INTERNATIONAL TELECOMMUNICATION UNION

# CCITT

# Series X
## Supplement 1

(11/1988)

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

SERIES X: DATA COMMUNICATION NETWORKS

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# SOME TEST RESULTS FROM SPECIFIC NATIONAL AND INTERNATIONAL PORTIONS

Reedition of Supplement 1 to CCITT X-series Recommendations published in the Blue Book, Fascicle VIII.3 (1988)

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**NOTES**

1 Supplement 1 to CCITT X-Series was published in Fascicle VIII.3 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.

**Supplement 1**

**SOME TEST RESULTS FROM SPECIFIC NATIONAL AND INTERNATIONAL PORTIONS**

*(referenced in Recommendation X.135)*

This supplement presents test results and is intended for illustrative purposes only. It contains results for national A and national B portions. The results were measured in the DATEX-P network, which is operated by the Deutsche Bundespost in the Federal Republic of Germany.

Since these figures apply to one network under a specific network traffic load at a specific time, they cannot be taken in any way to be presentative of the current or likely performance of either other networks of this same network at a different point of time. They are included for the sole purpose of summarizing one experiment in which the network performance was better than that defined in Recommendation X.135.

The above implies that many factors, including a particular set of equipment types, a specific configuration, distribution of network traffic loading, network topology, and network-specific dimensioning rules, impact the values obtained.

## 1 National A portion delay and throughput values

Table 1 presents call set-up delay, data packet transfer delay, throughput capacity, and clear indication delay values measured in a DATEX-P configuration selected to represent this National A portion of an international virtual connection. The measurements were taken during the busy hour on a representative set of connections. These results demonstrate that the delay and throughput performance provided in the National A portion can be much better than is indicated by the worst-case values specified in Recommendation X.135.

## 2 National B portion delay and throughput values

Table 2 presents call set-up delay, data packet transfer delay, throughput capacity, and clear indication delay values measured in a DATEX-P configuration selected to represent the National B portion of an international virtual connection. The measured configuration included a 128 kbit/s satellite circuit. The measurements were taken during the busy hour. These results demonstrate that the delay and throughput performance provided in the National B portion can be much better than is indicated by the worst-case values specified in Recommendation X.135.

TABLE 1

**Measured national A portion delay and throughput capacity values**

| Statistic | Measured national A value | | | |
|---|---|---|---|---|
| | Minimum | Mean | 95th Percentile | Maximum |
| Call set-up delay (ms) | 388 | 450 | 517 | 588 |
| Data packet transfer delay (ms) | 147 | 169 | 193 | 203 |
| Throughput capacity (bit/s) | – | 6287 | – | – |
| Clear indication delay (ms) | 85 | 107 | 142 | 180 |

*Note 1* – The measurements summarized in this table were conducted in January 1987. All reported values are based on measurements of at least 5 different 3-hop paths within the DATEX-P network. Each reported delay value is an average of at least 100 indvidual measurements, including at least 20 measurements on each path. The reported throughput capacity value is an average of 40 individual measurements, each involving the transfer of at least 450 packets.

*Note 2* – The data packet transfer delay and throughput capacity values were measured using data packets having a 128-octet user data field. In the throughput capacity measurements, the signalling rate on the access circuit sections was 9600 bit/s; the packet layer window size on the access circuit sections was 2; and the network internal packet layer window size was 4. (The network internal window is a network specific throughput class implementation in which higher negotiated throughput classes result in larger network internal window.)

*Note 3* – The clear indication delay values were estimated by measuring the time between transmission of a clear indication packet and receipt of the corresponding clear confirmation packet at the clearing DSE, and dividing the result by 2. Clear confirmation has end-to-end significance in the DATEX-P network.

*Note 4* – The reported delay values do not include delays in the access circuit sections or the DTEs.

TABLE 2

**Measured national B portion delay and throughput capacity values**

| Statistic | | Measured nation B values | | | |
|---|---|---|---|---|---|
| | | Minimum | Mean | 95th percentile | Maximum |
| Call set-up delay (ms) | | 1040 | 1089 | 1126 | 1197 |
| Data packet transfer delay (ms) | | 471 | 495 | 531 | 537 |
| Throughput capacity (bit/s) | | | | | |
| Network internal window size | 4 | – | 4127 | – | – |
| | 7 | – | 5350 | – | – |
| | 15 | – | 8595 | – | – |
| Clear indication delay (ms) | | 406 | 432 | 455 | 468 |

*Note 1* – The measurements summarized in this table were conducted in January 1987. All reported values are based on measurements of at least 5 different 3-hop paths (including 1 satellite-hop) within the DATEX-P network. Each reported delay value is an average of at least 100 individual measurements, including at least 20 measurements on each path.

Each reported throughput capacity value is an average of at least 40 individual measurements, each involving the transfer of at least 450 packets.

*Note 2* – The data packet transfer delay values were measured using data packets having a 128-octet user data field.

In each measurement, the signalling rate on the access circuit sections was 9600 bit/s and the packet layer window size on the access circuit section was 2.

*Note 3* – The clear indication delay values were estimated by measuring the time between transmission of a clear indication packet and receipt of the corresponding clear confirmation packet at the clearing DSE, and dividing the result by 2. Clear confirmation has end-to-end significance in the DATEX-P network.

*Note 4* – The reported delay values do not include delays in the access circuit sections or the DTEs.

*Note 5* – The measured values demonstrate that the packet layer network internal window size can strongly influence the throughput capacity of virtual connection portions that contain a satellite circuit.

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Printed in Switzerland

Geneva, 2009