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MAINTENANCE: ISDN

**APPLICATION OF MAINTENANCE
PRINCIPLES TO ISDN PRIMARY
RATE ACCESS**



Recommendation M.3604

FOREWORD

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Recommendation M.3604 was revised by Study Group IV and was approved under the Resolution No. 2 procedure on the 5th of October 1992.

CCITT NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized private operating agency.

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Recommendation M.3604**APPLICATION OF MAINTENANCE PRINCIPLES TO ISDN PRIMARY RATE ACCESS***(Melbourne 1988 as Rec. I.604; revised and renumbered 1992)**Abstract*

This Recommendation defines capabilities and functions used by the network to maintain the physical layer of ISDN primary rate access.

Keywords

- ISDN;
- maintenance;
- primary rate access.

1 Scope of application

This Recommendation covers the maintenance of that part of the ISDN subscriber primary rate access which is controlled by the network. The Recommendation follows the maintenance principles as defined in Recommendation M.20 [1] and applies to the primary rate access connected to the local exchange.

The scope of this Recommendation is to describe the minimum functions required to maintain the subscriber primary rate access. They are applicable to any primary rate access.

The principle of controlled maintenance (as defined in Recommendation M.20 [1]) is applied for maintaining the subscriber primary rate access.

Controlled maintenance is a method of sustaining a desired technical performance by the systematic application of supervision, testing and performance sampling in order to minimize preventive maintenance and to reduce corrective maintenance.

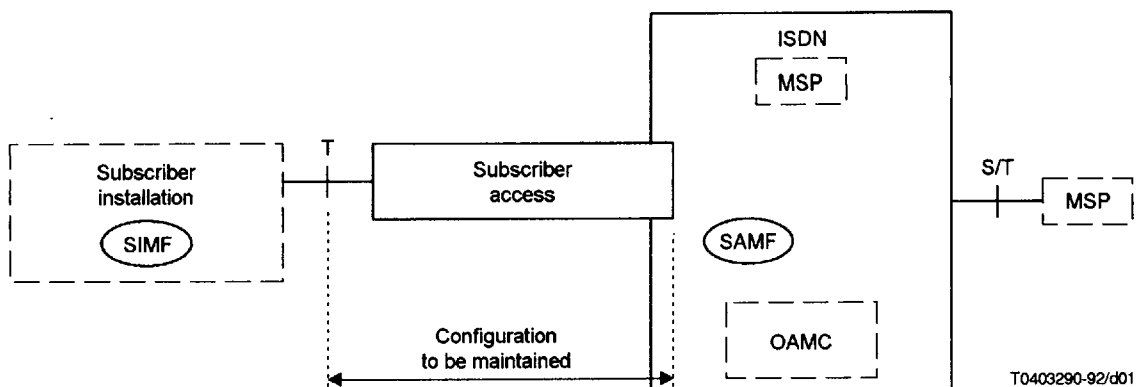
2 Network configuration for maintenance activities

Figure 1/M.3604 gives the basis for the general maintenance principles of the subscriber access.

3 Failure detection**3.1 General**

Unlike the ISDN basic access, the digital section of the ISDN subscriber primary rate access is never deactivated (as seen by the exchange); continuous automatic supervision of the correct functioning of layer 1 up to NT2 is always operating. This supervision is called continuous automatic supervision of layer 1.

Automatic supervision of the correct functioning of the D-channel layers 2 and 3 is also operating. This supervision is called automatic supervision of layers 2 and 3 of the D-channel protocol.



MSP Management Service Provider
 OAMC Operation Administration Maintenance Centre
 SAMF Subscriber Access Management Function
 SIMF Subscriber Installation Management Function

See Recommendation M.3600 [2] for detailed discussion of the terms.

Note 1 – The subscriber access contains a digital link which can use different varieties of transmission techniques and media. Figure 2/M.3604 shows examples of configurations made by using existing digital line systems and multiplexers complying with G.700 [7] - and G.900 [8] - Series Recommendations.

Note 2 – A local exchange should be able to connect different types of digital line systems and different types of subscriber installations at V_3 interfaces complying with Recommendation Q.512 [9].

Note 3 – The use of different types of digital line systems shall not affect the subscriber installation complying with Recommendation I.431 [10].

Note 4 – The subscriber access shall comply with the CRC procedure defined in Recommendations G.704 [5] and G.706 [6].

Note 5 – In some countries, the subscriber installation is allowed to control maintenance functions in the subscriber access.

FIGURE 1/M.3604
 Configuration for the maintenance of primary access

3.2 Automatic supervision

3.2.1 Objectives

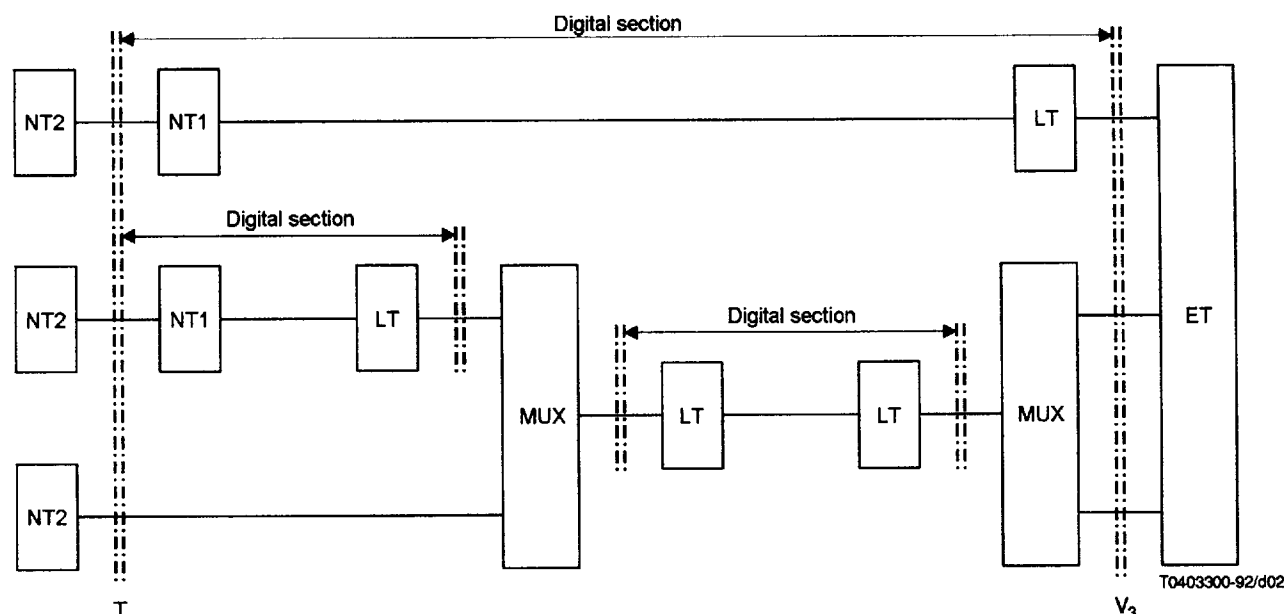
This supervision is realized by continuous automatic mechanisms located in various pieces of equipment of the ISDN primary rate access. These automatic mechanisms are never deactivated and are generally based on the operation of CRC information which is given by the CRC procedure associated with the link between the customer and the local exchange. These mechanisms are complemented by the detection of malfunctioning of particular items, e.g. loss of power supply, loss of incoming signal, loss of frame alignment. Minimum functions which could be allocated to the subscriber installation and exchange termination are listed below. Further details of these functions and those of the digital section are found in Annex A, where various options concerning the handling of CRC functions are described.

3.2.2 NT2 functions

The functions allocated to the NT2 are listed below:

- detection of loss of incoming signal;
- detection of loss of frame alignment;
- detection of AIS and RAI;
- generation of frame signal;
- CRC code generation;

- RAI generation;
- CRC monitoring of the incoming signal (network-to-user);
- detection of CRC error information (user-to-network);
- CRC error reporting to the network (optional in 1544 kbit/s systems).



Note – Digital sections may include zero, one or more regenerators.

FIGURE 2/M.3604
Examples of equipment configurations in the ISDN subscriber primary rate access

3.2.3 ET functions

The functions which are allocated to the ET are listed below:

- detection of loss of incoming signal;
- detection of loss of frame alignment;
- detection of AIS, generation of AIS (optional in 1544 kbit/s systems);
- detection of RAI;
- generation of frame signal;
- CRC code generation;
- RAI generation;
- CRC monitoring of the incoming signal (user-to-network);
- detection of the CRC error information (network-to-user);
- CRC error reporting to the user (optional in 1544 kbit/s systems).

The exchange termination may optionally detect the CRC error information reported by the user side.

The RAI is generated towards NT2 upon detection by the ET of a fault in the input direction (loss of signal, loss of frame alignment, detection of AIS).

The ET has the option to evaluate the transmission performance based on the statistical treatment of the local and remote CRC error reports and on the fault indications.

The transmission performance evaluation is based on a permanent processing of the elementary results presented by the continuous error monitoring of the digital transmission link. The result of this processing will give information on the transmission quality level (normal quality, degraded quality, unacceptable quality) and on the unavailability of the access (see § 5.6).

3.3 *Automatic supervision of layers 2 and 3 of the D-channel protocol*

This covers supervision of activities of layers 2 and 3 of the D-channel protocol. Automatic supervision of layers 2 and 3 will be made by self-acting mechanisms implemented in the network (e.g. in the ET).

There are three categories of automatic supervision which may be performed by layer 2 and layer 3 of the D-channel protocols:

- service provision incapability detection (e.g. incapability of layer 2 to establish a data link connection);
- protocol misoperation detection;
- error monitoring (e.g. the layer 2 CRC procedure can detect the occurrence of an errored frame).

These events should be recorded as discussed in Recommendation M.3640 [4].

3.4 *Continuity test*

For further study.

4 **System protection**

When a confirmed fault is detected which has an adverse effect on the availability and/or functionality of network equipment, the access is considered “out of service due to failure” and call attempts may be rejected to prevent further damage or to remove the adverse effect.

5 **Failure indication**

5.1 *Default indication signals*

- a) AIS – as defined in Recommendation I.431 [10].
- b) RAI – as defined in Recommendation I.431 [10].

5.2 *State tables*

State tables associated with failures in the primary rate access are given in Recommendation I.431 [10].

5.3 *Generation of defect indication signals by the NT2*

The NT2 functions are listed in § 3.2.2.

The generation of RAI toward the ET is used to indicate the loss of incoming layer 1 capability.

5.4 *Generation of defect indication signals by the subscriber access*

The digital link functions are listed in Annex A for each option within the access.