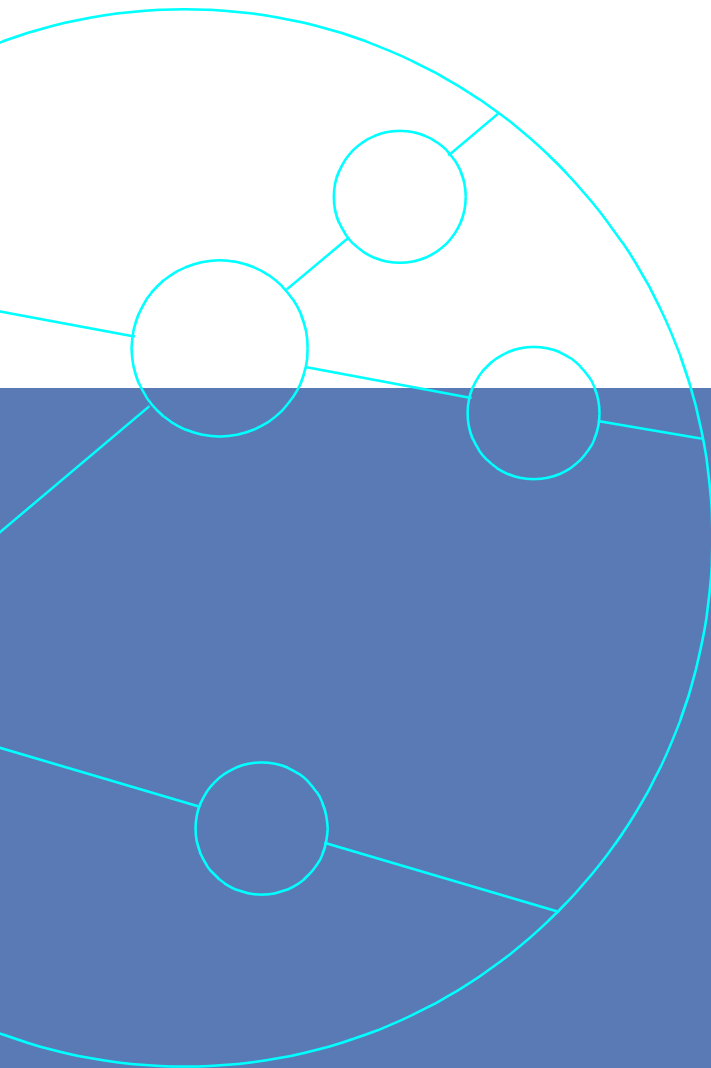


Aurora Forte ATM OAM Testing

This application note will describe how to use Aurora Forte to test and monitor the facilities provided by the Operation, Administration & Maintenance (OAM) functions of ATM networks. OAM controls the ATM layer alarm and circuit continuity and is important for monitoring the availability of connections.

Application Note ANFORTE 08A



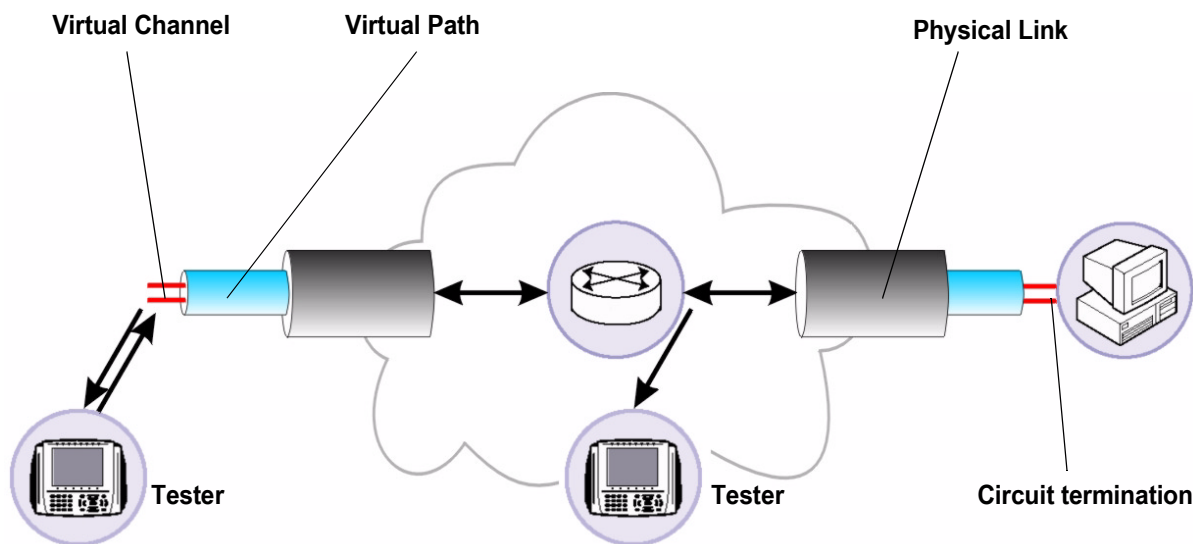
Testing the World's Digital Networks

TrendCommunications

ATM NETWORK OPERATION, ADMINISTRATION & MAINTENANCE

This application note will describe how to use Aurora Forte to test and monitor the facilities provided by the Operation, Administration & Maintenance (OAM) functions of ATM networks. OAM controls the ATM layer alarm and circuit continuity and is important for monitoring the availability of connections. It is important for a tester to have a comprehensive capability of OAM in order that broadband services can be tested fully. In some cases if the tester cannot simulate the OAM features of ATM then it is not possible for higher layer functions, such as IP, to operate.

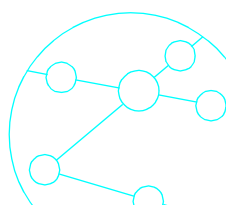
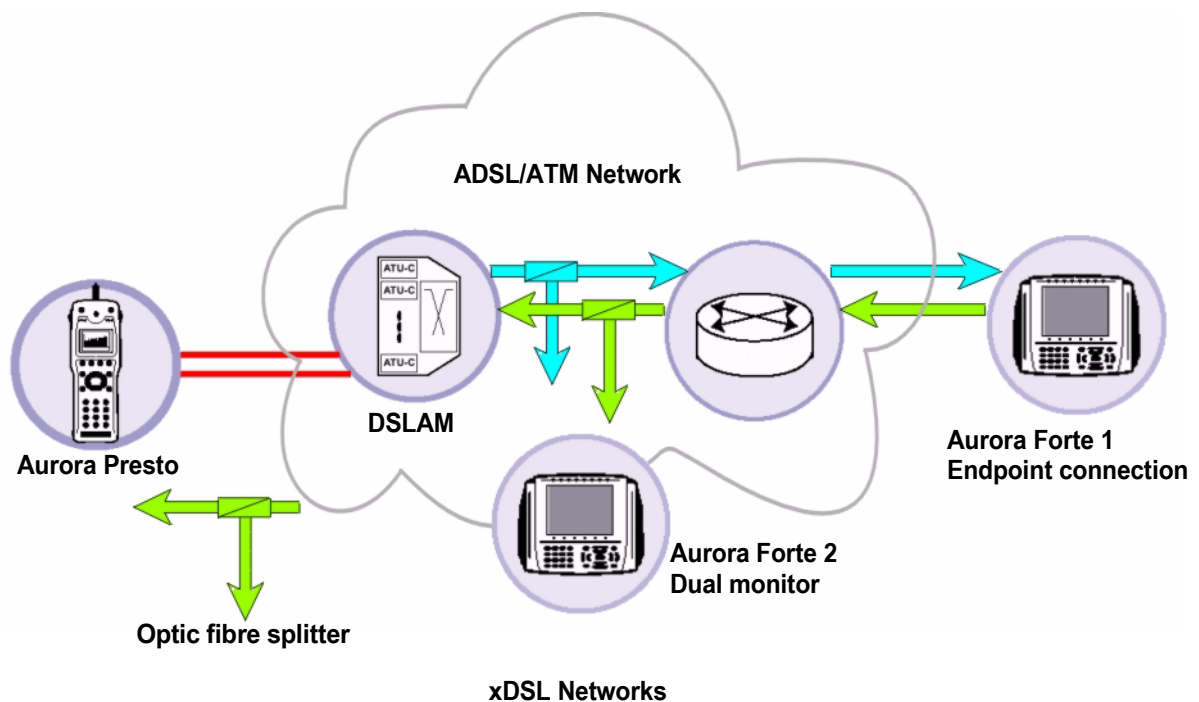
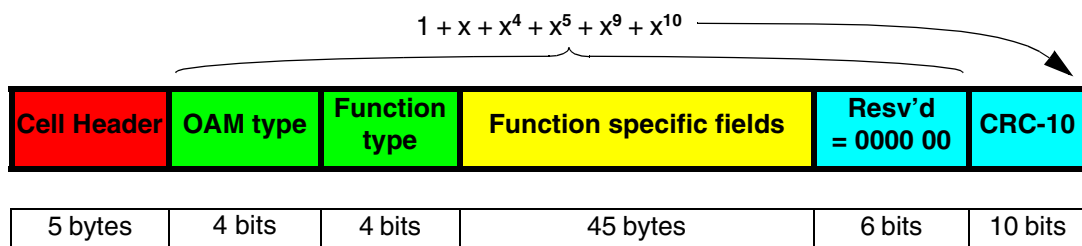
Application Note 8b provides additional technical information concerning the operation of ATM OAM functions.



Principles of OAM

ATM networks provided by public data carriers or large corporations are characterised by multiple switches in different locations with many users connected. It should be considered that the ATM network also includes DSL access networks that are using ATM encapsulation of user data. The ATM cloud will contain many switches that can be connected with multiple possible routes so that protection is provided in the event of link or switch failure. OAM cells on the ATM layer are an extension of the fault management functions of the physical layer so that on top of physical route protection there is monitoring of the ATM circuits through the network. The OAM functions of the network provide the necessary monitoring capability so that the network manager can be informed of the presence of faults and identify the location of both faulty routes and equipment.

OAM Format



In the xDSL network the OAM functions will be provided at the DSLAM to ensure reliable service, and also as far as the ADSL modem at the customer premises to check circuit continuity. It is important that test equipment being used is capable of simulating these functions.

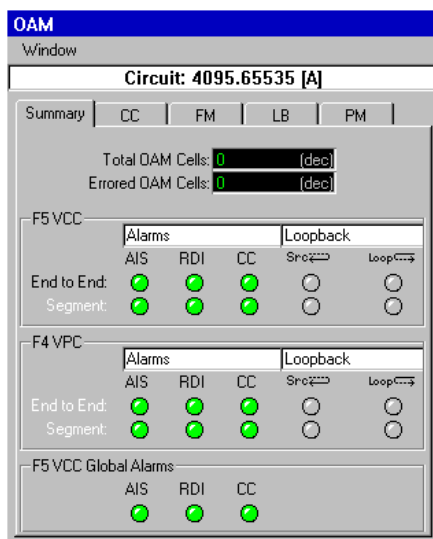
Aurora Forte is also capable of testing Asymmetric Digital Subscriber Link (ADSL) networks in combination with Aurora Presto. Aurora Presto is an ADSL tester that contains interface cards for terminating ADSL connections at either the Remote or Central location. The OAM functions of Aurora Presto will respond to F5 end to end and segment functions in a similar manner to Aurora Forte; so being able to prove that VCC routes into the network through the DSLAM are established and maintained.

Fault Monitoring Operation

The OAM functions contain special cells to monitor different aspects of the network performance. Continuity Check (CC) cells are used to ensure reliable path connection between user and network, in the case of faults arising Alarm Indication (AIS) and Remote Defect Indication (RDI) cells are generated. In addition the ATM Loopback cell can be used to prove a route through a network is reaching the correct end system, and to confirm that the route through the network has been configured correctly.

In summary this process provides the critical functions of:

- Continuous monitoring of link availability
- Notification to the far end of downstream link failure
- Notification to the near end of upstream link failure
- Indication of the fault location



How's the testing done?

Aurora Forte can be used to either test the OAM functions by sending and receiving the OAM cells, or for monitoring a live network with a receive only (including dual monitor) connection to a network link.

When Aurora Forte is terminating the network it can be used to send data replicating the user connection, allowing the OAM functions of the network to be tested. This will demonstrate that the circuit is working correctly, and if faults are responded to correctly.

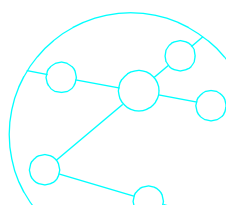
The tester can also be connected to a monitor point and here it will show all the active OAM flows on the network connection, and specific monitoring of the selected VCC or VPC. Separate views are provided for Continuity Check, Fault Management (AIS & RDI) and Loopback cells.

A trace window is also provided for viewing the decode of the received OAM cells. This provides information such as cell type and location ID values.

ATM Route Tracing and Loop Time

The loopback cell can be used to prove the route through a network. The types of task that can be accomplished are to prove that a route to an endpoint exists, that the correct endpoint is connected, which route is taken through the network, and if there is no route where the fault is occurring.

Aurora Forte provides an OAM cell trace window for displaying the cell contents of all OAM cells in real time. This is especially useful for listing the Location IDs of the network switches that the ATM route is configured to use, including the ID of the equipment at the circuit termination. An additional ability of recording the VPI/VCI values at each end of the VCC within the Loopback cell is included. With an Aurora Forte connected at each end of the network it is possible to confirm that the VCC at the far end is terminated on the intended VPI/VCI by viewing the VCC information in the OAM cell trace window. A trace history of up to 1000 cells is recorded for later viewing.



Typical Faults

No OAM cells on monitored VCC

- Check that selected VCC is correct. Try other VCCs that are being received in case VCC is routed incorrectly.

RDI being indicated

- Send user cells on VCC in order that there is real traffic.
- Check and un-check AIS injection on tester.
- ATM fault in network is preventing user data reaching far end.

No response from loopback cell

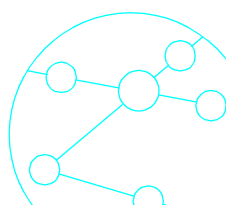
- No terminating equipment at far end of VCC.
- Loopback being sent into network on an incorrect VCC that is not terminated.
- VCC routing is incorrect within network and does not reach a termination.
(Use the Loopback trace route to discover the location of the routing error)

Loopback response is from incorrect destination device (according to LLID)

- Incorrect VCC used for sending Loopback cell
- VCC is routed incorrectly within the network
(Use the Loopback trace route to discover the location of the routing error)

What Next?

Aurora Forte can also be used to test the bandwidth traffic contract, VCC reliability and QoS characteristics and IP connectivity of the ATM network. Other application notes in this series provide information about these functions.



Aurora Presto

Aurora Presto is an ADSL handheld tester with the key features of providing a choice of ADSL interface cards, ATM25 and Ethernet data interfaces, data statistics are displayed for the ADSL and ATM layers and tests are implemented for ATM BERT and IP Ping. Other options are PPPoA, PPPoE software, and TDR/DMM hardware.

Aurora Forte

Aurora Forte is an ATM handheld tester with the key features of being multi-interface with a graphical user interface and providing physical, ATM and IP layer test routines. File Management System allows test results and configurations to be copied to/from a PC using the testers Ethernet port.

- *Portable, battery powered, handheld unit, rugged design*
- *Large high resolution colour display*
- *Graphical ICON based window applications for easy operation of tests*
- *Interfaces - combined E1 + E3, combined DS1 + DS3, ATM25,*
- *OC3/STM1 (Single mode, Multi mode, G703, CAT5)*
- *Bi-directional monitoring*
- *Pass / Fail parameters for fast analysis of test results*
- *Physical Frame and Alarm monitoring & Injection*
- *Physical BERT for E1, E3, DS1, DS3*
- *ATM VCC real time Traffic Scanning - up to 1024 VCC*
- *ATM cellstream transmission - up to 256 VCC*
- *ATM BERT*
- *Quality of Service (O.191) measurement*
- *Traffic Policing - to monitor and enforce a committed service level agreement*
- *F4 and F5 OAM testing of ATM fault management layer (AIS, RDI, CC, Loopback), real time and trace history OAM cell capture with English language decode*
- *IP ping over ATM - transmit and respond tests*
- *SVC UNI 3.0, 3.1, 4.0 support with comprehensive Information Element editing*
- *Management of results and configuration files via PC on Ethernet interface for simple operation*
- *Software upgrades available from Trend Communications website, with download to tester via Ethernet port*

Aurora Forte is subject to an ongoing development program with continuous addition of new features - call for more information.



TrendCommunications

Trend Communications Ltd
Knaves Beech Estate
Loudwater, High Wycombe
Bucks HP10 9QZ UK
www.trendcomms.com
info@trendcomms.com

Trend Communications SL
Pujades, 60
08005 Barcelona
(Spain)

International: +44 1628 524977
España:..... 93 300 3313
Deutschland: 089 32 30 09 11
US: 256 461 0790

UK:..... 01628 524977
France: 01 69 35 54 70
India:..... 22 8597 463/4