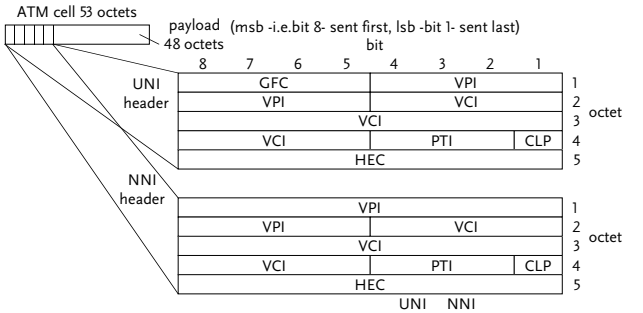
Not enough? Cellware sends news via Email ..... join up using http://www.cellware.de/sub.html

ATM cell header structure at UNI & NNI



		UNI	NNI	
CLP	Cell Loss Priority	1	1	bit
GFC	Generic Flow Control	4	-	bit
HEC	Header Error Control	8	8	bit
PTI	Payload Type Identifier	3	3	bit
VCI	Virtual Channel Identifier	16	16	bit
VPI	Virtual Path Identifier	8	12	bit

(Rec.I.361)

Cell types

Standardised physical layer cell header values at the UNI. Note that the last bit in octet 4 is not used as CLP for physical layer cells. Physical layer cells are not passed to the ATM layer.

	Octet 1	Octet 2	Octet 3	Octet 4	
Idle cell	0000 0000	0000 0000	0000 0000	000	1
Reserved for phys. layer	PPPP 0000	0000 0000	0000 0000	PPP	1
OAM cell (F1)	0000 0000	0000 0000	0000 0000	001	1
OAM cell (F3)	0000 0000	0000 0000	0000 0000	100	1

Combinations of pre-assigned values at the UNI. The first 4 bits of octet 1 are for GFC.

Use	VPI	VCI	VCI	PTI	CLP
Meta-signalling	XXXX XXXX	0000 0000	0000 0001	0A0	C
General broadcast signalling	XXXX XXXX	0000 0000	0000 0010	0AA	C
Point-to-point signalling	XXXX XXXX	0000 0000	0000 0101	0AA	C
VP OAM flow (F4)	YYYY YYYY	0000 0000	0000 0011	0A0	A
VP end-to-end OAM (F4)	YYYY YYYY	0000 0000	0000 0100	0A0	A
VP resource management	YYYY YYYY	0000 0000	0000 0110	110	?
Reserved for VP functions	YYYY YYYY	0000 0000	0000 0111	???	?
VC OAM flow (F5)	YYYY YYYY	ZZZZ ZZZZ	ZZZZ ZZZZ	100	A
VC end-to-end OAM (F5)	YYYY YYYY	ZZZZ ZZZZ	ZZZZ ZZZZ	101	A
Resource mgmt. cell	YYYY YYYY	ZZZZ ZZZZ	ZZZZ ZZZZ	110	A
Reserve for future standardisation	YYYY YYYY	0000 0000	0000 0000	1000-0000 1111	??? ?
Unassigned cell	0000 0000	0000 0000	0000 0000	BBB	0

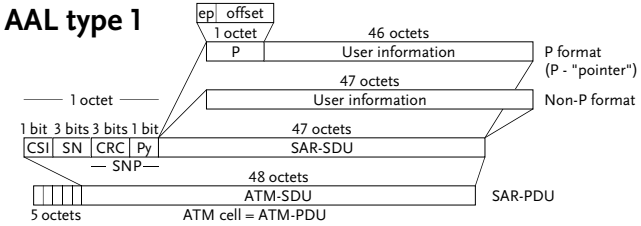
A- The bit may be 0 or 1 and is available for use by the appropriate ATM layer functions
B- The bit is a "don´t care" bit
C- The originating signal entity shall set CLP to 0. The value may be changed by the network.
P- The bit is available for use by the physical layer
X- Any VPI value VPI=0; VCI value is reserved for user signalling with local exchange
VPI≠0; VCI value is reserved for signalling with other signalling entities
Y- Any VPI value
Z- Any VCI value other than 0
?- For further study (Rec. I.361)

PTI usage

Coding of Payload Type Indication in ATM cells			PTI
ATM user data cell	no congestion experienced	ATM layer user-user indication=0	000
ATM user data cell	no congestion experienced	ATM layer user-user indication=1	001
ATM user data cell	congestion experienced	ATM layer user-user indication=0	010
ATM user data cell	congestion experienced	ATM layer user-user indication=1	011
OAM (F5) cell associated with segment			100
OAM (F5) cell associated with end-to-end			101
Resource management cell			110
Reserved for future functions			111

(Rec. I.361)

AAL type 1

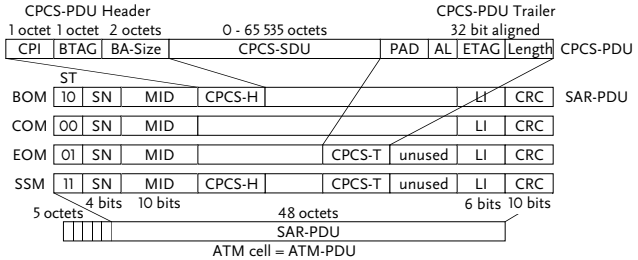


Structured data transfer (one of several AAL1 options)

P = octet offset of data block over 2 cells (= 0111 111 if not required)
CRC = Cyclic Redundancy Check
SN = Sequence Number
(non-P; CSI = 0
P format; CSI = 1 only if SN = 0,2,4 or 6)
CSI = Convergence Sublayer Indication
ep = Even Parity
SNP = Sequence Number Protection
Py = Parity (even, 1 bit)
SAR = Segmentation And Reassembly
PDU = Protocol Data Unit

(Rec. I.363.1)

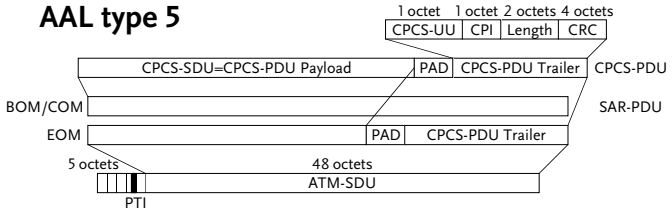
AAL type 3/4



AL = 32 bit Alignment (using 0)
Btag = Beginning Tag field per CPCS-PDU must be identical to Etag
BA-size = Buffer Allocation size
BOM = Beginning Of Message
COM = Continuation Of Message
CPI = Common Part Indicator (0 = octet as unit for BA-size, all other values for further study)
CPCS = Common Part Convergence Sublayer
CPCS-H = CPCS-Header
CPCS-T = CPCS-Trailer
CRC = Cyclic Redundancy Check
EOM = End Of Message
Etag = End Tag field - see Btag
IT = Information Type
Length = Length of CS-SDU
LI = Length Indication (max 44 octets)
MID = Multiplex Identification
PAD = Padding (0)
PDU = Protocol Data Unit
SAR = Segmentation And Reassembly
SDU = Service Data Unit
SN = Sequence Number
SSM = Single Segment Message
ST = Segment Type

(Rec. I.363)

AAL type 5



BOM = Beginning Of Message (PTI=0)
COM = Continuation Of Message (PTI=0)
CPCS = Common Part Convergence Sublayer
CPCS-UU = CPCS User-to-User indication
CPI = Common Part Indicator
CRC = Cyclic Redundancy Check
EOM = End Of Message (PTI=1)
Length = Length of CPCS-SDU (Length=0 ->Abort function)
PAD = Padding (0) to 47 octets
PDU = Protocol Data Unit
Reserved = 32 bit alignment of CPCS-PDU trailer
PTI = Payload Type Indication
SDU = Service Data Unit

(Rec. I.363)

Pocket Guide to ATM

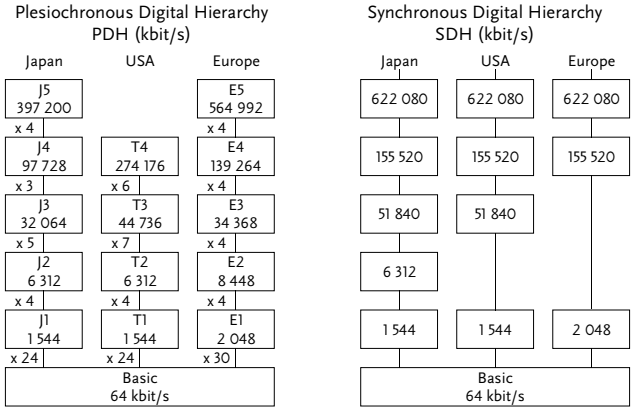
cellware broadband

Rudower Chaussee
12489 Berlin, Germany

Phone (+49 30) 6 70 08 -0
Fax (+49 30) 6 70 08 - 108
Email info@cellware.de
www http://www.cellware.de

Not enough? Try http://www.cellware.de for more.

Digital network hierarchies - bit rates



SONET/SDH - bit rates

CCITT (ITU-T) STM-M Synchronous Transport Module level M	ANSI STS-N Synchronous Transport Signal level N	Bit-Rate (Mbit/s)
-	STS-1	51.84
STM-1	STS-3 & STS-3c	155.52
-	STS-9	466.56
STM-4	STS-12	622.08
-	STS-18	933.12
-	STS-24	1 244.16
-	STS-36	1 866.24
STM-16	STS-48	2 488.32

SONET/SDH - optical

Application	Intra-office	Interoffice				
		Short Haul		Long Haul		
Wavelength	1310 nm	1310 nm	1550 nm	1310 nm	1550 nm	
Fibre type	G.652	G.652	G.652	G.652	G.652/654	G.653
Range	<2km	≈15km		≈40km	≈60km	

G.703 physical/electrical characteristics

E1	2 048 kbit/s	±50 ppm	HDB3 HDB3	75Ω coaxial 120Ω twisted pair
E2	8 448 kbit/s	±30 ppm	HDB3	75Ω coaxial
E3	34 368 kbit/s	±20 ppm	HDB3	75Ω coaxial
E4	139 264 kbit/s	±15 ppm	CMI	75Ω coaxial
SDH	155 520 kbit/s	±20 ppm	CMI	75Ω coaxial

ATM Forum phys./elec. characteristics

1	STS-3c	155.52 Mbit/s		optical fibre
2	DS3	44.74 Mbit/s	B3ZS 75Ω coaxial	
3	100Multi	100.00 Mbit/s	4B/5B 1300 nm	62.5/125 µm multimode optical fibre
4	155Multi	155.52 Mbit/s	8B/10B 1300 nm	62.5/125 µm multimode optical fibre

"Other" phys./elec. characteristics

TAXI	140 Mbit/s	4B/5B 1300 nm	62.5/125 µm multimode optical fibre

Not enough? Try http://www.itu.ch/ for more.

SONET STS-3 transport & path overhead

Section Overhead	A1	A1	A1	A2	A2	A2	C1		
	B1			E1			F1		
	D1			D2			D3		
	B2	B2	B2	K1			K2		
Line Overhead	H1	H1	H1	H2	H2	H2	H3	H3	H3
	D4			D5			D6		
	D7			D8			D9		
	D10			D11			D12		
	Z1	Z1	Z1	Z2	Z2	Z2	E2		

SDH STM-1 section & path overhead

(STS-3C almost same as STM-1, except for 2 bits in H1)

	1 column VC4 & VC3 Path Overhead (POH)								J1
Regenerator Section Overhead	A1	A1	A1	A2	A2	A2	C1		B3
	B1			E1			F1		C2
	D1			D2			D3		G1
	Administrative Unit (AU) pointers area A								F2
Multiplex Section Overhead	B2	B2	B2	K1			K2		H4
	D4			D5			D6		Z3
	D7			D8			D9		Z4
	D10			D11			D12		Z5
	Z1	Z1	Z1	Z2	Z2	Z2	E2		

Reserved for national use or undefined (all zeroes pattern)

A1,A2	Framing 11110110 00101000	Z1,Z2	future functions (to be defined)
B1	Bit Interleaved Parity (BIP-8)	B3	Path Bit Interleaved Parity (BIP-8)
B2	Bit Interleaved Parity (BIP-24)	C2	Signal label
C1	STM identifier	F2	VC-n Path user channel
D1-D12	Data communication over section	G1	Path status
E1,E2	Orderwire (voice communication)	H4	Multiframe indicator
F1	User channel	J1	VC-n Path trace
K1,K2	Automatic Protection Switching (APS) signalling	Z3-5	future functions (to be defined)

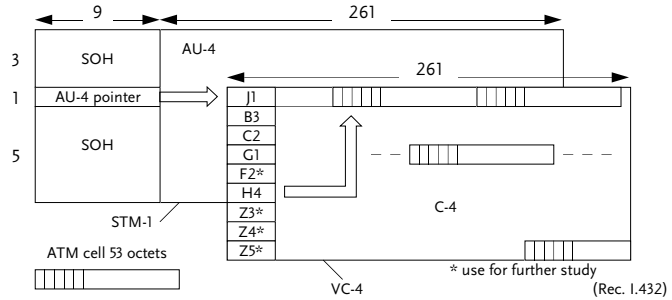
(Rec. G.708)

Scrambling

STM signal scrambled with frame synchronous generator polynomial 1 + x 6 + x7.

(Rec.G.709)

Mapping of ATM cells into an STM-1



(Rec. I.432)

H4, for ATM cell mapping into SDH

unused	unused	Cell offset indicator (0≤ offset ≤ 52)					
		msb					lsb
1	2	3	4	5	6	7	8

N.B. This pointer is generally redundant as the HEC mechanism for cell-delineation provides the same function with better performance.

(Rec. I.432)

Scrambling

ATM cell payload scrambled with self synchronising generator polynomial x 43 + 1.

(Rec. I.432)

Not enough? Try http://www.atmforum.com/ for more.

ATM over DS3

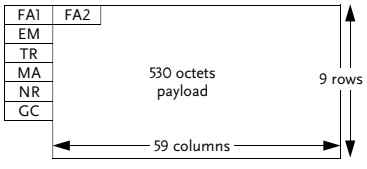
X1		F1		C1		F2		C2		F3		C3		F4
X2		F1		C1		F2		C2		F3		C3		F4
P1		F1		C1		F2		C2		F3		C3		F4
P2		F1		C1		F2		C2		F3		C3		F4
M1		F1		C1		F2		C2		F3		C3		F4
M2		F1		C1		F2		C2		F3		C3		F4
M3		F1		C1		F2		C2		F3		C3		F4

84 bits (85)

frame rate 106.4 µs

X1,X2 Alarm channel
P1,P2 Parity channel
M1..M3 M-Frame alignment channel
F1..F4 M-Subframe alignment channel
C1..C3 Application specific use

ATM over E3



FA1,2 Framing
EM Error monitoring (BIP-8)
TR Trail trace
MA Maintenance (FERF etc.)
NR Network operator octet
GC General purpose comms.

(see also Rec. G.804 and Rec. G.832)

ATM over J2

TS1	TS2-TS96	TS97	TS98	F1	F2	F3	F4	F5

98 timeslots (784 bits) + 5 F bits = 125µs

Frame No.	F1=785	F2=786	F3=787	F4=788	F5=789
1	1	1	0	0	m1
2	1	0	1	0	0
3	x1	x2	x3	a	m2
4	e1	e2	e3	e4	e5

m = data link bit (4 Kbit/s)
a = "a-bit" May be used as remote end alarm bit. Set to 0 if not used.
en = CRC-5 check-bit (n=1 to 5)
x = Spare bits, set to 1 if not used

Note TS97 & 98 may be used for signalling

ATM over E1

TS0	120 bits payload	TS16	120 bits payload

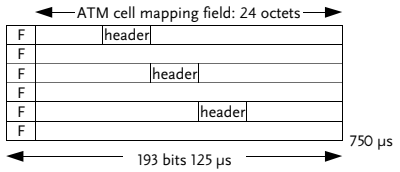
256 bits / 125 µs

TS0 Time Slot 0 (bits 1 to 8) framing
TS16 Time Slot 16 (bits 129 to 136) reserved for future use

(see also prETS 300 337)

ATM over DS1

ATM cells are byte aligned to the DS1 frame



F bits provide
F3 OAM functions
Detection of loss of frame alignment
Performance monitoring (CRC-6)
Transmission of RDI
Performance reporting

(see also Rec. G.804)

For framing detail see ATT pub.43801 (D4 or 193S) or ESF (193E)

ATM cell delineation

ATM cell delineation using HEC field - generator polynomial g(x) = x8 + x2 + x + 1

(Rec.I.432)