Recommendation T/CD 08-03 (Copenhagen 1987)

GENERAL INTERWORKING AND SERVICE ASPECTS OF PACKET SWITCHED PUBLIC DATA NETWORKS

Recommendation proposed by Working Group T/WG 10 "Terminal equipment" (TE)

Text of the Recommendation adopted by the "Telecommunications" Commission:

"The Conference of European Post and Telecommunications Administrations,

considering

— that European public packet switched data networks are in service, or will be in service, and that their interconnection has been carried out or is planned,

— that experience shows that interconnection of these networks pose practical problems, either because some of these problems have not been dealt with in CCITT or CEPT Recommendations, or because on some points it has emerged that these Recommendations give rise to differing interpretations,

— that as far as possible the differences in the implementation of national interfaces, network user procedures and facilities offered to users are kept to a minimum,

— that CEPT Recommendation T/CD 08-02 contains information on the harmonized implementation of optional user facilities and additional features,

— that CEPT Recommendation T/CD 08-01 contains information about the OSI-Network service provided by packet switched networks,

recommends

to the members of the CEPT to apply the specifications contained in the following pages."

Note. This Recommendation replaces Recommendation T/CSTD 2.

1. INTEGRAL NUMBER OF OCTETS

Administrations should inform users that DTEs should only use full octets in order to be able to interwork with all different networks and to ensure integrity of data.

2. PAD PARAMETERS

— Administrations should align their implementations with CCITT Recommendations.
— All E (essential) parameters should at least be implemented.
— Administrations should inform users that the packet-mode DTE (X.29) should only set parameter 1 to 0 in case of absolute necessity and should restore it afterwards.
— Administrations should always use the simple standard profile as defined in Recommendation X.28 as the default profile.

3. DCC/DNIC AND INTERNATIONAL PREFIX

— Administrations have to indicate clearly to users whether a 3-digit DCC or a 4-digit DNIC has to be used in front of the customer network address of a foreign country. Directories should indicate addresses used for national calls.
— If a single-digit international prefix is used, it should have the value of 0.

4. SUBADDRESSING (SHARED ADDRESS SPACE METHOD)

— Administrations should inform DTE implementors that at least 2-digit subaddresses are available on all European networks.

5. CALL PROGRESS SIGNALS

— Administrations should implement X.75 (84) and X.25 (84) clear/reset causes and diagnostic codes as early as possible.
— Administrations should send diagnostic codes to X.28 DTEs. This is an option in CCITT Recommendation X.28.

6. QUALITY OF SERVICE

— Administrations should provide the X.75 multilink feature as early as possible.
— Administrations should inform users that DTEs should use end-to-end recovery procedures if the quality of service provided by the networks is not sufficient for their applications.
— Administrations should operate all European international X.75 links at 64 kbit/s in order to provide appropriate network performance for applications using high speed access lines for throughput and/or transit delay reasons. Terrestrial links should normally be used. Satellite links may be used for backup only.
— Administrations should use automatic alternative routing in case of failures on the primary route. However, the backup route must have sufficient capacity, which may be provided by 64 kbit/s satellite backup links.

7. OSI NETWORK SERVICE

— Administrations should offer X.25 and X.75 version 1984 (including transit delay and CCITT-specified DTE facilities) in line with Recommendation T/CD 08-02 as early as possible in order to provide the OSI Network service according to Recommendation T/CD 08-01.

Test DTEs

— Administrations should provide test DTEs to conduct measurements according to the Annex. The details of the actual measurements have to be agreed bilaterally.

Annex

QUALITY OF SERVICE

1. VIRTUAL CIRCUIT THROUGHPUT FOR INTERNATIONAL CALLS WITHIN EUROPEAN NETWORKS

When public data networks provide international packet-switched data services according to Recommendation X.25, the following methodology for virtual circuit throughput measurements should be followed.

1.1. Definition

The virtual circuit throughput is defined as the total number of user data bits in an individual transfer sample (defined in X.140) that are successfully transmitted in one direction of a particular virtual circuit between a data source and a data link divided by the input/output timer (in seconds) for that sample. User data bits are the bits of the user data field in data packets of the X.25 — resp. X.75 — packet level (protocol/data at layer 4 and above). Framing, routing, bit-stuffing, error control and other protocol fields introduced by all protocols at or below the network layer are excluded.

1.2. Measurement method

For the estimation of throughput a virtual circuit is set up between data source and data sink. The measurement period should begin after a start-up period to permit the system to reach steady-state conditions.

Therefore it is recommended to start the input/output timer when the n-th data packet of the transfer sample enters the data source interface and to stop the timer when an RR or RNR packet containing an acknowledgment for the last data packet (with D-bit set to 1) of the sample exists at the data source interface.

The value of n should not be lower than 7. The time interval between starting and stopping the input/output times should not be less than 5 minutes.

An alternative method for ending the throughput measurement might be used if a network or the sink/source DTE does not support the D-bit procedure. Example of alternative method:
The input/output timer is stopped after a predefined interval (not less than 5 minutes) and before transmission of the last m data packets (m not less than 7) of the sample. The number of user data bits between starting and stopping the input/output times is measured.

1.3. Measurement Conditions

The attainable throughput on virtual circuits carried at the DTE/DCE interface may vary due to the statistical sharing of transmission and switching resources. The throughput further depends on various DTE characteristics. The following conditions are applicable:
— sending and receiving DTE have a local network connection at 9,600 bit/s;
— window size W = 2 is used by both DTEs;
— data packets have a field length of 128 octets;
— the receiving DTE is not flow controlling the DCE;
— the D-bit is not used;
— only 1 logical channel is active on both DTE connections.

2. TOTAL DATA PACKET TRANSFER DELAY AND CALL CONNECTION DELAY FOR INTERNATIONAL CALLS WITHIN EUROPEAN NETWORKS

When public data networks provide international packet switched data services according to Recommendation X.25, the following methodology for delay measurements should be applied.

The total data packet network transfer delay (TPTD) is the time interval that starts when the last bit of a data packet is placed in the output queue from a DTE and ends when the last bit of that data packet is received by the other DTE involved in the connection.

The call connection (CC) delay is the time interval that starts when the last bit of a call request packet is placed in the output queue from the calling DTE and ends when the DTE receives the last bit of either a call progress signal or the corresponding call connected packet but excludes the time interval that starts when the last bit of the incoming call packet is received by the called DTE and ends when the last bit of the call accepted packet is placed in the output queue from the called DTE.

These delays depend on various DTE characteristics. The following conditions are applicable:
— sending and receiving DTE have a local network connection at 9,600 bit/s;
— data packets have a field length of 128 octets;
— the receiving DTE is not flow controlling the DCE;
— only 1 logical channel is active on both DTE connections;
— no optional user facilities are requested.

3. AVAILABILITY OF A VIRTUAL CALL

Definitions and measurement conditions are for further study.