



Pricing for frequency usage

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**ECONOMIC ASPECTS OF SPECTRUM
REDEPLOYMENT
FOR DEVELOPMENT OF 2G&3G**

Yerevan (Armenia)

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EMC Analysis Centre (NIIR)

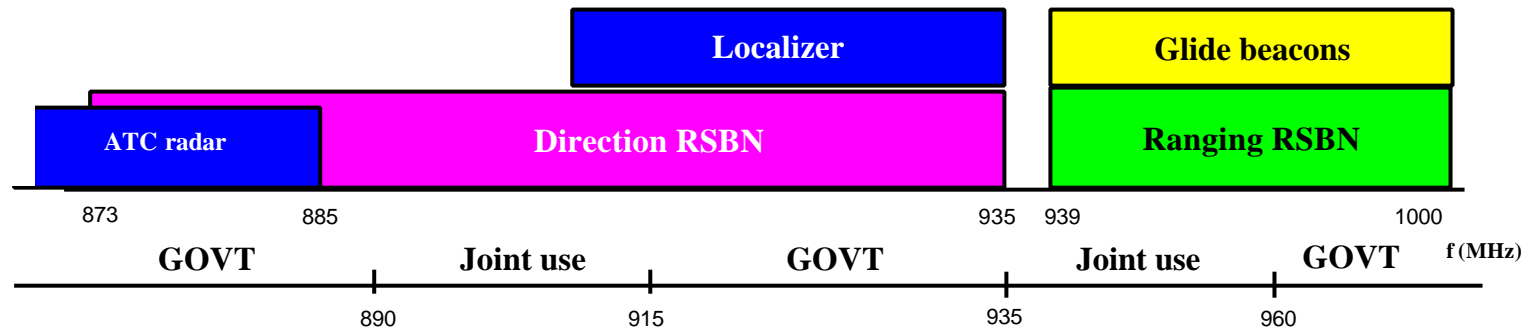


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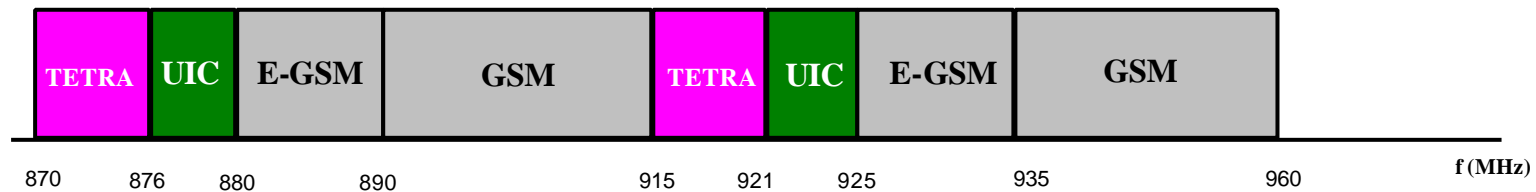
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Spectrum allocation in the 900 MHz band

Allocation to government radio services in Russia



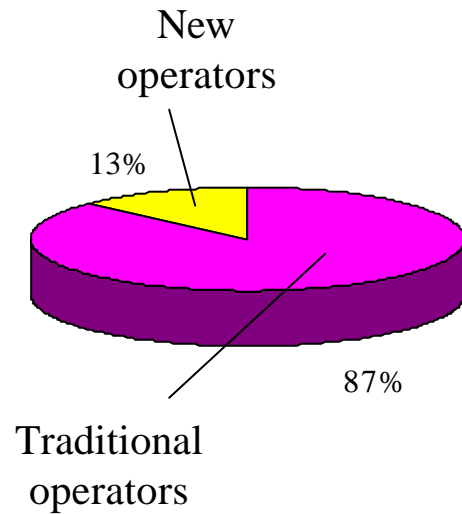
European allocation to civil radio services



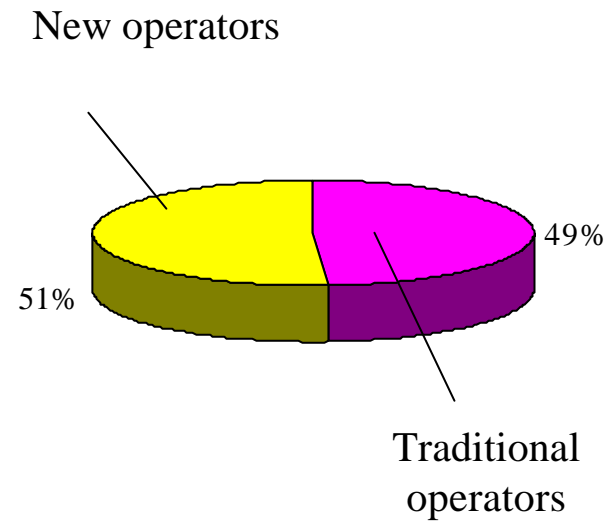


Comparison of revenues for traditional and new operators

Telecom infrastructure



Revenues



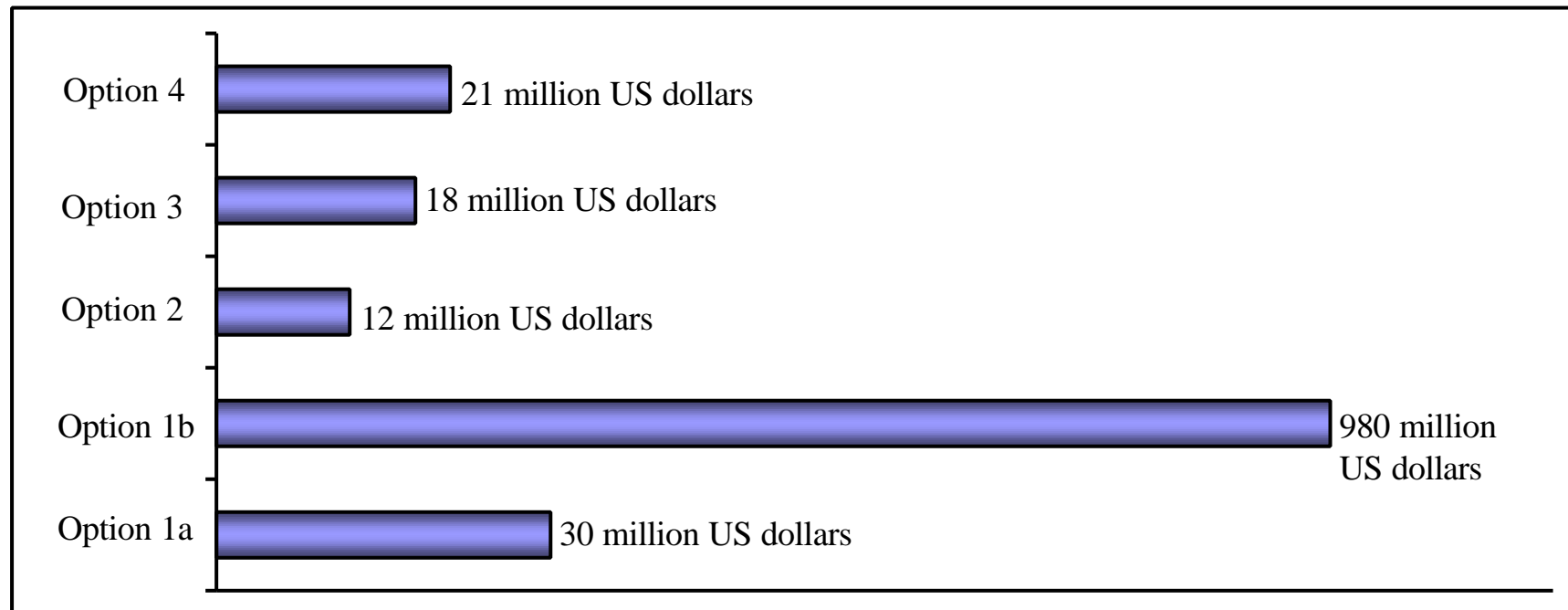


Main ways of ensuring shared operation of RSBN systems with GSM-900 networks

- organizational and technical measures to achieve electromagnetic compatibility by using frequency and space diversity;
- redeployment of the GSM-900 frequency bands by migrating aircraft and ground-based radio beacons to new types of RSBN operating in the international frequency band 960-1 215 MHz;
- redeployment of the GSM-900 frequency band through technical modernization of RSBN systems in operation to use only RSBN channels 17-33 (950.8-962.0 MHz);
- modernizing RSBN with subsequent migration to new types to use only RSBN channels 17-33 (950.8-962.0 MHz) and 41-88 (933.1-935.2 MHz and 873.6-903.7 MHz);
- use of new (satellite) technologies for migration of RSBN to the international frequency band 960-1 215 MHz.



Cost of spectrum redeployment in the GSM-900 band



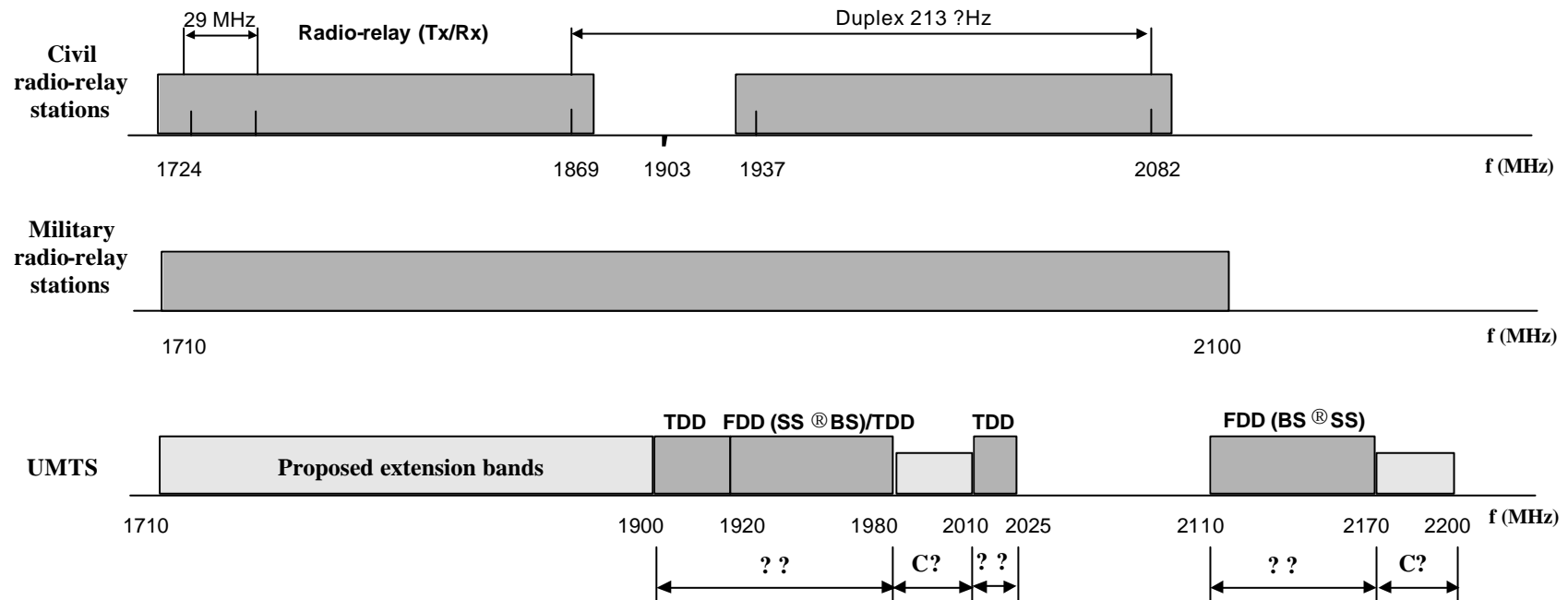


Time-frame for work on redeployment of the GSM-900 bands

- by 2002, completion of work to optimize frequency assignments within the unified national RSBN/PRMG space;
- by 2005, implementation of an organizational design project for the production of a test model of an RSBN beacon and modernization of on-board equipment, with the capability of operating in both directional and non-directional mode on the same frequency-code channels;
- after 2007, as resources are developed, replace RSBN-4N beacons with new beacons capable of operating in the dual mode.



Spectrum allocation in the 2 GHz band





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Expert evaluations of the cost of implementing organizational and technical measures for spectrum redeployment in the 2 GHz band

Measure	Cost of implementing the measures to redeploy spectrum (USD)		
	Single-hop RRL	Two-hop RRL	Subscriber radio access system
Percentage ratio of possible options	20%	80%	
W ₁	10 000 - 20 000	10 000 - 20 000	10 000 - 20 000
W ₂	500 - 1 000	500 - 1 000	500 - 1 000
W ₃	1 000	1 000	650
W ₄	3 000 - 5 000	3 000 - 5 000	5 000
W ₅	3 500	3 000	6 800
W ₆	7 400	12 600	14 300
W ₇	2 000	4 000	1 400
W ₈	9 500	87 000	11 400
W ₉	1 200	1 200	2 000
W ₁₀	50 000	110 000	53 000



General organizational and technical measures (to be implemented for radio-relay links (RRL))

- scientific research work to analyse the results of spectrum refarming and the impact of that process on the existing infrastructure and future development of the region in which RRLs are located as an integral part of a territorial (defence) system (W_1);
- preparation of the technical documentation and notifications to the national regulatory authorities of curtailment of the operation of radio systems (W_2);
- preparation of radio-frequency notices and obtaining frequency authorizations for radio systems to establish the infrastructure in the new frequency band (W_3);
- develop standards for frequency and geographical separation of radio systems in the new frequency band (W_4).



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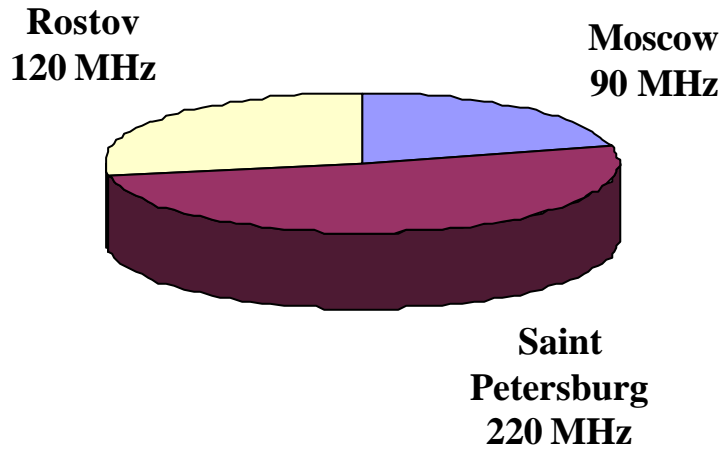
Specific organizational and technical measures (to be implemented for each RRL hop)

- disassembly (one RRL hop) of a radio system unit (W_5);
- preparation of project documentation for establishment of the infrastructure (reconstruction of RRL link hops) in the new frequency band (W_6);
- expert verification of frequency notices, analysis of electromagnetic compatibility and interference protection of newly introduced radio systems in the new frequency band (W_7);
- construction and assembly work for reconstruction of radio systems in the new frequency band (W_8);
- salvaging of old disassembled equipment (W_9);
- purchase of equipment in the new frequency band (W_{10}).



Cost of redeploying spectrum in the 2 GHz band

Amount of spectrum resource redeployed



Cost of redeploying spectrum

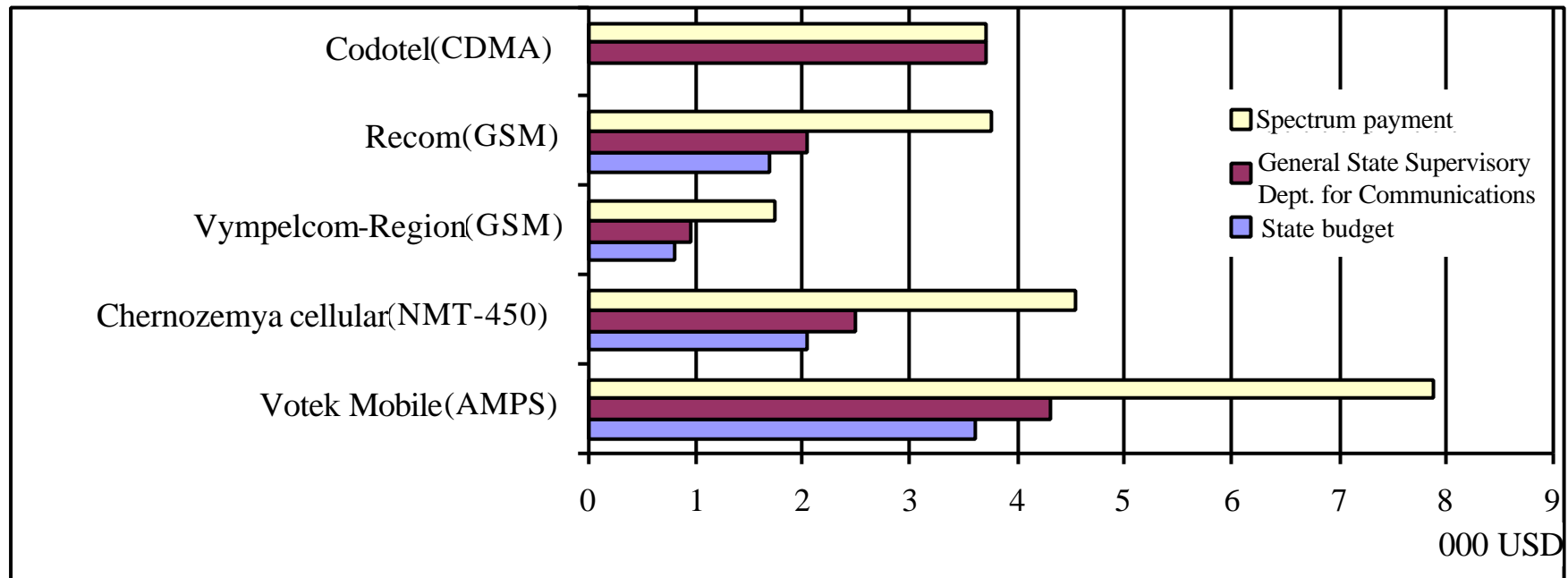




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*Quarterly payments for spectrum use
(cellular operators in Voronezh province)*





Radio-frequency spectrum redeployment strategy in Russia

- introduction of economic methods of managing spectrum use in addition to the administrative and organizational/technical methods;
- providing sources of funding for spectrum redeployment by modifying the system for payment of fees for use of the radio-frequency spectrum;
- cross-subsidization of spectrum redeployment for future radiocommunication and broadcasting technologies through fees for spectrum use in other high-income frequency bands;
- giving priority to redeploying the 2 GHz band for 3G networks and the 900 and 1 800 MHz bands for 2G networks.



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Decree of the Government of the Russian Federation on redeployment of radio-frequency spectrum for the introduction of new radio technologies in Russia

- the need to develop a Comprehensive spectrum redeployment programme;
- a time-line for spectrum redeployment, taking into account the lifetimes of radio technologies;
- the priority attached to refarming spectrum from various radiocommunication and broadcasting systems in the different regions of Russia;
- sources and methods of financing;
- the need to direct not less than 30% of revenues received from operators' fees for spectrum use to the establishment of an extrabudgetary fund in the State Radio-Frequency Service of the Russian Federation, which will be used to finance works and the purchase of equipment to replace obsolete fixed-service systems in the 2 GHz band.



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Thank you for your attention!

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