Errata

Document Title: Testing n x 64 Kb/s Services (AN 1211-2)

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HP References in this Application Note

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Testing n x 64 kb/s services
n x 64 kb/s traffic

Wideband services such as videoconference, LAN interconnection, and high-speed computer links usually require a bandwidth greater than 64 kb/s, but maybe less than the full 2 Mb/s, for example, 384 kb/s. These wideband signals can be sent in a 30-channel 2 Mb/s frame by “sharing” the signal between several “aggregated” 64 kb/s channels. According to CCITT recommendation G.704, the n x 64 kb/s signal is accommodated in “n” contiguous time-slots, omitting TS16, and with each timeslot taking consecutive octets of the traffic signal. If the remaining timeslots are unused for traffic, they should be filled with all 1s. Of course, more than one n x 64 kb/s signal may be carried in the 2 Mb/s frame, depending on the bandwidth.

In practice, it is not necessary to use contiguous timeslots provided they are filled in an agreed sequence and demultiplexed sequentially at the far end. An example of a non-contiguous plan is the recommendation for five 384 kb/s channels (six timeslots each) given in CCITT G.735:
1-2-3 + 17-18-19, 4-5-6 + 20-21-22 and so on.

The most critical factor when using n x 64 kb/s aggregate channels is to ensure all equipment is configured for the same sequence of timeslots. Furthermore, the integrity of this sequence must be maintained, particularly if the signal passes through switching equipment.

You need to know that each timeslot is delayed by the same amount, and that timeslots have not been interchanged by a switch. When problems occur, you need to identify the position of a received timeslot for a known transmit timeslot.

Conventional PRBS tests at leased line rates of 64 kb/s, 704 kb/s and 2 Mb/s are well understood. However, when framing at 2 Mb/s or 704 kb/s is added, the value of the test can be enhanced.

For example using a test set like the Hewlett-Packard 37722A digital telecom analyzer or the HP 37732A telecom/datacom analyzer, a multiplexer can be stimulated with a 64 kb/s signal and a check made in the appropriate timeslot of the outgoing 2 Mb/s stream. Similarly, you can send a PRBS test signal in one or more 64 kb/s timeslots, and check for timeslot integrity at the output of a crossconnect switch.

Tests on n x 64 kb/s circuits

When testing n x 64 kb/s circuits, the foremost requirement is to check the integrity of a wideband signal spread across several timeslots that make up an aggregate channel.
Two ways to test \( n \times 64 \) kb/s

When doing a "loop-back" test at \( n \times 64 \) kb/s, it is possible that the return path may use a different timeslot allocation. In this case, the test set would need to have independent settings of transmitter and receiver timeslots. The HP 37722A and 37732A have this facility. The above shows the setup for transmission of a 384 kb/s channel in timeslots 1, 2, 3 and 17, 18, 19, and reception in timeslots 4, 5, 6 and 20, 21, 22, as in CCITT recommendation G.735.

Drop and insert

One final application of a framed 2 Mb/s test set capable of "through-data" mode is to drop and insert single or multiple 64 kb/s test channels while the remaining channels carry revenue-earning traffic. This requires the test set to be placed in-circuit with the 2 Mb/s line. A much more detailed analysis is then possible on one or more 64 kb/s channels while still providing a partial service. Again, the HP 37722A and 37732A have this capability.