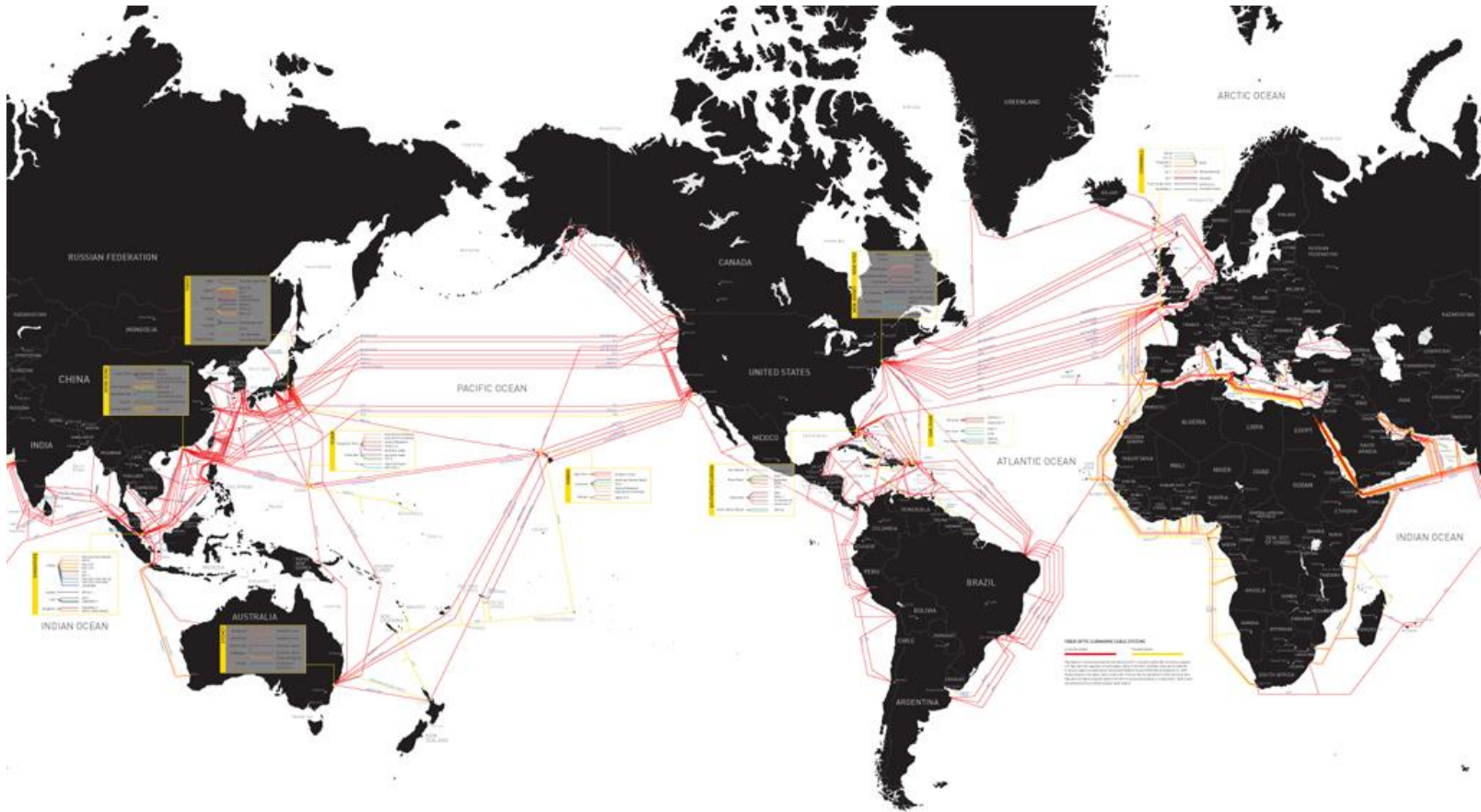


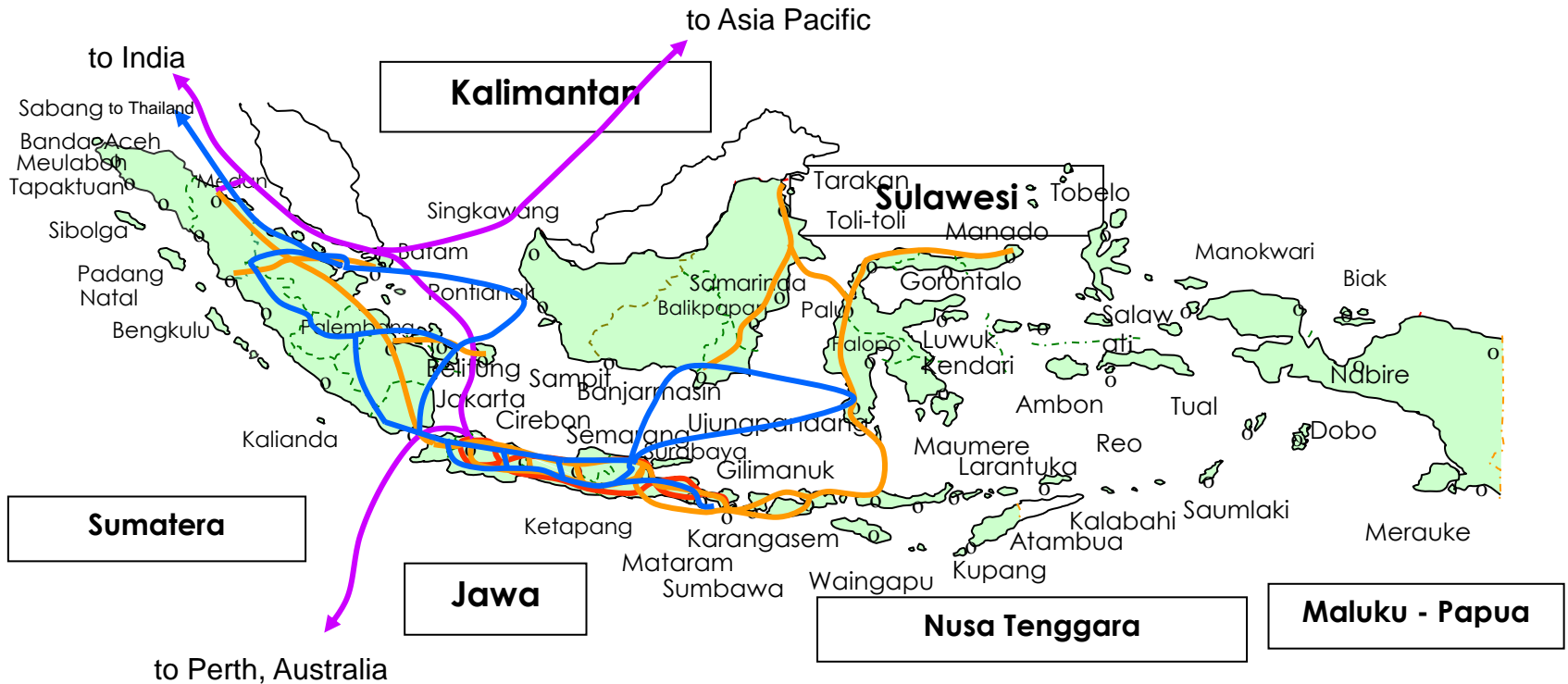
Siskom optik lanjut (2)

Penguat Optik

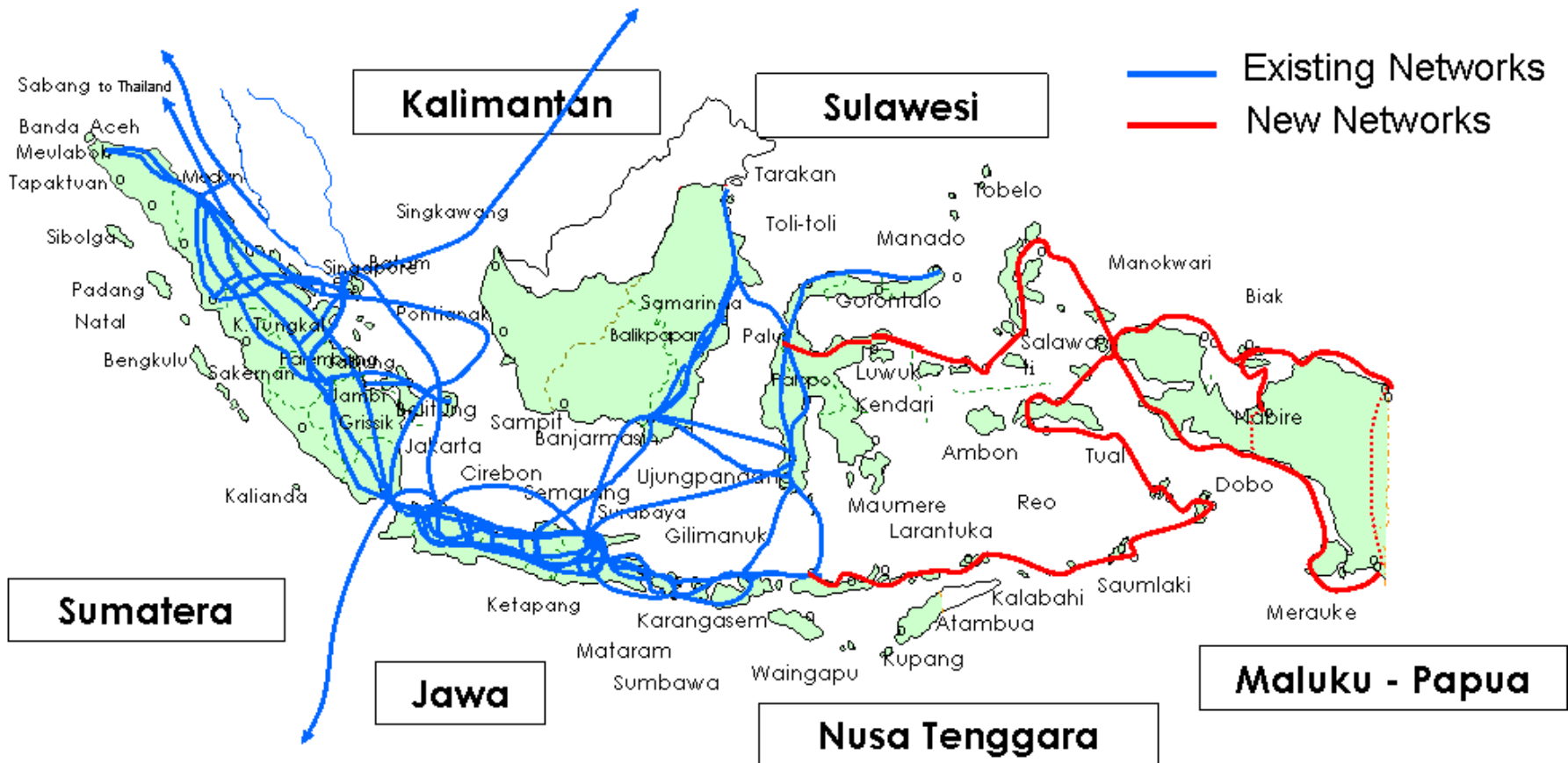
SKKL Dunia



SKKL Indonesia

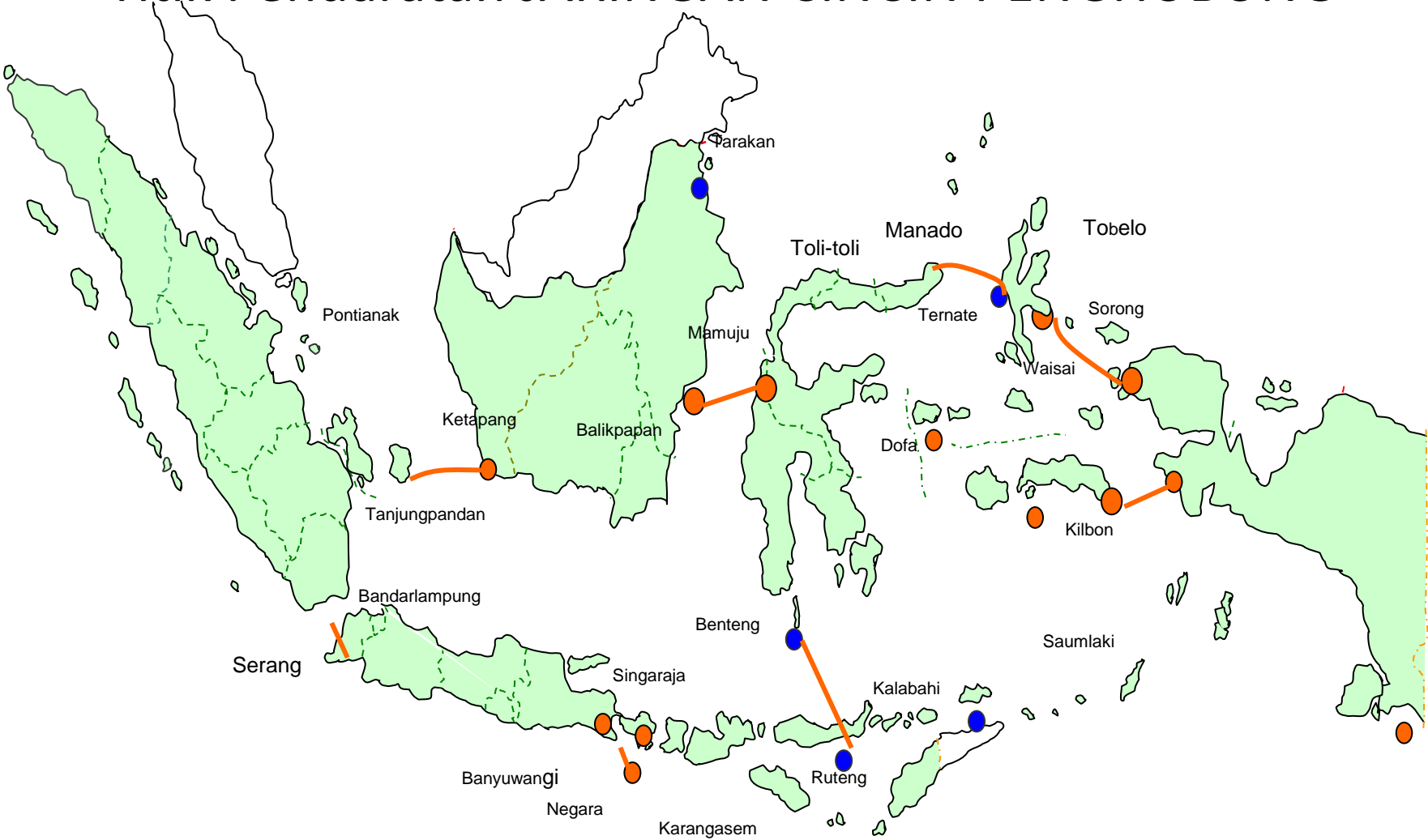


Palapa Ring Tahap1 (Eastern Ring)





Titik Pendaratan JARINGAN CINCIN PENGHUBUNG



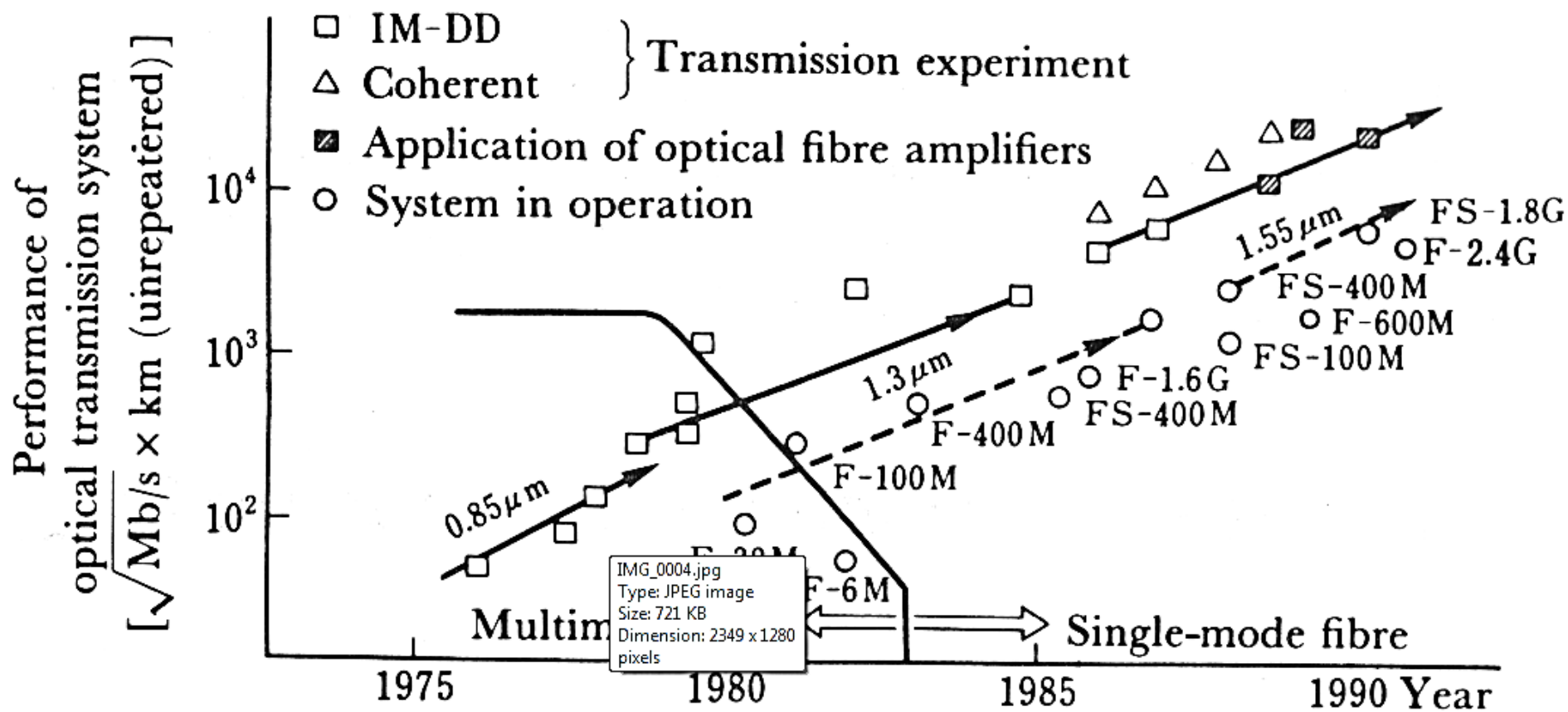


Fig. 1.2 The development of optical transmission systems (NTT).

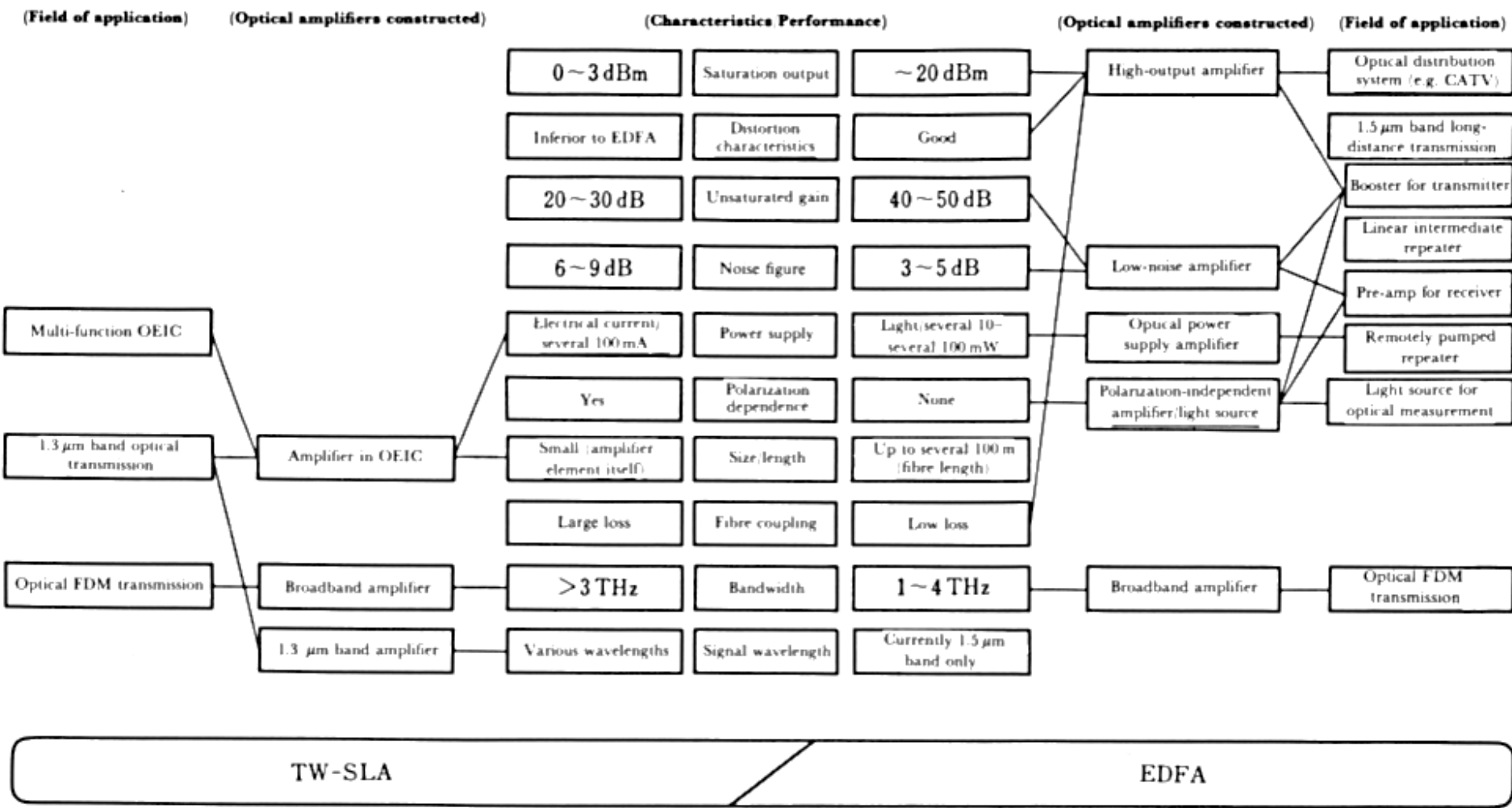
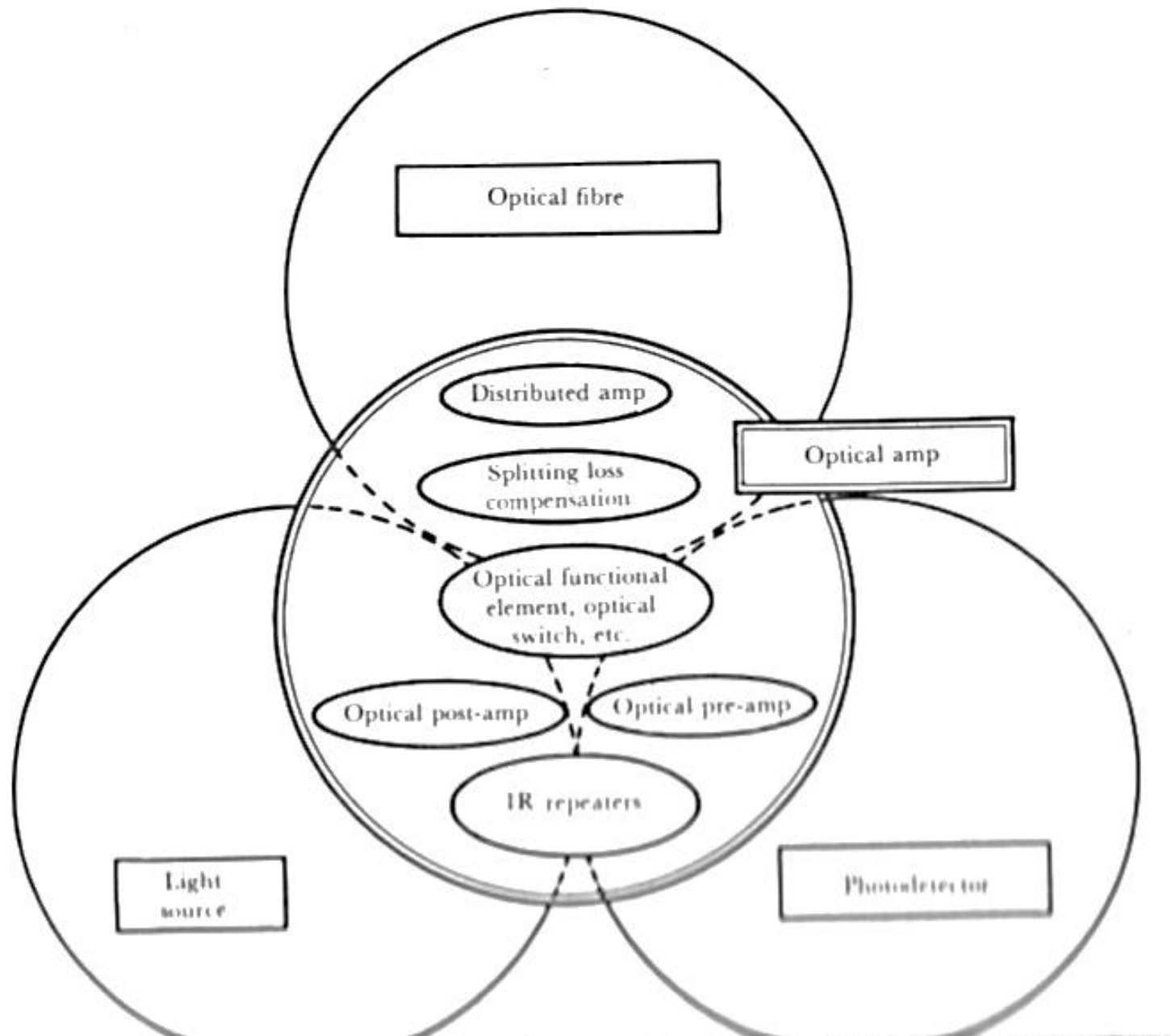
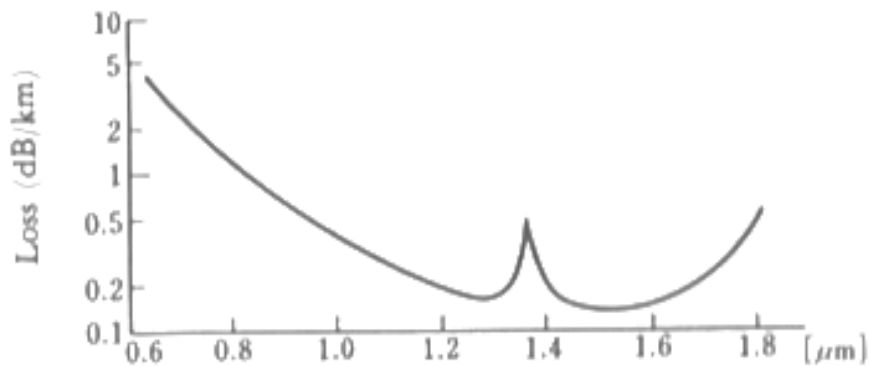


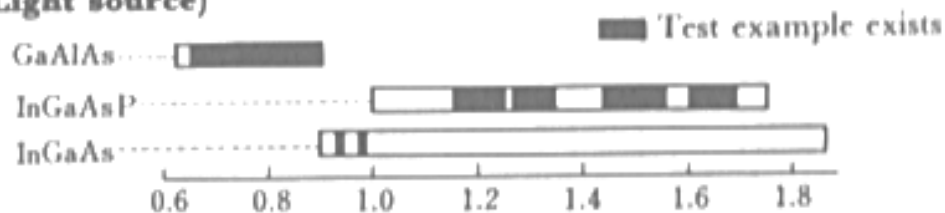
Fig. 1.6 Optical amplifier characteristics and applications.



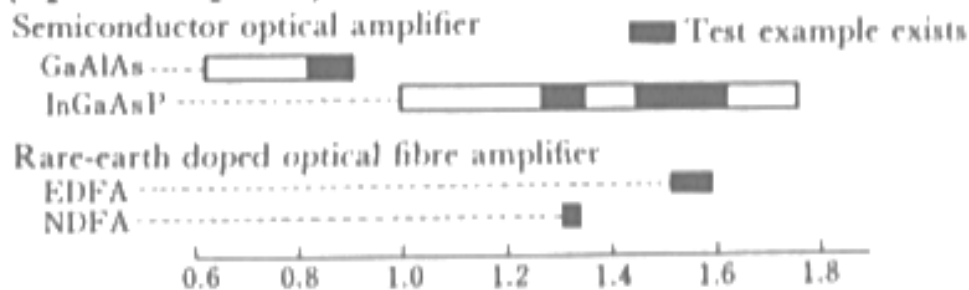
(Optical fibre)



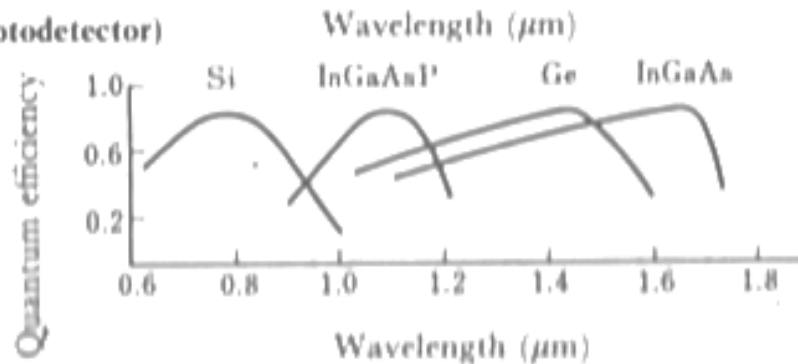
(Light source)

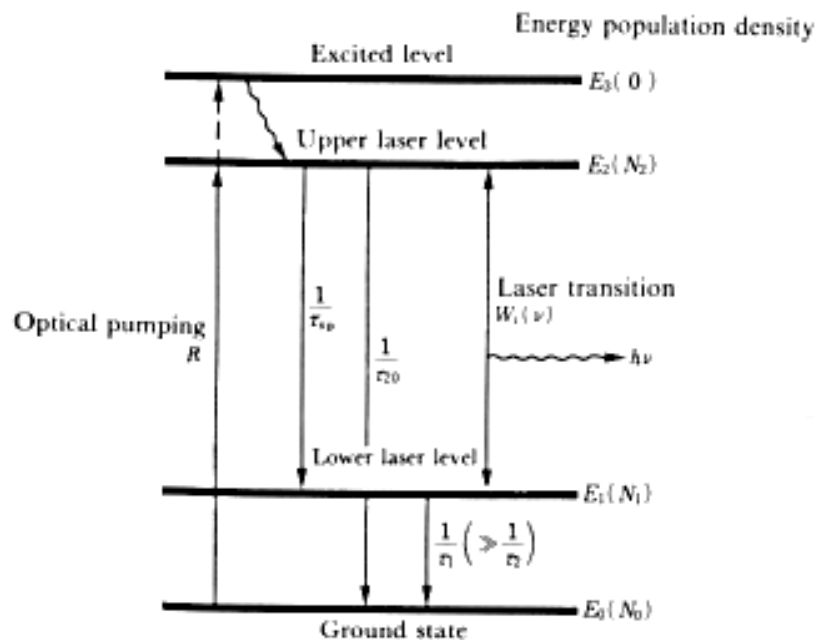


(Optical Amplifier)

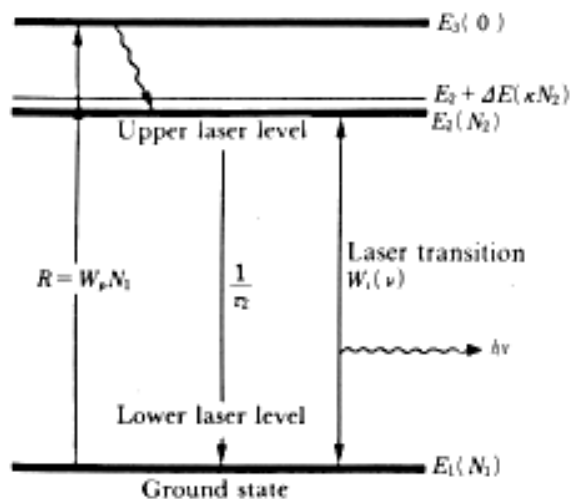


(Photodetector)





(a) Four level system
 (upper level E_2 lifetime τ_2 : $1/\tau_2 = 1/\tau_{sp} + 1/\tau_{20}$)



(b) Three-level system ($\kappa = \exp(-\Delta E/kT)$)

Fig. 2.1 Laser energy levels and transition rates.

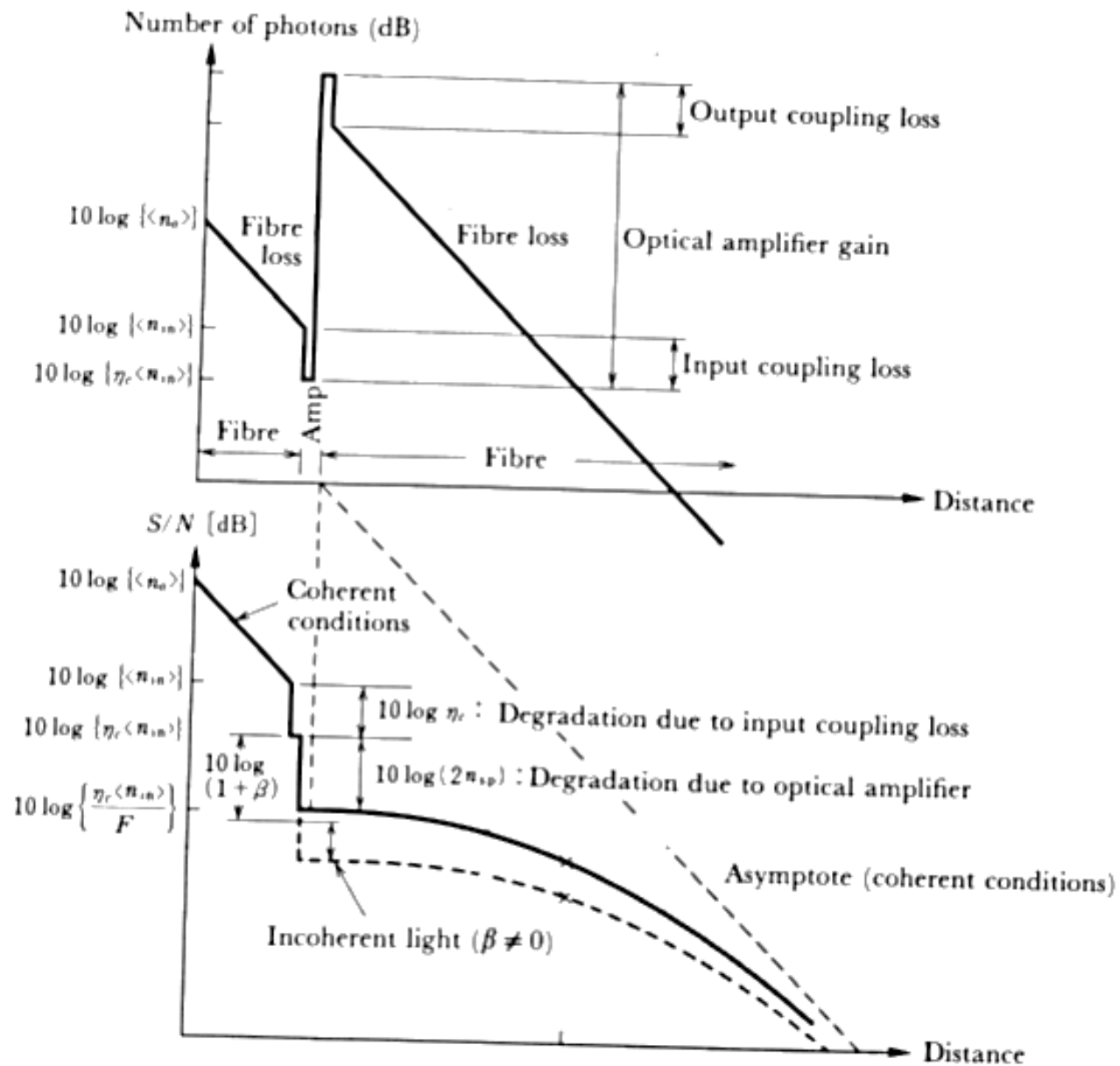


Fig. 2.3 Variation in number of photons and S/N ratio in optical amplification.

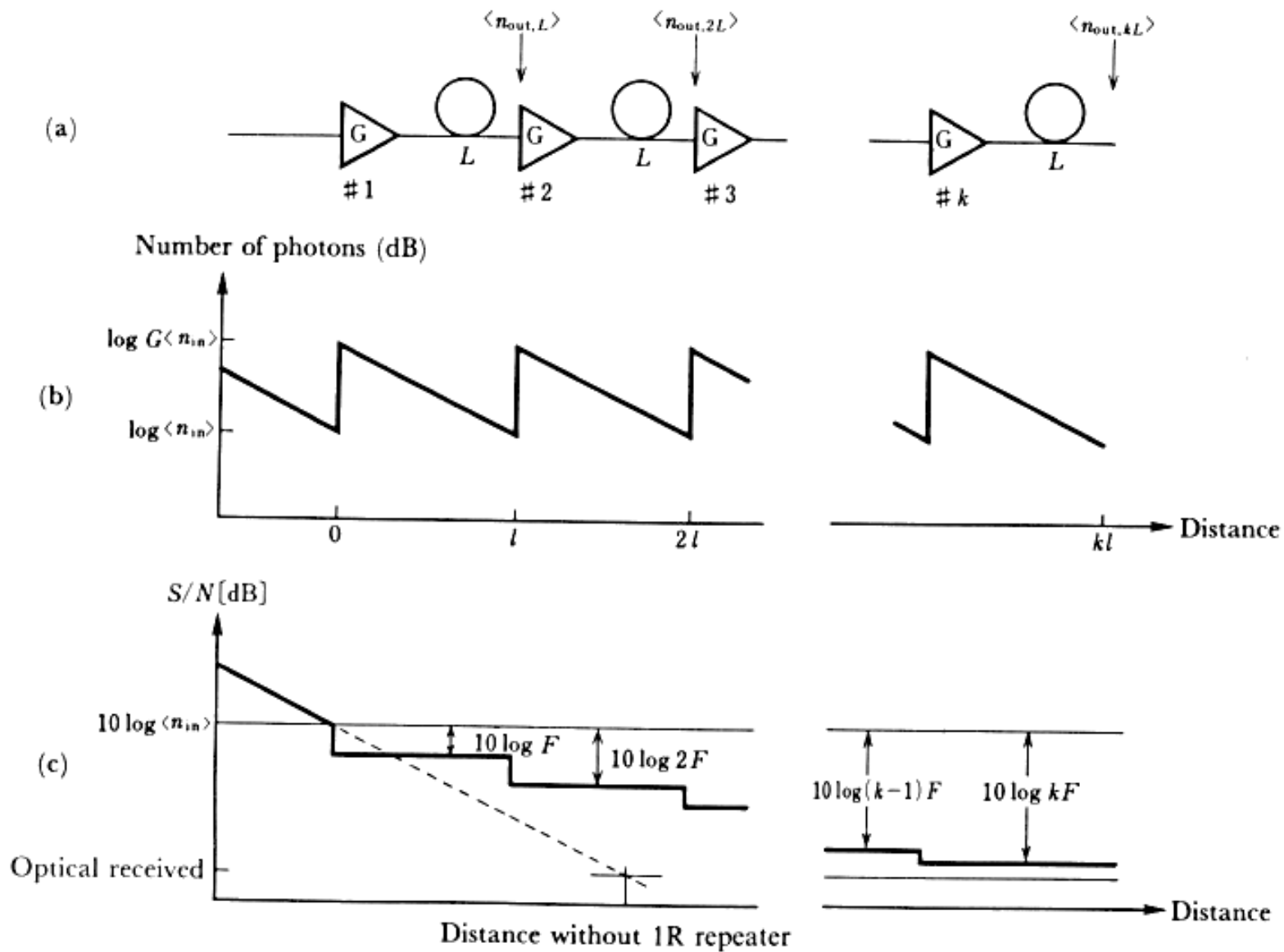
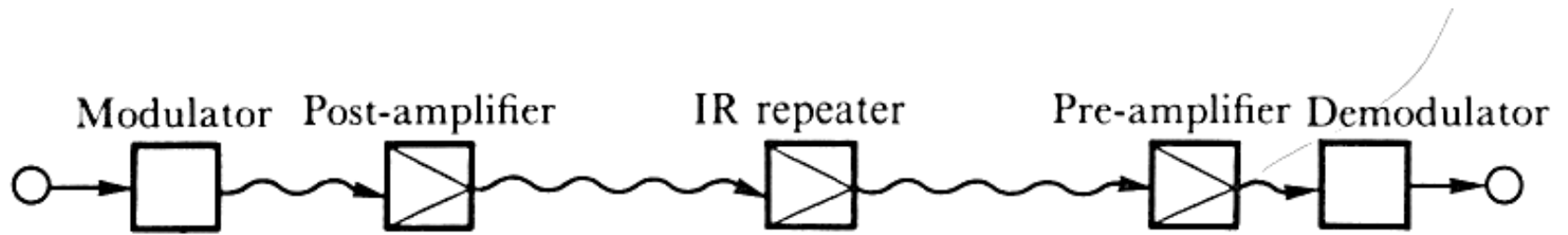
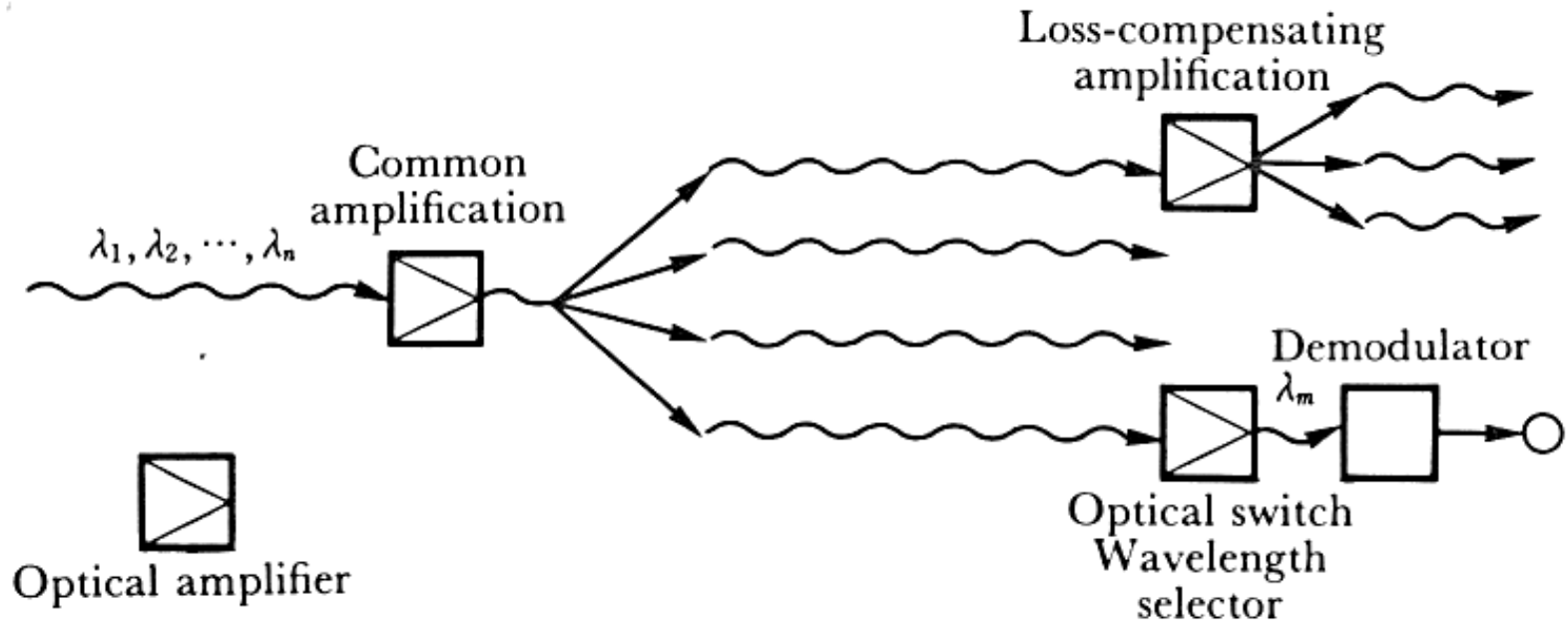


Fig. 2.4 Relationship between number of photons and S/N ratio for IR multi-repeated transmission.



(a) Application to trunk transmission system



(b) Application to signal distribution system

Fig. 2.6 Configurations for optical amplifiers in system applications.

Table 2.1 Requirements of different optical amplifiers and their fields of use

Function	Post-amplifier Amplifying transmitter output (Repeater gain increase)	In-line amplifier 1R multi- repeating (Simple repeater)	Pre-amplifier Improving optical receiver sensitivity (Repeater gain increase)	Common amplifier. Increasing branching number (Loss compensation)
High gain	△	○	○	○
High saturation output	○	△(○)	×	○
Low noise characteristics	×(△)	△(○)	○	△
Polarization independence	×	○	○	△
Low insertion loss	×	△	○	×
Narrow-band optical filter	×	×(△)	○	×
Optical isolator	○	○	○	○
Field (system) of application	Trunk trans- mission, subscriber, IM-DD, analogue, coherent	Trunk transmis- sion (land, undersea), IM-DD, co- herent, soliton transmission	Trunk transmis- sion IM-DD, analogue	Subscriber LAN, IM-DD, ana- logue, coherent

Note: ○: essential; △: necessary; ×: unnecessary

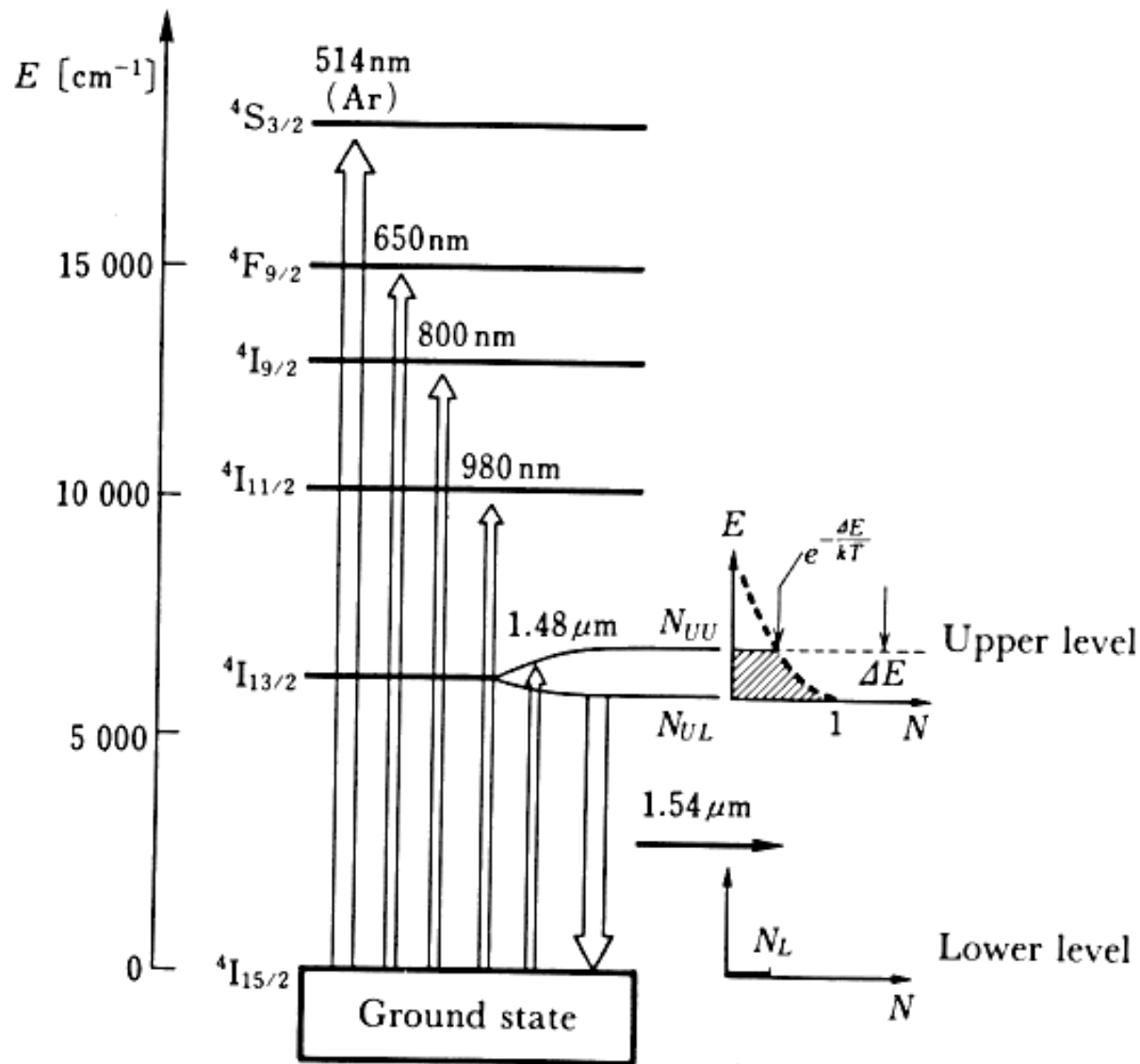


Fig. 2.9 Er^{3+} energy levels and pump and radiative transitions.

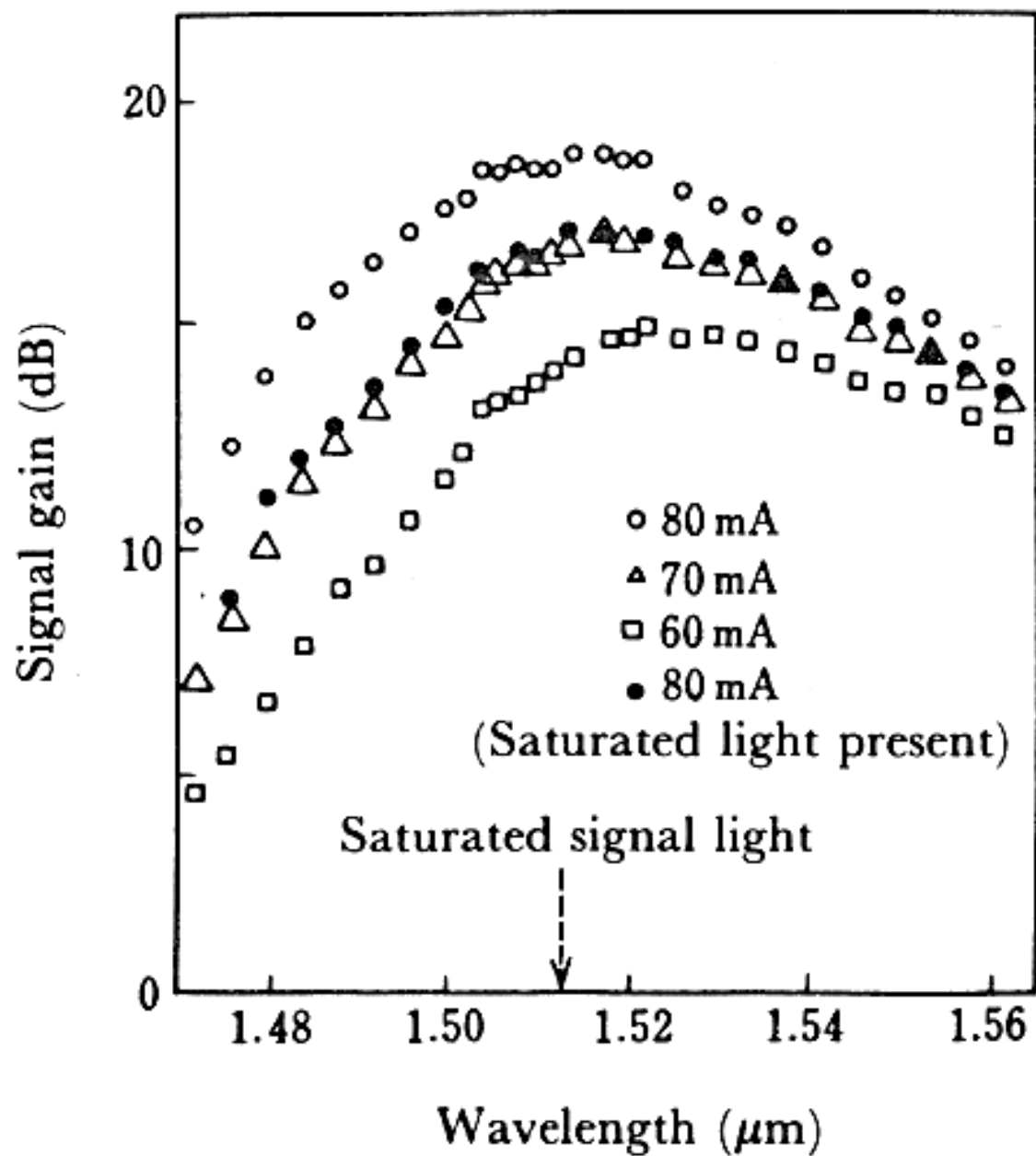


Fig. 3.1 Gain spectra.

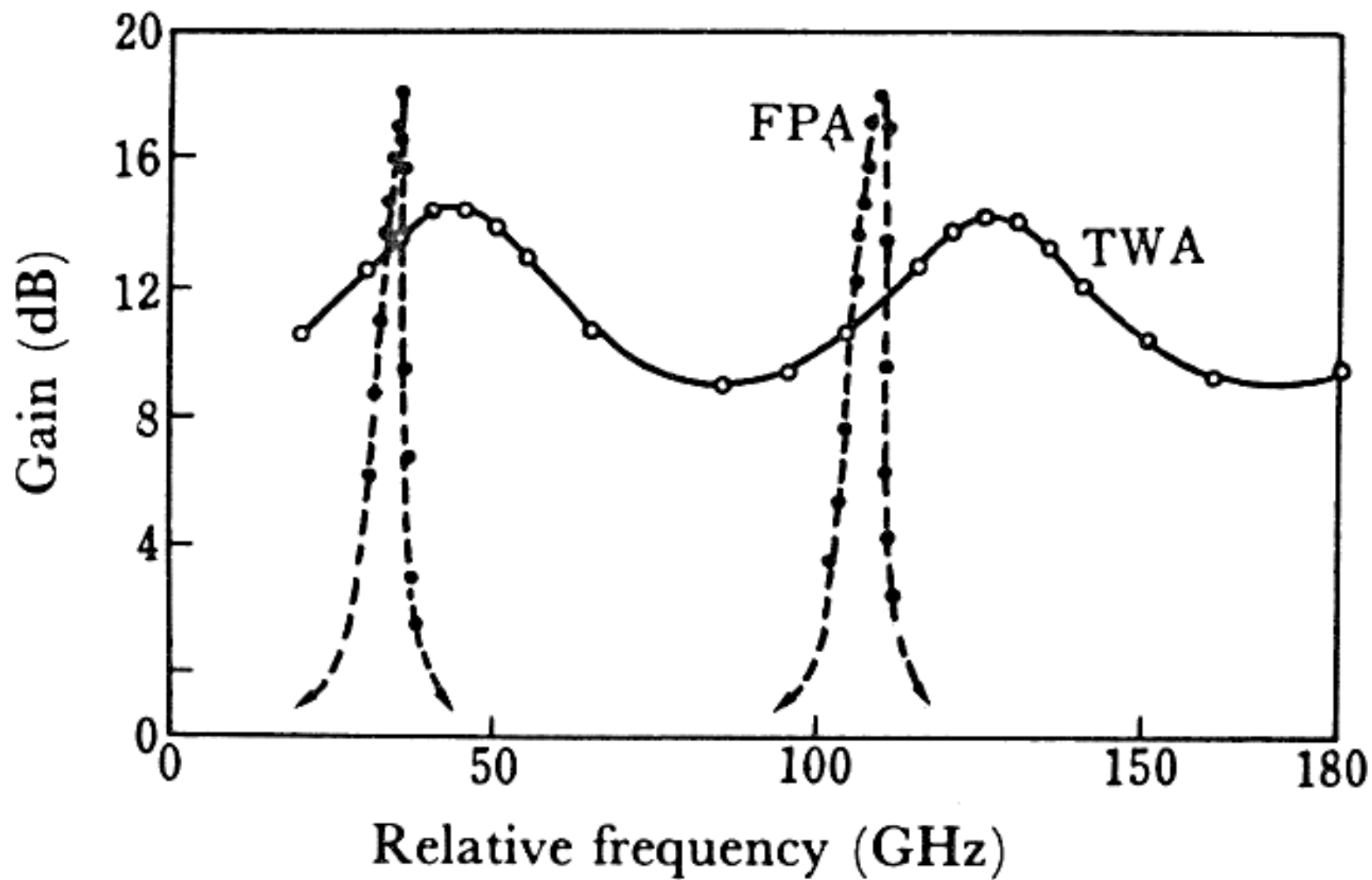


Fig. 3.4 Gain spectra.

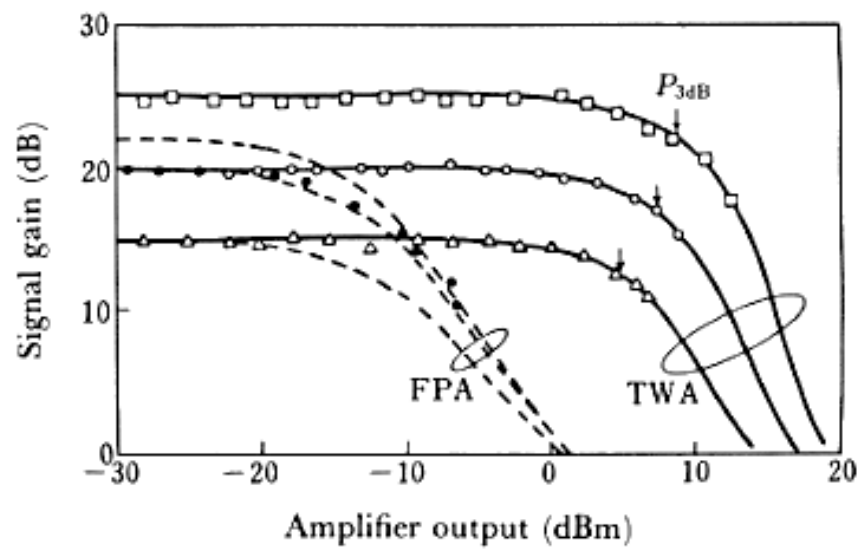


Fig. 3.5 Gain saturation.

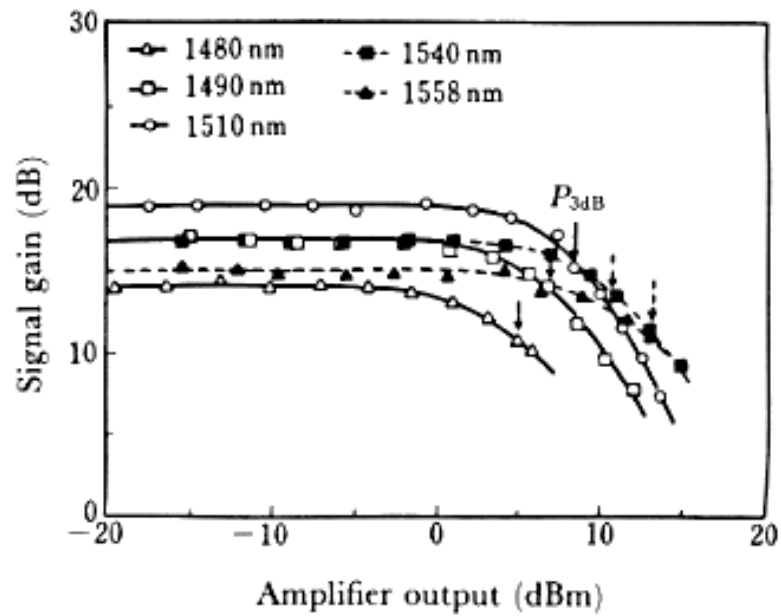


Fig. 3.6 Wavelength dependence of gain saturation.

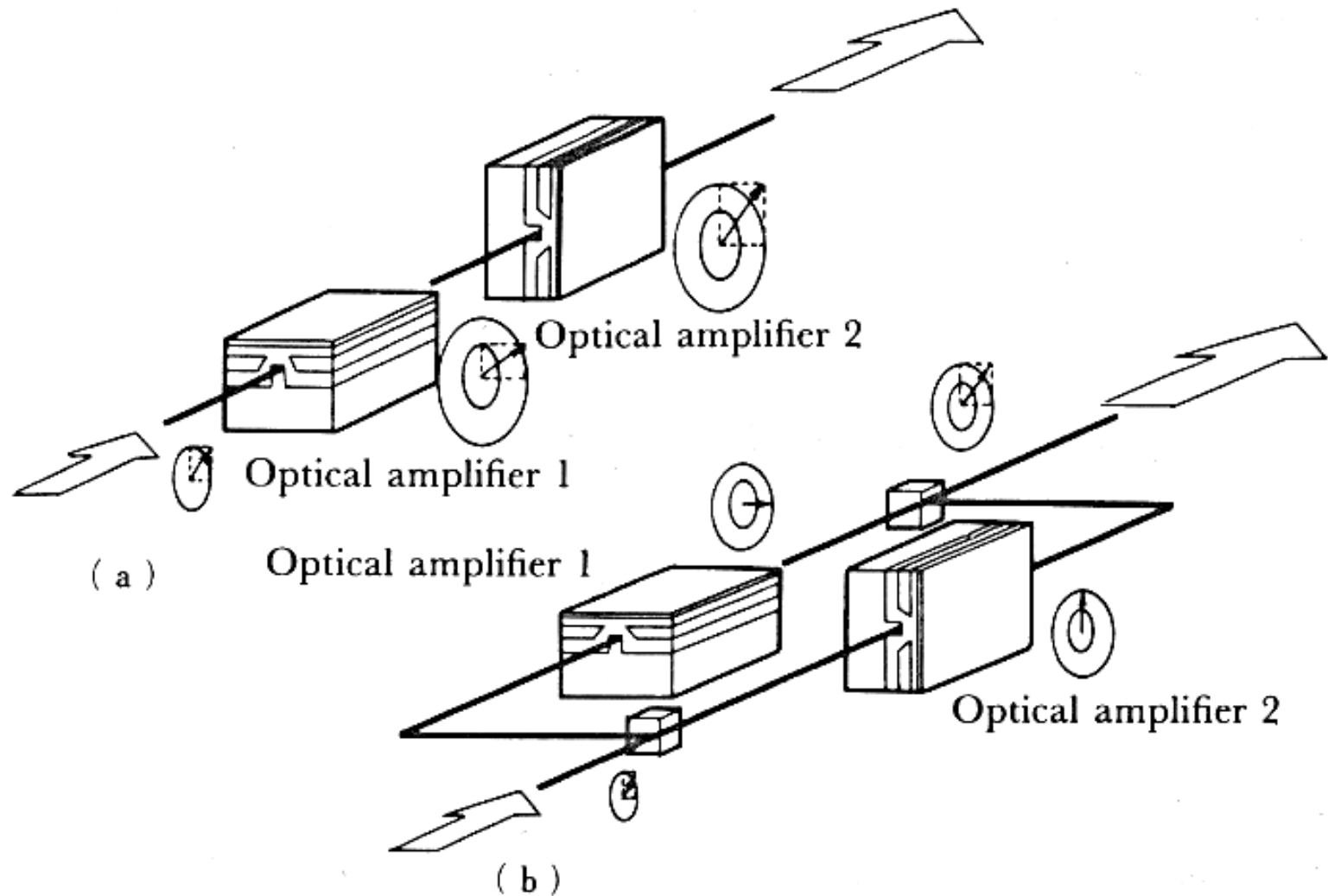
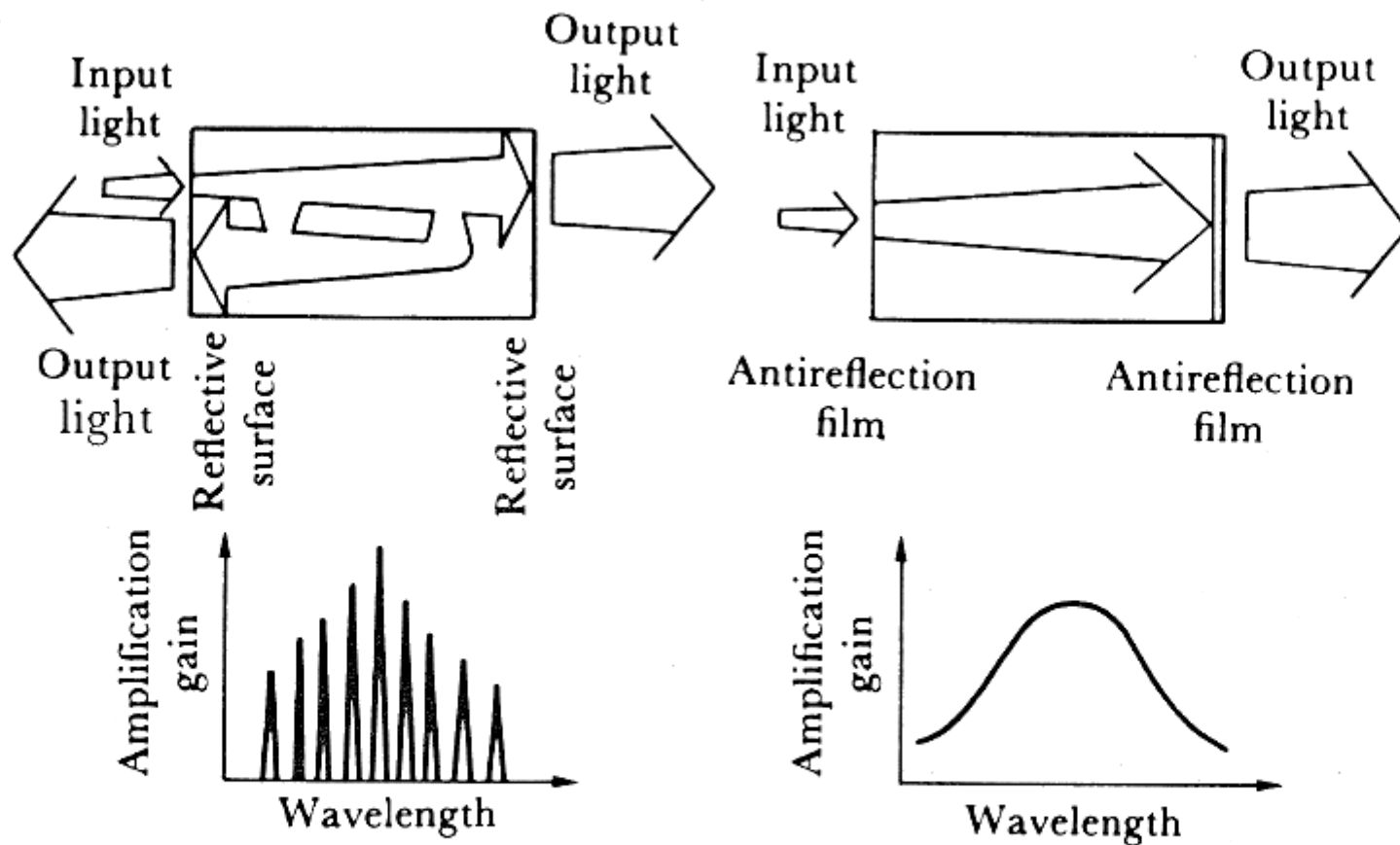


Fig. 4.1 Hybrid configurations for reducing polarization dependence.



(a) Resonant type optical amplifier (b) Travelling-wave optical amplifier

Fig. 4.3 Resonant-type optical amplifier and travelling-wave optical amplifier.

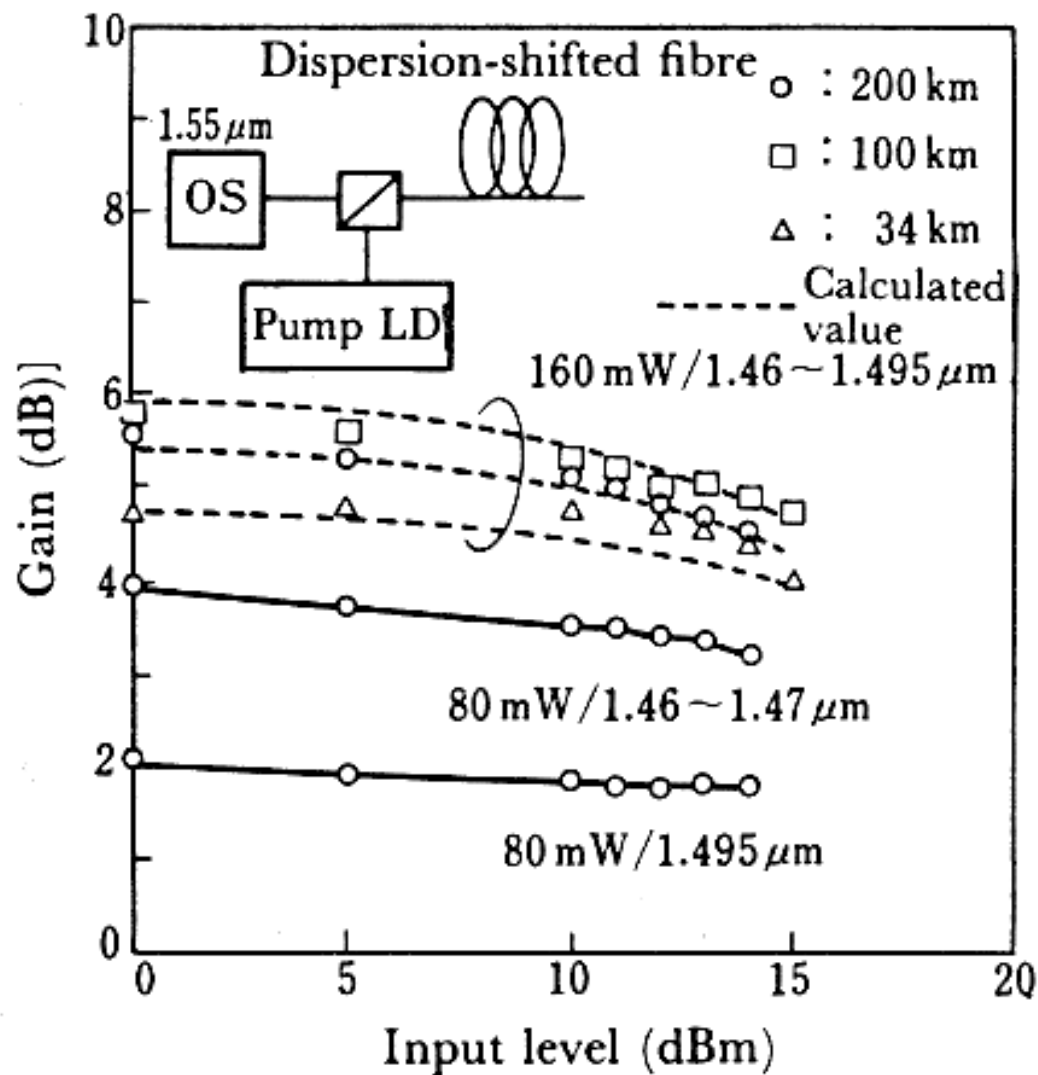


Fig. 9.5 Construction and characteristics of a Raman amplifier.

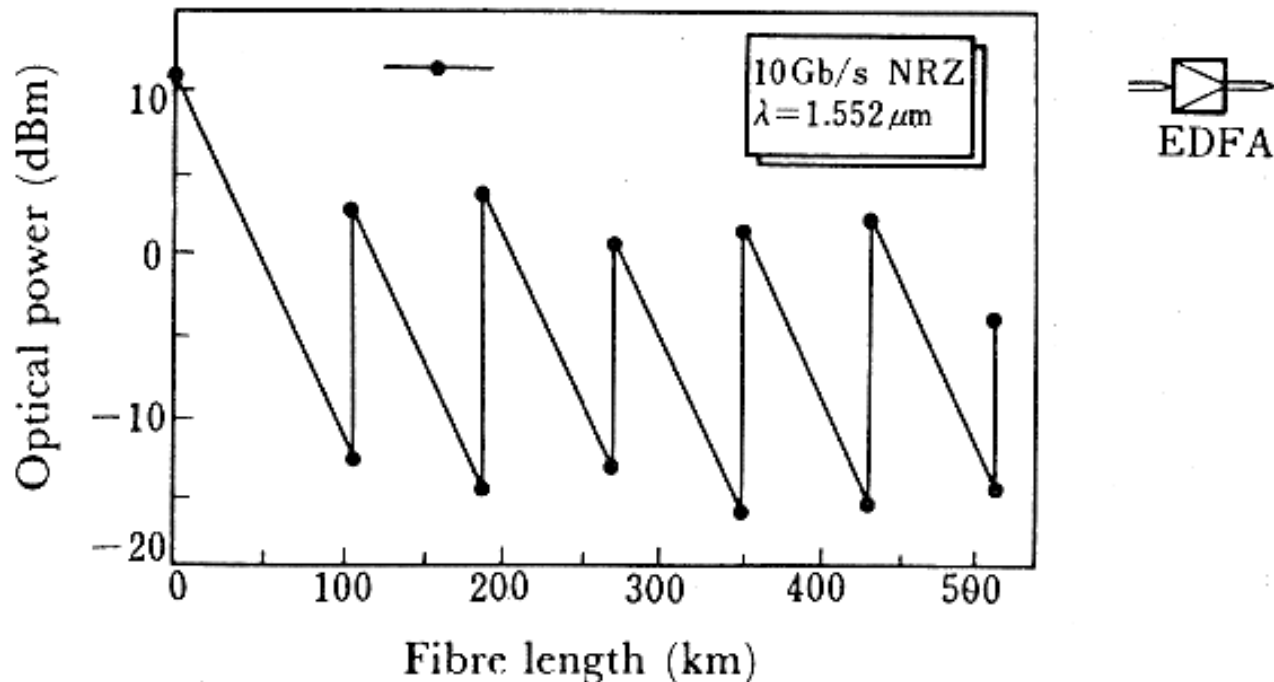
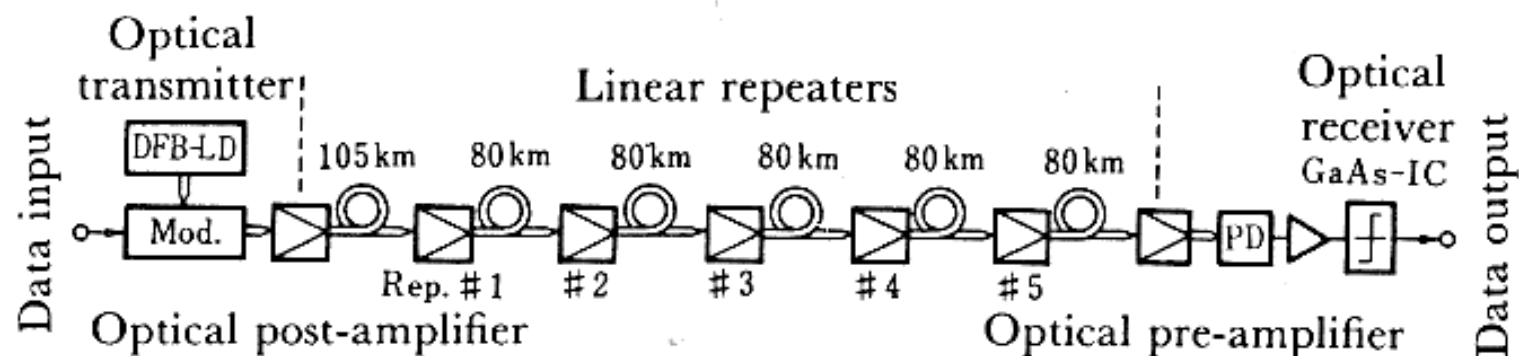


Fig. 9.12 Level diagram for 10 Gb/s–505 km transmission.