```
_                _       _       _           _                _
_   D    Synch       _ 2.4 &   _        _Trunk side   _I  8/G.763              _
_                _ 1.7 ms  _       _           _                    _
_                _       _       _           _                    _
_   E    Synch       _ 1.7 ms  _2 frames_Trunk side   _I 10/G.763              _
_                _       _       _           _I 18/G.763              _
+-----------------------+-----------+-----------+-------------+-------------------------
---+
```

TABLE 1/G.763

Synchronization Type Note 3	Buffer Size Note 1	Slip Size Note 2	Location Note 4	Figure No.
1. No Buffering				
A Asynch	No buffer	-	-	I 1/G.763
B Synch	No buffer	-	-	I 2/G.763 I 15/G.763 I 12/G.763
C Synch Analogue to Digital	No buffer	-	-	I 5/G.763
2. Plesiochronous/ Buffering				
A Asynch	0.5 ms	2 frames	Trunk side	I 3/G.763
B Synch	0.5 ms	2 frames	Bearer side	I 4/G.763 I 13/G.763 I 16/G.763
3. Plesiochronous/ Doppler Buffering				
A Synch	1.7 ms	2 frames	Bearer side	I 6/G.763 I 11/G.763 I 17/G.763 I 14/G.763 I 19/G.763
B Synch	2.4 & 1.7 ms		Bearer side & Trunk side	I 7/G.763
C Asynch	1.7 ms	2 frames	Trunk side	I 9/G.763

total time of the active intervals and their corresponding hangover times and front end delays, for all trunks over a fixed interval of time, e.g., one minute.

2.14Speech activity factor

The ratio of the time speech signals with their corresponding hangover time and front end delay occupy a trunk channel to the total measuring time, averaged over the total number of trunk channels carrying speech.

2.15Voice band data ratio

The ratio of the number of trunk channels carrying voice band data signals to the total number of trunk channels averaged over a fixed interval of time.

2.1664 kbit/s unrestricted digital data ratio

The ratio of the number of trunk channels carrying 64 kbit/s unrestricted digital data signals to the total number of trunk channels averaged over a fixed interval of time.

2.17DCME overload (mode)

The condition when the number of input trunk channels instantaneously active carrying speech exceeds the number of 32 kbit/s channels available for interpolation.

2.18Overload channels

The additional bearer channel capacity which is generated using variable bit rate (VBR) encoding to minimize or eliminate DSI competitive clipping.

2.19Average bits per sample

The average number of encoding bits per sample computed over a given time window for the ensemble of active interpolated bearer channels within a given interpolation pool. Only bearer channels carrying speech are included in this calculation.

2.20Transmission overload

The condition when the average bits per sample goes beyond the value set in accordance with speech quality requirements.

2.21Freeze-out

The condition when a trunk channel becomes active and cannot immediately be assigned to a bearer channel, due to lack of available transmission capacity.

2.22Freeze-out fraction (FOF)

The ratio of the total time that the individual channels experience the freeze-out condition to the

A record, held in a memory of a DCME, of the interconnections required between trunk channels and bearer channels. This record is dynamically updated in real time in accordance with the traffic demands made on the DCME.

2.12Control channel

A unidirectional transmission path from the transmit unit of one DCME to the receive unit of one or more associated DCMEs which is dedicated primarily to carrying channel assignment messages. In addition, the control channel transmits other messages such as idle noise levels, dynamic load control, and alarm messages.

Note - An alternative name for "control channel" is "assignment channel".

2.13Ensemble activity

The ratio of the time active signals and their corresponding hangover time and front end delay occupy the trunk channels to the total measuring time, averaged over the total number of trunk channels included in the measurement.

Note - A process complementary to DSI is required in the receive unit of a DCME, i.e., assignment of the interleaved bursts to their appropriate trunk channels.

2.6DCME frame

A time interval, the beginning of which is identified by a "unique word" in the control channel. The DCME frame need not coincide with the multi-frames defined in CCITT Recommendation G.704. The format specification of the DCME frame includes channel boundaries and bit position significance.

2.7Transmission channel

A 64 kbit/s time slot within a DCME frame.

2.8Bearer channel (BC)

A bearer channel is a unidirectional, digital, transmission path from the transmit unit of one DCME to the receive unit of a second associated DCME used to carry concentrated traffic between the two DCMEs.

Note 1 - A number of bearer channels in each direction of transmission form the both-way link required between two DCMEs. This link may be, for example, a 2048 kbit/s system.

Note 2 - A bearer channel may have any of the following instantaneous bit rates: 24, 32, 40 and 64 kbit/s.

2.9Trunk channel (TC)

A unidirectional, digital transmission path (generally short distance) used for carrying traffic and which connects a DCME to other equipment e.g., an International Switching Centre (ISC). Two such trunk channels (transmit and receive) are needed by 4 wire telephone circuits and constitute a trunk circuit.

Note 1 - Signals carried by a trunk channel will be transmitted at a bit rate of 64 kbit/s.

Note 2 - A number of trunk channels in each direction of transmission are required between a DCME and, for instance, an ISC. These trunk channels may be carried by a number of 1544 or 2048 kbit/s systems.

2.10Assignment message

The message specifying the interconnections required between trunk channels and bearer channels.

2.11Assignment map

Note - Several additional items yet to be fully considered include the evaluation of:

- instantaneous 2 bit speech encoding on overloads (to avoid clipping), and voice band data rate discrimination (to permit rates less than or equal to 4800 bit/s to be coded at 32 kbit/s only).

- silence elimination techniques (to permit saving of bearer channel capacity during the inactive periods of half-duplex voice band data calls).

2.Definitions relating to digital circuit multiplication equipment (DCME)

2.1Digital circuit multiplication equipment (DCME)

A general class of equipment which permits concentration of a number of 64 kbit/s PCM encoded input trunk channels on a reduced number of transmission channels (see 2.7).

2.2Digital circuit multiplication system (DCMS)

A telecommunications network comprised of two or more DCME terminals where each DCME terminal contains a transmit unit and a receive unit.

2.3Low rate encoding (LRE)

A voice band signal encoding method, e.g., adaptive differential pulse code modulation (ADPCM), which results in a bit rate less than 64 kbit/s, e.g., 40 kbit/s, 32 kbit/s, or 24 kbit/s.

Note 1 - Conversion between speech signals encoded in PCM at 64 kbit/s and those encoded in ADPCM must be carried out by means of transcoding processes given in Recommendations G.721 and G.723.

2.4Variable bit rate (VBR)

The capability of the encoding algorithm to dynamically switch between 32 and 24 kbit/s for speech traffic under control of the DCME.

2.5Digital speech interpolation (DSI)

A process which, when used in the transmit unit of a DCME, causes a trunk channel (see 2.9) to be connected to a bearer channel (see 2.8) only when activity is actually present on the trunk channel. This, by exploiting the probability of the Speech Activity Factor (see 2.14) of trunk channels being less than 1.0, enables the traffic from a number of trunk channels to be concentrated and carried by a lesser number of time shared bearer channels. The signals carried by a bearer channel therefore represent interleaved bursts of speech signals derived from a number of different trunk channels.

11.Recommendation G.763

DIGITAL CIRCUIT MULTIPLICATION EQUIPMENT USING A 32 KBIT/S ADPLM AND DIGITAL SPEECH INTERPOLATION

(Melbourne, 1988)

1.General

1.1Scope

This Recommendation is intended as an introduction to digital circuit multiplication equipment and systems, and as a base document for the specification of Digital Circuit Multiplication Equipment (DCME) and Digital Circuit Multiplication Systems (DCMS).

Essential facilities, interface conditions and overall performance requirements are given. Requirements for full compatibility and interoperability are under study (see Supplement No. 31).

1.2Attributes

Digital Circuit Multiplication equipment (DCME) is utilized as a means of augmenting the capacity of digital transmission systems operating between several International Switching Centers (ISC). DCME has all of the following attributes:

- digital speech interpolation (DSI);
- low rate encoding (LRE);

- dynamic load control (DLC) arrangement in association with interfacing;
- capability to accomodate the following types of bearer service requirements:

  speech
  3.1 kHz audio (data and speech)
  64 kbit/s unrestricted (transparent)
  alternate speech/64 kbit/s unrestricted.

The link between two DCMEs is generally one where a highly efficient traffic carrying capability is required, e.g., a long-distance link.

1.3Application

This Recommendation is applicable to the design of digital circuit multiplication equipment intended for, but not limited to, use in an international digital circuit. Freedom is permitted in design details which are not covered in this Recommendation (Note).