

## RECOMMENDATION ITU-R M.818-1

**SATELLITE OPERATION WITHIN INTERNATIONAL MOBILE  
TELECOMMUNICATIONS-2000 (IMT-2000)**

(Question ITU-R 39/8)

(1992-1994)

The ITU Radiocommunication Assembly,

*considering*

- a) that the ITU-R has been studying International Mobile Telecommunications-2000 (IMT-2000) and has issued Recommendation ITU-R M.687;
- b) that the ITU-R studies are continuing;
- c) the need for a flexible system structure able to match investment to the revenue growth, to adapt readily to environmental factors and to respond to new developments without restricting innovation;
- d) the relevant ITU-T Recommendations and on-going studies;
- e) that satellite operation within IMT-2000 will enhance the overall coverage and attractiveness of the services;
- f) that satellite operation within IMT-2000 could facilitate the development of telecommunication services in developing countries;
- g) that the technical characteristics of land mobile satellite systems are being studied, and some systems are coming into operation;
- h) that in order for IMT-2000 to be available to users anywhere on land, ships and aircraft, a satellite component of IMT-2000 will be required;
- j) that satellite systems using the geostationary orbit or a non-geostationary orbit (e.g. highly inclined elliptical orbit, or low-earth orbit), or combinations thereof, may provide IMT-2000 services;
- k) that the World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum (Malaga-Torremolinos, 1992) (WARC-92) has identified the bands 1 885-2 025 MHz and 2 110-2 200 MHz as being available on a worldwide basis for use by the terrestrial component of IMT-2000 and that within these bands the portions 1 980-2 010 MHz and 2 170-2 200 MHz as being available on a worldwide basis for use by the satellite component of IMT-2000 from the year 2005;
- l) that in addition to the use of the bands identified in *considering* k), above, for the satellite component of IMT-2000, the FSS bands may be used for feeder links and other network connections in support of IMT-2000;
- m) that a pocket-sized IMT-2000 personal station (PS) used for terrestrial communication may also be configured to operate directly with satellites as personal earth stations (PES) or indirectly via a mobile earth station (MES);
- n) that users may want to be able to use the same terminals and procedures as in the fixed network ISDN to access similar telecommunication services in IMT-2000;
- o) that particularly for an integrated PES/PS, certain design, operating, and economic advantages may be realized through adoption of features that enable use of the same hardware for the terrestrial and satellite components;
- p) that the design of the terrestrial component of the IMT-2000 should not be adversely affected by the satellite component;
- q) that the maximum compatibility of hardware and software between the satellite and terrestrial components of IMT-2000 will benefit the users and facilitate international roaming;
- r) that the satellite component of IMT-2000 will need to support Universal Personal Telecommunication (UPT);

s) that due to lack of mobile earth terminal antenna discrimination different carrier frequencies may be required for accessing the terrestrial and satellite components of the IMT-2000 to avoid interference problems,

*recommends*

1. that services provided by the IMT-2000 satellite component should include but not be limited to, the following:

- a paging (alerting) one-way data service direct from a satellite to an IMT-2000 satellite pager (SP);
- two-way voice or non-voice services should be provided for the following configurations:
  - service directly to/from a mobile earth station (MES);
  - service directly to/from a personal earth station (PES). The PES would comprise equipment and protocols fully or partially compatible with the terrestrial-based IMT-2000 personal station;
  - service to/from users connected by a local exchange (LX) via an MES;
  - service indirectly to/from a personal station (PS) communicating via an MES. In the case of vehicles with multiple users a cell station (CS) (cell site for PSs) may be included in the vehicle between the PSs and the MES.

Figure 1 shows some examples for satellite operation involved with IMT-2000;

2. that the signalling protocols of the satellite component of IMT-2000 should follow the OSI model, with special emphasis on establishing physical and logical modularity for those elements that may differ between satellite and terrestrial components;

3. that links are needed between the terrestrial and satellite network control elements of IMT-2000 to facilitate handovers and exchange of location registry data and other management information;

4. that in the frequency bands identified by WARC-92 for operation of the IMT-2000 satellite component, account should be taken of the constraints to be established for sharing with other services;

5. that a protocol be developed to establish whether a terrestrial or satellite component should be used for a given call;

6. that compatible but not necessarily identical multiple access schemes should be developed for the terrestrial and satellite components;

7. that the user presentation and operation of the PES should be as similar as possible to that of the PS;

8. that within the bands identified, common satellite frequency channels should be used to facilitate worldwide and regional planning and operation;

9. that the following factors:

- service,
- equipment (hardware and software),
- architecture,
- interfaces and protocols,

should be addressed in the development of detailed Recommendations relating to both the satellite and terrestrial components of IMT-2000.

The subjects of these detailed Recommendations include services, architecture, interfaces, quality of service and network management;

10. that the service provided by the satellite component should be of comparable quality to the terrestrial component of the IMT-2000, where it is possible, bearing in mind the particular constraints of satellite systems such as power, spectrum, and propagation delay;

11. that satellite links operating in the fixed-satellite service (FSS) bands providing the IMT-2000 service indirectly via fixed earth stations (FES) are not to be considered to be part of the satellite component of IMT-2000 but constitute an FSS connection in support of IMT-2000. An example of such a connection is illustrated in Fig. 1.

