables mobile reception; reception requires a roof, indoor



or external aerial, coverage of a larger area requires a network that can operate as a Single Frequency Network SFN or Multi Frequency Network MFN; the former is much more efficient but harder to plan and implement)

- **DMA – Digital Media Adapter** (digital multimedia interface, used to link different peripheral audio and video equipment)
- **DMB – Digital Multimedia Broadcasting** (an upgrade of the standard digital audio transmission system, intended to transmit television and radio stations and data, operates on terrestrial, satellite and mobile basis, uses existing and additional signal processing methods enabling transmission up to 1.5 Mbit/s or 4-5 different TV stations, operates in the 30 MHz-3 GHz range, for broadcasting it uses VHF 174–230 MHz and L-spectrum, 1452–1492 MHz)
- **Dolby digital 5.1** (digital five-channel surround sound, used in cinemas and home production, creates surround-sound effects, playback requires special player and six speakers)
- **DRM – Digital Radio Mondial** (also called T-DRM, Terrestrial-DRM, upgrade of the existing AM system, digital method for transmitting long-, medium- and short-wave audio signals, intended for radio stations to cover large areas, operates in the 0.15 MHz-30 MHz range, intended exclusively for terrestrial broadcasts, uses OFDM transmission method and QAM modulation in four ways, A, B, C and D, uses Advanced Audio Coding AAC, transmission capacity is 16-30 kbit/s, operates on existing analogue frequencies, can also enable simultaneous audio, data and video transmission)
- **DVB-C – Digital Video Broadcasting – Cable** (cable-based digital video broadcasting system uses MPEG-2 coding and QAM 64, 128, 256 modulation, also enables a duplex connection – interactivity – and so is used for Internet services, VOD – Video on Demand, PPV – Pay Per View, operates on MHP basis)
- **DVB-H – Digital Video Broadcasting – Handhelds** (digital terrestrial video broadcasting method for small, handheld mobile devices, also called mobile reception, data transmission can operate over the same network as DVB-T, simultaneously on the same channel, but such use is less likely, since the processing systems and the transmission methods are different, uses the MPEG-4 coding system, time-slicing mechanism based on IP data transmission, meaning that data transmission takes place in time bundles and not continually, as necessitated by the limited use of mobile devices in terms of energy, battery capacity; uses IFFT transformation of carriers 2K, 4K or 8K, COFDM modulation and additional coding protection MPE-FEC, transmission capacity on an individual channel depends on the parameters selected, ranging from 5-25 Mbit/s)
- **DVB-S – Digital Video Broadcasting – Satellite** (most commonly used digital transmission method, on various satellites: Astra, Eutelsat, Helasat, uses the MPEG-2 coding system and QPSK modulation, enables very high transmission capacity, since due to the active and control receivers on the aerial – Low Noise Block Converter, LNB – we can receive signals on four different levels, two frequency and two polarisation levels)
- **DVB-S2 – Digital Video Broadcasting – Satellite** (upgrade of the basic satellite transmission of digital signals, with 30% greater transmission efficiency due to improved modulation and coding systems)

- **DVB-T – Digital Video Broadcasting – Terrestrial** (also called DTT, defined standard in Europe and elsewhere for digital television and audio transmissions that can be received with aerials, data transmission for each station operates in the MPEG-2 coding system, uses the same channel width as analogue VHF and UHF transmission, 7 MHz, but the same width of channel can carry more different programmes due to modulation procedures COFDM, 16-QAM or 64-QAM, transmission capacity on an individual channel depends on selected parameters and is in the 12-20 Mbit/s range, individual programmes in the channel require capacity of 3-5 Mbit/s, managed by a dynamic multiplex)
- **DVI – Digital Visual Interface** (digital interface for transmitting only pure digital video signals without conversion)
- **eEurope 2005** (Action plan for the development of the information society in Europe – eEurope 2005 – was adopted in June 2002 in Seville, aimed at the development of e-business, e-learning, e-health and e-administration on the basis of secure broadband connections; in Point 3.1.4 of the Action Plan regarding the measure for use of broadband connections, measures are listed for the radiofrequency spectrum, use of broadband connections in less populated regions, elimination of barriers to wider use of broadband, contents on different platforms and the switchover to digital broadcasting; envisages an assessment of the situation in important markets in member states and the adoption of national implementation plans for the switchover to digital broadcasting, the eEurope 2005 action plan ends at the end of 2005, to be replaced by strategic framework i2010)
- **EPG – Electronic Programme Guide** (digital form of full data on programmes, titles, broadcast time, duration of broadcast, description of content and other data on individual programmes, can also contain images, is an upgrade of the existing form of teletext and videotext, the next level will be MHP – Multimedia Home Platform)
- **FEC – Forward Error Correction** (a technique used in digital signal transmission to reduce the error rate in the transmission of digital data, the transmitter transmits redundant additional data used for correction if individual parts of the basic transmission drop out)
- **Frequency dividend** (also called spectrum dividend, frequencies or spectrum that will be released after the switchover from analogue to digital broadcasting due to 3-6 fold increases in spectrum use efficiency, and compression of digital data. A term introduced by the European Commission during introduction of the market approach to discussion of the frequency spectrum. The term digital dividend is also sometimes used.)
- **Frequency spectrum** (frequency range of electromagnetic waves from 0-3000 GHz, roughly divided into several ranges, ultra-low, very low and radio 30 KHz–300 GHz)
- **HDMI – High Definition Multimedia Interface** (interface, the latest standard equipment for transmission of HDTV audio and video signals up to 5 Gbit/s, from 1 July 2005 also enables HDCP – High-bandwidth Digital Content Protection)
- **HDTV – High Definition Television** (enabled by digital broadcasting systems which ensure sufficient data transmission capacity; digital television

is not the same as HDTV, it is more the domain of cinema and video production, but it is increasingly also used for television purposes; at present there is no uniform standard for HDTV, since there are 720p/50, 1080i/25, 1080p/25 and 1080p/50 models; the last of these will likely become established in the future; all receiving equipment currently supports MPEG-2 standards, but in future they will likely also be compatible with the MPEG-4 AVC standard; the basis is agreed marking of equipment to show users that they can receive high definition television "HD ready", regardless of the format and standard; the change is evident in the size and aspect ratio of the image, which is 16:9, which is not the exclusive domain of HDTV; and 16:9 format is not sufficient for HDTV – the high bandwidth required for HDTV means that the audio is also improved – Dolby Digital 5.1, which requires special peripheral equipment, including cables and connectors, HDMI, DVI, HDCP; in most European countries there has to date been very limited interest in HDTV; with the right incentives and the transmission of appropriate content of wider social interest, such as the football World Cup in Germany in 2006, the Olympic Games in China in 2008, we can expect increased interest in HDTV)

- **i2010** (Initiative 2010, a document issued by the EU on 1 June 2005 discussing the information society, promoting growth and employment; its purpose is a single European information area with accessible and secure broadband communications, rich and diverse contents and digital services)
- **ITU – International Telecommunications Union** (international telecommunications organisation, member of the United Nations, national governments and private individuals coordinate global telecommunications networks and services; responsible for standardisation, harmonisation and development, including regulating the use of the broadcast spectrum and coordination of national policies)
- **MHP – Multimedia Home Platform** (internationally defined as the standard for transmission and playback of interactive content in digital television based on the JAVA programming language)
- **MP – Multiplex** (see Multiplex)
- **MP(E)V-A** (Multiplex for allotment, MPE(V) – determines for which unit, MPEV-(A) – determines for which network)
- **MP(N)** (Multiplex for the whole territory of Slovenia, national allotment)
- **MPEG-2** (generic video standard for coding audio and video with compression; in fact, it is not compression but data restriction; it was introduced in 1994 as a successor to MPEG-1, it is defined as the basic standard for DVB, enables data transmission up to 50 Mbit/s)
- **MPEG-4** (generic video standard for coding audio and video, the successor to the MPEG-2 standard from 1998, intended for systems with low capacity and bandwidth, such as mobile telephones and video telephones, but with the development of more complex compression algorithms and restrictions on data, they want also to use it in the future for DVB to increase transmission capacity)
- **MULTIPLEX – Multiplex, MP** (part of the telecommunications digital broadcasting system that combines multiple input channels, programmes, and then transmits them over a shared transmission system; in DVB

terminology this refers to the whole system operating on a single frequency channel in an SFN or MFN network and offering four or more different programmes)

- **MULTIPLEX – Multiplex, MUX** (device, part of the digital telecommunications broadcasting system, combines several different input channels, programmes, before – with certain external controls – transmitting them over a shared transmission system; in DVB technology so-called dynamic multiplexes are used which automatically adjust the rate and capacity of individual programmes in the channel as a whole)
- **QAM – Quadrature Amplitude Modulation** (method of amplitude modulation, processing a signal for digital transmission; with 16-QAM each carrier for 2 bits – 4 levels multiplied by factors –3, –1, 1 and 3, which gives us a constellation of 4 bits and 16 points; with 64-QAM each carrier for 3 bits – 8 levels – can be multiplied by factors –7, –5, –3, –1, 1, 3, 5 and 7, giving a constellation of 6 bits and 64 points)
- **RRC-06 – Regional Radiocommunications Conference** (regional radio conference for Region 1, Europe and Africa, to be held in Geneva, Switzerland, in April/May 2006 and organised by the ITU, involving preparation of and agreement on technical basis for planning digital radio and television for terrestrial broadcasting for frequency ranges VHF, 174 – 230 MHz and UHF, 470 – 862 MHz)
- **RSPG – Radio Spectrum Policy Group** (working group of the European Commission, gives professional opinions on proposed documents and policies of the European Commission covering the radio spectrum)
- **SDTV – Standard Definition Television** (used by analogue broadcast systems, standard formats are PAL, 720 columns x 576 rows, 50 frames a second, and NTSC, 720 columns x 480 rows, 60 frames a second, and two methods, 'progressive', transmission of whole pictures, and 'interlaced', transmission of partial pictures)
- **simulcast** (dual transmission of terrestrial television signal using digital and analogue techniques)
- **Spectrum dividend** (see frequency dividend)
- **superteletext** (upgrade of existing teletext, greater scope, faster transmission, includes pictures)
- **The Lisbon Strategy** (document issued by the European Commission in 2000 at the ministerial summit in Lisbon in Portugal; defines the strategy of making Europe the most competitive and dynamic knowledge-based economy with increased employment and social cohesion policy by 2010)
- **time sharing** (in broadcasting, means that two or more content or programme providers share the same transmission channel in a certain sequence, day/night, by hours or otherwise)

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