

## RECOMMENDATION 622

**TECHNICAL AND OPERATIONAL CHARACTERISTICS OF ANALOGUE CELLULAR SYSTEMS FOR PUBLIC LAND MOBILE TELEPHONE USE**

(Questions 37/8, 39/8)

(1986)

The CCIR,

CONSIDERING

- (a) Report 740;
- (b) Report 742, which gives details of a number of present analogue cellular systems;
- (c) that on-going studies necessary to specify future international cellular mobile telephone systems are not yet complete;
- (d) that many administrations are planning, implementing, or operating national and international mobile telephone systems which use analogue speech modulation and which have high capacity and spectrum efficiency;
- (e) that a limitation of the number of different analogue cellular systems would greatly facilitate the international use of these systems and would reduce equipment cost,

UNANIMOUSLY RECOMMENDS

that the following technical and operational characteristics of cellular land mobile telephone systems should be adopted for systems intended for international or regional use:

**1. General characteristics**

**1.1 Operational aspects**

The following general operational aspects should apply:

- automatic setting up and charging of calls to and from the mobile station;
- the ability to set up calls between the mobile station and any fixed telephone subscriber or other mobile telephone subscriber within the system;
- fees should be charged in a manner consistent with principles of the public switched telephone network (PSTN);
- the blocking probability should be designed in a manner similar to the PSTN services;
- continuous control of call quality should be maintained, with automatic hand-over between adjacent base stations within one system if needed;
- full duplex operation;
- speech quality should be comparable to that offered in the existing analogue PSTN.

**1.2 Cellular properties**

The following general aspects should apply:

- possibility to accommodate more than one base station in a service area;
- “hand-over” from one site to another, i.e. from one radio frequency to another if necessary;
- re-use of the same RF assignment simultaneously by more than one base station and for more than one communication;
- growth: the system may be able to start with a few large cells and gradually grow until many small cells are created at points of highest traffic density.

**1.3 Service protection**

- A transmitted serial number or some similar technique should prohibit the use of stolen units or use by unauthorized callers;
- unwanted intelligible signals (cross-talk) should be avoided or suppressed;
- the introduction of means to ensure privacy of communication should not be excluded by the design.

#### 1.4 *Services offered*

The following services should not be excluded:

- non-voice services, such as data services, etc.;
- equipment mounted in any vehicle;
- hand-held equipment;
- other enhancements consistent with the mobile service, such as abbreviated dialling, etc.

### 2. **Technical characteristics**

#### 2.1 *Radio cell configuration*

The radio cell configuration should be determined by thermal and environmental noise performance, co-channel interference, the typical multipath (Rayleigh) fading of mobile channels, terrain variability, the antenna patterns selected, and the service quality desired.

#### 2.2 *Control channel configuration*

2.2.1 *Control channel usage:* the following two methods are permissible:

- the exchange of control signals over channels which can also be used as communication channels;
- the provision of channels dedicated either to control or communication but not both.

Both methods reduce the total traffic capacity of the system; the choice between the above methods depends primarily on the amount of signalling traffic.

2.2.2 *Seizure:* multiple seizure reduction techniques such as the busy/idle status on control channels should be used to reduce the effects of collisions during attempts on the same control channel.

#### 2.3 *Speech quality*

For an analogue system, voice processing using a 2 : 1 syllabic compandor might be employed to improve speech quality.

#### 2.4 *Signalling reliability*

To improve signalling reliability, the following methods are preferred:

- forward error correcting coding such as BCH code;
- repeated control signal transmission;
- compelled techniques, e.g. recycle (ARQ) and repeat back techniques;
- diversity techniques.

#### 2.5 *RF equipment characteristics*

- Employment of diversity techniques should not be precluded;
- Recommendation 478\* should apply to each frequency band employed.

### 3. **Operational characteristics**

#### 3.1 *Call processing*

The following system functions should apply to the cellular system:

- radio channel assignment and set-up control when calls occur;
- radio channel release when calls terminate.

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\* Except that cellular systems, using exclusive frequency bands, because of their inherent separation in both frequency and space, might have relaxed adjacent-channel and spurious-emission requirements within their own bands.

### 3.2 *Supervision*

To supervise radio channel status and to maintain necessary quality, the system shall perform one or several of the following functions:

- appropriate control channel selection and identification of the registration areas for the mobile station;
- radio cell assignment of the mobile station for origination and/or termination of calls;
- speech channel status monitoring, as appropriate;
- monitoring the proper speech channel assignments;
- speech channel quality monitoring and appropriate radio cell selection for hand-over if necessary;
- monitoring the speech channel reassignment, whenever necessary;
- proper control monitoring at termination.

### 3.3 *Location registration*

In accordance with Recommendation 624.

### 3.4 *PSTN interface*

In accordance with CCITT Recommendation Q.70.

### 3.5 *Numbering plan*

In accordance with CCITT Recommendation E.213.

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