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**ITU-T**

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OF ITU

**Q.20**

**GENERAL RECOMMENDATIONS ON TELEPHONE  
SWITCHING AND SIGNALLING**

**INTERNATIONAL AUTOMATIC AND  
SEMI-AUTOMATIC WORKING**

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**COMPARATIVE ADVANTAGES OF "IN-BAND"  
AND "OUT-BAND" SYSTEMS**

**ITU-T Recommendation Q.20**

(Extract from the *Blue Book*)

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## NOTES

1 ITU-T Recommendation Q.20 was published in Fascicle VI.1 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

## Recommendation Q.20

### COMPARATIVE ADVANTAGES OF "IN-BAND" AND "OUT-BAND" SYSTEMS

Signalling over telephone circuits may be effected *in* the frequency band used for speech ("in-band" signalling), or *outside* it ("out-band" signalling). In the latter case, the same channel carries both the signalling and speech frequency bands, the signalling band being separate from the speech band, and signalling equipment is an integral part of the carrier system.

In a further type of out-band signalling, a circuit, not used for speech, can be used to effect the signalling requirements of a number of speech circuits. This may be termed "separate channel signalling". The separate channel may be:

- a) a channel in a carrier system used to effect the signalling requirements of the remaining channels in the same carrier system which are used for speech, signalling equipment being an integral part of the carrier system: this may be termed "built-in separate channel signalling";
- b) completely separate, in which case signalling equipment is not an integral part of the carrier system; this may be termed "completely separate channel signalling".

#### 1 Advantages of in-band signalling

1.1 In-band signalling can be applied to any type of line plant. The application of out-band signalling, and built-in separate channel signalling, is limited to carrier systems.

1.2 Through-signalling can be employed at transit points, and at carrier system terminals when a telephone circuit comprises two or more carrier links. No direct current repetition and thus no delay and no distortion of signals arises at such points. Out-band signalling and built-in separate channel signalling require a direct current repetition at such points.

1.3 Replacement of a faulty line section is easy. In the case of completely separate channel signalling, replacement of a faulty line section is based on security arrangements.

1.4 It is impossible to set up a connection on a faulty speech path. In the case of completely separate channel signalling, a continuity check of the speech path is required.

1.5 The full bandwidth of the speech channel is available for signalling. This facilitates the use of more than one signalling frequency. Normally the full bandwidth permits faster signalling than with a smaller signalling bandwidth. With in-band signalling, realization of this advantage is limited to those signals not required to be protected against signal imitation due to speech currents.

#### 2 Advantages of out-band signalling

2.1 Relative freedom from disturbances due to speech currents; freedom from disturbances due to echo-suppressors; freedom from disturbances which might arise from connections to other signalling systems. With in-band signalling it is necessary to take steps to guard against such disturbances.

2.2 Possibility of signalling, during the setting-up of the call, by either discontinuous or continuous transmission, and the possibility of transmitting those signals during speech. Signalling during speech is not compatible with in-band signalling.

2.3 Simplicity of terminal equipment due to § 2.1 above and to the possibility of continuous signalling.

Out-band signalling (where the same channel carries both speech and signalling) also has the advantage of §1.3 of in-band signalling.

Built-in separate channel signalling has the advantages of §§ 2.1, 2.2 and 2.3 of out-band, and the advantage of § 1.3 of in-band signalling.

Completely separate channel signalling has the advantages of §§ 2.1 and 2.2 of out-band signalling and, compared with out-band signalling and built-in separate channel signalling, has the additional advantages that no direct current repetition is necessary, and no distortion of signals arises, at carrier system terminals when a circuit comprises two or more carrier links.