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INTERNATIONAL ANALOGUE CARRIER SYSTEMS

GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS

MAKE-UP OF A CARRIER LINK

ITU-T Recommendation G.211

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation G.211 was published in Fascicle III.2 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.

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Recommendation G.211

MAKE-UP OF A CARRIER LINK

(amended at Geneva, 1964; further amended)

In the international telephone network, provision must be made for the interconnection of various sorts of carrier-transmission systems using symmetric cable pairs, open-wire lines, coaxial cable pairs or radio-relay links. It is thus desirable for the carrier equipment used in these various systems, and which is not confined to a particular sort of line, to meet general CCITT recommendations.

Basically, these equipments comprise translating equipments and through-connection filters.

1 Translating equipments

These equipments are classified below according to the procedure used to make up the large-capacity systems from the basic supergroup.

Two procedures are in use:

Procedure 1: the mastergroup and supermastergroup procedure;

Procedure 2: the 15-supergroup assembly procedure; their use is described in the Recommendations concerning the various line systems.

For international links, procedure 2 can be used above 4 MHz only by agreement between the Administrations concerned, including the agreement of the Administration(s) of the transit country or countries, if any.

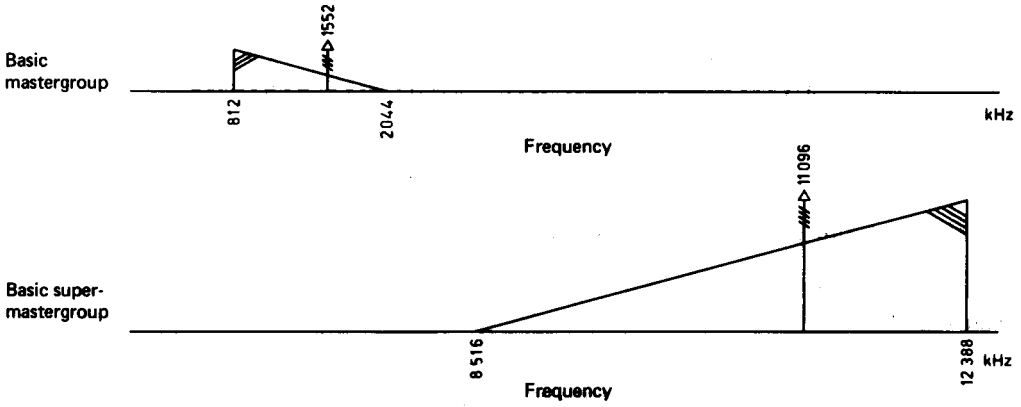
In the Recommendations, the names of the equipments defined above are also used for equipments which translate a basic group, supergroup or mastergroup or a basic (No. 1) 15-supergroup assembly into the line-frequency band and vice versa.

The translating equipments used in procedure 1 are:

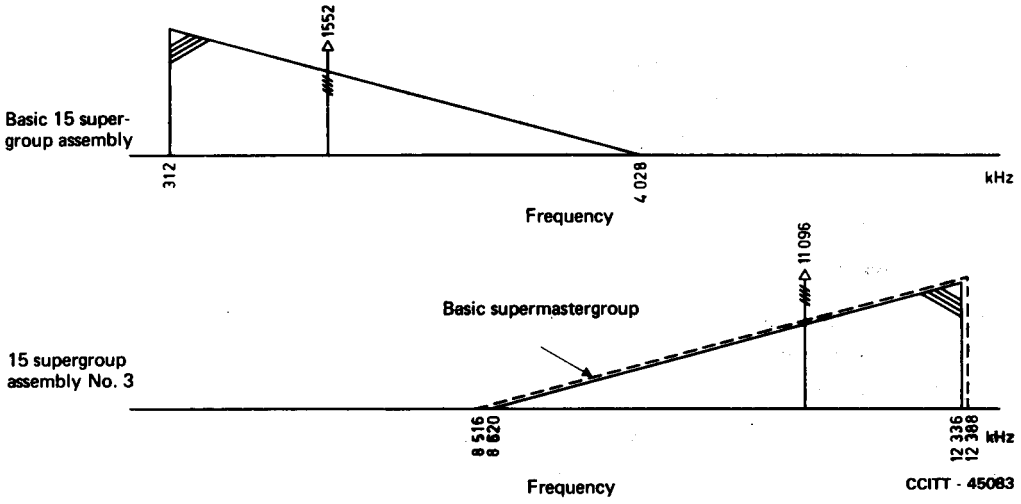
- channel-translating equipment, for translating the audio-frequency band into the basic group and vice versa (see Recommendations G.232, G.234 [1] and G.235);
- group-translating equipment for translating five basic groups into the basic supergroup and vice versa;
- supergroup-translating equipment for translating five basic supergroups into the basic mastergroup and vice versa;
- mastergroup-translating equipment for translating three basic mastergroups into the basic supermastergroup and vice versa;
- supermastergroup-translating equipment for translating the basic supermastergroup into the line-frequency band and vice versa.

Note - Figure 1/G.211, *a)* and *b)* recapitulates the basic frequency bands used in procedure 1; the through-connection possibilities described in Recommendation G.242 are provided for in these bands.

a) Frequency bands occupied by basic group and supergroup



b) Frequency bands occupied by basic mastergroup and supermastergroup



c) Frequency bands occupied by basic 15-supergroup assembly and by 15-supergroup assembly No. 3

FIGURE 1/G.211

Frequency bands occupied by basic groups, supergroups, mastergroups and supermastergroups, by the basic 15-supergroup assembly and the 15-supergroup assembly No. 3, together with the associated pilots

The translating equipments used in procedure 2 are:

- channel-translating equipment and group-translating equipment, as defined for procedure 1;

- supergroup-translating equipment for translating 15 basic supergroups into the basic assembly No. 1 of 15 basic supergroups and vice versa;

- 15-supergroup assembly equipment for translating basic assembly No. 1 of 15 supergroups into the frequency band of the 15-supergroup assembly No. 3 and vice versa;

- supermastergroup-translating equipment for translating 15-supergroup assembly No. 3 into the line-frequency band and vice versa.

Note 1 - Figure 1/G.211, *a)* and *c)* gives a recapitulation of the basic frequency bands used in procedure 2 in which the through-connection facilities described in Recommendation G.242 are provided.

Note 2 - The frequency band occupied by 15-supergroup assembly No. 3 (8620 to 12 336 kHz) lies within the frequency band occupied by the basic supermastergroup (8516 to 12 388 kHz). The equipments which are used for translating into the line-frequency band and vice versa may therefore be the same.

For this reason, these equipments carry the same name of "supermastergroup-translating equipment".

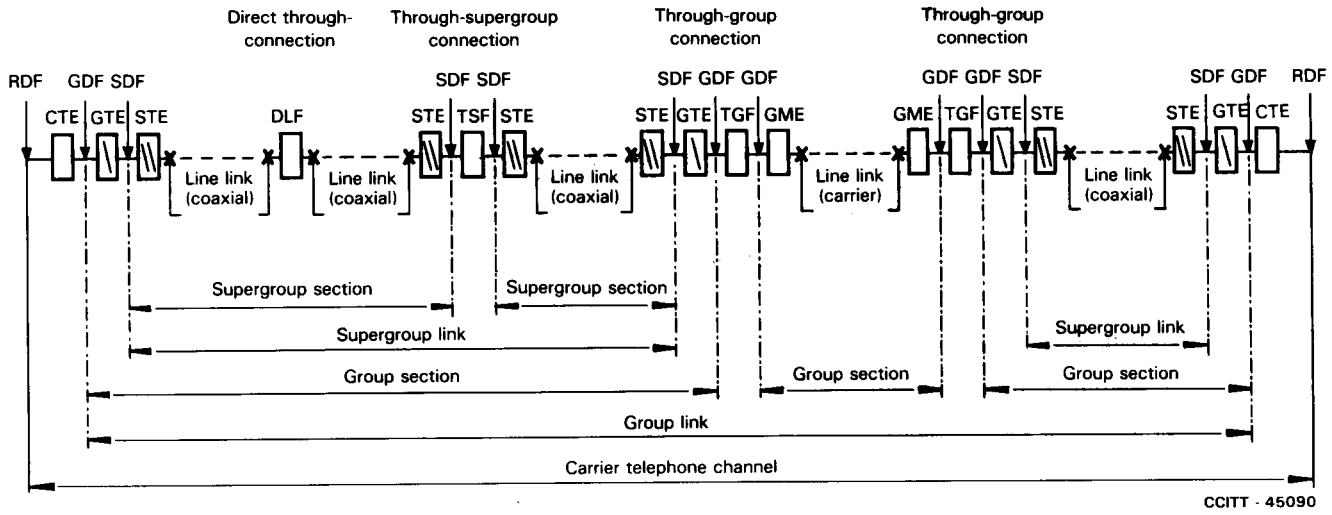
2 Through-connection filters

Through-group, supergroup, etc., filters and direct through-connection filters (see Recommendation G.242).

The equipment listed under the preceding sentence and § 1 above can be interconnected for setting up long groups, supergroups, etc., over several carrier systems. An example of such a link is shown in Figure 2/G.211 together with the expressions defined below that are recommended for describing the various parts of a circuit on such a group or supergroup, etc.

Figure 3/G.211 refers to definitions 3.2 to 3.11 below.

Those of the following definitions that concern "links" or "sections" apply, unless otherwise stated, to the combination of both directions of transmission. A distinction between the two directions of transmission may, however, be necessary in the case of unidirectional, multiple-designation "links" or "sections" set up over multiple-destination telecommunication satellite systems.



CTE = channel-translating equipment (translation of the audio band into the basic group and vice versa)
GTE = group-translating equipment (translation of the basic group into the basic supergroup and vice versa)
STE = supergroup-translating equipment (translation of the basic supergroup into the line frequency on coaxial cable, and vice versa)
GME = group-modulating equipment
DLF = direct line filter
TSF = through-supergroup filter
TGF = through-group filter
RDF = repeater distribution frame
GDF = group distribution frame
SDF = supergroup distribution frame

Note - This diagram shows only one direction of transmission.

FIGURE 2/G.211

3 Definitions

3.1 line link (using symmetric pairs coaxial pairs, etc.)

F: liaison en ligne (à paires symétriques, à paires coaxiales, etc.)

S: enlace en línea (de pares simétricos, de pares coaxiales, etc.)

A transmission path, however provided, together with all the associated equipment, such that the bandwidth available, while not having any specific limits, is effectively the same throughout the length of the link.

Within the link there are no direct filtration points nor any through-connection points for groups, supergroups, etc., and the ends of the link are the points at which the band of line frequencies is changed in some way or other.

3.2 group link

F: liaison en groupe primaire

S: enlace en grupo primario

The whole of the means of transmission using a frequency band of specified width (48 kHz) connecting two terminal equipments, for example channel translating equipments, wideband sending and receiving equipments (modems, etc.). The ends of the link are the points on group distribution frames (or their equivalent) to which the terminal equipments are connected.

It can include one or more group sections.

3.3 **supergroup link**

F: liaison en groupe secondaire

S: enlace en grupo secundario

The whole of the means of transmission using a frequency band of specified width (240 kHz) connecting two terminal equipments, for example group translating equipments, wideband sending and receiving equipments (modems, etc.). The ends of the link are the points on supergroup distribution frames (or their equivalent) to which the terminal equipments are connected.

It can include one or more supergroup sections.

3.4 **mastergroup link**

F: liaison en groupe tertiaire

S: enlace en grupo terciario

The whole of the means of transmission using a frequency band of specified width (1232 kHz) connecting two terminal equipments, for example supergroup translating equipments, wideband sending and receiving equipments (modems, etc.). The ends of the link are the points on mastergroup distribution frames (or their equivalent) to which the terminal equipments are connected.

It can include one or more mastergroup sections.

Note - As translating procedure 2 described under § 1 above does not enable mastergroups to be set up, the "mastergroup link" concept applies only in procedure 1.

3.5 **supermastergroup link**

F: liaison en groupe quaternaire

S: enlace en grupo cuaternario

The whole of the means of transmission using a frequency band of specified width (3872 kHz) connecting two terminal equipments, for example mastergroup translating equipments, wideband sending and receiving equipments (modems, etc.). The ends of the link are the points on supermastergroup distribution frames (or their equivalent) to which the terminal equipments are connected.

It can include one or more supermastergroup sections.

Note - As the frequency band occupied by 15-supergroup assembly No. 3 (8620 to 12 336 kHz) lies within the frequency band occupied by the basic supermastergroup (8516 to 12 388 kHz), the basic supermastergroup link can transmit one supermastergroup or an assembly of 15 supergroups.

3.6 **15-supergroup assembly link**

F: liaison en assemblage de 15 groupes secondaires

S: enlace en agregado de 15 grupos secundarios

The whole of the means of transmission using a frequency band of specified width (3716 kHz) connecting two terminal equipments (supergroup modems permitting the setting-up of a 15-supergroup assembly). The ends of the link are the points on 15-supergroup assembly distribution frames (or their equivalent) to which the terminal equipments are connected.

It can include one or more 15-supergroup assembly sections.

Note - The notion of 15-supergroup assembly link relates to translating procedure 2 mentioned in § 1 above. It is the equivalent of the "supermastergroup link" concept of the translating procedure 1 (900 telephone channels).

3.7 **group section**

F: section de groupe primaire

S: sección de grupo primario

The whole of the means of transmission using a frequency band of specified width (48 kHz) connecting two consecutive group distribution frames (or equivalent points) via at least one line link.

3.8 **supergroup section**

F: section de groupe secondaire

S: sección de grupo secundario

The whole of the means of transmission using a frequency band of specified width (240 kHz) connecting two consecutive supergroup distribution frames (or equivalent points) via at least one line link.

3.9 **mastergroup section**

F: section de groupe tertiaire

S: sección de grupo terciario

The whole of the means of transmission using a frequency band of specified width (1232 kHz) connecting two consecutive mastergroup distribution frames (or equivalent points) via at least one line link.

Note - As translating procedure 2 described in § 1 above does not enable mastergroups to be set up, the "mastergroup section" concept applies only in procedure 1.

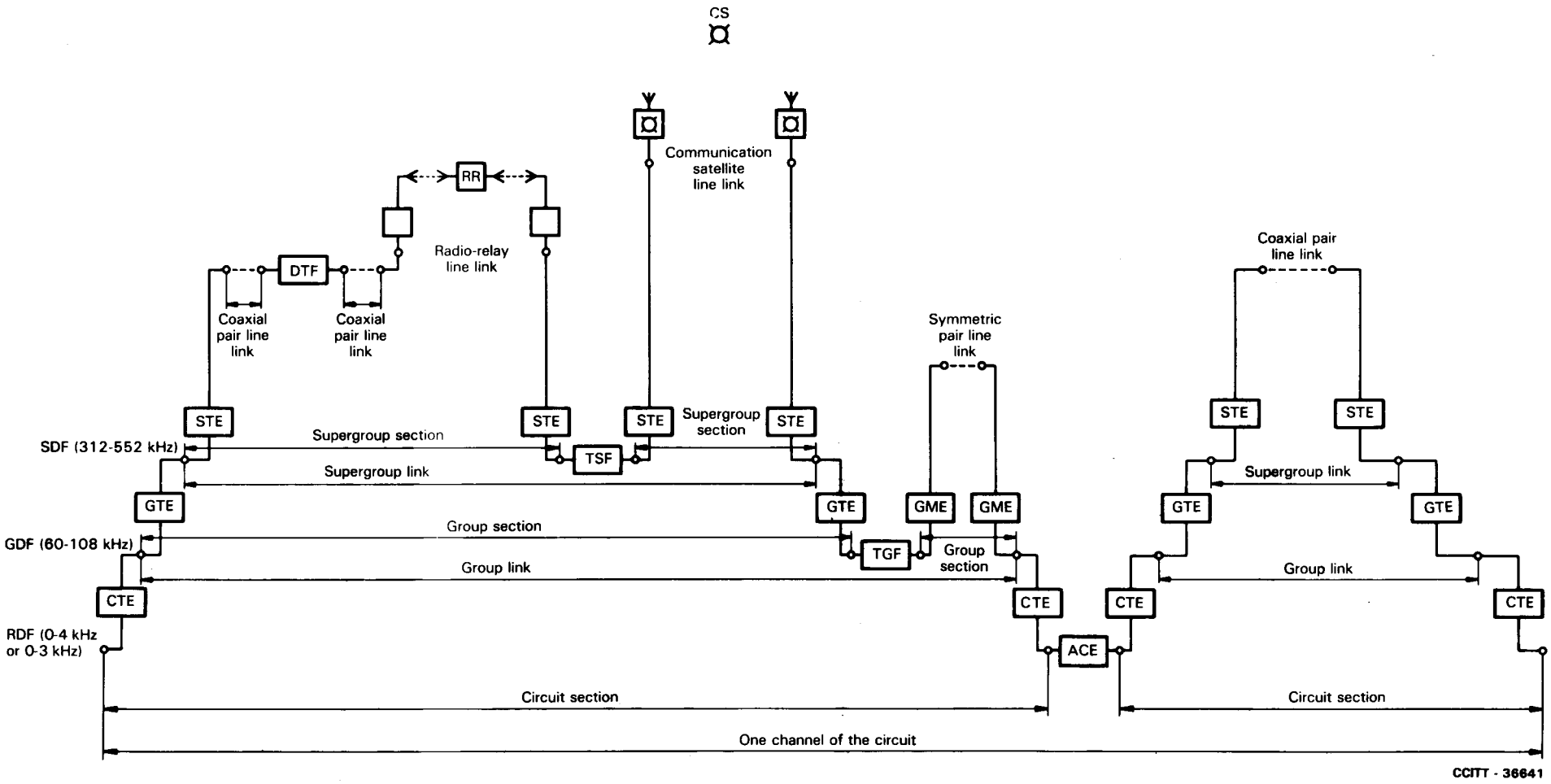
3.10 **supermastergroup section**

F: section de groupe quaternaire

S: sección de grupo cuaternario

The whole of the means of transmission using a frequency band of specified width (3872 kHz) connecting two supermastergroup distribution frames (or equivalent points) via at least one line link.

Note - As the frequency band occupied by 15-supergroup assembly No. 3 (8620 to 12 336 kHz) lies within the frequency band occupied by the basic supermastergroup (8516 to 12 388 kHz), the supermastergroup section can transmit one supermastergroup or an assembly of 15 supergroups.



ACE = audio-connecting equipment
CTE = channel-translating equipment (translation of the audio band into the basic group or vice versa)
GTE = group-translating equipment (translation of the basic group into the basic supergroup or vice versa)
STE = supergroup-translating equipment (translation of the basic supergroup into the line frequency on coaxial cable, or radio-relay system or vice versa)
CS = communication satellite

GME = group-modulating equipment
TSF = through-supergroup filter
TGF = through-group filter
RDF = repeater distribution frame
GDF = group distribution frame
SDF = supergroup distribution frame
RR = radio-relay system
DTF = direct transfer filter

FIGURE 3/G.211

Channel of a group set up on several line links in tandem

3.11 **15-supergroup assembly section**

F: section d'assemblage de 15 groupes secondaires

S: sección de agregado de 15 grupos secundarios

The whole of the means of transmission using a frequency band of specified width (3716 kHz) connecting two consecutive 15-supergroup assembly distribution frames (or equivalent points) via at least one line link.

Note 1 - Same note as for definition 3.6 above.

Note 2 - In a country which uses procedure 1, a 15-supergroup assembly can be through-connected without difficulty at the supermastergroup distribution frame. In this case, the 15-supergroup assembly is through-connected to position *3* (8620-12 336 kHz) instead of position *1* (312-4028 kHz) as required by the definition of the through-connection point of such an assembly (see Recommendation G.242, § 6). This through-connection point does not therefore correspond to this definition and is not at the end of a 15-supergroup assembly section.

3.12 **through-group connection point**

F: point de transfert de groupe primaire

S: punto de transferencia de grupo primario

When a group link is made up of several group sections, they are connected in tandem by means of through-group filters at points called through-group connection points.

3.13 **through-supergroup connection point**

F: point de transfert de groupe secondaire

S: punto de transferencia de grupo secundario

When a supergroup link is made up of several supergroup sections, they are connected in tandem by means of through-supergroup filters at points called through-supergroup connection points.

3.14 **through-mastergroup connection point**

F: point de transfert de groupe tertiaire

S: punto de transferencia de grupo terciario

When a mastergroup link is made up of several mastergroup sections, they are connected in tandem by means of through-mastergroup filters at points called through-mastergroup connection points.

3.15 **through-supermastergroup connection point**

F: point de transfert de groupe quaternaire

S: punto de transferencia de grupo cuaternario

When a supermastergroup link is made up of several supermastergroup sections they are connected in tandem by means of through-supermastergroup filters at points called through-supermastergroup connection points.

3.16 **through-15-supergroup assembly connection point**

F: point de transfert d'assemblage de 15 groupes

S: punto de transferencia de agregado de 15 grupos secundarios

When a 15-supergroup assembly link is made up of several 15-supergroup assembly sections, these sections are interconnected in tandem by means of through-15-supergroup assembly filters at points called through-15-supergroup assembly connection points.

As an alternative when the 15-supergroup assembly equipment provides sufficient filtering (corresponding to the definition of through-connection equipments - see Recommendation G.242, § 6) through-15-supergroup assembly filters can be dispensed with.

Note - When a 15-supergroup assembly is connected by means of through-supermastergroup filters, the point of interconnection is the through-supermastergroup connection point and not a through-15-supergroup assembly connection point.

3.17 **regulated line section (symmetric pairs, coaxial pairs or radio-relay links, etc.)**

F: section de régulation de ligne (à paires symétriques ou coaxiales ou sur faisceau hertzien, etc.)

S: sección de regulación de linea (de pares simétricos o coaxiales, o por radio-enlaces, etc.)

In a carrier transmission system, a line section on which the line-regulating pilot or pilots are transmitted from end to end without passing through an amplitude-changing device peculiar to the pilot or pilots.

3.18 **main repeater station**

F: station principale de répéteurs

S: estación principal de repetidores

A station, always the terminal of a line link (see definition 3.1 above), where direct line filtering or demodulation or both together may take place. As a consequence, in such a station there are equalizers and it is possible to find points which are of uniform relative level independent of frequency ("flat points").

Such a station, where all the supergroups, for example, are demodulated and brought into the basic supergroup position, is called a "main terminal station' and is of necessity at the end of a regulated-line section. A "main intermediate station" is a station within a regulated-line section where a direct through-connection takes place.

Reference

[1] CCITT Recommendation *8-channel terminal equipments,* Orange Book, Vol. III-1, Rec. G.234, ITU, Geneva, 1977.