

RECOMMENDATION ITU-R PN.341-3*

THE CONCEPT OF TRANSMISSION LOSS FOR RADIO LINKS**

(1959-1982-1986-1994)

The ITU Radiocommunication Assembly,

considering

- a) that in a radio link between a transmitter and a receiver, the ratio between the power supplied by the transmitter and the power available at the receiver input depends on several factors such as the losses in the antennas or in the transmission feed lines, the attenuation due to the propagation mechanisms, the losses due to faulty adjustment of the impedances or polarization, etc.;
- b) that it is desirable to standardize the terminology and notations employed to characterize transmission loss and its components;
- c) that Recommendation ITU-R PN.525 provides the free-space reference conditions for propagation,

recommends

that, to describe the characteristics of a radio link involving a transmitter, a receiver, their antennas, the associated circuits and the propagation medium, the following terms, definitions and notations should be employed:

1. Total loss (of a radio link)* (symbols: L_l or A_l)**

The ratio, usually expressed in decibels, between the power supplied by the transmitter of a radio link and the power supplied to the corresponding receiver in real installation, propagation and operational conditions.

Note 1 – It is necessary to specify in each case the points at which the power supplied by the transmitter and the power supplied to the receiver are determined, for example:

- before or after the radio-frequency filters or multiplexers that may be employed at the sending or the receiving end;
- at the input or at the output of the transmitting and receiving antenna feed lines.

2. System loss (symbols: L_s or A_s)

The ratio, usually expressed in decibels, for a radio link, of the radio-frequency power input to the terminals of the transmitting antenna and the resultant radio-frequency signal power available at the terminals of the receiving antenna.

Note 1 – The available power is the maximum real power which a source can deliver to a load, i.e., the power which would be delivered to the load if the impedances were conjugately matched.

* This Recommendation should be brought to the attention of the Coordination Committee for Vocabulary (CCV).

** Throughout this Recommendation, capital letters are used to denote the ratios (dB) of the corresponding quantities designated with lower-case type, e.g. $P_t = 10 \log p_t$. P_t is the input power to the transmitting antenna (dB) relative to 1 W when p_t is the input power (W).

*** A graphical depiction of this and subsequent definitions is shown in Fig. 1.

Note 2 – The system loss may be expressed by:

$$L_S = 10 \log (p_t/p_a) = P_t - P_a \quad \text{dB} \quad (1)$$

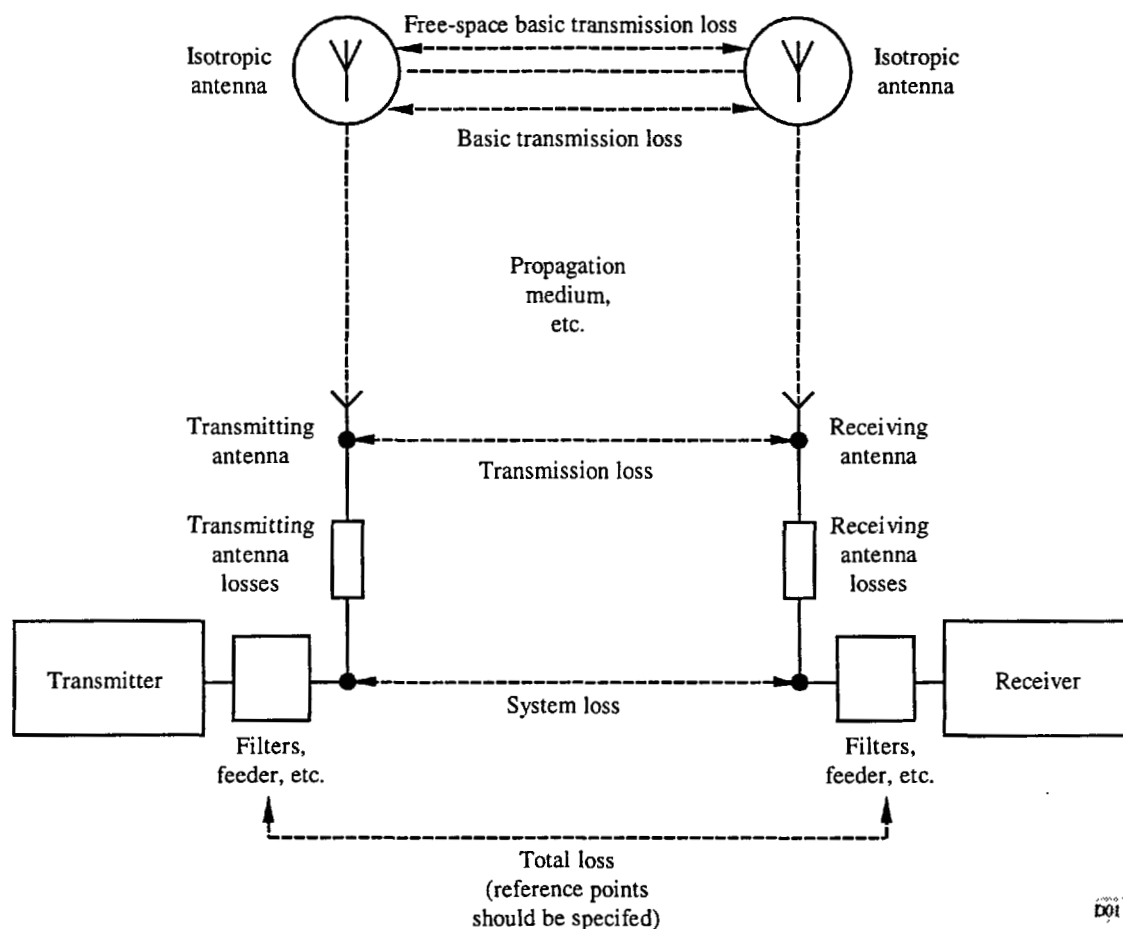
where:

p_t : radio-frequency power input to the terminals of the transmitting antenna

p_a : resultant radio-frequency signal power available at the terminals of the receiving antenna.

Note 3 – The system loss excludes losses in feeder lines but includes all losses in radio-frequency circuits associated with the antenna, such as ground losses, dielectric losses, antenna loading coil losses, and terminating resistor losses.

FIGURE 1
Graphical depiction of terms used in the transmission loss concept



3. Transmission loss (of a radio link) (symbols: L or A)

The ratio, usually expressed in decibels, for a radio link between the power radiated by the transmitting antenna and the power that would be available at the receiving antenna output if there were no loss in the radio-frequency circuits, assuming that the antenna radiation diagrams are retained.