INTERNATIONAL TELECOMMUNICATION UNION

CCITT

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CONSULTATIVE COMMITTEE

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(11/1988)

SERIES M: GENERAL MAINTENANCE PRINCIPLES

Maintenance of international transmission systems and telephone circuits – International transmission systems

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DEFINITIONS CONCERNING INTERNATIONAL TRANSMISSION SYSTEMS

Reedition of CCITT Recommendation M.300 published in the Blue Book, Fascicle IV.1 (1988)

NOTES

1 CCITT Recommendation M.300 was published in Fascicle IV.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 M.300

DEFINITIONS CONCERNING INTERNATIONAL TRANSMISSION SYSTEMS

1 Definitions concerning international analogue transmission systems

Note 1 – This Recommendation is partly duplicated in Recommendation G.211 [1].

Note 2 – Figure 1/M.300 refers to definitions 1.2 to 1.13. Figures 2/M.300, 3/M.300 and 4/M.300 refer to definitions 1.1 to 1.18.

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-destination *links* or *sections* set up over multiple-destination communication satellite systems.

1.1 line link (using symmetric pairs, coaxial pairs, radio-relay link, 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.

1.2 group section

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).

1.3 group link

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.

1.4 group

A group consists of a group link connected at each end to terminal equipments. These terminal equipments provide for the setting-up of a number of telephony channels (generally 12), one or more data transmission or facsimile channels, etc.

It occupies a 48 kHz frequency band. Figures 1/M.320, 2/M.320 and 3/M.320 show various possible arrangements of telephony channels in a basic group B (60 to 108 kHz).

1.5 supergroup section

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).

1.6 supergroup link

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 (modem, 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.

1.7 **supergroup**

A supergroup consists of a supergroup link connected at each end to terminal equipments. These terminal equipments provide for the setting-up of five group links or sections occupying adjacent frequency bands in a 240 kHz band or for one or more data transmission or facsimile channels, etc.

The basic supergroup occupies the band 312 to 552 kHz. Figure 1/M.330 shows the position of groups and channels within the supergroup.

1.8 **mastergroup section**

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).

1.9 **mastergroup link**

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.

1.10 **mastergroup**

A mastergroup consists of a mastergroup link terminated at each end by terminal equipments. These terminal equipments provide for the setting-up of five supergroup links or sections occupying frequency bands separated by 8 kHz in a 1232 kHz band.

The basic mastergroup consists of supergroups 4, 5, 6, 7 and 8 within the band of frequencies 812 kHz to 2044 kHz. (See Figure 1/M.340.)

1.11 **supermastergroup section**

The whole of the means of transmission using a frequency band of specified width (3872 kHz) connecting two consecutive supermastergroup distribution frames (or equivalent points).

1.12 **supermastergroup link**

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 equipment (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.

1.13 **supermastergroup**

A supermastergroup consists of a supermastergroup link connected at each end to terminal equipments. These terminal equipments provide for the setting-up of three mastergroup links or sections separated by two free spaces of 88 kHz and occupying a band whose total width is 3872 kHz. The basic supermastergroup is composed of mastergroups 7, 8 and 9 occupying the frequency band 8516-12 388 kHz. (See Figure 1/M.350.)

1.14 **15 supergroup assembly section**[1]

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) and connected, at least at one end, to through-15 supergroup assembly connection equipment. It always forms part of a 15 supergroup assembly link.

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[1] This definition is still under study by Study Group IV and is not identical to the one given in Recommendation G.211 [1].

1.15 **15 supergroup assembly link**[1]

The whole of the means of transmission using a frequency band of specified width (3716 kHz) connecting two 15 supergroup assembly distribution frames (or equivalent points). It can be made up of a number of 15 supergroup assembly sections. When terminal equipments are connected to both ends, it becomes a constituent part of a 15 supergroup assembly for carrying telephony or telegraphy channels or data or facsimile, etc.

1.16 **15 supergroup assembly**

A 15 supergroup assembly consists of a 15 supergroup assembly link terminated at each end by terminal equipments. These terminal equipments provide for the setting-up of 15 supergroup links or sections separated by free spaces of 8 kHz and occupying a band whose total width is 3716 kHz. The basic 15 supergroup assembly is made up of supergroups 2 to 16 occupying the frequency band 312-4028 kHz.

1.17 **through-group connection point**

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.

1.18 **through-supergroup connection point**

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.

1.19 **through-mastergroup connection point**

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.

1.20 **through-supermastergroup connection point**

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.

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

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.

Note – In a country normally using mastergroup and supermastergroup arrangements, a 15 supergroup assembly can be through-connected without difficulty at the supermastergroup distribution frame by means of through-supermastergroup filters. 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. The point where this through-connection is made is a through-supermastergroup connection point and not a through-15 supergroup assembly connection point.

1.22 **regulated line section (symmetric pairs, coaxial pairs or radio relay links)**

In a carrier transmission system, a line section on which the line-regulating pilot or pilots are transmitted from end to end without being subjected to any intermediate amplitude regulation associated with the pilot or pilots.

[1] This definition is still under study by Study Group IV and is not identical to the one given in Recommendation G.211 [1].

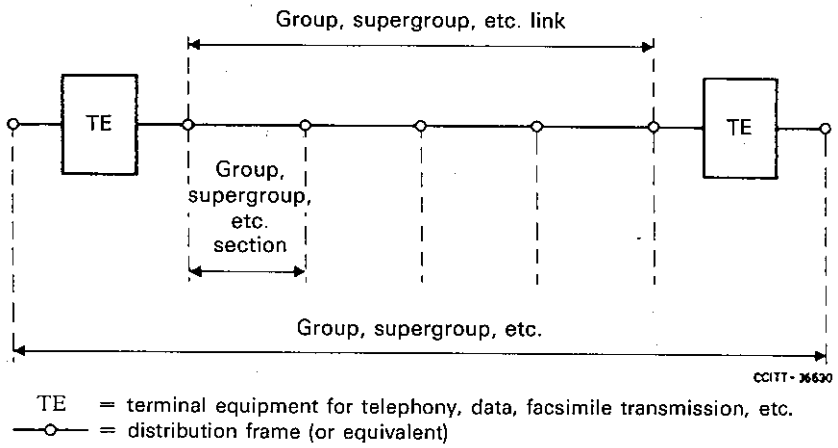


FIGURE 1/M.300

Group, supergroup, etc. link

2 Definitions concerning international digital transmission systems

Note 1 – This Recommendation is partly duplicated in Recommendation G.701 [2].

Note 2 – Figure 5/M.300 refers to definition 2.3 below. Figure 6/M.300 refers to definitions 2.10 to 2.19 below.

Those of the following definitions that concern digital paths 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-destination paths or sections set up over multiple-destination communication satellite systems.

2.1 alarm indication signal (AIS)

A signal that is used to replace the normal traffic signal when a maintenance alarm indication has been activated.

2.2 upstream failure indication

An indication provided by a digital multiplexer, line section or radio section, that a signal applied at its input port is outside its prescribed maintenance limit.

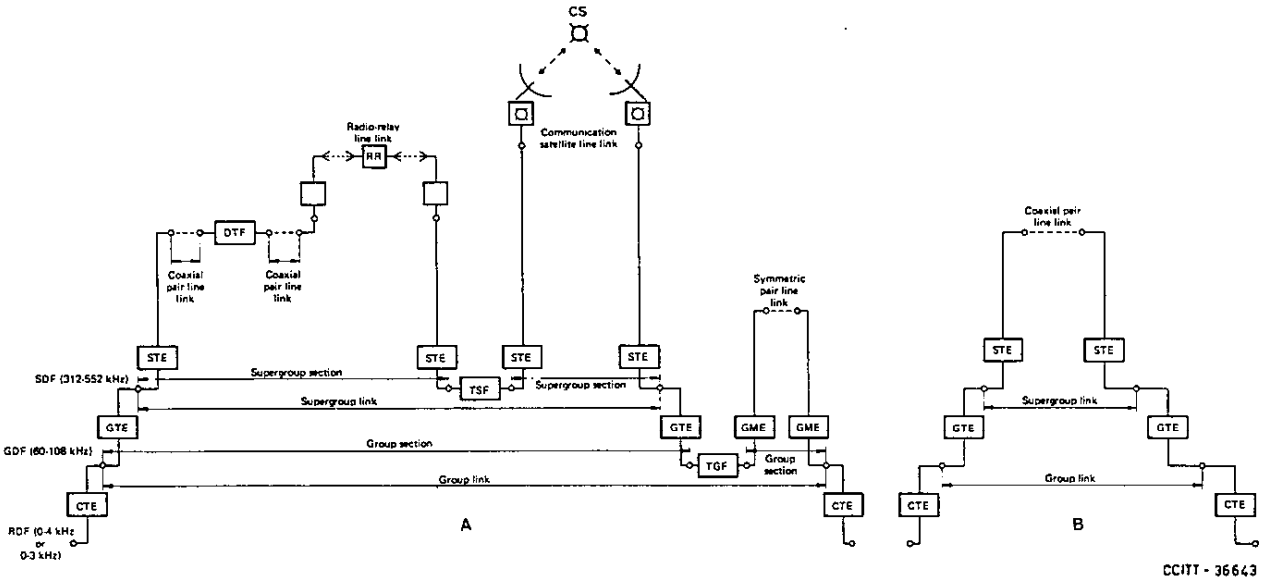
2.3 primary block (American: digroup)

A basic group of PCM channels assembled by time division multiplexing.

Note – The following conventions could be useful:

Primary block μ – a basic group of PCM channels derived from 1544 kbit/s PCM multiplex equipment.

Primary block A – a basic group of PCM channels derived from 2048 kbit/s PCM multiplex equipment.



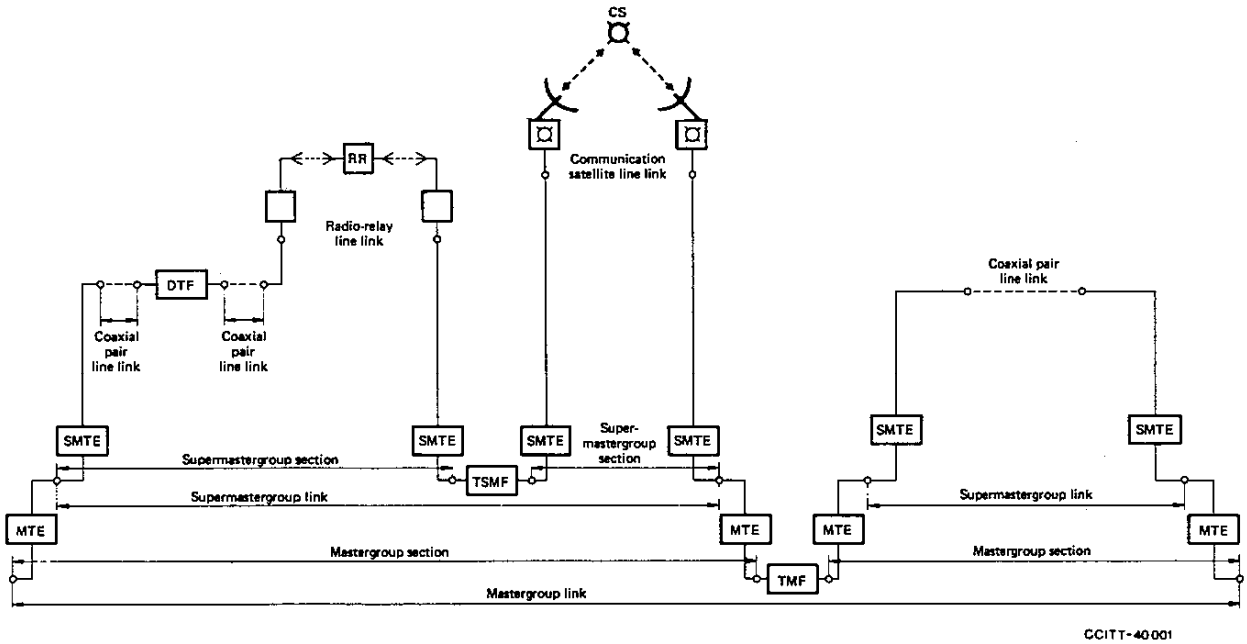
CTE = channel translating equipment (translation of the audio band into the basic group or vice versa)
GTE = group translating equipment (translation of the basic group into the basic supergroup)
STE = supergroup translating equipment (translation of the basic supergroup into the line frequency on coaxial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

DTF = direct through-connection filter
TSF = through-supergroup filter
TGF = through-group filter
RDF = repeater distribution frame
GDF = group distribution frame
SDF = supergroup distribution frame
RR = radio-relay station
CS = communication satellite

(The terminology used in this figure is in conformity with the definitions of Recommendation M.300. However, there are small inconsistencies with respect to recommendations giving details of lining-up procedure.)

FIGURE 2/M.300

Channel of a group set-up on: several line links in tandem (A), a single line link (B)

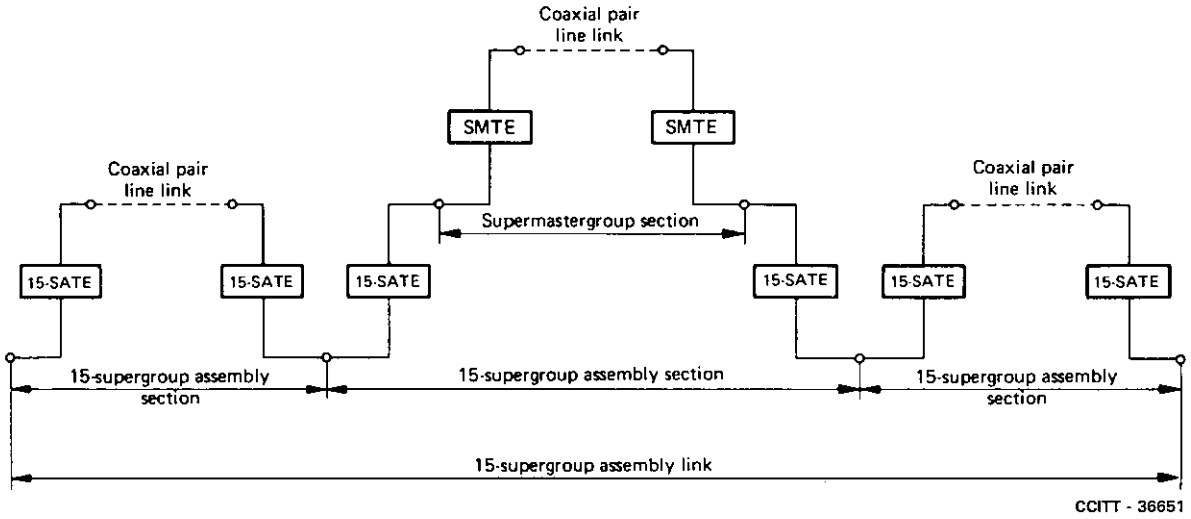


MTE = mastergroup translating equipment
SMTE = supermastergroup translating equipment
TMF = through-mastergroup filter
TSMF = through-supermastergroup filter

DTF = direct through-connection filter
RR = radio-relay station
CS = communication satellite

FIGURE 3/M.300

Mastergroup link



SMTE = supermastergroup translating equipment
15-SATE = 15-supergroup assembly translating equipment

FIGURE 4/M.300

15-supergroup assembly link

2.4 **PCM multiplex equipment**

Equipment for deriving a single digital signal at a defined digit rate from two or more analogue channels by a combination of pulse code modulation and time division multiplexing (multiplexer) and also for carrying out the inverse function (demultiplexer).

The term should be preceded by the relevant equivalent binary digit rate, e.g., 2048-kbit/s PCM multiplex equipment.

2.5 **digital multiplexer**

Equipment for combining by time division multiplexing two or more tributary digital signals into a single composite digital signal.

2.6 **muldex**

A contraction of multiplexer-demultiplexer. The term may be used when the multiplexer and demultiplexer are associated in the same equipment.

Note – When used to describe an equipment, the function of the equipment should qualify the title, e.g., PCM muldex, data muldex, digital muldex.

2.7 **digital multiplex equipment**

The combination of a digital multiplexer and a digital demultiplexer at the same location.

2.8 **digital multiplex hierarchy**

A series of digital multiplexers graded according to capability so that multiplexing at one level combines a defined number of digital signals, each having the digit rate prescribed for a lower order, into a digital signal having a prescribed digit rate which is then available for further combination with other digital signals of the same rate in a digital multiplexer of the next higher order.

2.9 **transmultiplexer**

An equipment that transforms frequency division multiplexed signals (such as group or supergroup) into corresponding time division multiplexed signals that have the same structure as those derived from PCM multiplex equipment. The equipment also carries out the inverse function.

2.10 **digital distribution frame**

A frame at which interconnections are made between the digital outputs of equipments and the digital inputs of other equipments.

2.11 **digital section**

The whole of the means of transmitting and receiving between two consecutive digital distribution frames (or equivalent) a digital signal of specified rate.

Note 1 – A digital section forms either a part or the whole of a digital path.

Note 2 – Where appropriate, the bit rate should qualify the title.

2.12 **digital path**

The whole of the means of transmitting and receiving a digital signal of specified rate between those two digital distribution frames (or equivalent) at which terminal equipments or switches will be connected. Terminal equipments are those at which signals at the specified bit rate originate or terminate.

Note 1 – A digital path comprises one or more digital sections.

Note 2 – Where appropriate, the bit rate should qualify the title.

Note 3 – Digital paths interconnected by digital switches form a digital connection.

2.13 **digital line section**

Two consecutive line terminal equipments, their interconnecting transmission medium and the in-station cabling between them and their adjacent digital distribution frames (or equivalents), which together provide the whole of the means of transmitting and receiving between two consecutive digital distribution frames (or equivalents) a digital signal of specified rate.

Note 1 – Line terminal equipments may include the following:

– regenerators,

– code converters,

– scramblers,

– remote power feeding,

– fault location,

– supervision.

Note 2 – A digital line section is a particular case of a digital section.

2.14 **digital line system**

A specific means of providing a digital line section.

2.15 **digital block**

The combination of a digital path and associated digital multiplex equipments.

Note – The bit rate of the digital path should form part of the title.

2.16 **digital line path**

Two or more digital line sections interconnected in tandem in such a way that the specified rate of the digital signal transmitted and received is the same over the whole length of the line path between the two terminal digital distribution frames (or equivalent).

2.17 **digital radio section**

Two consecutive radio terminal equipments and their interconnecting transmission medium which together provide the whole of the means of transmitting and receiving between two consecutive digital distribution frames (or equivalents) a digital signal of specified rate.

Note – A digital radio section is a particular case of a digital section.

2.18 **digital radio system**

A specific means of providing a digital radio section.

2.19 **digital radio path**

Two or more digital radio sections interconnected in tandem in such a way that the specified rate of the digital signal transmitted and received is the same over the whole length of the radio path between the two terminal digital distribution frames (or equivalent).

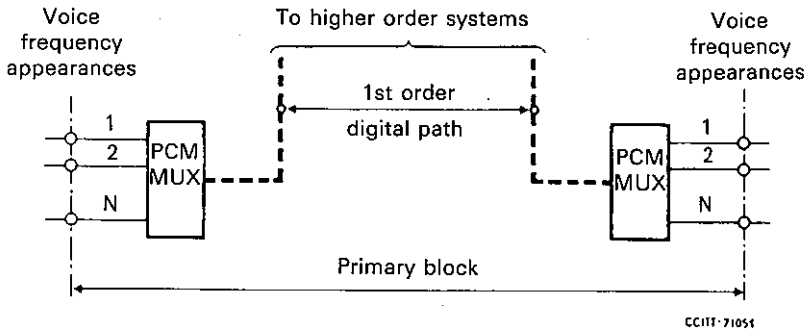


FIGURE 5/M.300

Example of a primary block

3 General definitions for international transmission systems

3.1 **national section**

The digital sections and group, supergroup, etc., sections between a station with control or subcontrol functions and a frontier station within the same country are termed comprehensively a national section. A national section will usually comprise several digital, group, supergroup, etc., sections. The digital, group, supergroup, etc., sections between the two stations with control functions within one country also constitute a national section.

3.2 **international section**

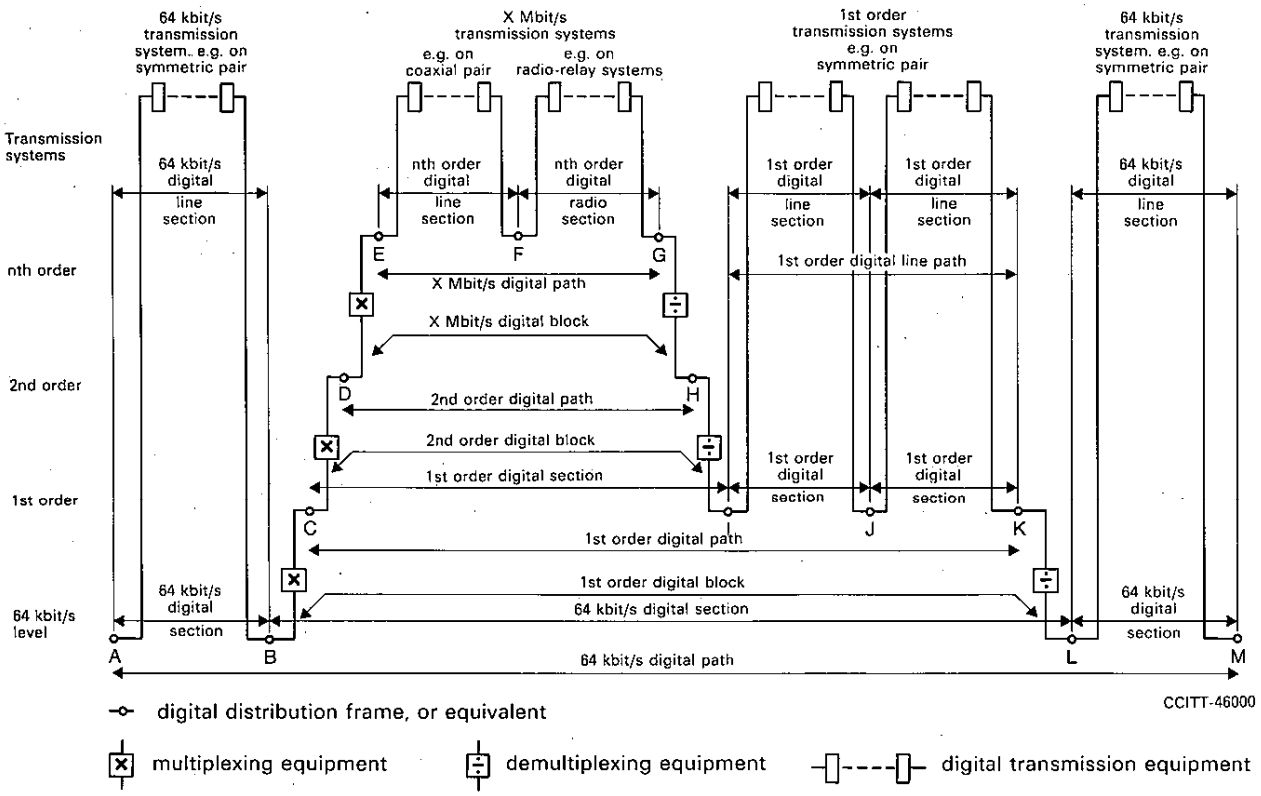
The digital, group, supergroup, etc., sections between two adjacent frontier stations in different countries constitute an international section. Some international sections may be a single digital, group, supergroup, etc., section routed over long submarine cable systems. If the international group, supergroup, etc., is routed via intermediate countries without the digital path being demultiplexed to its characteristic bit rate/basic frequency band, the frontier stations at the ends of the international digital, group, supergroup, etc., section are still considered to be adjacent.

3.3 **main section**

The sections into which a digital path or group, supergroup, etc., link is divided by the digital path, group, supergroup, etc., control and subcontrol stations are called main sections. A main section is the portion of the digital path or, group, supergroup, etc., link between two adjacent stations having control functions. In many cases, these two stations are in different countries. In the case of a country which has elected to have more than one station with control functions, a main section will lie wholly within that country. (See Figure 2/M.460.)

4 Definitions concerning international channels

Note 1 – Figure 7/M.300 refers to definition 4.2 below. Figures 8/M.300 and 9/M.300 refer to definition 4.3 below.



Note 1 — Digital line and radio sections may be at digit rates which are either hierarchical or non-hierarchical.
Note 2 — A-B is a 64 kbit/s digital line section, which is a particular case of a 64 kbit/s digital section.
Note 3 — A-M is a 64 kbit/s digital path which comprises three 64 kbit/s digital sections, A-B, B-L and L-M.
Note 4 — F-G is an X Mbit/s digital radio section which forms part of an X Mbit/s digital path E-G.
Note 5 — C-I is a 1st order digital section which contains a 2nd order digital path D-H.
Note 6 — I-K is an example of a digital line path.

FIGURE 6/M.300

Examples of digital path, digital section, digital line section, etc.

A channel, as used in the Series M Recommendations with international transmission systems and international telephone circuits, is a one-way transmission capability for a voice-frequency or equivalent voice-frequency signal. The specific types of channels are:

4.1 analogue channel

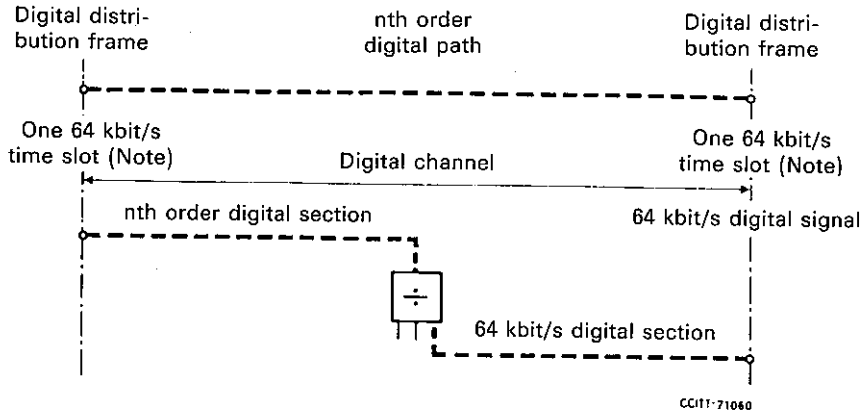
An analogue channel is a one-way transmission capability which is provided on audio pairs or analogue transmission systems, and which appears at voice frequency at both ends. Where an analogue channel is provided by an analogue transmission system, it will not have voice frequency appearances other than at its ends.

4.2 digital channel

A digital channel provides one-way 64 kbit/s transmission capability, on a digital path. A digital channel appears at both ends on a digital distribution frame or equivalent either at 64 kbit/s or as a 64 kbit/s time slot in a digital path at a specified level of the digital hierarchy.

4.3 mixed analogue/digital channel

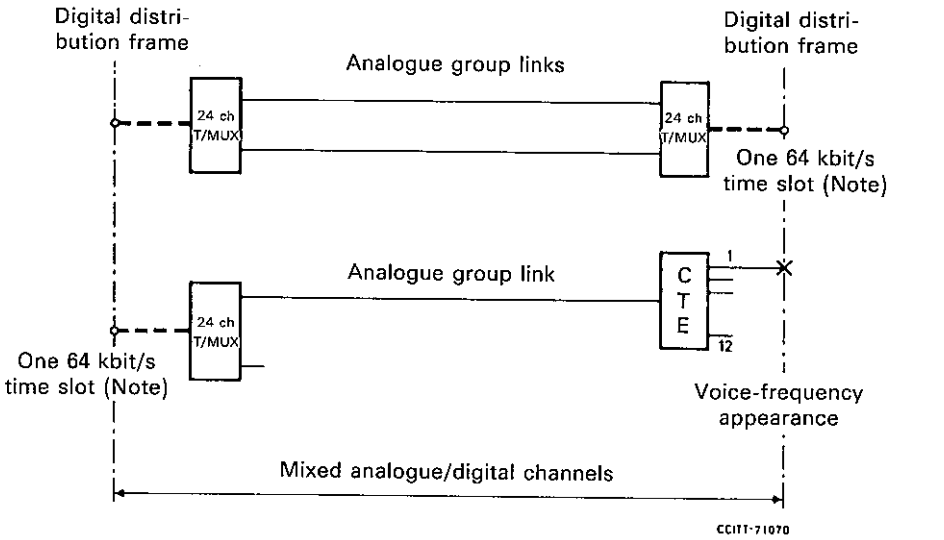
A mixed analogue/digital channel is a one-way transmission capability provided over an analogue transmission system with transmultiplexer equipment at one end and transmultiplexer or analogue translating equipment at the other end. Where the end of the channel is provided by transmultiplexer equipment, the channel appears as a 64 kbit/s time slot on a digital distribution frame at the output of the transmultiplexing equipment in a digital path at a specified level of the digital hierarchy. Where the end of the channel is provided by analogue translating equipment, it appears at voice frequency.



Note – Here the digital channel appears as a 64 kbit/s time slot in a digital path or section. It is not directly accessible.

FIGURE 7/M.300

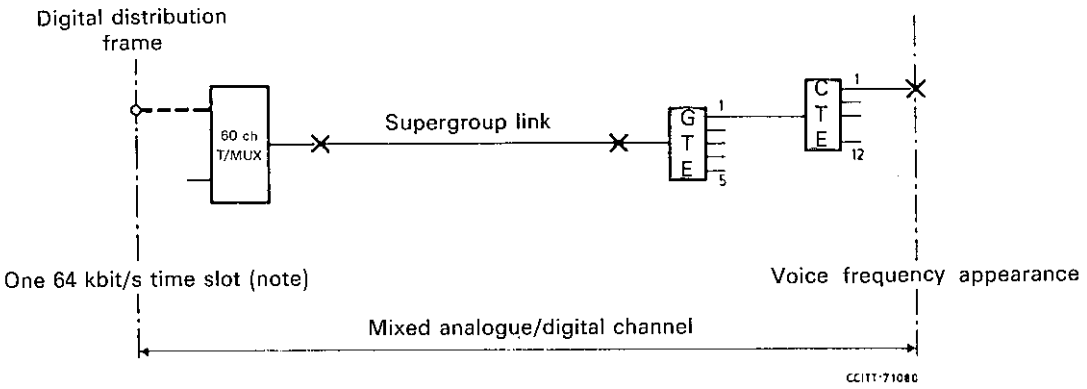
Diagrammatic representations of a digital channel



Note – Here the digital channel appears as a 64 kbit/s time slot in a digital path or section. It is not directly accessible.

FIGURE 8/M.300

Examples of mixed analogue/digital channels



60 ch T/MUX — Transmultiplexer (60 channel type)

G T E — Group translating equipment

C T E — Channel translating equipment

Note – Here the digital channel appears as a 64 kbit/s time slot in a digital path. It is not directly accessible.

FIGURE 9/M.300

Example of a mixed analogue/digital channel

References

[1] CCITT Recommendation *Make-up of carrier links*, Vol. III, Rec. G.211.

[2] CCITT Recommendation *Vocabulary of pulse code modulation (PCM) and digital transmission terms*, Vol. III, Rec. G.701.

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