given bit rate. When jitter is present at the digital input port of digital equipment, in many cases some portion of the jitter is transmitted to the corresponding digital output port. Many types of digital equipment inherently attenuate the higher frequency jitter components present at the input. To control jitter in cascaded homogeneous digital equipment, it is important to restrict the value of jitter gain. The jitter transfer for a particular digital equipment can be measured using a digital signal modulated by sinusoidal jitter.

Figure 3/G.823 indicates the general shape of a typical jitter transfer characteristic. The appropriate values for the levels x and -y dB and the frequencies f, f_5, f_6 and f_7 can be obtained from the relevant Recommendation.

Because the bandwidth of phase smoothing circuits in asynchronous digital equipment is generally above 10 Hz, wander on the input signal may appear virtually unattenuated on the output. However, in certain particular digital equipments (e.g. nodal clocks) it is necessary that wander be sufficiently attenuated from input to output. CCITT Recommendations dealing with synchronous equipment will ultimatelydefine limiting values for particular wander transfer characteristics.

the terminating equipment may eventually exceed the wander and jitter tolerance of the equipment in which case slip will occur. The maximum permissible long-term mean controlled slip rate resulting from this mechanism is given by Recommendation G.811, i.e. one slip in 70 days.

At nodes terminating links interconnecting independently synchronized networks (or where plesiochronous operation is used in national networks), the relative TIE between the incoming signal and the internal timing signal of the terminating equipment may eventually exceed the wander and jitter tolerance of the equipment in which case slip will occur. The maximum permissible long-term mean controlled slip rate resulting from this mechanism is given by Recommendation G.811, i.e. one slip in 70 days.

For systems in which the output signal is controlled by an autonomous clock (e.g., quartz oscillator) more stringent output jitter values may be defined in the relevant equipment specifications (e.g., for the muldex in Recommendation G.735, the maximum peak-to-peak output jitter is 0.05 UI).

8.3Modifications to § 2, Recommendation G.823 (Fascicle III.3 of the Red Book)

2.2Network limits for wander

A maximum network limit for wander at all hierarchical interfaces has not been defined. Actual magnitudes of wander, being largely dependent on the fundamental propagation characteristics of transmission media and the ageing of clock circuitry (see Recommendation G.811, § 3), can be predicted. Studies have shown that, provided input ports can tolerate wander in accordance with the input tolerance requirements of § 3.1.1, then slips introduced as a result of exceeding the input tolerance will be rare. For interfaces to network nodes the following limits apply:

The MTIE (see Recommendation G.811) over a period of S seconds shall not exceed the following:

1) $S < 10^4$; this region requires further study;

2) $(10^{-2} S + 10000)$ ns: applicable to values of S greater than 10^4

Note - The resultant overall specification is illustrated in Figure 2/G.823.

FIGURE 2/G.823

Permissible maximum time interval error (MTIE)
vs. observation period S for the ouput of a network node

8.4Paragraph 3.1.3 should be amended as shown below:

3.1.3Jitter and wander transfer characteristics

Jitter transfer characteristics define the ration of output jitter to input jitter amplitude versus jitter frequency for a

8.Amendments to Recommendation G.823 (Fascicle III.3 of the Red Book)

8.1§ 2 of G.823 should be amended as shown below:

"2.Network limits for the maximum output jitter at any hierarchical interface

2.1Network limits for jitter

The limits given in Table 1/G.823 represent the maximum permissible levels of jitter at hierarchical interfaces within a digital network. The limits should be met for all operating conditions and regardless of the amount of equipment preceding the interface. These network limits are compatible with the minimum tolerance to jitter that all equipment input ports are required to provide."

8.2At the end of § 2, new text should be added as shown below:

FIGURE 1/G.823

Measurement arrangements for output jitter
from an hierarchical interface or an equipment output port

It is assumed that, within a synchronized network, digital equipment provided at nodes will accommodate permitted phase deviations on the
incoming signal, together with jitter and wander from the transmission plant, i.e. under normal synchronized conditions, slip will not occur. However, it should be recognized that, as a result of some performance degradations, failure conditions, maintenance actions and other events, the relative time interval error (TIE) between the incoming signal, and the internal timing signal of the terminating equipment may exceed the wander and jitter tolerance of the equipment which will result in a controlled slip.

At nodes terminating links interconnecting independently synchronized networks (or where plesiochronous operation is used in national networks), the relative TIE between the incoming signal and the internal timing signal of