DATA SYSTEMS—"DATAPHONE®" SERVICE AND OTHER DATA SERVICE ON THE DIRECT DISTANCE DIALING NETWORK MINIMUM ACCEPTABLE PERFORMANCE (MAP) CRITERIA

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1. GENERAL

1.01 The switched telecommunications network and other switched networks may provide a large number of possible tandem arrangements of equipment and facilities on successive calls between two specific locations. It would be impractical to attempt to specify transmission requirements for every arrangement, and to maintain each arrangement to its separate requirement. Although transmission performance on the network is maintained in such a manner that on an "average," customers will receive satisfactory performance on a large percentage of data calls, it is recognized that a small number of customers may, because of geographical location, calling patterns, limited network access, etc, experience frequent or consistent substandard performance. The minimum acceptable performance (MAP) program has been initiated as an aid in identifying the situations where a substandard grade of service exists.

1.02 This section is reissued to provide revised MAP parameters and limits. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 The MAP program is intended to be used with assistance from data technical (DATEC) support personnel investigating escalated data trouble reports. Trouble reports are normally escalated to the DATEC teams when craft personnel are not able to clearly establish that a trouble situation exists or are not able to correct a trouble situation satisfactorily. Normally, the DATEC personnel will not be involved until after it has been determined that operational problems, timing arrangements, data set strapping options, and other nontransmission problems are not causing the problems experienced. Similar problems involving data circuits on private switched networks may also be investigated.

2. MAP PROGRAM

2.01 The MAP program requires the measurement of up to 12 critical transmission parameters to determine whether any of the parameters are out of limits on over 85 percent of calls. The program may be applied either where telephone company (TELCO) or customer-provided equipment (CPE) data sets are used. The MAP program applies only to supported arrangements using data jacks at both ends.

3. PARAMETERS MEASURED

3.01 The parameters used in the MAP program to rate transmission performance are: 1004-Hz insertion loss, C-notched noise (measured using a 1004-Hz holding tone on the facility), impulse noise, phase jitter, slope between 404 and 2804-Hz

referenced to 1004-Hz, peak-to-average signal ratio (P/AR), intermodulation distortion (second and third order measured using the 4-tone method), gain hits, phase hits, dropouts, frequency shift, and envelope delay distortion. These parameters are supported data jack to data jack.

3.02 If two of the MAP criteria parameters are at the limits and nominal amounts of other impairments are present on the channel, degraded performance can be expected. Survey statistics indicate that there will be less than one percent of the direct distance dialing (DDD) connections where more than two of the parameter limits specified in this section are exceeded.

4. TEST EQUIPMENT

4.01 A list of test equipment which has been evaluated for use in making transmission measurements is given in the AT&T Product Evaluation (PER) 117. Appropriate test equipment for measuring the parameters listed in paragraph 3.01 should be available to the DATEC personnel at each test location.

5. BASIC PROCEDURES

5.01 The basic procedure followed by DATEC teams in identifying trouble situations where MAP measurements are required, is to dispatch personnel to the selected test locations, place test calls, and measure the MAP parameters. Test requirements are given in paragraph 6.02.

5.02 The MAP program is intended only to identify the connections on which trouble situations exist. Craft personnel will (with the guidance of DATEC) refer to appropriate sections for corrective actions.

Choosing Test Locations

5.03 An analysis of trouble reports may be helpful in determining the proper test locations. If trouble has been experienced while transmitting to a particular location, end-to-end tests will be made to that location. If reports indicate that more than one location is involved in trouble reports, tests should be made to the location reporting the most trouble.

5.04 If trouble has been experienced in sending to more than one location without a pattern, test locations must be chosen arbitrarily. Under such conditions, it should be remembered that the trouble is likely to be located in the calling loop, the serving central office, or in the toll connecting trunks at the calling end.

5.05 If the trouble reports indicate that the difficulties are experienced in a particular time period in the day, tests should be made during that specific time period.

Placing Test Calls

5.06 Where TELCO data sets are used, the DATEC team should place test calls in the same manner as a customer would or may ask the customer to place the calls. If CPE data sets are used, the customer should be asked to place a series of calls in the usual operating manner. In either case, steps should be taken to insure that the customer is not billed for the test calls by following the procedures given in Section 010-250-001.

6. REQUIREMENTS

6.01 A simplified procedure may be used where the customer establishes a connection which is "bad" and has the same problem that has been referred to DATEC. All MAP parameters are then measured on this connection. If all parameters are in limit on two such connections, terminate testing. If any parameter is out of limits, corrective action is required.

6.02 When a test call has been set up, measurement of the parameters listed in Table A should be made. Note that P/AR may be substituted for envelope delay distortion measurement in most cases. In the following sequence, if (1) or (2) is accomplished, the service can be rated as satisfactory and no further action is required. If condition (3) exists, holding and tracing will be required to isolate a possible trouble condition. Action should be taken to correct out of limit transmission performance so that condition (1) or (2) is met. Complete one of the following series of calls as follows:

(1) Seven calls are completed with no parameter limit exceeded on any call or

(2) Ten calls are completed with one or more parameter limits exceeded on only one call

or

(3) Two calls are completed with one or more parameter limits exceeded on each before accomplishing either (1) or (2).

6.03 Requirements for the measured parameters are given in Table A. If two or more MAP criteria are at the limits, a connection is considered unsatisfactory and additional investigation will be required.

6.04 If the facility is proven satisfactory in a case where customer-provided modems are used, it is the responsibility of the customer to test the modems.

7. REFERENCES

7.01 When a trouble situation has been identified, reference should be made to appropriate sections for aid in isolating and clearing the indicated troubles. The following sections cover maintenance procedures and give information about test equipment used in making MAP investigations.

SECTION	TITLE
010-250-001	Crediting Charges on Test Calls
100-520-101	KS-14510 Volt-Ohm-Milliammeter—Description and Application
103-115-101	25B and 25BR Voiceband Gain and Delay Sets (J94025B and J94025BR)—Description, Operation, and Maintenance
103-204-100	Model TTS-4 Series of Transmission Test Sets—Instruction Manual
103-611-102	3C Noise Measuring Set—Description
103-626-100	6F and 6FR Voiceband Noise Measuring Sets (J94006F and J94006FR)—Description, Operation, and Maintenance
107-101-100	914B Data Test Set—Description and Operation
107-402-100	921A Data Test Set—Description and Operation
314-205-300	Data Systems—DATAPHONE Service and Other Data Services on the Direct Distance Dialing Network—Overall Maintenance Procedures
314-205-500	Data Systems—DATAPHONE Service and Other Data Services on the Direct Distance Dialing Network/Overall Data Transmission Test Limits
314-205-501	Data Systems—DATAPHONE Service and Other Data Services on the Direct Distance Dialing Network—Test Requirements for Subscriber, Foreign Exchange, PBX, and WATS Lines
590-101-103	Jacks for Registered Data Equipment-Single and Multiline Installations

TABLE A

MAP PROGRAM PARAMETERS AND LIMITS

PARAMETER	LIMITS (JACK TO JACK)
1004-Hz Insertion Loss	30 dB
C-Notched Noise (1004-Hz Holding Tone)	24 dB below received power of 1004-Hz test tone at data level
Impluse Noise (1004-Hz Holding Tone)	15 counts in 15 min, threshold at 6 dB below received data level
Phase Jitter (20-300 Hz) (4-300 Hz) (4-20 Hz)	10 degrees, peak-to-peak 15 degrees, peak-to-peak 10 degrees, peak-to-peak
Slope, 1004 to 2804 Hz (Referenced to 1004 Hz)	$\leq$14 dB
P/AR	$\geq$48
Intermodulation Distortion 2nd order 3rd order	27 dB below received fundamental level 32 dB below received fundamental level
Gain Hits	8 in 15 min $\geq$3 dB
Phase Hits	8 in 15 min $\geq 20^{\circ}$
Dropouts	1 in 30 minutes, $\geq$12 db
Frequency Shift	$\pm$5 Hz
Envelope Delay Distortion*	800 μs maximum (1000 to 2400 Hz) 2600 μs (600 to 2800 Hz)

*If the P/AR limit is met, it should not be necessary to measure the envelope delay distortion test.