



INTERNATIONAL TELECOMMUNICATION UNION

# ITU-T

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

# G.776.1

(10/98)

SERIES G: TRANSMISSION SYSTEMS AND MEDIA,  
DIGITAL SYSTEMS AND NETWORKS

Digital transmission systems – Terminal equipments –  
Operations, administration and maintenance features of  
transmission equipment

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**Managed objects for signal processing network  
elements**

ITU-T Recommendation G.776.1

(Previously CCITT Recommendation)

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# **ITU-T RECOMMENDATION G.776.1**

## **MANAGED OBJECTS FOR SIGNAL PROCESSING NETWORK ELEMENTS**

### **Summary**

This Recommendation identifies the information model for the operations and management of Signal Processing Network Elements (SPNE).

### **Source**

ITU-T Recommendation G.776.1 was prepared by ITU-T Study Group 15 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 23rd of October 1998.

## FOREWORD

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The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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## Recommendation G.776.1

### MANAGED OBJECTS FOR SIGNAL PROCESSING NETWORK ELEMENTS

(Geneva, 1998)

#### 1 Scope

This Recommendation provides the necessary information required for controlling Signal Processing Network Elements (SPNE) from a Telecommunications Management Network (TMN). SPNEs as used in this Recommendation include echo cancellers, transcoders, circuit multiplication systems, and signal/service processing systems.

Information in this Recommendation is based on actual and planned equipment installed (or to be installed) in today's Public Switched Telephone Networks. It is important to also note that this Recommendation does not specify functionality or performance for any particular implementation of an SPNE. The criteria contained herein are intended to only reflect the collective universe of options and features for the particular SPNE class.

#### 2 References

The following Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- CCITT Recommendation G.164 (1988), *Echo suppressors*.
- ITU-T Recommendation G.165 (1993), *Echo cancellers*.
- ITU-T Recommendation G.168 (1997), *Digital network echo cancellers*.
- ITU-T Recommendation G.701 (1993), *Vocabulary of digital transmission and multiplexing, and Pulse Code Modulation (PCM) terms*.
- CCITT Recommendation G.703 (1991), *Physical/electrical characteristics of hierarchical digital interfaces*.
- ITU-T Recommendation G.704 (1995), *Synchronous frame structures used at 1544, 6312, 2048, 8488 and 44 736 kbit/s hierarchical levels*.
- CCITT Recommendation G.706 (1991), *Frame alignment and Cyclic Redundancy Check (CRC) procedures relating to basic frame structures defined in Recommendation G.704*.
- CCITT Recommendation G.711 (1988), *Pulse Code Modulation (PCM) of voice frequencies*.
- CCITT Recommendation G.726 (1990), *40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)*.
- CCITT Recommendation G.727 (1990), *5-, 4-, 3- and 2-bits/sample embedded adaptive differential pulse code modulation (ADPCM)*.

- CCITT Recommendation G.761 (1988), *General characteristics of a 60-channel transcoder equipment.*
- CCITT Recommendation G.762 (1988), *General characteristics of a 48-channel transcoder equipment.*
- ITU-T Recommendation G.763 (1998), *Digital circuit multiplication equipment using ADPCM (Recommendation G.726) and digital speech interpolation.*
- ITU-T Recommendation G.766 (1996), *Facsimile demodulation/remodulation for digital circuit multiplication equipment.*
- ITU-T Recommendation M.3100 (1995), *Generic network information model.*
- ITU-T Recommendation Q.50 (1997), *Signalling between Circuit Multiplication Equipments (CME) and International Switching Centres (ISC).*
- CCITT Recommendation X.721 (1992), *Information technology – Open Systems Interconnection – Structure of management information: Definition of management information.*

### **3 Definitions**

The definitions used in the above referenced Recommendations are used in this Recommendation as well.

### **4 Abbreviations**

This Recommendation uses the following abbreviations.

ABPS	Average Bits Per Sample
ADPCM	Adaptive Differential Pulse Code Modulation
AMI	Alternate Mark Inversion
B8ZS	Bipolar with eight Zero Substitution
BC	Bearer Channel
BER	Bit Error Ratio
BPV	Bipolar Violation
CAS	Channel Associated Signalling
CC	Control Channel
CCITT	Consultative Committee for International Telephone and Telegraph
CCS	Common Channel Signalling
CMI	Code Mark Inversion
CRC	Cyclic Redundancy Check
dB	decibel
DCME	Digital Circuit Multiplication Equipment
DCN	Disconnect
DLC	Dynamic Load Control



DS0	Digital Signal level 0 (Time slot at 64 kbit/s)
DS1	Digital Signal level 1 at 1544 kbit/s
DSI	Digital Speech Interpolation
E1	Digital signal level 1 at 2048 kbit/s
EC	Echo Canceller
ECE	Echo Canceller Equipment
ERL	Echo Return Loss
ESF	Extended Super Frame
FCC	Fax Control Channel
FEC	Forward Error Correction
FSK	Frequency Shift Keying
FSTI	Facsimile Statistics Time Interval
HDB3	High Density Bipolar of order three
Hz	Hertz
ID	Identifier
IESS	Intelsat Earth Station Standards
IT	Intermediate Trunk
ITU	International Telecommunication Union
kbit/s	kilobits per second
Max	Maximum
Min	Minimum
ms	milliseconds
NSF	Non-Standard Facilities
PCM	Pulse Code Modulation
PRI	Primary Rate Interface
RDN	Relative Distinguished Name
Rx	Receive
SF	Super Frame
SND	Send
SPNE	Signal Processing Network Element
STI	Statistics Time Interval
T1	Digital Signal Level 1 at 1544 kbit/s
TC	Trunk Channel
TCH	Transparent Circuit Handler
TS	Time Slot
Tx	Transmit

USM	User Signalling Module
VB	Voice Band
VBD	Voice Band Data
VPA	Voice Path Assurance
ZCS	Zero Code Suppression

## 5 Information model

This Recommendation identifies the information model of Signal Processing Network Elements (SPNE) used in the management of these elements from a Telecommunications Management Network (TMN). This model is given in Annex A and describes managed object classes and their properties and provides the entity relationship diagrams. SPNEs as used in this Recommendation include echo cancellers, circuit multiplication systems, and signal/service processing systems.

### ANNEX A

#### SPNE management information model

This Recommendation contains the managed object model for the various types of Signal Processing Network Elements (SPNE). The model is available electronically as part of this annex to allow use by implementors with automated tools.

The file *G776\_1\_Entity* contains the entity relationship diagrams.

The file *G776\_1\_Objects* contains the object classes.

The file *G776\_1\_Packages* contains the packages.

The file *G776\_1\_Attributes* contains the attributes.

The file *G776\_1\_Name\_Bindings* contains the name bindings.

The file *G776\_1\_Actions* contains the actions.

The file *G776\_1\_Notifications* contains the notifications.

The file *G776\_1\_ASN1* contains ASN.1 defined types.

### APPENDIX I

#### Tutorial information

This Recommendation contains the managed object model for the various types of Signal Processing Network Elements (SPNE). A tutorial on the various SPNE types and associated management information is available electronically as part of this appendix.

The tutorial may be found in file *G776\_1\_Appendix\_I*.

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