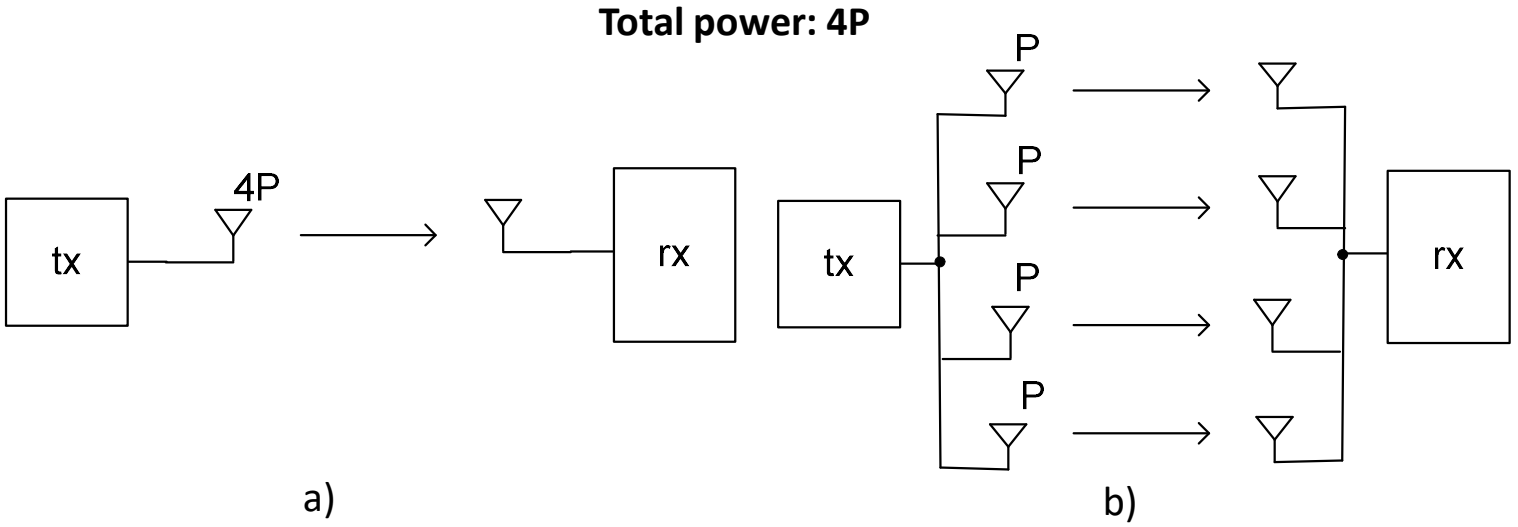
Tradeoff Example

‘You want to design a 1.5Gbps link with a restricted bandwith of 1 GHz. Select the modulation to achieve the rate with minimum tx power, between BPSK, QPSK, 16QAM, 64QAM’

MIMO Gain

- *Which one is better and why?*

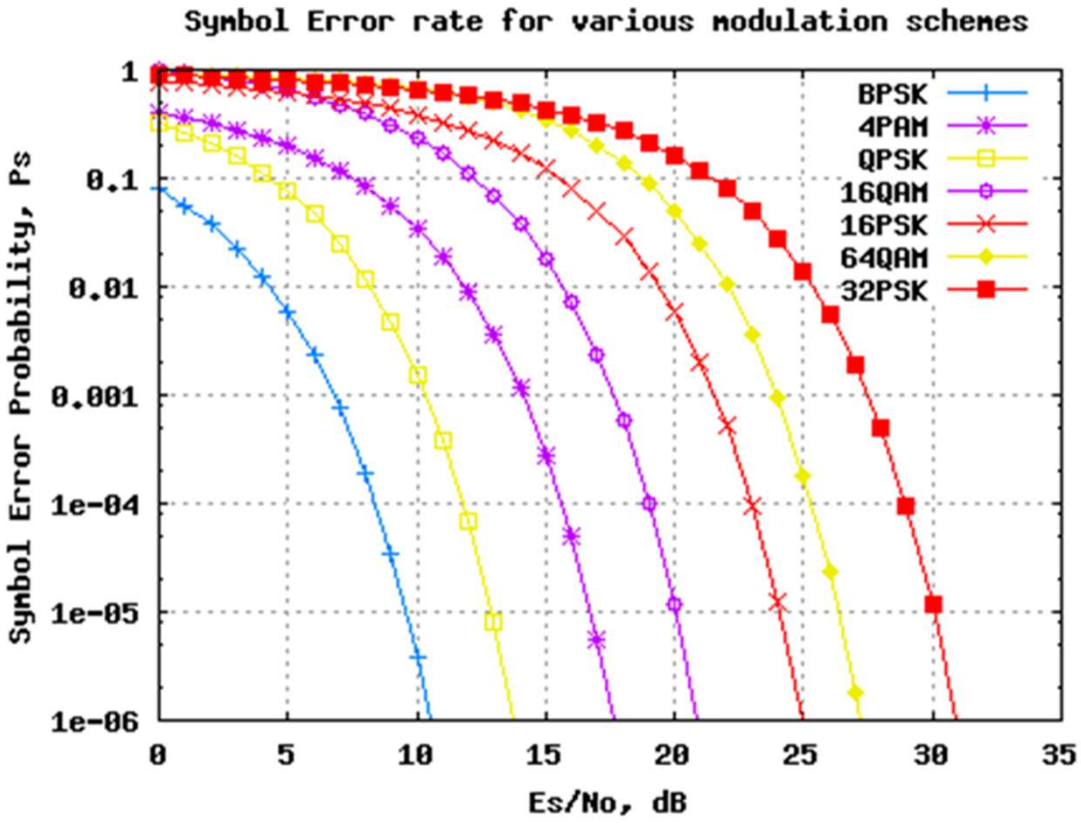


Example

A microwave Line of Sight (LoS) link is designed to transmit a 64 QAM modulated 1.5 Gbit/s data stream using a 10 GHz carrier, with the transmitter power being limited to 1 Watt. The link employs two identical microwave transmit and receive antennas each has a gain of 12 dB and each is fed by a coaxial cable with coupling efficiency of 35%. Using power budget calculations and Figure 1 below, comment on the suitability of this link for the purpose of high quality data transmission with symbol error rate better than 10^{-6}, over a short distance of 2 km. Assume that the receiver and transmitter antennas are of the same height and that the receiver front end equipment has a noise figure of 8 dB and is operating at room temperature (27 ^{o}C).

k= 1.38 x 10^{-23} Joule/Kelvin

Example


Symbol Error rate for various modulation schemes
Symbol Error Probability, Ps
Es/No, dB
1
0.1
0.01
0.001
1e-04
1e-05
1e-06
0
5
10
15
20
25
30
35
BPSK
4PAM
QPSK
16QAM
16PSK
64QAM
32PSK