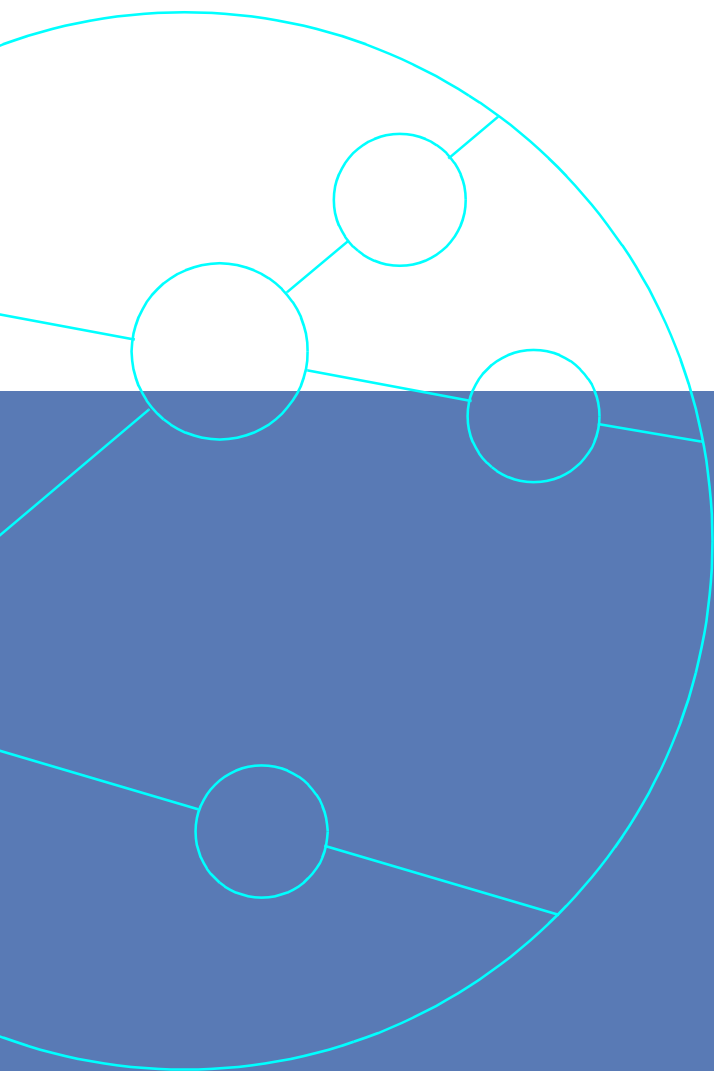




# Aurora Forte ATM Bit Error Rate Testing

*This application note will show you how to configure and operate Aurora Forte to carry out a Bit Error Rate Test (BERT) on an ATM virtual circuit using any installed interface module.*

*Application Note ANFORTE 04*



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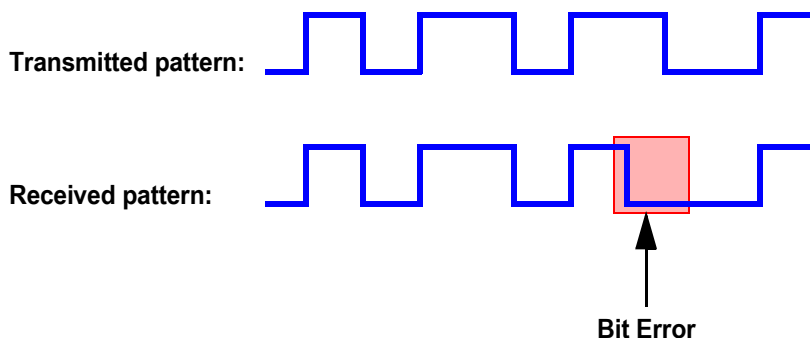
## ATM BIT ERROR RATE TESTING

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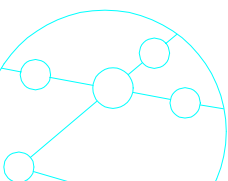
This application note will show you how to configure and operate Aurora Forte to carry out a Bit Error Rate Test (BERT) on an ATM virtual circuit using any installed interface module.

### Determining Network Quality

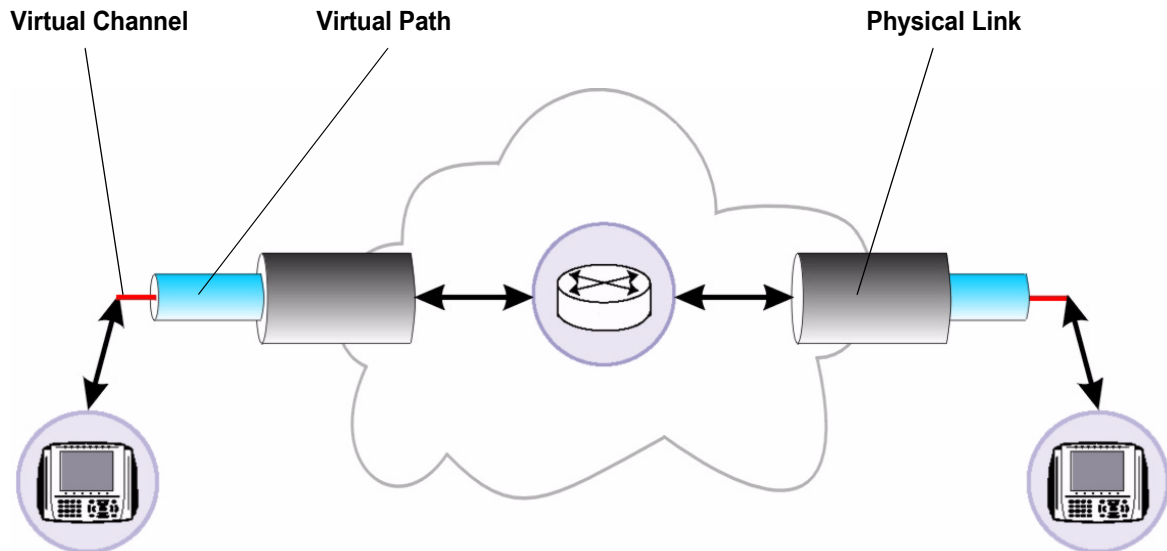
In Application Note #1 it was explained that an ATM network requires an error free network for reliable transfer of ATM data. A bit error occurs when some form of interference or fault results in the line code that is encoding the data onto the network to produce a binary 1 to be received instead of a binary 0, or vice versa.



A Physical Layer Bit Error Rate Test can be done (see Application Note #3), however this may not be practical if you cannot have access for testing to the whole of the network link between the input and output test points. An ATM BERT can be used to prove that the error performance either for a particular Virtual Channel Connection (VCC), or for the whole ATM link, by using a test pattern as the payload for the ATM cellstream. In addition the test will confirm that the VCC routing is correct.



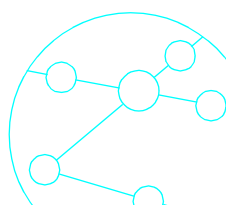
## What needs to be tested?



In this scenario the tester will be using an ATM cellstream to carry the BERT payload. The cellstream selected can be set to use 100% of the link bandwidth and will therefore measure the ATM link performance as a whole. Alternatively the bandwidth could be set to the same as will be provided to the end users application that will run over the link. In this case an assessment of the typical link quality will be measured. The test can be made with a tester at each end of the circuit, or with the circuit looped at the far end and only one tester being used.

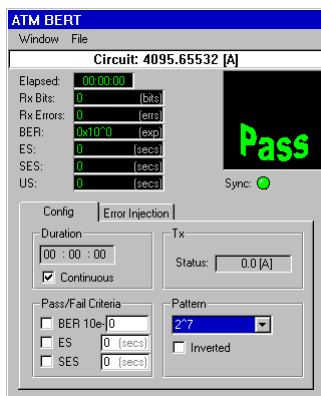
The ATM BERT application on Aurora Forte can also be used for testing over a DSL network between Aurora Presto and Aurora Forte. This test will give proof that the ATM layer is operating correctly through the DSL network, especially at the DSLAM.

If a bit error occurs then it will have different effects depending on whether it hits the cell header or payload, and also whether the bit errors occur individually or as bursts. The ATM cell is able to correct a single bit error that occurs in the header bytes. If more than one bit error happens in the header then this will be detected in almost every case but it cannot be corrected, in this circumstance the whole cell will be deleted resulting in the loss of the 48 bytes of payload information. There is also a small chance that a header error will result in a valid header checksum, but the VP/VC value will not be of the correct cellstream - this will still result in the effective loss of payload data from the cellstream. If the bit errors happen within the 48 bytes payload of the cell then these will corrupt the payload information, and during the ATM Bit Error Rate Test will be measured as errors.



## How's the testing done?

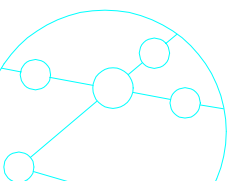
When you start making the ATM BER test the first task is to configure the Traffic Generator. You will have to select the cellstream VCC ID, select the Pseudo Random Bit Sequence (PRBS) pattern, and the bandwidth profile.



The received cellstream containing the PRBS is opened in the ATM BERT application window. There are various setup options for the control of the test and for setting pass/fail criteria. You can also inject errors during the test from a choice of single errors, or continuous errors of 1 in 1000 (10e-3) or 1 in 1,000,000 (10e-6).

When you start the measurement the tester will show that synchronisation has been achieved, the timer will start to increment and the Rx bit count will begin. At the end of the test the Bit Error Rate will be calculated. During the test the bit errors that are counted will be used to assess the quality of the line: Errored Seconds (ES) - any second containing at least one bit error. Severely Errored Seconds (SES) - Any second where the error rate is worse than 1 in 1000 Unavailable Seconds (US) - number of continuous seconds where SES is consecutively 10 or more.

At the end of the test you can check the measurements to decide if the line quality is acceptable. For most organisations an error rate of less than 10e-6 is OK, provided that SES=0. Different companies will normally have their own procedures and you should check these as well.



## Typical Faults

### No sync

- Is the interface setup on the tester correct?
- Is the signal route correct? that is, is the Rx wiring connected by a path to the Tx port?
- Is the cellstream routed correctly? The VCC may change in the network between input and output.
- The error rate may be too high for sync to be possible.

### Occasional errors

- Bad wiring joints may give errors when they are mechanically stressed.
- Wiring may be damaged, for example insulation stripped, or twisted pairs unbalanced, making it susceptible to interference.
- Bursts of errors
- Could be similar faults as for occasional errors.
- Interference from high voltage/current equipment, especially lifts or trains.

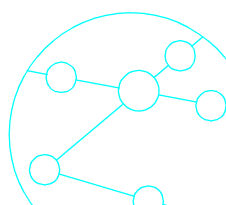
## What Next?

This application note has described using Aurora Forte for an ATM Bit Error Rate test. This will prove that the cellstream routing is correct and that the circuit error rate is OK. You may want to use the test results as a report to your customer, or archive the results for comparison at a later date.

An alternative method to BERT is the O.191 QoS measurement technique. This is a more rigorous test of the ATM connection and provides assessment of other parameters that affect the cellstream performance.

## 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.



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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.



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