INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
INNOVATION & LEADERSHIP

POWER BUDGET ANALYSIS FOR FIBER OPTICS LINK PART 2

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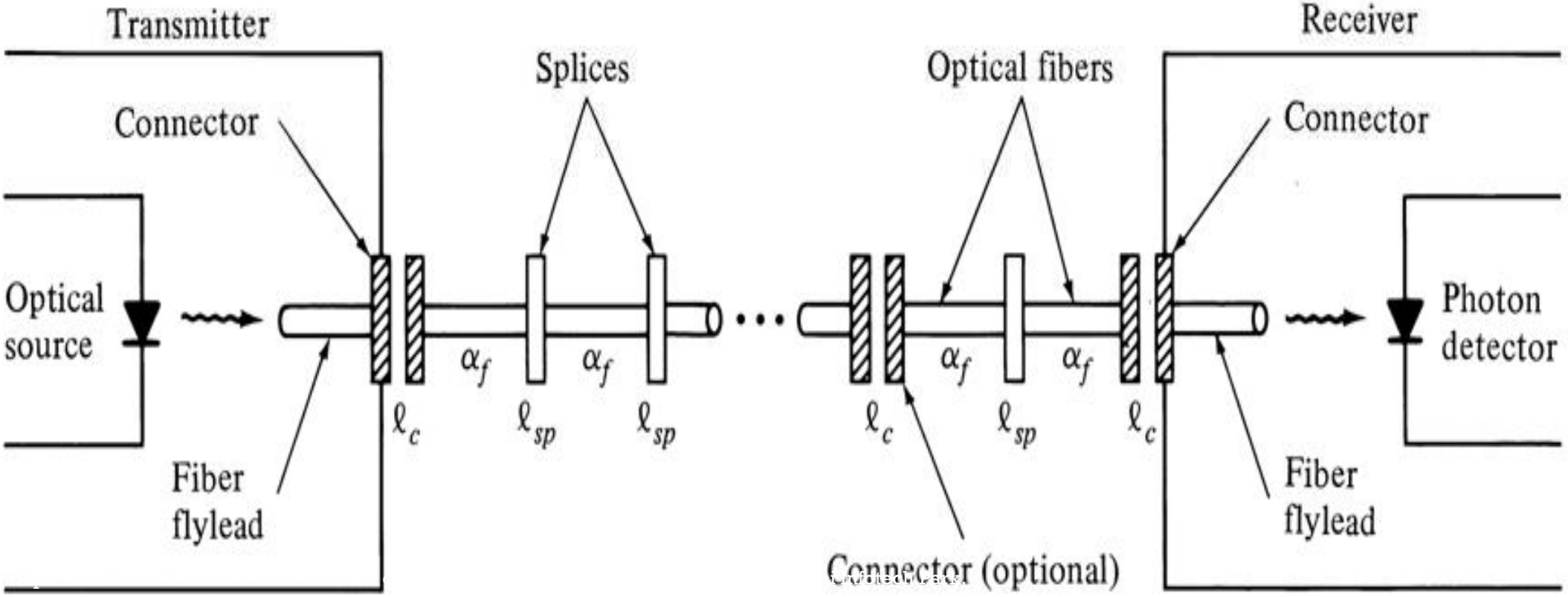
OPTICAL POWER LOSS MODEL

A typical optical power loss model for a point- to- point link considered

- one transmitter,
- one receiver
- two connectors & splices as shown in figure

Optical power-loss model



- The total optical power received at photodetector is equal to losses occuring in fiber, connetor , splices & loss of light coupled into fiber from transmitter.
- The loss budget is nothing but summation of above losses mention. Each of these loss elements is expressed in decibels (dB) as,
  - $loss = 10 \log \frac{Pout}{Pin}$
- Where,

  $Pin = power\ entering\ into\ fiber\ (coupled\ power\ from\ LED\ or\ Laser\ to\ Fiber)$
- $Pout = power\ leaving\ the\ loss\ elements\ (power\ measured\ at\ photodetector)$

- The total link loss budget is equal to differenence between Ps optical power emering from the end of a fiber flylead attached to the light source and receiver sensitivity P_R.

$$P_T = P_S - P_R$$
$$= 2l_C + \alpha_f L + system\ margin$$

- $l_C = connector\ loss$
- $\alpha_f = attenuation\ constant\ of\ fiber$
- $L = length\ of\ fiber$
- $system\ margin\ usually\ 3\ to\ 6\ dB\ if\ not\ given\ assume\ 6\ dB.$

LINK POWER MARGIN OR SYSTEM MARGIN

- Link Power analysis is capable to provide analysis which gives compnent aging, temperature fluctuations and losses arising from components that are going to add in future.
- This addition in link budget is called link power margin, normally its between range 3 to 6 dB.

Thank You

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