Recommendation T/CD 08-02 (Odense 1986)

INTERWORKING ASPECTS OF PACKET SWITCHED PUBLIC DATA

Recommendation proposed by Working Group T/WG 10 "Data communications" (CD)

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 and that their interconnection has been carried out,

— that experience shows that interconnection of these networks can 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 should be kept to a minimum,

— that CEPT Recommendation T/CSTD 2 provides already some guidelines on interworking aspects,

recommends

— that the optional user facilities and additional features for user classes 8-11 should be implemented in a harmonized way according to this Recommendation, as given in following table."

Harmonization of optional user facilities for user classes 8-11 in CEPT countries

X.2 (Version 84)		CCITT		CEPT	
Optional user facility		User classes of service			
		8-11		8-11	
		VC	PVC	VC	PVC
1.	*Optional user facilities assigned for an agreed contractual period*				
1.1	Extended packet sequence numbering (module 128)	A	A	N	N
1.2	Nonstandard default window sizes	A	A	EA	EA
1.3	Nonstandard default sizes 16, 32, 64, 2048, 4096	A	A	N	N
	256	A	A	EA	EA
	512, 1024	A	A	A	A
1.4*	Default throughput classes assignment	A	A	EA	EA
1.5	Flow control parameter negotiation	E	—	E	—
1.6*	Throughput class negotiation	E	—	E	—
1.7	Packet retransmission	A	A	N	N
1.8	Incoming calls barred	E	—	E	—
1.9	Outgoing calls barred	E	—	E	—
1.10	One-way logical channel outgoing	E	—	E	—
1.11	One-way logical channel incoming	A	—	EA	—
1.12	Closed user group	E	—	E	—
1.13*	Closed user group with outgoing access	A	—	EA	—
1.14	Closed user group with incoming access	A	—	EA	—
1.15	Incoming calls barred within a closed user group	A	—	EA	—
1.16	Outgoing calls barred within a closed user group	A	—	EA	—
1.17	Bilateral closed user group	A	—	N	—
1.18	Bilateral closed user group within outgoing access	A	—	N	—
1.19	Reverse charging acceptance	A	—	EA	—
1.20	Fast select acceptance	E	—	E	—
1.21	Multilink procedure	A	A	A	A
1.22	Charging information	A	—	A	—
1.23	Direct call	FS	—	N	—
1.24*	Hunt group	A	—	EA	—
1.25	On-line facility registration	A	—	A	—
1.26	D-bit modification	A	A	N	N
1.27	Local charging prevention	A	—	A	—
1.28*	Call redirection	A	—	EA	—
1.29	Network user identification	A	—	A	—
1.30	Extended frame sequence numbering	A	A	N	N
1.31	RPOA selection	A	—	N	—
2.	*Optional user facilities on a per-call basis*				
2.1	Closed user group selection	E	—	E	—
2.2	Bilateral closed user group selection	A	—	N	—
2.3	Reverse charging[1)]	A	—	EA	—
2.4	RPOA selection	A	—	N	—
2.5	Flow control parameter negotiation	E	—	E	—
2.6	Fast select	E	—	E	—
2.7*	Throughput class negotiation	E	—	E	—
2.8	Abbreviated address calling	FS	—	N	—
2.9	Charging information	A	—	A	—
2.10*	Transit delay selection and indication	E	—	E	—
2.11	Call redirection notification (to alternate DTE)	A	—	A	—
2.12*	Called line address modified notification	A	—	EA	—
2.13	Network user identification	A	—	A	—
2.14*	Closed user group with outgoing access selection	A	—	A	—
3.	*Additional features*				
3.1	Extended interrupt	E	E	E	E
3.2	CCITT-specified DTE facilities	E	—	E	—

E = Essential. A = Additional. N = Presently not offered, unlikely to be available on many networks in the future.
EA = A-facility essential in CEPT countries. FS = Following study.

[1)] For the time being, only for national use.

* For facilities marked with an * details in the implementation are found in the following pages.

1. ADDITIONAL INFORMATION ON THROUGHPUT CLASS

1.1. **Definitions** (provisional until final decision in CCITT)

The virtual circuit throughput is defined as the total number of user data bits in an individual transfer sample that are successfully transmitted in one direction of a particular virtual circuit between a data source and a data sink divided by the input/output time (in seconds) for that sample (defined in CCITT Recommendation X.140).

User data bits are the bits of the user data field in data packets of the X.25-rsp. 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.

The *throughput class* is a value, determined for each direction of transmission on a virtual call at the time of call establishment which is intended to represent the largest value of actual throughput likely to be experienced during the existence of the call.

1.2. **Implementation details**

1.2.1. Throughput class negotiation should be as defined in CCITT Recommendation X.25.

1.2.2. Throughput class has an end-to-end significance; in particular, once a virtual call is established, the values of throughput class for each direction of transmission are the same at both DTE/DCE interfaces.

1.2.3. Networks do not guarantee that the throughput achieved will correspond to the throughput class 100% of the time. However, in the long term, networks should guarantee the achievable throughput on the basis of a 95% probability value under specific conditions.

1.2.4. The throughput achieved may exceed the throughput class.

1.2.5. Network should not allow at the DTE/DCE interface a throughput class which exceeds the physical line speed of the access. If a higher value is requested then the network should negotiate it down.

1.2.6. For throughput class negotiation at the DTE/DCE interface, the network should consider each virtual circuit as independent.

1.2.7. It is the responsibility of each network node (national or international) to reduce the requested throughput class if this throughput class corresponds to a throughput that cannot be achieved on the virtual circuit, for example if the physical line speed of the link would be exceeded.

1.2.8. The conditions upon which an international node reduces the throughput class requested on a X.75 link should be decided by bilateral agreement between Administrations. In particular, specific link characteristics and operating conditions should be taken into account; for example, on a 9,600 bit/s X.75 link, the throughput class should not exceed 9, corresponding to 4,800 bit/s.

1.2.9. It is the responsibility of each network whether or not to apply a relation between the requested throughput class and the flow control parameter values (window and packet size) on the national part of an international virtual circuit. In particular, networks negotiating the flow control parameters with end-to-end significance should consider that this end-to-end significance may only be valid on the national part of the international virtual circuit.

1.2.10. The eventual relation to be applied on an international X.75 link between throughput class and flow control parameter values should be decided by bilateral agreement between Administrations. It should be a long term objective that Administrations can decide this issue unilaterally.

1.2.11. Determination of rules additional to those in X.25 concerning the throughput class negotiation to be used on a part of a virtual circuit should be based on measurements of throughput. These measurements should be made under strictly specified conditions.

1.2.12. Networks should, as much as possible, allocate resources to each virtual circuit in order to ensure that the throughput achievable will correspond to the throughput class requested by the DTE which originated the call.

2. ADDITIONAL INFORMATION ON TRANSIT DELAY SELECTION AND INDICATION (provisional until final decision in CCITT)

2.1. The DTE may select a desired transit delay in the call request packet as defined in paragraph 6.28 of X.25.

The network may take this value for the selection of a specific route. The network (for international connections the originating network) will replace the value provided by the DTE with a network specific value dependent on its internal characteristics. Some networks may also use several specific values taking into account, e.g. different trunk speeds and the use of satellites or cables.

For national calls, this value will be signalled to the called DTE.

In case of an international call, the originating network will add to its specific value a value depending on the characteristics of the international links as the transit delay selection utility. Each following network will add its network specific value and in case of transit an outgoing link specific value.

The use of the transit delay for route selection in case of transit arrangements is for further study.

If a network receives a call request with the *transit delay selection and indication* facility to be sent to a called DTE of which the network knows that it cannot handle this facility the network will not clear the call: In this case the network may delete the facility in the incoming call packet.

The network may only insert the transit delay selection and indication facility in the call connected packet if this facility was sent in the call request and in the corresponding incoming call packet.

2.2. **Values used for network specific and link specific transit delay**

The exact values are considered as a national matter and should be based on measurement results under specific conditions.

X.135 is considered as a useful starting point in case where no measurement results are available. The values in it are consistent with figures of 400 ms for a national network and 150 ms for an international link, with an additional 150 ms if the link is at 9.6 kbit/s instead of 48 kbit/s or more and an additional 300 ms if it is over a satellite transmission channel. These are mean values, not 95% values. However, a value of 200 ms on national calls, with an additional 150 ms to 250 ms for international calls seems to be more appropriate in European environment if no satellite is used.

2.3. The coding of the X.75 utility should align with that in X.25, using a two octet presentation in units of milliseconds.

If an X.75 link does not yet support the transit delay signalling, the call should be established that means no transit delay utility should be signalled to the other network and not transit delay indication facility should be signalled back to the calling DTE.

3. ADDITIONAL INFORMATION ON HUNT GROUP

3.1. Hunt groups may be limited to a single network node.

3.2. Hunt group membership may preferably imply a common facility profile.

3.3. If a calling DTE in a hunt group uses its own specific address there should be a possibility of signalling a subaddress. This subaddress should be signalled to the called DTE independent whether the individual address or the hunt group address is signalled in the INCOMING CALL packed to the called DTE.

3.4. The Hunt Group should allow for at least 10 members.

4. ADDITIONAL INFORMATION ON CALL REDIRECTION

Call Redirection should also be available if the called DTE is busy.

5. ADDITIONAL INFORMATION ON CALLED LINE ADDRESS MODIFIED NOTIFICATION (CLAMN)

5.1. CLAMN can only be passed to a DTE where explicitly known that this facility is accepted by this DTE. A DTE not recognizing CLAMN may be able to detect redirection/hunting by comparison of called address in the call connected packet.

5.2. CLAMN has to be signalled over an X.75 link. For an interim period, network must have the option not to signal CLAMN to other networks, because some networks may not yet have implemented this facility/utility. In this case the call has to be established without CLAMN.

5.3. If a DTE indicates invalid reason in the CLAMN in the CALL ACCEPTED/CLEAR REQUEST packet, this invalid reason should be overwritten by the network with the reason DTE originated.

6. ADDITIONAL INFORMATION ON CUG

Note 6 to Table 24/X.25 warns that some international CUG calls may be cleared if the destination network does not support CUG with OA selection, even though the called DTE should be accessible. This is understood to refer to the fact that the X.75 CUG utility is mandatory whereas the CUG + OA utility is optional.

In order to solve this problem, all European networks should support the CUG + OA utility on X.75 links.

7. ADDITIONAL INFORMATION ON EXTENDED INTERRUPT

7.1. All networks will eventually support 32 octets interrupt packets.

Networks supporting 32 octets interrupt packets earlier than others should not selectively prevent them being sent over X.75 links. The result of this will depend on the reaction of the receiving network; it may, for example, be the resetting or clearing of the call.

7.2. There are 2 solutions for the problem of existing 1980 DTEs in relation to 32 octets interrupt packets:

(a) the 32 octets interrupt packet is sent to the DTE;

(b) an X.25 port parameter indicates whether a DTE supports a single or 32 octets interrupt packet (possibly as on facet of a more general 1980/84 parameter). If a DTE supports only an one octet interrupt packet and a longer interrupt packet was received from the remote DTE, the network should reset the virtual call.

Solution (b) should be the preferred one.

8. ADDITIONAL INFORMATION ON CCITT-SPECIFIED DTE FACILITIES

All networks should check the presence of the OSI marker and may also check the codes following it. The presence of the OSI marker could be used for charging purposes.

If a network receives a call request with *CCITT-specified DTE facilities* to be sent to a called DTE of which the network knows that it cannot handle these facilities, the network will not clear the call. In this case the network may delete these facilities in the incoming call packet.

If a network receives a call accepted packet with CCITT-specified DTE facilities to be sent to calling DTE of which the network knows that it cannot handle these facilities, the network will not clear the call. In this case the network may delete these facilities in the call connected packet.