GUIDING PRINCIPLES IN NATIONAL R-F SPECTRUM MANAGEMENT

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It is the author's firm belief that every R-F allotment should stem from a defined policy. The guiding principles of such a policy are suggested in the following paper.

The R-F Spectrum is a scarce national resource; in Israel it is managed by the Ministry of Communication - MOC. Any change in the right to use a particular frequency e.g. change of user's name, location or technical specification requires prior approval by the MOC.

The basis for frequency allotments to the various services are the **Radio Regulations of the ITU.**

Owing to their scarcity, no allotments will be made to those services which can avail themselves of technically sound and timely alternatives: fibre-optic and coaxial cables, satellite, IR, etc.

Due to the severe congestion of the R-F spectrum, there is a need to encourage the development of means that allow frequency-sharing among various systems. An exclusive frequency will be granted only when no technical or operational solution can be found for their operation on a common frequency.

In view of the desire to maximize the exploitation of the R-F spectrum, notwithstanding the small size of the country, the MOC will monitor the distribution of signals with regard to frequency, time, space and intensity and will intervene whenever warranted.

The efficient solution of spectrum management problems requires computerized methods. Computer-aided techniques are used by MOC for: licensing, "type approval", microwave link design, RFI & hazard analysis.

The potential interference zones caused by a given transmitter extend beyond its service coverage. Consequently, serious efforts (both economic and technological) should be made from the outset, to minimize interference to existing and future comms. The following measures will help in this respect:-

1. Operating at minimum Tx power that will provide communication of acceptable quality.

2. Restricting the sector of radiation, i.e. using directional antennae, whenever compatible with the communications requirements.
Antenna gain permits Tx power reduction without reducing EIRP.

3. Installing the antennae at the minimum height that will maintain a satisfactory signal.

4. Not exceeding the minimum bandwidth compatible with the rate of transmission of information.

5. Transmitting on as high a frequency as possible
The advantages from the spectrum management point of view are:
a) Spectrum congestion is less severe.
b) The propagation range of the potential interference is limited.
c) The antenna apertures are smaller for the same gain, and we profit from improved sidelobe patterns.

6. Make certain that spurious and harmonic emissions are kept down to a minimum in conformity with applicable standards.

MOC will encourage the transition to digital systems. These technologies permit reasonable performance standards, even under conditions of low signal-to-noise ratios, as well as compression of the transmitted frequency band.
MOC will also encourage "trunking" and "cellular" techniques, permitting the simultaneous use of the limited radio band available by a larger number of callers.

Freq. allotments and type-approvals will be granted to applicants whose demands are well justified, for a limited period of up to seven years. This ceiling retains flexibility in the process of allotments, for the sake of future developments.

In order to simplify the identification of sources of interference to wireless communications, MOC prefers to allocate discrete frequencies as opposed to the freedom to choose a frequency within the band.

Unlike the case of other natural resource, a radio frequency that is not exploited is a frequency wasted. Due to the heavy traffic of official communications, in times of emergency, certain freq. bands must be evacuated by private users upon the declaration of the state of emergency. Thus, the spectrum is fully exploited at all times.

A freq. allotment will be released for use by a new system only after the operator provides the MOC with a timetable, of the changeover from the old to the new frequencies.

Every few years the MOC will update the spectrum plans, and changes will be introduced to intensify exploitation of the spectrum resource. In this way, we shall improve the efficiency of existing systems, and make room for new services.

Distribution of TV transmissions should be accomplished mainly by cables, since the great majority of the viewers are on stationary sites. The VHF & UHF bands should be reserved to serve Mobile Communications. The Mobile Service has no alternative to the use of relatively low

frequencies which do not require an undisturbed line of sight between the base station and the mobile receiver.

A good alternative for CATV and terrestrial transmissions is broadcasting via a satellite. In this application the Satellite Service offers significant advantages over terrestrial transmission:
a) The elimination of radiation hazards to the population caused by Tx installed in a densely populated area.
b) In Israel most hill-tops are natural reserves or serve as sites of communications installations. The construction of a TV transmitting station involves the installation of electricity and water services, and the paving of roads, all of which ruin the natural beauty of the landscape.

It is the declared policy of the MOC to encourage free and fair competetion among companies.
MOC will consult with manufacturers, operators,users, importers,research institutes, other administrations.

The resolutions of the National Frequency Committee and current allotments shall be published. Thereby, we shall assure equal level of information among all firms.

Consistent application of the a/m principles will aid the State in utilising the R-F spectrum as a tool towards promoting economic growth and the creation of jobs.

* When presenting this paper, I shall demonstrate the application of these principles in the allotments of microwave channels to CATV links in the 18 18 gHz band.