

RURAL AREAS DIGITALIZATION

In presence of the fast developing and evolving communication technologies, appreciable advances have been registered with all the related integrated services on global scale and particularly in the developed world. Most of the developing and transitional countries still face and has to overcome the problem of digitalization of the telephone communication in general and solving of the rural infrastructural and digitalization problems in particular.

For transitional countries like Armenia the general problem is one of overall upgrading of the existing infrastructure and changing of the exchanges from analogue to digital ones where necessary. The digitalization of the cities and backbone structure of telecommunication in Armenia is almost ready or on the verge of completion. Same cannot be said about the rural areas of the country.

Doubtless, the enhanced telecommunication services in the rural areas not only will improve the telecommunication in the villages, but also will help the stimulation of the local economies, businesses, increase the demand for such services, and augment the number of subscribers.

Taking into account the financial resources, cost effectiveness, existing demand, priority factors, urgency and the requirement to provide optimal telecommunication solutions, ArmenTel undertook serious research and planning works to reconcile and meet these criterias and at the same time secure rural population of Armenia with modern and financially feasible means of communication.

Several options, among which full digitalization of the rural areas using remote subscriber units, overlaid digital network through new regional center digital exchanges using existing access network and transmission means, installation of GSM card-phones, and fixed-wireless technology have been studied, considered and even for some options projects were prepared.

All of the options have their merits and disadvantages at the same time. In the case of Armenia the priority was given to the urgency of the matter. To meet and satisfy the immediate needs of the rural population in Armenia in the most restricted period of time, the “installation of GSM card-phones” option fitted best and opted for. Presently, the actual implementation of the “installation of GSM card-phones” is underway in earnest. Installing GSM cardphones the provision of telephone services become generally available (allowing incoming and outgoing calls) to the rural population at tariffs equivalent to the tariffs offered to population living in areas covered by conventional wireline service. But this option may not meet full telecommunication demand.

In this article, we would like to present and discuss the case study of “overlaid digital network through new regional center digital exchanges using existing access network and transmission means” option. This option, though requires considerable financial resources and may be in excess of the existing demand. Adoption of this option provides and can serve for broadband services.

Overlaid Digital Network Through New Regional Center Digital Exchanges

The main idea is the improvement of communication quality and services in the rural areas using existing network. To illustrate the case in question let us observe and study it in the example of the Armenia.

Armenia consists of 10 Marzes (governorates) and each of the Marzes have number of regions (41 in all) with regional centers. Most of the villages of any given region have either physical telephone lines or served via transmission trunks (in presence of telephone exchange in the village) connected to the telephone exchange of the regional center. The digitalization plan for the region specifies the installation of small digital switches in the 34 regional centers (7 regional centers already have digital switches). The capacity of the new digital switch depends on the existing subscriber quantity in the

villages and the foreseeable demand in the future. The cutover of the village subscriber telephone lines served from the existing analogue regional center exchanges to the new digital exchanges will secure modern telecommunication services to the villages. The plan envisages to overlay part of the analogue network and allows for the co-existence of the analogue and digital networks in the named regions, thus improving overall communication in the rural areas of the country. Some important parameters are considered during the planning stage. Among these parameters the following are noteworthy to mention:

- Expansion capability for subscriber and trunk capacities to replace the existing analogue exchanges altogether in the future.
- Ability to work with wide range of signalling systems (including old Soviet signalling systems) in order to incorporate different signalling systems of different exchanges installed in the villages.
- This option ensures the in use dialling plan, routing and switching will be carried out in the regional center. This allow the change of the first digit of the subscriber number only for the subscribers that are cutover from analogue to digital.
- Capability to serve long distance subscribers for more than 15km.

Critical Success Factors:

- Choice of right, purposefull equipment as to its cost, availability, adaptability with the existing analogue equipment, future maintainance convenience, and at the same time meet all technical specifications put forward;
- Training of the personnel to run and operate the new equipment;
- Strict adherence, and observance of the existing signalling specifications in ArmenTel's network throughout the Republic of Armenia, while interconnecting the new digital and existing analogue exchanges in the rural areas.

Technical characteristics

Capacity:

- Subscriber capacity - from 100 to 2000 subscriber lines,
- Trunk capacity - from 3 to 12 E1 trunks (G.703),
- Up to 50 analogue interconnection lines (desirable).

Interfaces:

- Subscriber line:
 - Impedance: max 2000 Ohm (including telephone device),
 - Isolation: max 20 KOhm,
 - Card phones with 16KHz & polarity reversal.
- Network Interconnections:
 - E1 (G.703) trunks,
 - E1/2 (PCM-15) trunks (desirable),
 - Analogue interconnection lines (desirable).

Signaling types:

- Subscriber line signaling:
 - Pulse Dial, DTMF,
- Trunk signaling:
 - R1, R1.5,
 - CAS1 (for rural network switches), CAS2 (Pulse dial, Shuttle, MFC packet),
 - E&M (for rural network switches),
 - 1VF (Pulse dial, Shuttle, MFC packet),
 - R2D (National Specification with ANI request),
 - CCS 7 (optional),

Operation and Management:

- Locally,
- Centralized: from O&M Center:
 - Dial up, via 64Kbps leased line,
 - WAN.

Billing:

- Recognition and transfer of A number,
- Local call charging possibility,
- Call detailed records,
- Pulse metering.

Statistic measurements:

- ASR (Answer Secure Ratio),
- Periodic statistical information.

Power Supply:

- Autonomic Power Supply DC 48V or 60V (with rectifiers and batteries).