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

Digital transmission systems – Terminal equipments – Principal characteristics of multiplexing equipment for the synchronous digital hierarchy

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Vocabulary of terms for synchronous digital hierarchy (SDH) networks and equipment

ITU-T Recommendation G.780

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION G.780

VOCABULARY OF TERMS FOR SYNCHRONOUS DIGITAL HIERARCHY (SDH) NETWORKS AND EQUIPMENT

Summary

This Recommendation lists abbreviations and describes terms used in ITU-T Recommendations on synchronous digital hierarchy (SDH) networks and equipment.

Source

ITU-T Recommendation G.780 was prepared by ITU-T Study Group 15 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 22nd of June 1999.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

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.

NOTE

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Introduction

This text is an updated version of Recommendation G.780 – Vocabulary of Terms for Synchronous Digital Hierarchy (SDH) Networks and Equipment. The abbreviations and terms were taken from the Recommendations listed below.

Recommendation	Latest Pub.	ITU-T Question/Study Group
G.707	03/96	11/15
G.781 (G.synce)	06/99	9/15
G.783	04/97	9/15
G.784	06/99	13/15
G.832	10/98	11/15
G.841	10/98	9/15
G.842	04/97	9/15
G.957	06/99	16/15
G.958	11/94	16/15
G.803	06/97	19/13
G.813	08/96	18/13
G.825	03/93	18/13
G.826	02/99	16/13
G.827	08/96	15/13
G.829	–	16/13
G.831	08/96	19/13

Recommendation G.780

VOCABULARY OF TERMS FOR SYNCHRONOUS DIGITAL HIERARCHY (SDH) NETWORKS AND EQUIPMENT

(Geneva, 1999)

In cases where specific SDH terms are used only in one Recommendation, they will be described in that Recommendation.

Plans are to enhance Recommendation G.780 in the future with abbreviations and terms related to SDH network architecture and management.

The following abbreviations and terms are used in some of the Recommendations dealing with SDH networks and equipment (Recommendations G.707, G.783, G.784, G.803, G.826, G.832, G.841, G.842, G.957 and G.958).

1 Abbreviations

This Recommendation uses the following abbreviations:

A	Adaptation function
AAL	ATM Adaptation Layer
ACSE	Association Control Service Element
AcSL	Accepted Signal Label
AcTI	Accepted Trace Identifier
ADM	Add-Drop Multiplexer
AI	Adapted Information
AIS	Alarm Indication Signal
AITS	Acknowledged Information Transfer Service
ALS	Automatic Laser Shutdown
AP	Access Point
APDU	Application Protocol Data Unit
API	Access Point Identifier
APId	Access Point Identifier
APS	Automatic Protection Switching
ASE	Application Service Element
ASN.1	Abstract Syntax Notation One
ATM	Asynchronous Transfer Mode
AU	Administrative Unit
AU-n	Administrative Unit, level n
AUn-AIS	Administrative Unit Alarm Indication Signal
AUG	Administrative Unit Group
AU-LOP	Administrative Unit Loss of Pointer
B-ISDN	Broadband ISDN
BBE	Background Block Error

BBER	Background Block Error Ratio
BER	Bit Error Ratio
BIP	Bit Interleaved Parity
BIP-X	Bit Interleaved Parity-X
Br	Bridge
C	Connection function
C-n	Container-n
CAS	Channel Associated Signalling
CBR	Constant Bit Rate
CC	Connect Confirm
CEC	Cell Error Control
CI	Characteristic Information
CID	Consecutive Identical Digit
CK	Clock
CLNP	Connectionless Network Layer Protocol
CLNS	Connectionless Network Layer Service
CLR	Clear
CM	Connection Matrix
CMI	Coded Mark Inversion
CMIP	Common Management Information Protocol
CMISE	Common Management Information Service Element
CONP	Connection Oriented Network-layer Protocol
CP	Connection Point
CR	Connection Request
CRC	Cyclic Redundancy Check
CRC-N	Cyclic Redundancy Check-N
CSES	Consecutive Severely Errored Seconds
CV	Code Violation
D	Data
DCC	Data Communications Channel
DCN	Data Communications Network
DEC	Decrement
DEG	DEgraded Signal
DEG	Degraded
DEGTHR	Degraded Threshold
DS	Defect Second
DXC	Digital Cross Connect
E0	Electrical interface signal 64 kbit/s
E11	Electrical interface signal 1544 kbit/s
E12	Electrical interface signal 2048 kbit/s
E22	Electrical interface signal 8448 kbit/s

E31	Electrical interface signal 34 368 kbit/s
E32	Electrical interface signal 44 736 kbit/s
E4	Electrical interface signal 139 264 kbit/s
E/O	Electrical/Optical
EB	Errored Block
EBC	Errored Block Count
ECC	Embedded Control Channel
EDC	Error Detection Code
EDCV	Error Detection Code Violation
EMF	Equipment Management Function
EOW	Engineering Order-Wire
EQ	Equipment
Eq	Recommendation G.703 type electrical signal, bit rate order q (q = 11, 12, 21, 22, 31, 32, 4)
ES	Electrical Section
ES	Errored Second
ES1	Electrical Section, level 1
ESA	Errored Seconds Type A
ESB	Errored Seconds Type B
ESR	Errored Second Ratio
ET	Extra Traffic
EX	Extinction ratio
EXC	EXCessive errors
EXER	EXERcise
EXER-R	Exercise-Ring
EXER-S	Exercise-Span
ExSL	Expected Signal Label
ExTI	Expected Trace Identifier
F_B	Far-end Block
F_DS	Far-end Defect Second
F_EBC	Far-end Errored Block Count
FAL	Frame Alignment Loss
FAS	Frame Alignment Signal
FBBE	Far-end Background Block Error
FC	Failure Counts
FDS	Far-end Defect Second
FEBC	Far-end Errored Block Count
FEBE	Far End Block Error (renamed as REI)
FERF	Far End Receive Failure (renamed as RDI)
FES	Far-end Errored Second
FIFO	First In First Out

FLS	Frame loss second
FM	Fault Management
FOP	Failure of Protocol
FPM	Flicker Phase Modulation
FPME	Far-end Performance Monitoring Event
FS	Forced Switch
FS	Frame Start signal
FSES	Far-end Severely Errored Second
FS-P	Forced Switch to Protection
FS-R	Forced Switched working to Protection-Ring
FS-S	Forced Switched working to Protection-Span
FS-W	Forced Switch to Working
FU	Functional Unit
GNE	Gateway Network Element
HEC	Header Error Check
HEC	Header Error Control
HO	Higher Order
HO	Hold Off
HOA	Higher Order Assembler
HOI	Higher Order Interface
HOP	Higher-Order Path
HOPM	Higher-Order Path Matrix
HOPT	Higher-Order Path Termination
HOTCA	Higher-Order Tandem Connection Adaptation
HOTCT	Higher-Order Tandem Connection Termination
HOVC	Higher Order Virtual Container
HP	Higher order Path
HP-DEG	Higher order Path Degraded
HP-EXC	Higher order Path Excessive Errors
HP-SSF	Higher order Path Server Signal Fail
HP-TIM	Higher order Path Trace Identifier Mismatch
HP-UNEQ	Higher order Path UNEQuipped
HPA	Higher order Path Adaptation
HPC	Higher order Path Connection
HPOM	Higher order Path Overhead Monitor
HPP	Higher order Path Protection
HPT	Higher order Path Termination
HRP	Hypothetical Reference Path
HSUT	Higher order path Supervisory Unequipped Termination
HTCA	Higher order path Tandem Connection Adaptation
HTCM	Higher order path Tandem Connection Monitor

HTCT	Higher order path Tandem Connection Termination
HUG	Higher order path Unequipped Generator
I/F	Interface
ID	Identifier
IEC	Incoming Error Count
IF	In Frame state
IFU	Interworking Functional Unit
IG	International Gateway
INC	INCrement
IncAIS	Incoming AIS
IP	Interworking Protocol
IRA	International Reference Alphabet
IS	Intermediate System
ISF	Incoming Signal Failure
ISDN	Integrated Services Digital Network
ISID	Idle Signal Identification
ISM	In-Service Monitoring
ISO	International Organization for Standardization
LAPD	Link Access Protocol for D-channel
LC	Link Connection
LCD	Loss of Cell Delineation
LCN	Local Communications Network
LED	Light-Emitting Diode
LO	Lockout
LO	Lower Order
LO	Lockout of Protection
LOA	Loss of Alignment; generic for LOF, LOM, LOP
LOF	Loss of Frame
LOI	Lower Order Interface
LOM	Loss of Multiframe
LOP	Loss of Pointer
LOP	Lower-Order Path
LOS	Loss of Signal
LOVC	Lower Order Virtual Container
LOW	Lockout of Working
LP	Lower order Path
LP	Lockout of Protection
LP-DEG	Lower order Path Degraded
LP-EXC	Lower order Path Excessive Errors
LP-S	Lockout of Protection-Span
LP-SSF	Lower order Path Server Signal Fail

LP-TIM	Lower order Path Trace Identifier Mismatch
LP-UNEQ	Lower order Path UNEQuipped
LPA	Lower order Path Adaptation
LPC	Lower order Path Connection
LPOM	Lower order Path Overhead Monitor
LPP	Lower order Path Protection
LPT	Lower order Path Termination
LSB	Least Significant Bit
LSUT	Lower order path Supervisory Unequipped Termination
LTC	Loss of Tandem Connection
LTCA	Lower order path Tandem Connection Adaptation
LTCM	Lower order path Tandem Connection Monitor
LTCT	Lower order path Tandem Connection Termination
LTI	Loss of all Incoming Timing references
LUG	Lower order path Unequipped Generator
MAF	Management applications function
MAINTREG	MAINTenance REGisters
MBS	Monitoring Block Size
MC	Matrix Connection
MCF	Message Communications Function
MD	Mediation device
MF	Mediation function
MFI	MultiFrame Indicator
MI	Management Information
MLM	Multi-Longitudinal Mode
MO	Managed object
MOC	Managed object class
MON	Monitored
MP	Management Point
MRTIE	Maximum Relative Time Interval Error
MS	Multiplex Section
MS	Manual Switch
MS-AIS	Multiplex Section Alarm Indication Signal
MS-P	Manual Switch to Protection
MS-R	Manual Switch-Ring
MS-RDI	Multiplex Section Remote Defect Indication
MS-REI	Multiplex Section Remote Error Indication
MS-S	Manual Switch-Span
MS-W	Manual Switch to Working
MSA	Multiplex Section Adaption
MSB	Most Significant Bit

MSn	Multiplex Section layer, level n (n = 1, 4, 16)
MSOH	Multiplex Section OverHead
MSP	Multiplex Section Protection
MSPA	Multiplex Section Protection Adaption
MSPT	Multiplex Section Protection Termination
MST	Multiplex Section Termination
MSTE	Multiplex Section Terminating Element
MSw	Manual Switch
MTIE	Maximum Time Interval Error
MUX	Multiplexer
N-ISDN	Narrow-Band ISDN
N_B	Near-end Block
N_BBE	Near-end Background Block Error
N_DS	Near-end Defect Second
N_EBC	Near-end Errored Block Count
NA	Not Applicable
NBBE	Near-end Background Block Error
NC	Network Connection
N.C.	Not Connected
NDF	New Data Flag
NDS	Near-end Defect Second
NE	Network Element
NEBC	Near-end Errored Block Count
NEF	Network Element Function
NES	Near-end Errored Second
NLR	Network layer relay
NMON	Not Monitored
NNE	Non-SDH Network Element
NNI	Network Node Interface
NPDU	Network Protocol Data Unit
NPME	Near-end Performance Monitoring Event
NR	No Request
NRZ	Non-Return to Zero
NSAP	Network Service Access Point
NSES	Near-end Severely Errored Second
NU	National Use
NUT	Non-pre-emptible Unprotected Traffic
O/E	Optical/Electrical
OAM	Operation, Administration and Maintenance
OAM	Operation and Maintenance
OAM&P	Operations, Administration, Maintenance and Provisioning

ODI	Outgoing Defect Indication
OEI	Outgoing Error Indication
OF_B	Outgoing Far-end Block
OF_BBE	Outgoing Far-end Background Block Error
OF_DS	Outgoing Far-end Defect Second
OF_EBC	Outgoing Far-end Errored Block Count
OFS	Out-of-Frame Second
OHA	OverHead Access
ON_B	Outgoing Near-end Block
ON_BBE	Outgoing Near-end Background Block Error
ON_DS	Outgoing Near-end Defect Second
ON_EBC	Outgoing Near-end Errored Block Count
OOF	Out of Frame
OOS	Out-of-Service
ORL	Optical Return Loss
OS	Optical Section
OS	Operations System
OS/MD	Operations System/Mediation Device
OSF	Outgoing Signal Fail
OSF	Operations System Function
OSI	Open Systems Interconnection
OSn	Optical Section layer, level n (n = 1, 4, 16)
OW	Order Wire
P0x	64 kbit/s layer (transparent)
P11x	1544 kbit/s layer (transparent)
P12s	2048 kbit/s PDH path layer with synchronous 125 µs frame structure according to Recommendation G.704
P12x	2048 kbit/s layer (transparent)
P21x	6312 kbit/s layer (transparent)
P22e	8448 kbit/s PDH path layer with 4 plesiochronous 2048 kbit/s
P22x	8448 kbit/s layer (transparent)
P31e	34 368 kbit/s PDH path layer with 4 plesiochronous 8448 kbit/s
P31s	34 368 kbit/s PDH path layer with synchronous 125 µs frame structure according to Recommendation G.832
P31x	34 368 kbit/s layer (transparent)
P32x	44 736 kbit/s layer (transparent)
P4a	139 264 kbit/s PDH path layer with 3 plesiochronous 44 736 kbit/s
P4e	139 264 kbit/s PDH path layer with 4 plesiochronous 34 368 kbit/s
P4s	139 264 kbit/s PDH path layer with synchronous 125 µs frame structure according to Recommendation G.832
P4x	139 264 kbit/s layer (transparent)

P	Protection
PDH	Plesiochronous Digital Hierarchy
PDU	Protocol Data Unit
PEP	Path End Point
PERFREG	PERFormance REGisters
PG	Pointer Generator
PJC	Pointer Justification Count
PJE	Pointer Justification Event
PL	Physical Layer
PLL	Phase Locked Loop
PLM	PayLoad Mismatch
PM	Performance Monitoring
POH	Path OverHead
PP	Pointer Processor
PPDU	Presentation Protocol Data Unit
PPI	PDH Physical Interface
Pq	PDH path layer, bit rate order q (q = 11, 12, 21, 22, 31, 32, 4)
PRBS	Pseudo-Random Binary Sequence
PRC	Primary Reference Clock
PS	Protection Switching
PSC	Protection Switch Count
PSD	Protection Switch Duration
PSE	Protection Switch Event
PSN	Packet Switched Network
PSS	Protection Switch Second
PSTN	Public Switched Telephone Network
PT	Path Termination
PTE	Path Terminating Element
PTR	Pointer
QoS	Quality of Service
RDI	Remote Defect Indication
REI	Remote Error Indication
RFI	Remote Failure Indication
RI	Remote Information
RMS	Root-Mean-Square
ROSE	Remote Operations Service Element
RP	Remote Point
RR-R	Reverse Request-Ring
RR-S	Reverse Request-Span
RS	Regenerator Section
RS-TIM	Regenerator Section Trace Identifier Mismatch

RSn	Regenerator Section layer, level n (n = 1, 4, 16)
RSOH	Regenerator Section OverHead
RST	Regenerator Section Termination
RTG	Regenerator Timing Generator
RTR	Reset Threshold Report
RxSL	Received Signal Label
RxTI	Received Trace Identifier
S11	VC-11 path layer
S11D	VC-11 tandem connection sublayer
S11P	VC-11 path protection sublayer
S12	VC-12 path layer
S12D	VC-12 tandem connection sublayer
S12P	VC-12 path protection sublayer
S2	VC-2 path layer
S2D	VC-2 tandem connection sublayer
S2P	VC-2 path protection sublayer
S3	VC-3 path layer
S3D	VC-3 tandem connection sublayer using TCM definition according to Annex D/G.707 (option 2)
S3P	VC-3 path protection sublayer
S3T	VC-3 tandem connection sublayer using TCM definition according to Annex C/G.707 (option 1)
S4	VC-4 path layer
S4D	VC-4 tandem connection sublayer using TCM definition according to Annex D/G.707 (option 2)
S4P	VC-4 path protection sublayer
S4T	VC-4 tandem connection sublayer using TCM definition according to Annex C/G.707 (option 1)
SAPI	Service Access Point Identifier
SD	Signal Degrade
SD-P	Signal Degrade-Protection
SD-R	Signal Degrade-Ring
SD-S	Signal Degrade-Span
SDH	Synchronous Digital Hierarchy
SDXC	Synchronous Digital hierarchy Cross-Connect
SEC	SDH Equipment Clock
SEMF	Synchronous Equipment Management Function
SES	Severely Errored Second
SESR	Severely Errored Second Ratio
SETG	Synchronous Equipment Timing Generator
SETPI	Synchronous Equipment Timing Physical Interface
SETS	Synchronous Equipment Timing Source

SF	Signal Fail
SF-R	Signal Fail-Ring
SF-S	Signal Fail-Span
Sk	Sink
SLM	Signal Label Mismatch
SLM	Single-Longitudinal Mode
Sm	lower order VC-m layer (m = 11, 12, 2, 3)
SmD	VC-m (m = 11, 12, 2, 3) tandem connection sublayer
Smm	VC-m (m = 11, 12, 2, 3) path layer non-intrusive Monitor
SMN	SDH Management Network
SmP	VC-m (m = 11, 12, 2, 3) path Protection sublayer
Sms	VC-m (m = 11, 12, 2, 3) path layer Supervisory-unequipped
SMS	SDH Management Subnetwork
Sn	higher order VC-n layer (n = 3, 4)
SnD	VC-n (n = 3, 4) tandem connection sublayer using TCM definition according to Annex D/G.707 (option 2)
SNC	SubNetwork Connection
SNC/I	SubNetwork Connection protection with Inherent monitoring
SNC/I	Inherently monitored SubNetwork Connection protection
SNC/N	SubNetwork Connection protection with Non-intrusive monitoring
SNC/N	Non-intrusively monitored SubNetwork Connection protection
SNC/S	Sublayer (tandem connection) monitored SubNetwork Connection protection
SNCP	SubNetwork Connection Protection
SNDCF	SubNetwork Dependent Convergence Function
Snm	VC-n (n = 3, 4) path layer non-intrusive Monitor
SnP	VC-n (n = 3, 4) path Protection sublayer
Sns	VC-n (n = 3, 4) path layer Supervisory-unequipped
SnT	VC-n (n = 3, 4) Tandem connection sublayer using TCM definition according to Annex C/G.707 (option 1)
So	Source
SOH	Section Overhead
SPDU	Session Protocol Data Unit
SPI	SDH Physical Interface
SPRING	Shared Protection Ring
SSD	Server Signal Degrade
SSF	Server Signal Fail
SSM	Synchronization Status Message
SSMB	Synchronization Status Message Byte
SSU	Synchronization Supply Unit
STM	Synchronous Transport Module
STM-N	Synchronous Transport Module-N

SVC	Switched Virtual Circuit
Sw	Switch(ed)
TC-RDI	Tandem Connection Remote Defect Indication
TC-REI	Tandem Connection Remote Error Indication
TCM	Tandem Connection Monitor
TCM	Tandem Connection Monitoring
TCOH	Tandem Connection Overhead
TCP	Termination Connection Point
TCT	Tandem Connection Trace
TCTE	Tandem Connection Terminating Element
TD	Transmit Degrade
TDEV	Time Deviation
TEI	Terminal End-point Identifier
TF	Transmit Fail
TFAS	trail Trace identifier Frame Alignment Signal
TI	Timing Information
TIM	Trace Identifier Mismatch
TMN	Telecommunications Management Network
TP	Termination Point
TP	Timing Point
TP	Transmission Path
TPDU	Transport Protocol Data Unit
TPmode	Termination Point mode
TR	Threshold Report
TS	Time Slot
TSAP	Transport Service Access Point
TSD	Trail Signal Degrade
TSF	Trail Signal Fail
TSI	TimeSlot Interchange
TSID	Test Signal Identification
TSL	Trail Signal Label
TT	Trail Termination function
TTF	Transport Terminal Function
TTI	Trail Trace Identifier
TTP	Trail Termination Point
TTs	Trail Termination supervisory function
TU	Tributary Unit
TU-m	Tributary Unit-m
TU-n	Tributary Unit-n
TUG	Tributary Unit Group
TUG-m	Tributary Unit Group-m

TUG-n	Tributary Unit Group-n
TxSL	Transmitted Signal Label
TxTI	Transmitted Trace Identifier
UAS	UnAvailable Second
UAT	UnAvailable Time
UI	Unit Interval
UI	Unnumbered Information
UITS	Unacknowledged Information Transfer Service
UNEQ	UNEQuipped
UNI	User Network Interface
USR	USeR channel
UTC	Coordinated Universal Time
VC	Virtual Container
VC-n	Virtual Container-n
VC-n-Xc	Concatenation of X Virtual Containers-n
VC-n-Xc	Virtual Container-n X times concatenated
VP	ATM virtual path
VP	Virtual Path
W	Working
WDM	Wavelength-Division Multiplexing
WFM	White Frequency Modulation
WTR	Wait to Restore

2 Vocabulary for SDH networks and equipment

This Recommendation defines the following terms:

2.1 1+1 (protection) architecture: A 1+1 protection architecture has one normal traffic signal, one working SNC/trail, one protection SNC/trail and a permanent bridge.

At the source end, the normal traffic signal is permanently bridged to both the working and protection SNC/trail. At the sink end, the normal traffic signal is selected from the better of the two SNCs/trails.

Due to the permanent bridging, the 1+1 architecture does not allow an extra unprotected traffic signal to be provided.

2.2 1:n (protection) architecture (n ≥ 1): A 1:n protection architecture has n normal traffic signals, n working SNCs/trails and 1 protection SNC/trail. It may have 1 extra traffic signal.

The signals on the working SNCs/trails are the normal traffic signals.

The signal on the protection SNC/trail may either be one of the normal traffic signals, an extra traffic signal, or the null signal (e.g. an all-ONEs signal, a test signal, one of the normal traffic signals). At the source end, one of these signals is connected to the protection SNC/trail. At the sink end, the signals from the working SNCs/trails are selected as the normal signals. When a defect condition is detected on a working SNC/trail or under the influence of certain external commands, the transported signal is bridged to the protection SNC/trail. At the sink end, the signal from this protection SNC/trail is then selected instead.

2.3 Access Point (AP): A "reference point" that consists of the pair of co-located "unidirectional access" points, and therefore represents the binding between the trail termination and adaptation functions.

2.4 Access Point Identifier (APId): An unique identification for each Access Point of the network.

2.5 Active trail/path/section/SNC/NC: The trail/path/section/SNC from which the signal is selected by the protection selector.

2.6 Adaptation function (A): A "transport processing function" that consists of a co-located adaptation source and sink pair.

2.7 Adapted Information (AI): The information passing across an AP.

2.8 Add-Drop Multiplex (ADM): Network elements that provide access to all, or some subset of the constituent signals contained within an STM-N signal. The constituent signals are added to (inserted), and/or dropped from (extracted) the STM-N signal as it passed through the ADM.

2.9 Add traffic: Traffic inserted into working channels on the ring at a ring node.

2.10 Administrative Unit (AU): An Administrative Unit is the information structure which provides adaptation between the higher order path layer and the multiplex section layer. It consists of an information payload (the higher order Virtual Container) and an Administrative Unit pointer which indicates the offset of the payload frame start relative to the multiplex section frame start.

Two Administrative Units are defined. The AU-4 consists of a VC-4 plus an Administrative Unit pointer which indicates the phase alignment of the VC-4 with respect to the STM-N frame. The AU-3 consists of a VC-3 plus an Administrative Unit pointer which indicates the phase alignment of the VC-3 with respect to the STM-N frame. In each case the Administrative Unit pointer location is fixed with respect to the STM-N frame.

2.11 Administrative Unit Group (AUG): One or more Administrative Units occupying fixed, defined positions in an STM payload are termed an Administrative Unit Group (AUG).

An AUG consists of a homogeneous assembly of AU-3s or an AU-4.

2.12 Agent: Part of the MAF which is capable of responding to network management operations issued by a manager and may perform operations on managed objects, issuing events on behalf of managed objects. The managed objects can reside within the entity or in another open system. Managed objects from other open systems are controlled by a distant agent via a local manager. All SDH NEs will support at least an agent. Some SDH NEs will provide managers and agents (being managed). Some NEs (e.g. regenerators) will only support an agent.

2.13 Alarm: A human observable indication that draws attention to a failure (detected fault) usually giving an indication of the severity of the fault.

2.14 Alarm Indication Signal (AIS): A code sent downstream in a digital network as an indication that an upstream failure has been detected and alarmed. It is associated with multiple transport layers.

2.15 All-ONEs: The entire capacity of the adapted or characteristic information is set to logic "1".

2.16 Anomaly: The smallest discrepancy which can be observed between the actual and desired characteristics of an item. The occurrence of a single anomaly does not constitute an interruption in the ability to perform a required function. Anomalies are used as the input for the Performance Monitoring (PM) process and for the detection of defects.

2.17 Atomic function: A function which if divided into simpler functions would cease to be uniquely defined for digital transmission hierarchies. It is therefore indivisible from a network point of view. The following atomic functions are defined in each network layer:

– bidirectional Trail Termination function (..._TT), Trail Termination Source function (..._TT_So), Trail Termination Sink function (..._TT_Sk) and Connection function (..._Co);

– between client and server layer networks three adaptation functions are defined: Adaptation Sink function ..._A_Sk, Adaptation Source function ..._A_So, and the bidirectional Adaptation function ..._A.

2.18 AUn-AIS: The Administrative Unit AIS (AU-AIS) is specified as all "1"s in the entire AU-n (n = 3, 4, 4-Xc), including the AU-n pointer.

2.19 Automatic Laser Shutdown (ALS): The ALS function of an optical line system automatically switches off the transmitter of a regenerator section in case of cable break in this section.

2.20 Automatic Protection Switching (APS): Autonomous switching of a signal between and including two MS_TT, Sn_TT, or Sm_TT functions, from a failed working trail/SNC to a protection trail/SNC and subsequent restoration using control signals carried by the K-bytes in the MSOH, HO POH, or LO POH.

2.21 Background Block Error (BBE): An errored block not occurring as part of an SES.

2.22 Background Block Error Ratio (BBER): The ratio of Background Block Errors (BBE) to total blocks in available time during a fixed measurement interval. The count of total blocks excludes all blocks during SESs.

2.23 Basic function: A generic functionality consisting of combinations of atomic functions. The 1994 version of Recommendation G.783 defined these functions.

2.24 Bidirectional trail/connection type: A two-way trail/connection through a transport network.

2.25 Bidirectional (protection) switching: For a unidirectional fault, both directions (of the trail, subnetwork connection, etc.), including the affected and unaffected direction, are switched.

2.26 Bit Interleaved Parity (BIP): Bit Interleaved Parity-X (BIP-X) code is defined as a method of error monitoring. With even parity an X-bit code is generated by the transmitting equipment over a specified portion of the signal in such a manner that the first bit of the code provides even parity over the first bit of all X-bit sequences in the covered portion of the signal, the second bit provides even parity over the second bit of all X-bit sequences within the specified portion, etc. Even parity is generated by setting the BIP-X bits so that there is an even number of 1s in each monitored partition of the signal. A monitored partition comprises all bits which are in the same bit position within the X-bit sequences in the covered portion of the signal. The covered portion includes the BIP-X.

2.27 Bridge (Br): The action of transmitting identical traffic on both the working and protection channels.

2.28 Broadcast connection type: An input CP is connected to more than one output CP.

2.29 Characteristic Information (CI): The information passing across a CP or TCP. It is a signal with a specific format, which is transferred on "network connections". The specific formats will be defined in the technology specific Recommendations.

2.30 Client/server layer: Any two adjacent network layers are associated in a client/server relationship. Each transport network layer provides transport to the layer above and uses transport from the layers below. The layer providing transport is termed a server, the layer using transport is termed client.

2.31 Connection: A "transport entity" which consists of an associated pair of "unidirectional connections" capable of simultaneously transferring information in opposite directions between their respective inputs and outputs.

2.32 Connection function (C): An atomic function within a layer which, if connectivity exists, relays a collection of items of information between groups of atomic functions. It does not modify the members of this collection of items of information although it may terminate any switching protocol information and act upon it. Any connectivity restrictions between inputs and outputs shall be stated.

2.33 Connection Matrix (CM): A connection matrix is a matrix of appropriate dimensions which describes the connection pattern for assigning VC-ns on one side of an LPC or HPC function to VC-n capacities on the other side and vice versa.

2.34 Connection Point (CP): A reference point where the output of a trail termination source or a connection is bound to the input of another connection, or where the output of a connection is bound to the input of a trail termination sink or another connection. The connection point is characterized by the information which passes across it. A bidirectional connection point is formed by the association of a contradirectional pair.

2.35 Consecutive Identical Digit (CID) immunity: The ability of a digital system component to sustain the occurrence of a digital signal containing a continuous stream of binary zeros or ones.

2.36 Consolidation: The allocation of server layer trails to client layer connections which ensures that each server layer trail is full before the next is allocated. Consolidation minimizes the number of partially filled server layer trails. It therefore maximizes the fill factor.

Thus a number of partially filled VC-4 paths may be consolidated into a single, fully filled VC-4.

2.37 Common Management Information Service Element (CMISE): See ITU-T Rec. X.710 | ISO/IEC 9595.

2.38 Compound function: A function which represents a collection of atomic functions within one or more layer(s).

Example 1 – A combination of several atomic adaptation functions within a certain layer (each serving one client layer) is a compound adaptation function. A combination of a (compound) adaptation function and the layer's termination function is a compound function.

Example 2 – The atomic functions in the Optical Section (OS), Multiplex Section (MS) and Regenerator Section (RS) layers may be combined to form a major compound function.

The compound functions facilitate simplified descriptions of equipment. Standardized compound functions attach a unique name to a common combination of atomic functions.

2.39 Concatenation: A procedure whereby a multiplicity of Virtual Containers is associated one with another with the result that their combined capacity can be used as a single container across which bit sequence integrity is maintained.

2.40 Container-n (n = 1-4): A container is the information structure which forms the network synchronous information payload for a Virtual Container. For each of the defined Virtual Containers there is a corresponding container. Adaptation functions have been defined for many common network rates into a limited number of standard containers. These include those rates already defined in Recommendation G.702. Further adaptation functions will be defined in the future for new broadband rates.

2.41 Data Communications Channel (DCC): Within an STM-N signal there are two DCC channels, comprising bytes D1-D3, giving a 192 kbit/s channel, and bytes D4-D12, giving a 576 kbit/s channel. D1-D3 (DCC_R) are accessible by all SDH NEs whereas D4-D12 (DCC_M), not being part of the regenerator section overhead, are not accessible at regenerators. D1-D3 are allocated for SDH NE use. The D4-D12 channel can be used as a wide area, general purpose, communication channel to support TMN including non-SDH applications. This would include both communication between OSs and communication between an OS and a network element (including SDH network elements). The application of the D4-D12 channel requires study for general TMN applications and also for SDH network element management applications.

2.42 Defect: The density of anomalies has reached a level where the ability to perform a required function has been interrupted. Defects are used as input for PM, the control of consequent actions, and the determination of fault cause.

2.43 Desynchronizer: The desynchronizer function smoothes out the timing gaps resulting from decoded pointer adjustments and VC payload demapping in the time domain.

2.44 Embedded Control Channel (ECC): An ECC provides a logical operations channel between SDH NEs, utilizing a data communications channel (DCC) as its physical layer.

2.45 Errored Block (EB): A block in which one or more bits are in error.

2.46 Errored Second (ES): A one-second period with one or more errored blocks or at least one defect.

2.47 Errored Second Ratio (ESR): The ratio of ES to total seconds in available time during a fixed measurement interval.

2.48 Exercise-Ring (EXER-R): This command exercises ring protection switching of the requested channel without completing the actual bridge and switch. The command is issued and the responses are checked, but no working traffic is affected.

2.49 Exercise-Span (EXER-S): This command exercises span protection of the requested channel without completing the actual bridge and switch. The command is issued and the responses are checked, but no working traffic is affected.

2.50 Extra traffic signal: A signal that can be routed via the protection trail/path/section/SNC/NC if it is standby.

2.51 Failure: The fault cause persisted long enough to consider the ability of an item to perform a required function to be terminated. The item may be considered as failed; a fault has now been detected.

2.52 Fault: A fault is the inability of a function to perform a required action. This does not include an inability due to preventive maintenance, lack of external resources, or planned actions.

2.53 Fault cause: A single disturbance or fault may lead to the detection of multiple defects. A fault cause is the result of a correlation process which is intended to identify the defect that is representative of the disturbance or fault that is causing the problem.

2.54 Forced switched working to protection-Ring (FS-R): This command performs the ring switch from working channels to the protection channels for the span between the node at which the command is initiated and the adjacent node to which the command is destined. This switch occurs regardless of the state of the protection channels, unless the protection channels are satisfying a higher priority bridge request.

2.55 Forced switched working to protection-Span (FS-S): This command switches the traffic from the working channels to the protection channels of that span. This switch occurs regardless of the state of the protection channels, unless the protection channels are satisfying a higher priority bridge request, or a signal failure (or a K-byte failure) exists on the protection channels of the span.

2.56 Function: A process defined for digital transmission hierarchies (e.g. PDH, SDH) which acts on a collection of input information to produce a collection of output information. A function is distinguished by the way in which characteristics of the collection of output information differs from the collection of input information.

2.57 Grooming: The allocation of server layer trails to client layer connections which groups together client layer connections whose characteristics are similar or related.

Thus it is possible to groom Virtual Container, level 12 (VC-12) paths by service type, by destination, or by protection category into particular VC-4 paths which can then be managed accordingly. It is also possible to groom VC-4 paths according to similar criteria into Synchronous Transport Module (STM-N) sections.

2.58 Higher Order (HO) path: In an SDH network, the higher order path layers provide a server network for the lower order (LO) path layers. The comparative terms "lower" and "higher" refer only to the two participants in such a client/server relationship. VC-1/2 paths may be described as "lower order" in relation to VC-3 and VC-4, while the VC-3 path may be described as "lower order" in relation to VC-4.

2.59 Higher order Path Adaptation (HPA):The HPA function adapts a lower order VC (VC-1/2/3) to a higher order VC (VC-3/4) by processing the TU pointer which indicates the phase of the VC-1/2/3 POH relative to the VC-3/4 POH and assembling/disassembling the complete VC-3/4.

2.60 Higher order Path Connection (HPC): The HPC function provides for flexible assignment or interconnection of higher order VCs (VC-3/4).

2.61 Higher order Path Overhead Monitor (HPOM): The HPOM function monitors the path overhead in a higher order VC without terminating the path or modifying the POH.

2.62 Higher order Path Termination (HPT): The HPT function terminates a higher order path by generating and adding the appropriate VC POH to the relevant container at the path source and removing the VC POH and reading it at the path sink.

2.63 Holdoff time: The time between declaration of signal degrade or signal fail, and the initialization of the protection switching algorithm.

2.64 Layer: A concept used to allow the transport network functionality to be described hierarchically as successive levels; each layer being solely concerned with the generation and transfer of its characteristic information.

2.65 Lockout of Protection-Span (LP-S): This command prevents the usage of the span for any protection activity. If any working traffic is already using the protection on this span, this command causes this traffic to switch back to the working channels. Thus, all ring switching that uses the protection capacity of the locked-out span is prevented (and pre-empted), and span switching is prevented only on the locked-out span.

2.66 Loss of Frame (LOF): An LOF state of an STM-N signal is considered to have occurred when an OOF state persists for a defined period of time.

2.67 Loss of Pointer (LOP): The LOP state is one resulting from a defined number of consecutive occurrences of certain conditions which are deemed to have caused the value of the pointer to be unknown.

2.68 Loss of Signal (LOS): The LOS state is considered to have occurred when the amplitude of the relevant signal has dropped below prescribed limits for a prescribed period.

2.69 Lower Order Interface (LOI): The LOI function is a combination of a PPI, LPA, and LPT function, described below. It interfaces with a PDH signal and maps it into a lower order VC.

2.70 Lower Order (LO) path: See Higher Order path above.

2.71 Lower order Path Adaptation (LPA): The LPA function adapts a PDH signal to an SDH network by mapping/demapping the signal in to/out of a synchronous container. If the signal is asynchronous, the mapping process will include bit level justification.

2.72 Lower order Path Connection (LPC): The LPC function provides for flexible assignment or interconnection of lower order VCs.

2.73 Lower order Path Overhead Monitor (LPOM): The LPOM function monitors the path overhead in a lower order VC without terminating the path or modifying the POH.

2.74 Lower order Path Termination (LPT): The LPT function terminates a lower order path by generating and adding the appropriate VC POH to the relevant container at the path source and removing the VC POH and reading it at the path sink.

2.75 Management Applications Function (MAF): An application process participating in system management. The management applications function includes an agent (being managed) and/or manager. Each SDH network element (NE) and operations system or mediation device (OS/MD) must support a management applications function that includes at least an agent. A management applications function is the origin and termination for all TMN messages.

2.76 Management Information (MI): The signal passing across an access point.

2.77 Managed Object (MO): The management view of a resource within the telecommunication environment that may be managed via the agent. Examples of SDH managed objects are: equipment, receive port, transmit port, power supply, plug-in card, virtual container, multiplex section, and regenerator section.

2.78 Managed Object Class (MOC): An identified family of managed objects that share the same characteristics, e.g. "equipment" may share the same characteristics as "plug-in card".

2.79 Management Point (MP): A reference point where the output of an atomic function is bound to the input of the element management function, or where the output of the element management function is bound to the input of an atomic function.

NOTE – The MP is not the TMN Q3 interface.

2.80 Manager: Part of the MAF which is capable of issuing network management operations (i.e. retrieve alarm records, set thresholds) and receiving events (i.e. alarms, performance). SDH NEs may or may not include a manager while SDH OS/MDs will include at least one manager.

2.81 Manual Switch-Ring (MS-R): This command performs the ring switch from the working channels to the protection channels for the span between the node at which the command is initiated and the adjacent node to which the command is destined. This occurs if the protection channels are not in an SD condition and are not satisfying an equal or higher priority bridge request (including failure of the protection channels).

2.82 Manual Switch-Span (MS-S): This command switches the traffic from the working channels to the protection channels for the same span over which the command is initiated. This occurs if the protection channels are not in an SD condition and are not satisfying an equal or higher priority bridge request (including failure of the protection channels).

2.83 Message Communications Function (MCF): The message communications function provides facilities for the transport of TMN messages to and from the MAF, as well as facilities for the transit of messages. The message communications function does not originate or terminate messages (in the sense of the upper protocol layers).

2.84 Multiplex Section (MS): A multiplex section is the trail between and including two multiplex section trail termination functions.

2.85 Multiplex Section Adaption (MSA): The MSA function processes the AU-3/4 pointer to indicate the phase of the VC-3/4 POH relative to the STM-N SOH and assembles/disassembles the complete STM-N frame.

2.86 Multiplex Section Alarm Indication Signal (MS-AIS): The Multiplex Section AIS (MS-AIS) is specified as all "1"s in the entire STM-N, excluding the STM-N RSOH.

2.87 Multiplex Section Overhead (MSOH): The MSOH comprises rows 5 to 9 of the SOH of the STM-N signal. See SOH definition.

2.88 Multiplex Section Protection (MSP): The MSP function provides capability for switching a signal between and including two MST functions, from a "working" to a "protection" channel.

2.89 Multiplex Section Termination (MST): The MST function generates the MSOH in the process of forming an SDH frame signal and terminates the MSOH in the reverse direction.

2.90 Multiplex Section Remote Defect Indication (MS-RDI): The Multiplex Section Remote Defect Indication (MS-RDI) is used to return an indication to the transmit end that the received end has detected an incoming section defect or is receiving MS-AIS. MS-RDI is generated by inserting a "110" code in positions 6, 7 and 8 of the K2 byte before scrambling.

2.91 NE Transit Delay: NE Transit delay is defined as the period of time taken for an information bit arriving at an NE input port to reappear at an output port on the same NE via a defect free trail.

Transit delay is affected by e.g.:

- time slot interchange;
- relationship of actual clock frequencies in all layers;
- synchronizers and desynchronizers;
- physical path (internal route) taken through the NE.

A transit delay measurement should define under which conditions the measurement was made to establish minimum and maximum values in seconds.

2.92 Network Connection (NC): A transport entity formed by a series of contiguous "link connections" and/or "subnetwork connections" between "termination connection points".

2.93 Network Element (NE): A stand-alone physical entity that supports at least NEFs and may also support OSF/MFs. It contains managed objects, a MCF and a MAF.

2.94 Network Element Function (NEF): A function within an SDH entity that supports the SDH based network transport services, e.g. multiplexing, cross-connection, regeneration. The network element function is modelled by managed objects.

2.95 Network Node Interface (NNI): The interface at a network node which is used to interconnect with another network node.

2.96 Non-revertive (protection) operation: In non-revertive operation, the traffic signal (service) does not return to the working SNC/trail if the switch requests are terminated.

2.97 Normal signal: A signal that is transmitted via a protected trail/section/path/SNC/NC.

2.98 Operations System Function or Mediation Function (OSF/MF): A telecommunications management network (TMN) entity that processes management information to monitor and control the SDH network. In the SDH sub-portion of the TMN, no distinction is made between the operations system function and the mediation function; this entity being a MAF containing at least a manager.

2.99 Operations System or Mediation Device (OS/MD): A stand-alone physical entity that supports OSF/MFs but does not support NEFs. It contains a message communications function (MCF) and a MAF.

2.100 Out-of-Frame Second (OFS): An OFS is a second in which one or more out of frame events have occurred.

2.101 Out of Frame (OOF): The OOF state of an STM-N signal is one in which the position of the frame alignment bytes in the incoming bit stream is unknown.

2.102 Outgoing Signal Fail (OSF): A signal fail indication output at the AP of a tandem connection termination function.

2.103 Overhead Access (OHA): The OHA function provides access to transmission overhead functions.

2.104 Path: A trail in a path layer.

2.105 Path Overhead (POH): Virtual Container POH provides for integrity of communication between the point of assembly of a Virtual Container and its point of disassembly. Two categories of Virtual Container POH have been identified:

– Higher order Virtual Container POH (VC-4/VC-3 POH):

  VC-3 POH is added to either an assembly of TUG-2s or a Container-3 to form a VC-3. VC-4 POH is added to either an assembly of TUG-3s or a Container-4 to form a VC-4. Amongst the functions included within this overhead are Virtual Container path performance monitoring, alarm status indications, signals for maintenance purposes and multiplex structure indications (VC-4/VC-3 composition).

– Lower order Virtual Container POH (VC-3/VC-2/VC-1 POH):

  Lower order VC-n (n = 1, 2, 3) POH is added to the Container-n to form a VC-n. Among the functions included in this overhead are Virtual Container path performance monitoring, signals for maintenance purposes and alarm status indications.

2.106 PDH Physical Interface (PPI): The PPI function converts a PDH interface signal into an internal logic level PDH signal, and vice versa.

2.107 Pointer: An indicator whose value defines the frame offset of a Virtual Container with respect to the frame reference of the transport entity on which it is supported.

2.108 Pointer Justification Event (PJE): A PJE is an inversion of the I- or D-bits of the pointer, together with an increment or decrement of the pointer value to signify a frequency justification.

2.109 Process: A generic term for an action or a collection of actions.

2.110 Protection trail/path/section/SNC/NC: A specific trail/path/section/SNC/NC that is part of a protection group and is labelled protection.

2.111 Reference point: The delimiter of a function.

2.112 Regenerator Section (RS): A regenerator section is the trail between and including two regenerator section terminations.

2.113 Regenerator Section Overhead (RSOH): See SOH definition.

2.114 Regenerator section termination (RST): The RST function generates the RSOH in the process of forming an SDH frame signal and terminates the RSOH in the reverse direction.

2.115 Regenerator timing generator (RTG): The RTG function provides a timing reference to the outgoing STM-N signal of a regenerator. This timing reference is derived from the incoming STM-N signal recovered by the SPI function in normal operation, or from an internal oscillator included in the RTG in case of fault.

2.116 Remote Defect Indication (RDI): A signal which conveys the defect status of the characteristic information received by the Trail Termination sink function back to the network element which originated the characteristic information.

2.117 Remote Error Indication (REI): A signal which conveys either the exact or truncated number of error detection code violations of the characteristic information as detected by the trail termination sink function back to the network element which originated the characteristic information.

2.118 Remote Information (RI): The information passing across a RP; e.g. RDI and REI.

2.119 Remote Point (RP): A reference point where the output of a trail termination sink function of a bidirectional trail termination is bound to the input of its trail termination source function, for the purpose of conveying information to the remote end.

2.120 Revertive (protection) operation: In revertive operation, the traffic signal (service) always returns to (or remains on) the working SNC/trail if the switch requests are terminated; i.e. when the working SNC/trail has recovered from the defect or the external request is cleared.

2.121 Reverse Request-Ring (RR-R): This command is transmitted to the tail-end NE on the short-path as an acknowledgment for receiving the short-path ring bridge request.

2.122 Reverse Request-Span (RR-S): This command is transmitted to the tail-end NE as an acknowledgment for receiving the short-path span bridge request. It is transmitted on the short-path only.

2.123 SDH aligning: A procedure by which the frame offset information is incorporated into the Tributary Unit or the Administrative Unit when adapting to the frame reference of the supporting layer.

2.124 SDH cross-connect (SDXC): An SDH cross-connect equipment is any cross-connect equipment that provides controlled transparent connection and reconnection of VCs constructed according to Recommendation G.707 between its interface ports. These interface ports may be at the SDH rates defined in Recommendation G.707 and/or PDH rates defined in Recommendation G.702. Additionally, it shall support the control and management functions as defined in Recommendation G.784.

2.125 SDH higher-order path layer networks: Those layer networks with characteristic information of VC-3[1], VC-4 or VC-4-Xc.

2.126 SDH lower-order path layer networks: Those layer networks with characteristic information of VC-11, VC-12, VC-2, VC-2-Xc or VC-3[1].

2.127 SDH Management Network (SMN): An SDH management network is a subset of a TMN, responsible for managing SDH NEs. An SMN may be subdivided into a set of SDH management subnetworks.

2.128 SDH management subnetwork (SMS): An SDH management subnetwork (SMS) consists of a set of separate SDH ECCs and associated intra-site data communication links which have been interconnected to form an operations data communications control network within any given SDH transport topology. An SMS represents an SDH specific local communications network (LCN) portion of a network operator's overall operations data network or TMN.

2.129 SDH mapping: A procedure by which tributaries are adapted into Virtual Containers at the boundary of an SDH network.

2.130 SDH multiplex section layer: A layer network with characteristic information of STM-N, i.e. with a bit rate of STM-N and the multiplex section overhead as defined in Recommendation G.707.

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[1] The VC-3 is considered to be a higher-order path if it is supported directly by an AU-3 in a multiplex section layer network; it is considered a lower-order path if it is supported by a TU-3 in a VC-4 layer network.

2.131 SDH multiplexing: A procedure by which multiple lower order path layer signals are adapted into a higher order path or the multiple higher order path layer signals are adapted into a multiplex section.

2.132 SDH path layer: A transport assembly composed of the SDH higher-order path layer network and lower-order path layer network together with the associated adaptation functions.

2.133 SDH Physical Interface (SPI): The SPI function converts an internal logic level STM-N signal into an STM-N line interface signal.

2.134 SDH regenerator section layer: A layer network with characteristic information of STM-N, i.e. with a bit rate of STM-N and the regenerator section overhead as defined in Recommendation G.707.

2.135 SDH section layer: A transport assembly composed of the SDH multiplex section layer network and regenerator section layer network together with the associated adaptation functions.

2.136 Section: A trail in a section layer.

2.137 Section Overhead (SOH): SOH information is added to the information payload to create an STM-N. It includes block framing information and information for maintenance, performance monitoring and other operational functions. The SOH information is further classified into Regenerator Section Overhead (RSOH) which is terminated at regenerator functions and Multiplex Section Overhead (MSOH) which passes transparently through regenerators and is terminated where the AUGs are assembled and disassembled. The rows 1-3 of the SOH are designated as RSOH while rows 5-9 are designated to be MSOH.

2.138 Server Signal Degrade (SSD): A signal degrade indication output at the CP of an adaptation function.

2.139 Server Signal Fail (SSF): A signal fail indication output at the CP of an adaptation function.

2.140 Severely Errored Second (SES): A one-second period which contains ≥X% errored blocks or at least one defect. SES is a subset of ES. (X = 30, Recommendation G.826 or X = 15, Recommendation G.829).

2.141 Severely Errored Second Ratio (SESR): The ratio of SES to total seconds in available time during a fixed measurement interval.

2.142 Signal Degrade (SD): A signal indicating the associated data has degraded in the sense that a degraded defect (dDEG) condition is active.

2.143 Signal Degrade-Protection (SD-P): This command is used when an NE detects a degradation on its protection channels, and there are no higher priority bridge requests existing on the working channels. (Degradation is defined below under Signal Degrade-Span.) This bridge request is used only for four-fibre rings.

2.144 Signal Degrade-Ring (SD-R): For two-fibre rings, any degraded multiplex section is protected using the ring switch. (Degradation is defined below under Signal Degrade-Span.) For four-fibre rings, this bridge request is used when the working channels are degraded and the protection channels on the same span are degraded or not available.

2.145 Signal Degrade-Span (SD-S): Signal Degrade is defined in Recommendation G.783. In four-fibre rings, the working channels on the degraded span can be protected using the protection channels on the same span. This bridge request is used to switch the working traffic to the protection channels in the same span where the failure is located.

2.146 Signal Fail (SF): A signal indicating the associated data has failed in the sense that a near-end defect condition (not being the degraded defect) is active.

2.147 Signal Fail-Ring (SF-R): For two-fibre rings, all SFs (as defined previously for span switching) are protected using the ring switch. For four-fibre rings, the ring switch is used only if traffic cannot be restored using span switching. If failures exist on both the working and protection channels within a span, it is necessary to initiate a ring bridge request. Hence, this command is used to request ring switching for signal failures.

2.148 Signal Fail-Protection (SF-P): This command is used to indicate to an adjacent node that the protection channels are in a Signal Fail state. A signal failure of the protection channels is equivalent to a lockout of protection for the span that is affected by the failure. Hence, the K1 byte that is transmitted to the adjacent node is the same code as that of a Lockout of Protection-Span. SF-P is used only for four-fibre rings.

2.149 Standby trail/path/section/SNC: The trail/path/section/SNC from which the signal is **not** selected by the protection selector.

2.150 SubNetwork Connection (SNC): A "transport entity" that transfers information across a subnetwork, it is formed by the association of "ports" on the boundary of the subnetwork.

2.151 SubNetwork Connection Protection (SNCP): A working subnetwork connection is replaced by a protection subnetwork connection if the working subnetwork connection fails, or if its performance falls below a required level.

2.152 Supervisory-unequipped VC: The VC-n (n = 1, 2, 3, 4) supervisory-unequipped signal is an enhanced unequipped VC-n signal. This signal indicates to downstream transport processing functions that the virtual container is unoccupied, and sourced by a supervisory generator. Additional information on quality, source and status of the connection is available by means of the bit error, path trace and path status indications.

2.153 Synchronous Digital Hierarchy (SDH): The SDH is a hierarchical set of digital transport structures, standardized for the transport of suitably adapted payloads over physical transmission networks.

2.154 Synchronous Equipment Management Function (SEMF): The SEMF converts performance data and implementation specific hardware alarms into object-oriented messages for transmission over the DCC(s) and/or a Q-interface. It also converts object-oriented messages related to other management functions for passing across the Sn reference points.

2.155 Synchronous Equipment Timing Generator (SETG): The SETG function filters the timing reference signal from those selected in the SETS to ensure that the timing requirements at the TO reference point are met.

2.156 Synchronous Equipment Timing Physical Interface (SETPI): The SETPI function provides the interface between and external synchronization signal and the synchronous equipment timing source.

2.157 Synchronous Equipment Timing Source (SETS): The SETS function provides timing reference to the relevant component parts of a synchronous equipment and represents the SDH network element clock.

2.158 Synchronous Transport Module (STM): An STM is the information structure used to support section layer connections in the SDH. It consists of information payload and Section Overhead (SOH) information fields organized in a block frame structure which repeats every 125 μs. The information is suitably conditioned for serial transmission on the selected media at a rate which is synchronized to the network. A basic STM is defined at 155 520 kbit/s. This is termed STM-1. Higher capacity STMs are formed at rates equivalent to N times this basic rate. STM capacities for N = 4, N = 16 and N = 64 are defined; higher values are under consideration.

The STM-1 comprises a single Administrative Unit Group (AUG) together with the SOH. The STM-N contains N AUGs together with SOH.

2.159 Telecommunications Management Network (TMN): See Recommendation M.3010.

2.160 Termination Connection Point (TCP): A special case of a connection point where a trail termination function is bound to an adaptation function or a connection function.

2.161 Timing Information (TI): The information passing across a TP.

2.162 Timing Point (TP): A reference point where an output of the synchronization distribution layer is bound to the input of an adaptation source or connection function, or where the output of an adaptation sink function is bound to an input of the synchronization distribution layer.

2.163 Trail: A "transport entity" which consists of an associated pair of "unidirectional trails" capable of simultaneously transferring information in opposite directions between their respective inputs and outputs.

2.164 Trail Segment: A segment for which one end is a trail termination.

2.165 Trail Signal Degrade (TSD): A signal degrade indication output at the AP of a termination function.

2.166 Trail Signal Fail (TSF): A signal fail indication output at the AP of a termination function.

2.167 Trail termination function (TT): An atomic function within a layer which generates, adds, and monitors information concerning the integrity and supervision of adapted information.

2.168 Trail Trace Identifier (TTI): The TTI represents the source address.

2.169 Transverse compatibility: The capability to mix various manufacturers' equipments within a single optical section.

2.170 Tributary Unit-n (TU-n): A Tributary Unit is an information structure which provides adaptation between the lower order path layer and the higher order path layer. It consists of an information payload (the lower order Virtual Container) and a Tributary Unit pointer which indicates the offset of the payload frame start relative to the higher order Virtual Container frame start. The TU-n (n = 1, 2, 3) consists of a VC-n together with a Tributary Unit pointer.

One or more Tributary Units, occupying fixed, defined positions in a higher order VC-n payload is termed a Tributary Unit Group (TUG). TUGs are defined in such a way that mixed capacity payloads made up of different size Tributary Units can be constructed to increase flexibility of the transport network.

A TUG-2 consists of a homogeneous assembly of identical TU-1s or a TU-2.

A TUG-3 consists of a homogeneous assembly of TUG-2s or a TU-3.

2.171 TUn-AIS: The Tributary Unit AIS (TU-AIS) is specified as all "1"s in the entire TU-n (n = 1, 2, 3), including the TU-n pointer.

2.172 Unequipped VC: These signals indicate to downstream transport processing functions that the virtual container is unoccupied, not connected to a path termination source function. Additional information on the quality is only available by means of the BIP monitoring.

2.173 Undefined bit: If a bit is undefined, its value is set to a logical "0" or a logical "1".

2.174 Undefined byte: If a byte is undefined, it contains eight undefined bits.

2.175 Unidirectional trail/connection type: A one-way trail/connection through a transport network.

2.176 Unidirectional (protection) switching: For a unidirectional fault (i.e. a fault affecting only one direction of transmission), only the affected direction (of the trail, subnetwork connection, etc.) is switched.

2.177 Unprotected: Not protected.

2.178 Virtual Container-n (VC-n): A Virtual Container is the information structure used to support path layer connections in the SDH. It consists of information payload and Path Overhead (POH) information fields organized in a block frame structure which repeats every 125 or 500 μs. Alignment information to identify VC-n frame start is provided by the server network layer.

Two types of Virtual Containers have been identified.

– Lower order Virtual Container-n: VC-n (n = 1, 2, 3):

  This element comprises a single Container-n (n = 1, 2, 3) plus the lower order Virtual Container POH appropriate to that level.

– Higher order Virtual Container-n: VC-n (n = 3, 4):

  This element comprises either a single Container-n (n = 3, 4) or an assembly of Tributary Unit Groups (TUG-2s or TUG-3s), together with Virtual Container POH appropriate to that level.

2.179 Wait to Restore (WTR): This command is issued when working channels meet the restoral threshold after an SD or SF condition. It is used to maintain the state during the WTR period unless it is pre-empted by a higher priority bridge request.

2.180 Wait To Restore time: A period of time that must elapse before a – from a fault recovered – trail/connection can be used again to transport the normal traffic signal and/or to select the normal traffic signal from.

2.181 Working trail/path/section/SNC/NC: A specific trail/path/section/SNC/NC that is part of a protection group and is labelled working.

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