

SOME FACTS AND PROSPECTS FOR THE ESTABLISHMENT OF TELEVISION BROADCASTS IN MAINLAND TANZANIA

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1. What is Television

Television is a system in which an optical image is translated into electrical signals for transmission by radio or over wires, after which the signals are translated back to light rays to form a reproduction of the original image on the receiver screen. It is desired that the picture picked up by a Television (TV) receiver, be a faithful reproduction of the scene televised. Any scene being televised has a wide range of specific features and qualities. It may contain a great number of colours, gradations of shade, coarse and fine details, motion may be present in a variety of forms and the objects making up the scene are usually in three dimensions.

The more faithful the received TV picture is the more elaborate, expensive and bulky the TV equipment must be. On the other hand among the important requirements for a TV system, and especially so for a telecasting system, are the utmost in simplicity, reliability, and low cost. It may be agreed that colour and 3-dimensional effect are second in importance to other aspects more vital to the information transmitted, such as definition and contrast. This is why, in the early days of TV, scientists and inventors limited themselves to finding methods for the transmission of two dimensional black and white motion picture with acceptable definition and contrast.

The science and techniques of TV are constantly being improved and developed so as to correctly reproduce the transmitted information. At the present time there is a clearly marked trend to change from black and white TV to colour TV since this increases the equality of the received picture to the transmitted original scene. This equality is very important not only in TV broadcasting but also in scientific research.

2. What Television can offer

Television is a mighty means of political and cultural education of masses. With the help of TV we are made observers of current events and late developments which may happen from any corner of the world.

Television systems are used in areas of atomic radiation, underwater environments and in space. There are several areas in science, industry and education where the TV camera has contributed immeasurably to man's versatility and his knowledge of his environment and himself.

In Tanzania, TV can play a greater role in education whereby the standard of teaching can be improved and the money used to educate each scholar reduced, especially in secondary and technical schools. Moreover peasants in villages can be taught by viewing on TV receivers the better ways of farming, fishing, prevention of diseases, fighting against them when they occur (for example the fight against cholera would have been well illustrated through TV, much better than through radio alone).

The following programmes could be included:- primary and secondary education, agriculture, "ukombozi" and the front line states, health, news, science and technology, political education, women's programmes, children's programmes, sports, drama, religion etc.

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3. Colour Television systems

Today three basic colour TV systems are in use:- NTSC (National Television System Committee) system, SECAM (Sequence de Couleurs Avec Memoire) system and PAL (Phase Alternation Line) system. The NTSC system which in 1953 became a standard is the mother colour TV system used in USA, Canada, Japan and some countries in the American continent. The SECAM system which started in France and USSR in 1967 has been adopted in GDR, Czechoslovakia, Bulgaria, Hungary and some North African countries. In 1967 broadcasts of PAL system were started in West Germany. The system is now adopted in Great Britain, Switzerland, Sweden, Denmark, Austria, Belgium, Norway, Finland, Holland and Zanzibar.

Many pieces of equipment used at the transmitting and receiving terminals are identical in the three systems. The methods and techniques used to convert light images into electrical signals and output circuits in the colour TV set are the same in the three systems. They only differ in the methods by which information is relayed from camera to receiver. The three systems have each its own advantages and disadvantages. However, looking at the operational characteristics of PAL system and the current trend of other world countries it is better to recommend PAL system to be used in mainland Tanzania

4. Television Standards

TV standards are named by letters such as A, B, D, E, I, K, L, M, The standards differ in the bandwidth of the TV channel, difference between vision and sound carrier frequencies, kind of modulation (amplitude modulation or frequency modulation) etc. If one of the above mentioned terms do not coincide a TV- set from one country might not properly reproduce a picture and sound signal in another country. Countries with the same standards can easily exchange programmes and TV sets.

Zanzibar has standard I (British UHF standard) which has 6 MHz difference between vision and sound carrier frequencies. It is therefore not possible to receive TV programmes from neighbouring countries or at least there will be no sound but disturbed picture, or if one tunes at the receiver, sound may be good but the picture will disappear.

When establishing TV broadcasts in mainland Tanzania, the above mentioned features should be taken into account.

5. Ways and means of extending the coverage of Television services

A typical TV broadcast station usually covers an area within a radius of 60 to 80 km. This is because the radio waves within the VHF and UHF bands allocated to TV services cannot bend around the earth's curvature and are only propagated within the line of sight distance from the transmitter antenna.

In the circumstances, the height of transmitting and receiving antennas becomes a critical factor. Since receiving antennas cannot be taller than a few tens of metres and any further increase in their height is not economical, the transmission distance is solely determined by the height of the transmitting antenna at the TV broadcasting station. However, it is very expensive to build huge towers for the transmitting antenna and therefore this cannot possibly provide means for extending coverage of TV services.

The alternatives ordinarily used are radio, cable, and satellite relay systems. Each type has merits and demerits of its own and this defines the field of application for them.

5.1 Radio relay system

Radio relay systems usually operate in the microwave region (UHF and SHF bands) for which reason they are often referred to as microwave systems or links. Microwave relay stations are spaced 40 to 50 km apart and their antennas are set up to towers 50 to 70 m tall. Most microwave relay stations are designed to operate unattended and watch on their performance is maintained by means of telemetry information relayed to attended stations.

The advantages offered by microwave links over other forms of relay systems may be summed up as follows:-

- a) Capital and maintenance costs are low.
- b) TV signals can be dropped at any point on a link for use by adjacent areas.
- c) Short time is needed for construction.

In some locations it is difficult, if at all possible, to space relay stations 40 to 50 km apart. This above applies to the mountains, deserts, and large bodies of water. In these conditions, it is more advantageous to build tropospheric - scatter relay links. For its operation, a tropospheric-scatter link depends on the fact that microwaves, in propagating through the atmosphere are forward scattered from discontinuities in the troposphere. Troposcatter repeaters may be spaced 300 to 400 km apart. For reliable service, however, their transmitters must have a power output of several tens of kilowatts which is at least 100 times the power output of an ordinary radio-relay transmitter. The surface area of antennas used in troposcatter systems is 100 to 150 times larger than the surface area of an antenna in conventional radio-relay systems. However, the cost of a troposcatter system in inaccessible localities is only a fraction of that of a conventional radio-relay system because the number of repeaters needed is reduced considerably.

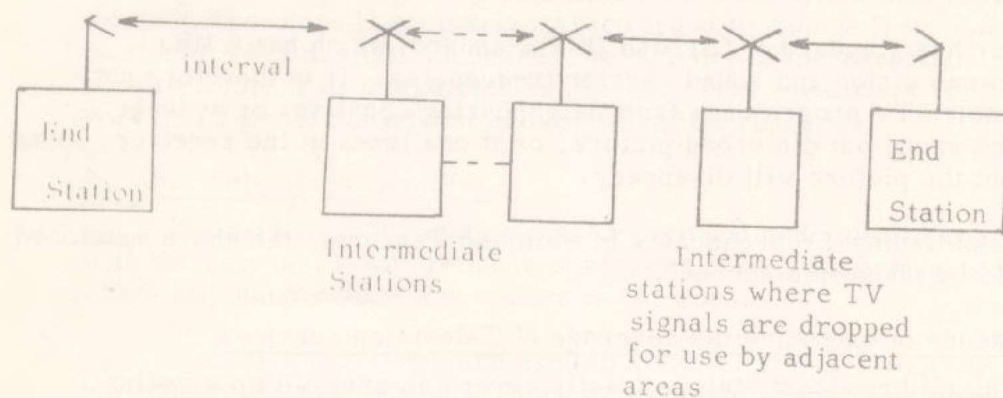


Fig. 1: Principle of a radio relay system

5.2 Cable relay systems

In some cases, it is more advantageous to relay TV programmes for long distances over special trunk line cables. Coaxial pairs introduce appreciable phase distortion and attenuation so much that after each 6 to 7 km unattended amplifier units and after each 100 to 200 km attended amplifier units have to be employed so as to reduce the losses.

5.3 Satellite relay systems

In the vast areas instead of building hundreds of TV broadcast and relay stations and setting up thousands of kilometres of radio relay links satellite communication links are used.

Signals can be relayed via a satellite to the earth in two ways:-

- a) Using an artificial earth satellite as a passive reflector for radio waves,
- b) using an artificial earth satellite as an active repeater.

A passive communications satellite is usually a large sphere made from a thin metallised plastic film. A major advantage of a passive satellite is that it carries no electronic gear. Its major disadvantage is that it reflects incident radio waves in all directions so that the receiving antenna can pick up only a fraction of the transmitted signal. Systems based on active repeater satellites have wider capabilities. An active repeater satellite carries equipment necessary to boost the signal to be relayed.

The arrangement of a satellite relay system between two points by means of a single satellite is shown in fig.2. The system operates as follows:- The TV signal originating at a programming TV centre is relayed by a TV broadcast station to the satellite. The satellite receives, amplifies and relays the signal to the receiving stations of the particular system on the earth. The signal picked up by the receiving station is channelled over a junction link to a repeater or a TV broadcast station which relays it farther to its subscribers who can see program on their receivers.

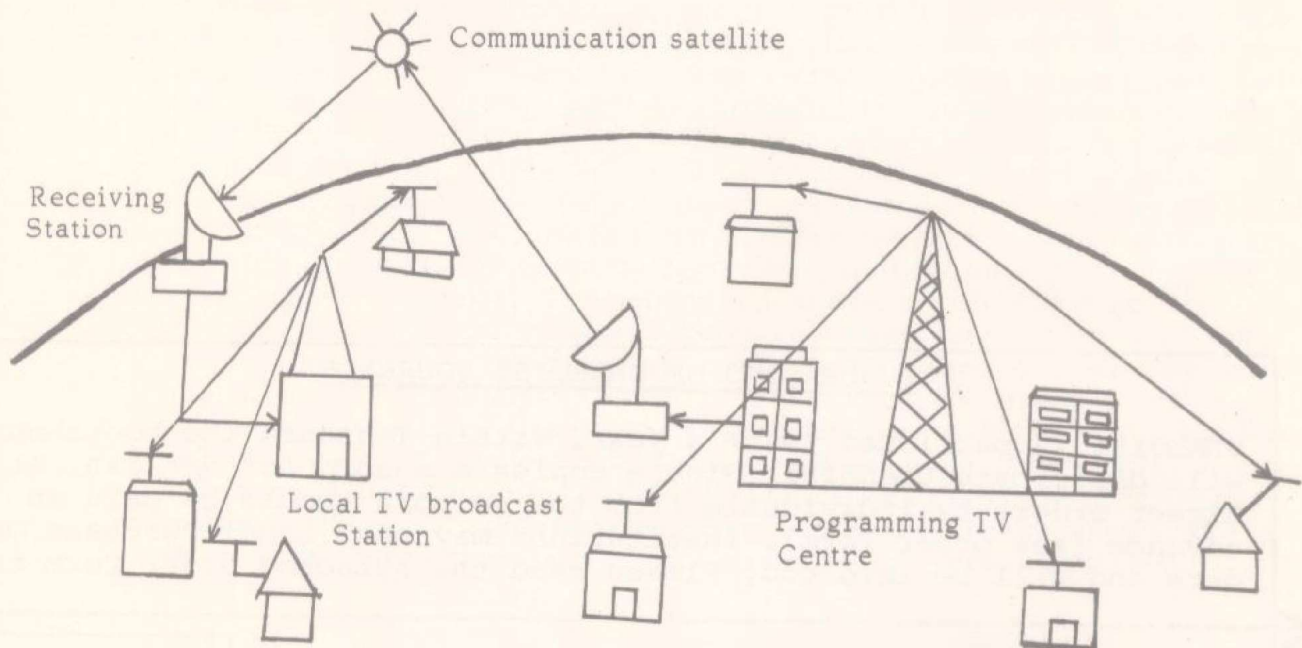


Fig. 2: Operation of a satellite relay system

6. Conclusion and Recommendations

- a) TV services need experienced personnel as from the cameraman, sound engineer (control engineer), video engineer to the artists. If we think that we should have TV services in mainland Tanzania, then there should be a concise programme to train such specialists in advance. The earlier this is done the earlier such a service would become "Tanzanian".
- b) Feasibility studies as to how such the cost of installing TV services in the country will be, should be carried on as soon as possible as this takes a long time.
- c) Satellite relay systems can easily provide coverage of TV services to the whole area of Tanzania. However, their costs are high and therefore their installation will highly depend on the availability of funds. It is therefore quite probable that at the initial stage radio relay systems and to a

less extent cable relay systems will have to play a greater role. In this case priority will have to be given to some areas to have TV services first.

- d) The experience of TV Zanzibar over the past years of operation should be taken into account when planning to have TV services in mainland Tanzania.

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