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Issues associated with a change of the television system in the former OIRT Member countries

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This report summarizes the findings of a study conducted within EBU Working Party V considering the issues associated with a change of television system in some former OIRT Member countries. The countries concerned are Bulgaria, the Czech Republic, Hungary, Poland, Romania and Slovakia.

Within these countries it has already been decided that the colour system employed in terrestrial television broadcasts will be changed from SECAM to PAL. It has further been decided that the channel spacing of 8 MHz will be maintained.

The remaining issues to be resolved concern the basic television system to be used in these countries in the future. In particular, it must be decided whether the intercarrier-frequency will remain 6.5 MHz (systems D and K) or be changed to 5.5 MHz (systems B1 and G).

Decisions on these matters has to be taken by the individual Administrations concerned. This report reviews some of the technical, economic, coordination, and others aspects which should be considered in making such a decision. *Tables 1 to 3* give an overview of the situation in February 1994.

Matters related to programme production are not dealt with in this report, which concentrates on transmission issues.

1. Technical aspects

Modification of the intercarrier-frequency of existing transmitters from 6.5 MHz to 5.5 MHz is in principle possible, but it will cause difficulties and in some cases it might even be impossible. Completely new transmitting equipment might be required in some cases. The same is also true for the associated measurement and test equipment.

The receivers in the hands of the public must also be able to work with any changed intercarrier-frequency, or it must be possible to adapt the older receivers to operate with the new standard.

It must be noted that a change in the vision-to-sound frequency spacing from 6.5 to 5.5 MHz carries the risk of causing increased interference to some neighbouring countries. This is because the television channels in Bands I and III overlap when the arrangements for systems D and B are considered. Under these circumstances, a shift of 1 MHz in the sound carrier frequency can move it to a more critical position in the channel of a neighbouring transmission. It must be guaranteed that in all countries concerned the coverage will not be reduced.

2. Economic aspects

It has to be decided on a case-by-case basis whether it is better to modify existing transmitters or to replace them by new ones when changing the inter-carrier frequency to 5.5 MHz. This is also true for parts of the measurement and test equipment.

At the receiving side, the main problem is the percentage of single-standard receivers. The price of new receivers, or of modifications to older receivers, may influence the decision concerning a change of intercarrier-frequency, bearing in mind the socio-economic situation in each individual country.

Although, in principle, each country can decide for itself what vision-to-sound frequency spacing it should use, it may be necessary to undertake formal coordination with neighbouring countries if a change is made from 6.5 to 5.5 MHz. In any case, a harmonized solution is likely to be of benefit to all countries concerned.

Table 1 - Baseband TV systems (PAL/SECAM).

Factors under consideration	County and EBU Member responding to enquiry					
	Bulgaria BTV	Czech Republic CTV	Hungary MTV	Poland PTV	Romania RTV	Slovak Republic STV
Broadcast TV system(s) in service at end 1993 (national, regional, local)	<i>National networks: (BNT1, BNT2)</i> SECAM 100%	<i>National networks: Inhab.% Area%</i> CT1 PAL 96.5 76.6 CT2 SECAM 98.1 94.1 CT3 PAL 34.6 16.3 <i>Local stations: Premiera</i> PAL 12 5	<i>National networks:</i> SECAM 100% <i>Local stations:</i> (starting) <i>Satellite services:</i> PAL 100%	<i>National networks:</i> SECAM 100% <i>Local stations:</i> small number in PAL	PAL 100%	<i>National networks:</i> STV1 PAL (experimental) STV2 PAL 100% TA3 (not in operation at present)
Legislative decision for SECAM to PAL transition	Decision from PTT, BNT and Parliamentary Commission	Yes	Not yet	Not yet	-	STV1: Not yet STV2: Yes
Firm date for SECAM to PAL transition	<i>BNT2:</i> in PAL since January 1994	Termination of SECAM, February 1994	Transition to PAL expected in 1995	<i>TVP2 and all local stations:</i> PAL since January 1994 <i>TVP1:</i> Transition to PAL as from 1995		STV1: regular broadcasts in PAL from beginning of 1994
Significant technical problems	No	No	Single-standard SECAM receivers	Single-standard SECAM receivers		Non-linear differential parameters of TV transmitters
Numbers of receivers in service (x 10 ⁶) Colour dual standard Monochrome PAL-only SECAM-only Undetermined Total	(Data for first TV set in family only) 1.4 1.6 0.5 3.8	0.5 3.2	2.1 2.2 0.007 4.3	6.2 4.9 0.4 1.1 0.4 13.0	1.8 3.0 < 0.01 4.8	2.0
Decision taken for introduction of satellite TV broadcasting	No	No	National programme in 11 GHz band, in PAL	TV Polonia, broadcasting in PAL since March 1993	No	In preparation
Estimate of satellite broadcasting in period 1995-1998	-	Under consideration (Approx. 11% of households in early 1994)	TV receivers for terrestrial broadcasting: 20% TV receivers for both terrestrial and satellite: 80%	Approx. 22% of households in early 1994	Terrestrial: 100% Satellite: - Approx. 300,000 satellite receivers for foreign programmes	One satellite programme
Development of enhanced TV systems	-	Under study	Under study	Under study	-	Under study
Other important factors to be considered	Compatibility of accepted TV system	Full area coverage of Czech Republic	-	-	Cable TV distribution systems	Full area coverage of Slovak Republic

3. Coordination

3.1 UHF channel spacing

In the UHF bands the channel spacing is already 8 MHz throughout Europe, hence no coordination problems with neighbouring countries are to be expected.

3.2 VHF channel spacing

In the VHF bands, two channel spacings are used: 7 MHz in the western countries concerned and a 8 MHz in the former OIRT countries. This leads to overlapping channels both in Band I and Band III.

Due to these overlapping channels, the necessary protection ratios will change if the intercarrier-frequency is changed to 5.5 MHz. The impact will be different for each combination of wanted and unwanted television channels; therefore, each combination will have to be dealt with bi- or multi-laterally on a case-by-case basis.

3.3 Vision/sound power ratio

In order to improve the overall interference situation, the power ratio between the first sound carrier and the vision carrier should be reduced to -13 dB in all countries.

Table 2 - RF standards for television.

Factors under consideration	County and EBU Member responding to enquiry					
	Bulgaria BTB	Czech Republic CTV	Hungary MTV	Poland PTV	Romania RTV	Slovak Republic STV
RF TV standard in use at end of 1993	D, K - SECAM	D, K - PAL (D, K - SECAM only to February 1994)	D, K - SECAM	D, K - SECAM	D, G - PAL	D, K - PAL (except Bratislava, using B1, G - PAL)
National regulations setting RF standard	No	Official decision for D, K - PAL (May 1993)	No (Note 1)	No (Note 2)	Yes	No (Note 3)
Main advantages expected from change	-	Technical, economic and picture quality	-	-	-	-
Studies done on RF aspects of TV broadcasting	Technico-economic study. Experimental transmissions on 1st and 2nd networks	(Note 4)	Experimental transmissions	-	Start of transmissions in standard G	Experimental transmissions
Estimated RF situation for TV standards in period 1995-1998	D, K - PAL 75% B1, G - PAL 25%	D, K - PAL 100%	By 1998: B1 - PAL 100% G - PAL 100%	D, K - PAL 100%	D - PAL 90 - 60% G - PAL 10 - 40%	D, K - PAL 50% B1, G - PAL 50%

Notes:

- 1) B1 should be considered for Bands I and III. Transition from K to G is theoretically possible and should be considered for Bands IV and V.
- 2) Representatives of Polish Television, the PTT and Industry have agreed on PAL/D,K standard. Official decision has not been published.
- 3) Official decision expected in first half of 1994.
- 4) Reported to EBU Specialist Group V/EPS, Warsaw, March 1993 (doc. Temp. 3, 4, 5, 6, 7, 8, 9).

Table 3 - Television sound systems.

Factors under consideration	County and EBU Member responding to enquiry					
	Bulgaria BTB	Czech Republic CTV	Hungary MTV	Poland PTV	Romania RTV	Slovak Republic STV
TV sound system in use at end of 1993	<i>Mono:</i> 100%	<i>Mono:</i> 90% of area 81% of homes <i>2-channel FM:</i> 10% of area 19% of homes served	<i>Mono:</i> 100%	<i>Mono:</i> 100%	<i>Mono:</i> 100%	<i>Mono:</i> 92% <i>2-channel FM:</i> 8%
National regulation setting choice of TV sound system	No	Yes 2-channel FM (6.5/6.25 MHz) according to CSN 36.75.23	No	No	No	2-channel FM
Main advantages expected from change		Optimal adaptation to D, K standard and to Czech situation. Geographical aspects. Simplicity of implementation. Later introduction of MUSICAM/FM possible.				Optimal adaptation to Slovak conditions. Simplicity of implementation.
Preferences regarding choice of sound system	NICAM 728 would be technically optimal	2-channel FM	NICAM 728 would be technically optimal	2-channel FM (MUSICAM/FM possible later)	NICAM 728, although some problems foreseen owing to co-existence of D and G standards	2-channel FM
Technical studies undertaken	-	Introduction of mono/duo/stereo sound on another main transmitter of CTV	Tests with 2-channel FM and NICAM 728	-	-	Experimental transmissions at Bratislava (2-channel FM with B1, G)

3.4 Transition period

The transition period would last up to 10 years and the interference situation will be different at each point of time during this period.

4. Further aspects

4.1 Economic considerations

It has to be borne in mind that despite high cost penalties both at the transmitting and receiving side, viewers will perceive no immediate change in reception quality.

The change of the standard is a costly matter for the broadcasters. The setting aside of the related amount of money has to be organized in each country individually and methods of funding need to be considered.

4.2 Standardization

System B1-PAL would be a new television system; therefore it would have to be included in the appropriate ITU-R Recommendations.

4.3 Opening of digital services

It may well happen that, even during the transition period of up to 10 years, digital terrestrial television services will start.
