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ATM Pocket Guide

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TEKELEC

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At Tekelec, our vision is to be a leading provider of premier intelligent network elements that enable network operators and infrastructure suppliers to rapidly deliver advanced communications products and services to their customers worldwide.

The "premier intelligent network elements" that Tekelec provides encompass a wide range of advanced diagnostic solutions and switching systems.

Our diagnostic tools, marketed under the names Chameleon and MGTS, give customers the power to design, validate and commission products and services to new technology standards. Our diagnostic tools are applicable to:

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- LAN/WAN/GAN networks
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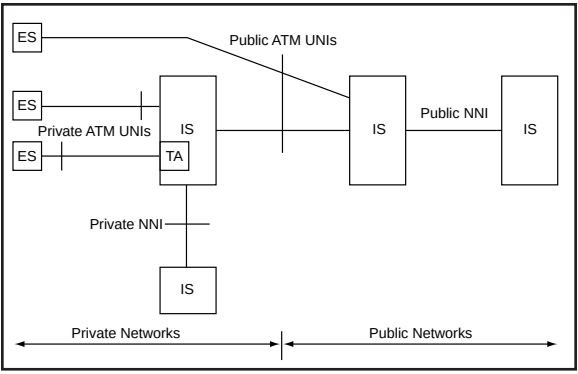
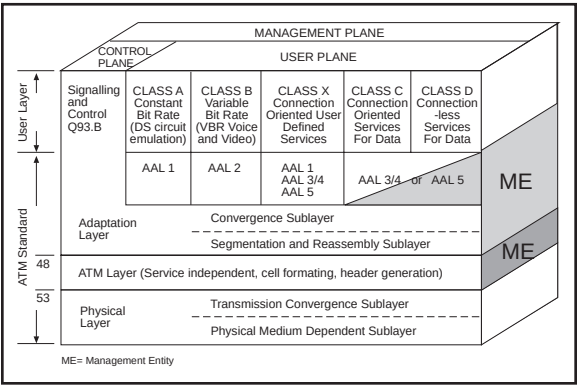
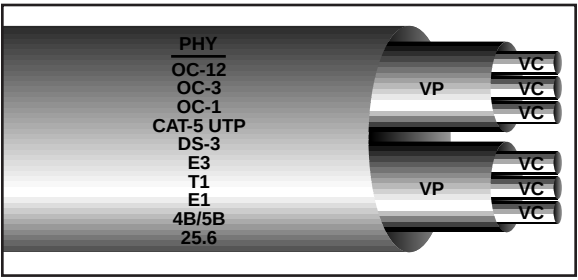


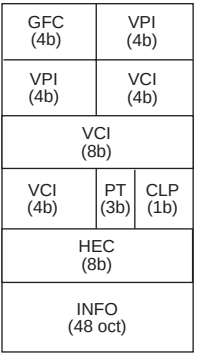
ATM Model



Virtual Paths and Virtual Channels



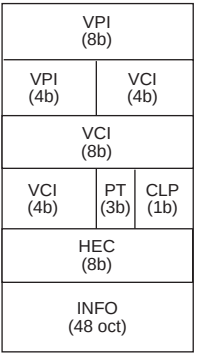
UNI Cell Header



GFC: Generic Flow Control
(000=Uncontrolled Access)
VPI: Virtual Path Identifier
VCI: Virtual Channel Identifier
PT: Payload Type
CLP: Cell Loss Priority
(1=subject to discard)
HEC: Header Error Control

QOS:
Unspecified
Specified
Deterministic Delay
Statistical Variation
Loss

NNI Cell Header



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QOS:
Unspecified
Specified
Deterministic Delay
Statistical Variation
Loss

ATM AAL Service Classes

	AAL1	AAL2	AAL3/4	AAL5
Timing relation between source and destination	Required	Required	Not required	Not required
Bit rate	Constant	Variable	Variable	Variable
Connection mode	Connection oriented	Connection oriented	Connection or connectionless oriented	Connection oriented

AAL1

AAL1_SAR_PDU:

SN		SNP		SAR_PDU Payload
CSI (1b)	SC (3b)	CRC (3b)	Parity (1b)	(47 oct)

SN Sequence Number
CSI Convergence Sublayer Indicator
Used for Residual Time Stamp (RTS) for clocking
SC Sequence Count
SNP Sequence Number Protection

AAL2 Preliminary Format (AAL2 has not been finalized)

AAL2_SAR_PDU:

SN	IT	SAR_PDU Payload	LI	CRC

SN Sequence Number
IT Info Type (BOM, COM, EOM, Timing Info)
LI Length Indicator
CRC Will correct up to 2 errors

AAL3/4

CPAAL3/4_CS_PDU:

Header			Info		Traile	
CPI (1 Oct)	Btag (1 Oct)	BAsize (2 Oct)	User Info (0 to 65,535 Oct)	PAD (0-3 Oct)	AL (1 Oct)	Etag (1 Oc

CPI Message type, (set to zeros when BAsize & Length field values are en
Btag Beginning tag (0 to 255)
BAsize Buffer Allocation size
PAD To achieve 32 bit alignment in info field
AL All zeros, to achieve 32 bit alignment in trailer
Etag End tag, must be same value as Btag
Length Must be same as BAsize (16 bits = 65535 bytes)

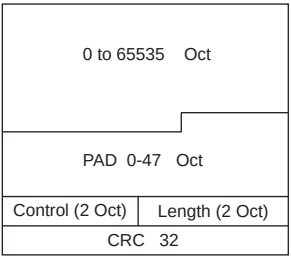
AAL3/4_SAR_PDU

ST (2b)	SN (4b)	MID (10b)	SAR_PDU Payload (44 oct)	LI (6b)	CRC (10B)

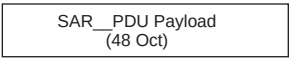
ST Segment Type (BOM 10, COM 00, EOM 01, SSM 11)
SN Sequence Number Modulo 16
MID Multiplexing Identification (SAR_PDU's from CS_PDU have the same
LI Length Indicator (#bits from CS_PDU in SAR_PDU BOM & COM = 44

AAL5

CPAAL5_PDU



AAL5_SAR_PDU



Length Length of the PDU without PAD
Control Reserved, all zero's
PAD For 48 octet boundaries including up to CRC 32 field

Alignment of SAR_PDU
ATM SDU Type 1 in last cell, then next segment is first
of next CPAAL5_PDU SDU type is in PTI field in cell header

Predefined Header Field Values

Use	Value[1,2,3,4]			
	Octet 1	Octet 2	Octet 3	Octet 4
Unassigned cell indication	00000000	00000000	00000000	0000xxx0
Meta-signalling (default)[5,7]	00000000	00000000	00000000	00010a0c
Meta-signalling[6,7]	0000yyyy	yyyy0000	00000000	00010a0c
General Broadcast signalling (default)[5]	00000000	00000000	00000000	00100aac
General Broadcast signalling[6]	0000yyyy	yyyy0000	00000000	00100aac
Point-to-point signalling (default)[5]	00000000	00000000	00000000	01010aac
Point-to-point signalling[6]	0000yyyy	yyyy0000	00000000	01010aac
Invalid Pattern	xxxx0000	00000000	00000000	0000xxx1
Segment OAM F4 flow cell[7]	0000aaaa	0000aaaa	00000000	00110a0a
End-to-end OAM F4 flow cell[7]	0000aaaa	0000aaaa	00000000	01000a0a

1: "a" indicates that the bit is available for use by the appropriate ATM layer function
2.: "x" indicates "don't care" bits
3: "y" indicates any VPI value other than 00000000
4: "c" indicates that the originating signalling entity shall set the CLP bit to 0. The network may change the value of the CLP bit
5: Reserved for user signalling with the local exchange
6: Reserved for signalling
7: The transmitting ATM entity shall set bit 2 of octet 4 to zero. The receiving ATM entity shall ignore bit 2 of octet 4.

PTI Coding

(MSB First)

000	User data cell no congestion SDU type 0
001	User data cell no congestion SDU type 1
010	User data cell congestion SDU type 0
011	User data cell congestion SDU type 1
100	VCC OAM F5 flow segment
101	VCC OAM F5 flow end-to-end
110	Reserved: future traffic control and resource management
111	Reserved: future functions

F4 & F5 OAM Cell Structure

ATM Payload

OAM Cell Type (4b)	Function Type (4b)	Function Specific	CRC-10 (10b)

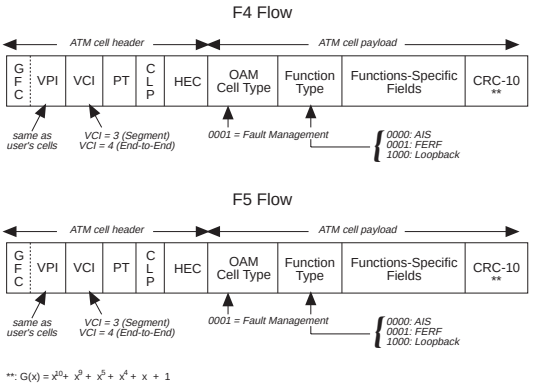
Cell type 1:

Function 0: AIS
Function 1: FERF
Function 3: Loopback

Provides:

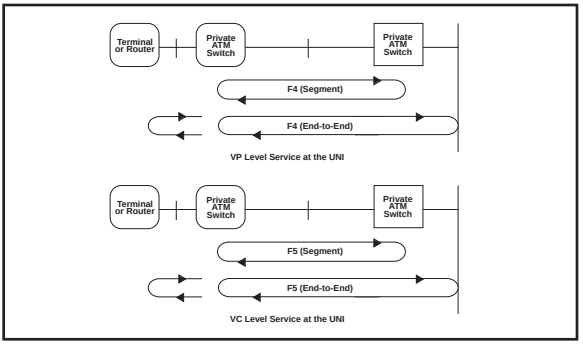
- VP & VC: AIS, FERF
- Loopback activation and deactivation (only cell looped)
- Loopback location ID 72 bit (default = all ones)
- One second timer

Common OAM Cell Format

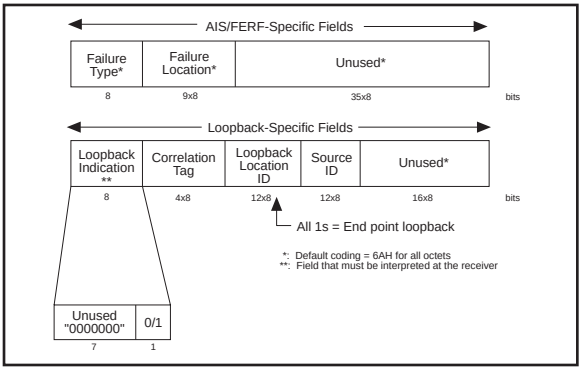


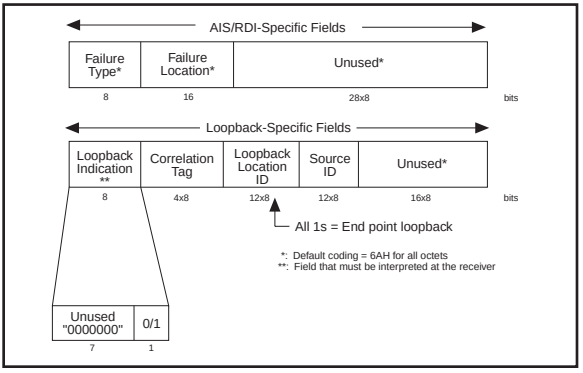
**: $G(x) = x^{10} + x^9 + x^5 + x^4 + x + 1$

ATM Layer OAM Flows at the UNI

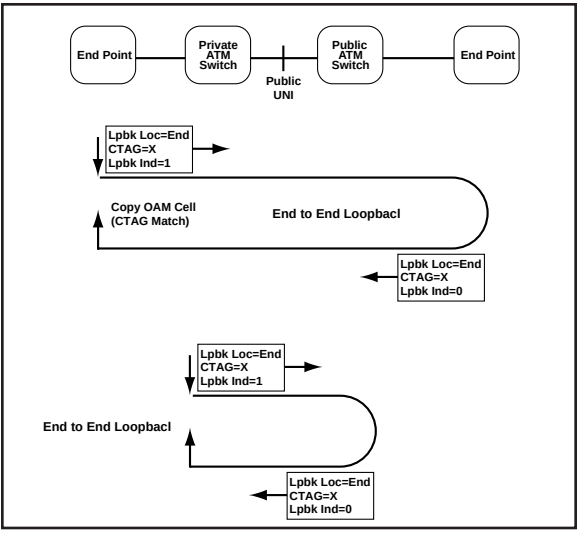


OAM Cell Fault Management-Specific Fields





Loopback Function



Glossary of Acronyms

AAL	ATM Adaption Layer
ABR	Available Bit Rate
AL	Access Link
ANSI	American National Standards Institute
ATM	Asynchronous Transfer Mode
BA	Buffer Allocation
BER	Bit Error Rate
B-ICI	Broadband Intercarrier Interface
B-ISDN	Broadband (aspects of) Integrated Services Digital Network
B-ISUP	Broadband Integrated Service User Part
BOM	Beginning of Message
CBR	Constant Bit Rate
CC	Call Control
CCITT	International Telegraph and Telephone Consultative Committee
CE	Connection Element
CEP	Connection End Point
CI	Continuation Indicator
CIR	Cell Insertion Ratio
CLP	Cell Loss Priority
CLR	Cell Loss Ratio
CL	Connectionless Service
CO	Connection Oriented Service
COM	Continuation of Message
CPE	Customer Premises Equipment
CPN	Customer Premises Network
CRC	Cyclic Redundancy Check
CRF	Connection Related Function
CS	Convergence Sublayer
EOM	End of Message
ET	Exchange Termination
GFC	Generic Flow Control
HEC	Header Error Control
HLF	Higher Layer Functions
IWU	Interworking Unit
ITU-T	International Telecommunications Union-Telecommunications Standardization Sector
LAN	Local Area Network
LANE	LAN Emulation
LE	Local Exchange
LFC	Local Functional Capabilities
LT	Line Termination
MID	Message Identifier

Glossary of Acronyms

MSB	Most Significant Bit
MPOA	Multi-Protocol Over ATM
MSP	Maintenance Service Provider
NNI	Network Node Interface
NS	Network Supervision
NT	Network Termination
OAM	Operation and Maintenance
OSI	Open Systems Interconnection
PCI	Protocol Control Information
PDU	Protocol Data Unit
PHY	Physical Layer
PMD	Physical Medium Dependent (layer)
PNNI	Private NNI
PVC	Permanent Virtual Circuit
PRM	Protocol Reference Model
PS	Protection Switching
PT	Payload Type
QOS	Quality of Service
SAR	Segmentation and Reassembly (layer)
SAP	Service Access Point
SDH	Synchronous Digital Hierarchy
SDU	Service Data Unit
SEP	Signalling Endpoint
SOH	Section Overhead
SONET	Synchronous Optical Network
SP	Service Provider
SPN	Subscriber Premises Network
SVC	Signalling Virtual Channel
TA	Terminal Adapter
TE	Terminal Equipment
UBR	Unspecified Bit Rate
UNI	User Network Interface
VBR	Variable Bit Rate
VC	Virtual Channel
VCC	Virtual Channel Connection
VCI	Virtual Channel Identifier
VCL	Virtual Channel Link
VP	Virtual Path
VPC	Virtual Path Connection
VPI	Virtual Path Identifier
VPL	Virtual Path Link
VPT	Virtual Path Terminator
XC	Cross-Connect

ATM References

ATM UNI Specifications, V3.0
ATM Forum Technical Committee Members

Bellcore ATM and AAL Protocols Generic Requirements,
TA-NWT-001113

ITU-T I.432

Ensure The Quality Of Your Network Services

Tekelec's highly adaptable Chameleon Open ensures the quality of your network services. This multi-protocol analyzer can monitor, analyze and simulate the most demanding real-world conditions over all your major networks.

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Tekelec's EAGLE STP features an open distributed architecture and high capacity and throughput. It is tailored to the SS7 switching needs of independent telcos, cellular carriers, IXCs, CAPs, and RBOCs and is installed in over 50% of domestic cellular companies that have their own STPs. The EAGLE is scalable from two to 500 links giving it the capacity to grow with your needs.

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Calabasas, California 91302
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