Current Activities of Telecom-LS - on the way to the Digital Broadcasting

Telecom-LS is carrying on the development of a wide range of equipment for digital multi-channel telephony, TV and data transmission via land-based radio channels and fiber optic communication lines and also transmitter-receiver digital broadcasting equipment.

The digitalization of the existing analogue telecommunications networks

Lately one of the main directions in Telecom-LS activities has become the solution of problems in the digitalization of the existing land-based telecommunications networks – primarily radio relay ones – and the shift to the digital TV broadcasting. Telecom-LS has an abundant unique experience in economical methods of the telecommunications networks' digitalization based on hybrid analogue-digital technologies and embodied in production-run equipment. Some system-network solutions designed by Telecom-LS for the introduction of modern tele-info-communication services on the basis of multi-purpose interactive system of the digital TV broadcasting were granted with an international approval (the ITU Recommendations, Studies' Questions, Contributions to international organizations).

The shift to a digital telecommunications network is currently happening in Russia sufficiently up-tempo and in a great degree it is based on Telecom-LS hardware solutions. Due to the vastness of this many hundred thousand kilometer networks and their branching trying to doing it in one instant would inevitably has led to great financial expenses. That's why Telecom-LS has drafted a concept of a step-by-step digitalization by the most economical means, i.e., using the existing analogue network and based upon hybrid analogue-digital technologies.

For countries with vast analogue radio relay lines still in use the modernization of the latter so they could be used for the digital data transmission is the simplest and the cheapest way of switching the said lines to digital data transmission and handling.

Such a modernization is based upon the organization of digital streams' transmission via existing radio relay lines and using the special modem equipment designed by Telecom-LS. After the application of this equipment a UHF transmitter-receiver hardware of an existing analogue radio relay frequency modulation system may without any substantial expenditure be immediately used for the transmission of the digital data at a 34 MB per second and later at 51 MB per second speed (STM-0).

Telecom-LS has an abundant experience in the organization of digital channels of up to 34 MB per second speed in the existing analogue radio relay lines. In course of the organization of a digital highway only data terminal equipment is usually being replaced. Our solutions allow keeping the existing systems of control, administrative communication and line reservation virtually unchanged, thus allowing to construct on the basis of existing radio relay lines mixed analogue-digital systems with a common protection channel. Such an approach allows implementing a step-by-step increase in the digital channels' capacity and correspondingly a step-by-step financing.

The digital modem equipment of 34 MB per second capacity and TV coders will allow you to transmit up to 4 digital TV channels together with accompanying sound channels via an analogue radio relay line's channel. The channels, that have become vacant, might be used for the transmission of the digital data.

Our solutions for analogue radio relay lines ensure:

- **Minimal expenses on setting up digital highways of up to 34 and 51 MB per second capacity (STM-0);**
- **Setting up mixed analogue-digital radio relay systems;**
- **A step-by-step build-up of the number of digital channels;**
- **Joint reservation system for analogue and digital channels;**
- **Heatless switch for digital channels;**
- **The transmission of up to 4 digital TV signals instead of a single analogue TV signal via one radio channel;**
- **Keeping the existing systems of control and of administrative communication;**
- **A simultaneous transmission via an analogue channel together with an analogue telephone or a TV signal of an extra digital signal of 2 or 2x2 MB per second.**

The approach to the digitalization of an existing analogue radio relay network, which was designed by Telecom-LS, allows its step-by-step modernization.

The main phases are as follows:

- **Phase 1 – the organization of digital 2 MB per second or 2x2 MB per second digital streams at existing analogue radio relay lines with a sub carrier frequency higher, than that of an analogue TV or telephony range.**
- **Phase 2 – the digitalization of radio relay lines' channels used for the telephony with an installation of 34 and 51 MB per second digital streams' transmission modems at existing radio relay lines.**
- **Phase 3 – the digitalization of radio relay lines' channels used for TV by the installation of digital TV transmission codecs, which ensure the transmission of up to four TV signals in a 34 MB per second stream and of up to six TV signals in a 51 MB per second stream.**

The extra benefits of this solution are the keeping of existing antenna-waveguide equipment and antenna-towers of an existing radio relay network, the keeping of the transmitter-receiver hardware with their corresponding frequency plans and the keeping – to a great extent – of existing management and monitoring systems.

As the result an analogue radio relay line is turned into a digital one, which is fully equipped with corresponding telecontrol, telesignalling, administrative communication and heatless switch reservation systems.

Due to minimal expenses such a way of the modernization leads to a very fast payback, especially for companies providing cellular telephony and Internet access services, for which the pay-back time for 2 MB per second modems on a sub carrier may well not exceed one month.

Telecom-LS has also developed the equipment for digital TV transmission via radio relay and fiber optic lines.

The said equipment ensures transmission a full-color TV SECAM/PAL/NTSC signal and of up to four accompanying sound signals via channels of analogue and digital radio relay and fiber optic lines within a digital stream of 8.448 to 34.368 MB per second speed.

A coder and a decoder together with inverse multiplexing blocks form a complex, which ensures the transmission of a full-color TV signal in N (N = from 4 to 16) streams at the 2.048 MB per second speed, thus allowing to transmit a TV signal in SDH systems without extra multiplexers, which are rather costly.

The said equipment is able to transmit TV signals via channels of any existing digital radio relay line and also via channels of analogue radio relay lines, which were modernized for transmission of digital streams. Currently it's widely used in Russian telecommunication networks.