**Errored Second (ES) :** an errored second is an interval of a second during which any error whatsoever has occurred, regardless of whether that error was a single bit error, or a complete loss of communication for that entire second; the type of error is not important for the purpose of counting errored seconds.

In communication systems with very low uncorrected bit error rates, such as modern fiber optic transmission systems, or systems with higher low-level error rates that are corrected using large amounts of forward error correction, errored seconds are often a better measure of the effective user-visible error rate than the raw bit error rate.

For many modern packet-switched communication systems, even a single uncorrected bit error is enough to cause the loss of a data packet by causing its CRC check to fail; whether that packet loss was caused by a single bit error, or a hundred-bit-long error burst is irrelevant.

For systems using large amounts of forward error correction, the reverse applies; a single low-level bit error will almost never occur, since any small errors will almost always be corrected, but any error sufficiently large to cause the forward error correction to fail will almost always result in a large burst error.

More specialist and precise definitions of errored seconds exist in standards such as the T1 and DS1 transport systems.

**Severely Errored Second (SES):** A one-second period which contains ≥30% errored blocks

or at least one defect. SES is a subset of ES.

Consecutive Severely Errored Seconds may be precursors to periods of unavailability, especially

when there are no restoration/protection procedures in use. Periods of consecutive Severely Errored

Seconds persisting for T seconds, where 2 ≤ T < 10 (some Network Operators refer to these events

as "failures"), can have a severe impact on service, such as the disconnection of switched services.

The only way this Recommendation limits the frequency of these events is through the limit for the

SESR. (See Notes 1 and 2.)

NOTE 1 – The defects and related performance criteria are listed in the relevant Annexes (B, C or D) for the

different network fabrics PDH, SDH or cell-based.

NOTE 2 – To simplify measurement processes, the defect is used in the definition of SES instead of defining SES directly in terms of severe errors affecting the path. While this approach simplifies the measurement of SES, it should be noted that there may exist error patterns of severe intensity that would not trigger a defect as defined in Annexes B, C and D. Thus, these would not be considered as an SES under this definition.

**Unavailable Seconds (UAS) :** The Unavailable Seconds (UAS) metric indicates during how many seconds of some interval the service can be considered to have been unavailable.

► ITU-T Recommendation Y.1563 defines UAS based on the concept of Severely Errored Seconds (SES). A period of unavailability starts with 10 consecutive SES and ends with 10 consecutive non-ES. Those first 10 consecutive SES are part of the period of unavailability. See the diagram below, taken from Y.1563, for an illustration: Table

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