



# ATM Test Solutions



**ANT-20SE**  
Advanced Network Tester for bit rates from 64 kbit/s up to STM-64/OC-192 in ATM/SDH/SONET/PDH networks:

- Signaling emulation as per ATM Forum UNI 3.0/3.1 and ITU-T Q.2931/Q.2961
- SVC and PVC testing
- Automatic end-to-end testing of SVCs
- Real-time measurement of ATM QoS on four channels simultaneously



**750E ATM Tester**  
The Single-Tester Solution for ATM Field Testing Worldwide

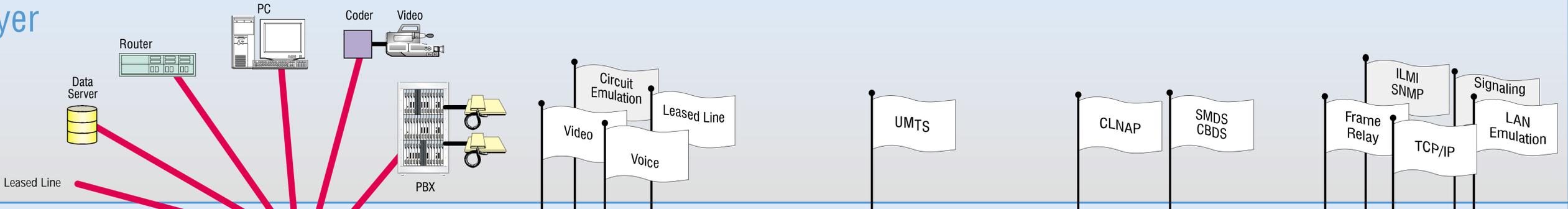


**CycloneFrame IP Optimizer**  
The easy-to-use troubleshooting solution for today's IP-based services



**Domino-360 ATM**  
Internetworking Analyzer for high-performance testing that keeps pace with the dynamic enhancement and creation of ATM standards

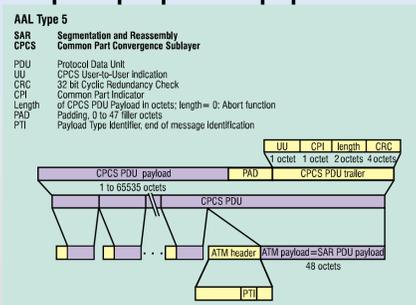
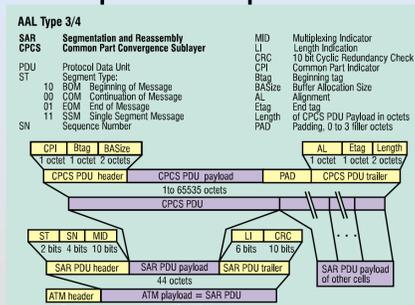
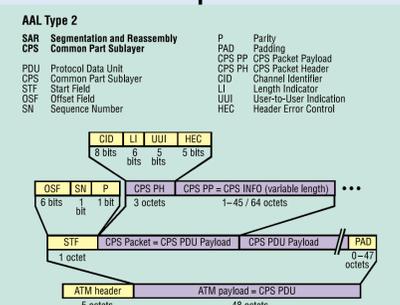
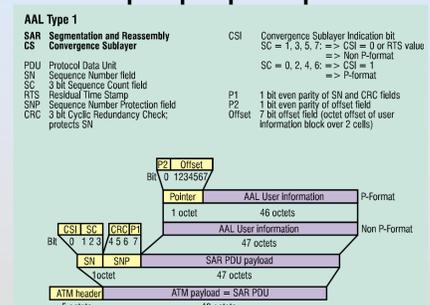
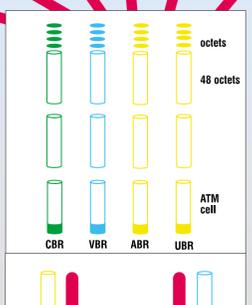
## Services Layer



## ATM Adaptation Layer

**AAL Features**

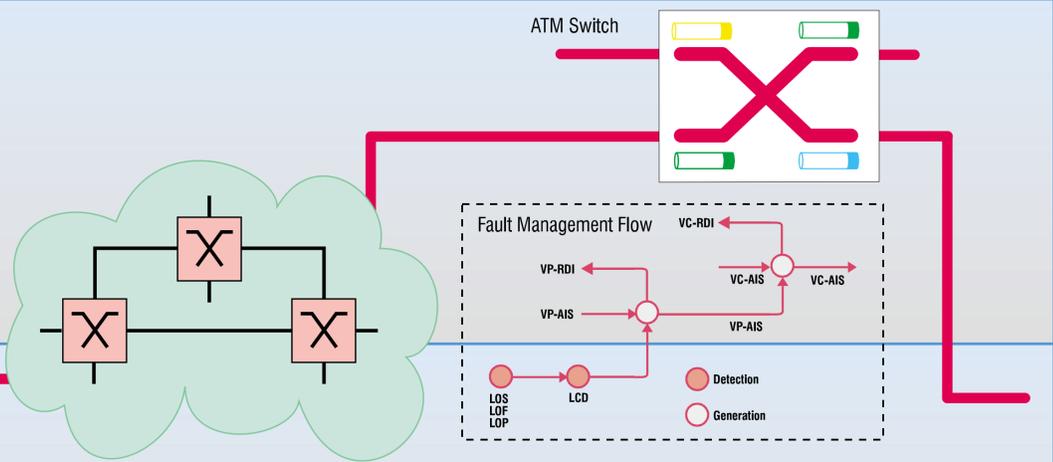
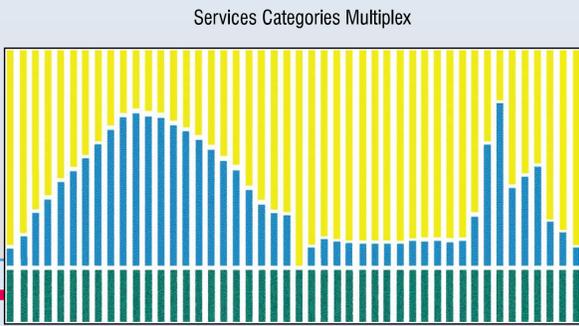
|                                    | AAL 1 | AAL 2      | AAL 3/4 | AAL 5    |
|------------------------------------|-------|------------|---------|----------|
| Transfer of timing information     | yes   | no         | no      | no       |
| Transport of multiple connections  | no    | yes        | yes     | no       |
| Overhead of management information | low   | low        | high    | very low |
| Header frame error detection       | yes   | yes        | no      | n/a      |
| User frame error detection         | no    | no         | yes     | yes      |
| Error correction                   | no    | no         | no      | no       |
| Cell header relevance              | no    | no         | no      | yes      |
| Dedicated user frame size          | small | very small | large   | large    |



## ATM Layer

**ATM Forum Service Categories**

|                              | ATM Layer Service Categories |             |             |             |                            |
|------------------------------|------------------------------|-------------|-------------|-------------|----------------------------|
|                              | CBR                          | rt-VBR      | nt-VBR      | UBR         | ABR                        |
| <b>Traffic Parameters:</b>   |                              |             |             |             |                            |
| PCR and CDVT <sub>max</sub>  | specified                    | specified   | specified   | specified   | specified                  |
| SCR, MBS, CDVT <sub>ex</sub> | n/a                          | specified   | n/a         | n/a         | n/a                        |
| MCR                          | n/a                          | n/a         | n/a         | specified   | n/a                        |
| <b>QoS Parameters:</b>       |                              |             |             |             |                            |
| peak-to-peak CDV             | specified                    | specified   | unspecified | unspecified | unspecified                |
| max CTD                      | specified                    | specified   | unspecified | unspecified | unspecified                |
| CLR                          | specified                    | specified   | unspecified | unspecified | low for conforming sources |
| <b>Other Attributes:</b>     |                              |             |             |             |                            |
| feedback                     | unspecified                  | unspecified | unspecified | unspecified | specified                  |



## Physical Layer

**Abbreviations**

|        |   |        |   |
|--------|---|--------|---|
| AAL    | ATM Adaptation Layer                          | MMF    | Multi-Mode Fibre                          |
| ABR    | Available Bit Rate                            | MSVC   | Multi-Signaling Virtual Channel           |
| AS     | Alarm Indication Signal                       | n/a    | not applicable                            |
| ATM    | Asynchronous Transfer Mode                    | NNI    | Network-to-Network Interface              |
| B-ISDN | Broadband Integrated Services Digital Network | rt-VBR | real-time Variable Bit Rate               |
| CBDS   | Connectless Broadband Data Service            | OAM    | Operation, Administration and Maintenance |
| CBR    | Constant Bit Rate                             | PCR    | Peak Cell Rate                            |
| CDV    | Cell Delay Variation                          | PDH    | Plesiochronous Digital Hierarchy          |
| CDVT   | Cell Delay Variation Tolerance                | QoS    | Quality of Service                        |
| CER    | Cell Error Rate                               | RDI    | Remote Defect Indication                  |
| CLNAP  | Connectless Network Access Protocol           | rt-VBR | real-time Variable Bit Rate               |
| CLR    | Cell Loss Rate                                | SCR    | Sustained Cell Rate                       |
| CMR    | Cell Misinsertion Rate                        | SDF    | Synchronous Digital Hierarchy             |
| CPE    | Customer Premises Equipment                   | SMDS   | Switched Multi-Megabit Data Service       |
| CRC    | Cyclic Redundancy Check                       | SMP    | Simple Network Management Protocol        |
| CTD    | Cell Transfer Delay                           | SONET  | Synchronous Optical Network               |
| CS     | Error Detection Code                          | STM-1  | Synchronous Transport Module level 1      |
| GDRA   | Generic Call Rate Algorithm                   | STM-N  | Synchronous Transport Module level N      |
| HEC    | Header Error Control                          | STP    | Shielded Twisted Pair                     |
| ILMI   | Interim Local Management Protocol             | SVC    | Switched Virtual Circuit                  |
| IP     | Internet Protocol                             | TCP    | Transmission Control Protocol             |
| LAN    | Local Area Network                            | UNI    | User-Network Interface                    |
| LCD    | Loss of Cell Delimitation (synchronization)   | UP     | Unshielded Twisted Pair                   |
| LOF    | Loss of Frame                                 | VC     | Virtual Channel                           |
| LOP    | Loss of AU Pointer                            | VP     | Virtual Path                              |
| LPS    | Loss of Signal                                | WAN    | Wide Area Network                         |
| MBS    | Maximum Burst Size                            |        |   |
| MCR    | Minimum Cell Rate                             |        |   |
| MCTD   | Mean Cell Transfer Delay                      |        |   |

**ATM Cell Format at UNI**

**Cell Header Structure**

| GFC    | VPI    | VC1     | PTI    | HEC    | Cell Payload |
|--------|--------|---------|--------|--------|--------------|
| 4 bits | 8 bits | 16 bits | 3 bits | 8 bits | 48 octets    |

(A: NNI no GFC field - 12 bits VPI)

**Predefined VCIs**

| VCI  | Interpretation                            | PTI code | Interpretation                             |
|------|---|----------|--|
| 0    | Unassigned cell (VPI=0)                   | 000      | User data cell, congestion not experienced |
| 0    | Unused (VPI>0)                            | 001      | experienced                                |
| 1    | Meta-signaling cell (UNI)                 | 010      | User data cell, congestion not experienced |
| 2    | General broadcast signaling cell (UNI)    | 011      | experienced                                |
| 3    | Segment OAM F4 flow cell                  | 100      | Segment OAM F5 flow cell                   |
| 4    | End-to-end OAM F4 flow cell               | 101      | End-to-end OAM F5 flow cell                |
| 5    | Point-to-point signaling cell             | 110      | VC resource management cell                |
| 6    | VP resource management cell               | 111      | Reserved for future standardized function  |
| 7-31 | Reserved for future standardized function |          |  |

**UNI formats**

| Frame Format | Bit rate kbit/s | Transmission Media | Distance          | Line Code |
|--------------|-----------------|--------------------|-------------------|-----------|
| STS-12       | 622 080         | SMF                | 15 km at 1.5 km/s | NRZ       |
|              |                 | MMF                | 300 m             | NRZ       |
|              |                 | UTP-5              | 100 m             | NRZ       |
| STM-1        | 155 520         | SMF                | 15 km at 1.5 km/s | NRZ       |
|              |                 | MMF                | 300 m             | NRZ       |
|              |                 | UTP-5              | 100 m             | NRZ       |
| STS-3c       | 155 520         | SMF                | 15 km at 1.5 km/s | NRZ       |
|              |                 | MMF                | 300 m             | NRZ       |
|              |                 | UTP-5              | 100 m             | NRZ       |
| STS-1        | 51 840          | SMF                | 15 km at 1.5 km/s | NRZ       |
|              |                 | MMF                | 300 m             | NRZ       |
|              |                 | UTP-5              | 100 m             | NRZ       |
|              |                 | MMF                | 300 m             | NRZ       |
|              |                 | UTP-5              | 100 m             | NRZ       |
| F4           | 139 264         | Coax               | n.s.              | CM        |
| F5           | 81 368          | Coax               | n.s.              | HDB3      |
| F6           | 2 432           | Coax               | n.s.              | HDB3      |
|              |                 | TP                 | n.s.              | HDB3      |
| DS3          | 44 128          | Coax               | 300 m             | 8B/6B     |
| DS1 ESF      | 1 544           | TP                 | 9 km              | 8B/6B     |
| J2           | 6 312           | Coax               | n.s.              | 8B/6B     |
| Cell Stream  | 25 920          | UTP-5              | 100 m             | 8B/10B    |
| Cell Stream  | 155 520         | MMF                | 2 km              | 8B/10B    |
|              |                 | Coax               | 100 m             | CM        |
|              |                 | STP                | 2 km              | 8B/10B    |
|              |                 | Coax               | 100 m             | CM        |
| TAXI         | 100 000         | MMF                | 100 m             | 4B/5B     |

**Degradation of QoS Parameters**

The following table summarizes how various sources of degradation can impair the performance parameters.

| Attribute              | CER | CLR | CMR | MCTD | CDV |
|------------------------|-----|-----|-----|------|-----|
| Propagation Delay      |     |     |     | X    |     |
| Media Error Statistics | X   | X   | X   |      |     |
| Switch Architecture    |     | X   | X   | X    | X   |
| Buffer Capacity        |     | X   | X   | X    | X   |
| Number of Tandem Nodes | X   | X   | X   | X    | X   |
| Traffic Load           |     | X   | X   | X    | X   |
| Failures               |     | X   |     |      |     |
| Resource Allocation    |     | X   |     | X    | X   |

**OAM Cell Format ITU-T L610**

OAM Cell Information Field

| Header   | OAM Type | Function Type | Function specific field | Reserved for future use | EDG (CRC-10) |
|----------|----------|---------------|-------------------------|-------------------------|--------------|
| 5 octets | 4 bits   | 4 bits        | 45 octets               | 6 bits                  | 10 bits      |

| OAM Type                | Coding | Function Type  | Coding |
|-------------------------|--------|--|--------|
| Fault Management        | 0001   | AIS  | 0000   |
|                         | 0001   | RDI  | 0001   |
|                         | 0001   | Continuity Check   | 0100   |
|                         | 0001   | Loopback   | 1000   |
| Performance Management  | 0010   | Forward Monitoring                                       | 0000   |
|                         | 0010   | Backward Reporting                                       | 0001   |
| Activation/Deactivation | 1000   | Forward monitoring and the associated Backward reporting | 0000   |
|                         | 1000   | Continuity Check   | 0001   |
|                         | 1000   | Forward Monitoring                                       | 0010   |
| System Management       | 1111   | *  | *      |

\* Not standardized by Recommendation L610

A Principal Member of  
  
**The ATM Forum**  
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