

## RECOMMENDATION ITU-R M.818-2\*

**Satellite operation within International Mobile Telecommunications-2000 (IMT-2000)**

(Question ITU-R 229/8)

(1992-1994-2003)

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 systems are by nature well suited to provide distribution services mentioned in Recommendation ITU-R M.816;
- g) that satellite operation within IMT-2000 could facilitate the development of telecommunication services in developing countries;
- h) that the technical characteristics of land mobile satellite systems are being studied, and some systems are coming into operation;
- j) 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;
- k) 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;
- l) that satellite systems (including the satellite component of IMT-2000) could be useful for the provision of services in emergency and disaster relief situations;
- m) that the World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum (Málaga-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;

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\* Radiocommunication Study Group 8 made editorial amendments to this Recommendation in 2004 in accordance with Resolution ITU-R 44.

- n) that World Radiocommunication Conferences have identified, in addition to the frequency bands indicated in *considering* m), the frequency bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 626.5 MHz, 1 626.5-1 645.5 MHz, 1 646.5-1 660.5 MHz, 2 483.5-2 500 MHz, 2 500-2 520 MHz and 2 670-2 690 MHz for possible use by the satellite component of IMT-2000 according to *resolves* 1 and 2 of Resolution 225 (Rev.WRC-2003);
- o) that in addition to the use of the bands identified in *considering* m) and n), 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;
- p) 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);
- q) that users may want to be able to use the same terminals and procedures as in the fixed network integrated services digital network (ISDN) to access similar telecommunication services in IMT-2000;
- r) 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;
- s) that the design of the terrestrial component of the IMT-2000 should not be adversely affected by the satellite component;
- t) 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;
- u) that the satellite component of IMT-2000 will need to support universal personal telecommunication (UPT);
- v) 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 an MES;
  - service directly to/from a PES. The PES would comprise equipment and protocols fully or partially compatible with the terrestrial-based IMT-2000 PS;
  - service to/from users connected by a local exchange (LX) via an MES;
  - service indirectly to/from a 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 optional services provided by the IMT-2000 satellite component could also include:
- distribution services for the provision of information from a central source to an unlimited number of authorized receivers connected to the network (MES, PES or SP);
- 3** that the signalling protocols of the satellite component of IMT-2000 should follow the open system interconnection (OSI) model, with special emphasis on establishing physical and logical modularity for those elements that may differ between satellite and terrestrial components;
- 4** 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;
- 5** 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;
- 6** that a protocol be developed to establish whether a terrestrial or satellite component should be used for a given call;
- 7** that compatible but not necessarily identical multiple access schemes should be developed for the terrestrial and satellite components;
- 8** that the user presentation and operation of the PES should be as similar as possible to that of the PS;
- 9** that within the bands identified, common satellite frequency channels should be used to facilitate worldwide and regional planning and operation;
- 10** that the following factors:
- service,
  - equipment (hardware and software),
  - architecture,
  - interfaces and protocols,

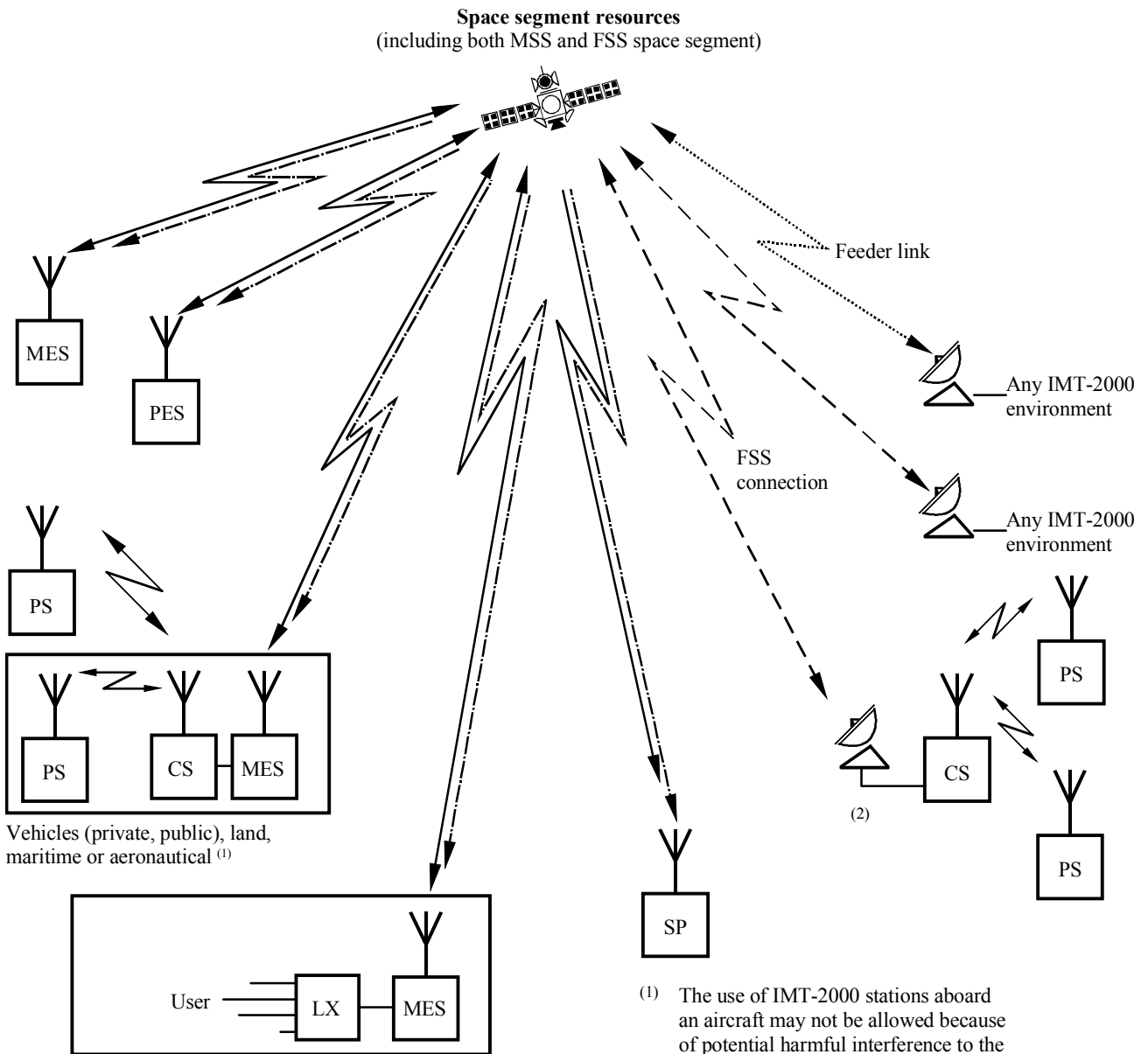
should be addressed in the development of detailed Recommendations relating to both the satellite and terrestrial components of IMT-2000.

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

**11** 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;

**12** that satellite links operating in the 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.

FIGURE 1  
Some examples for satellite operation involved with IMT-2000



- CS: cell station
- LX: local exchange
- MES: mobile earth station
- PES: personal earth station (hand held)
- PS: personal station
- SP: satellite pager

- Mobile links including the satellite component of IMT-2000 (MSS)
- ..... Feeder links in the FSS bands
- - - - FSS connection in support of IMT-2000
- · - · Distribution services link