

Power Efficient H.263 Video Transmission over Wireless Channels

submitted to ICC2002

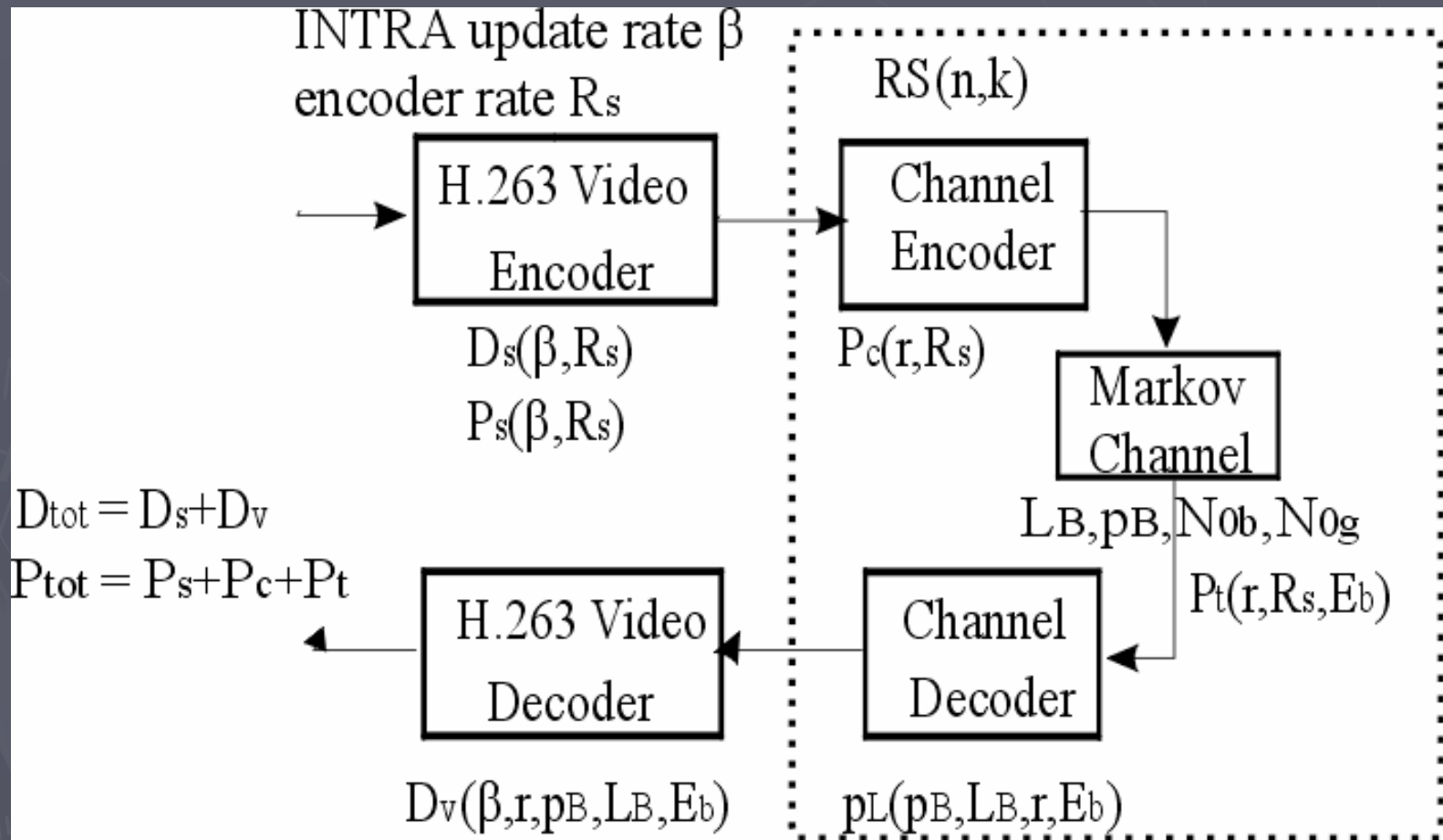
Contributions

- ▶ Power consumption models for an H.263 video encoder
- ▶ Optimal power allocation for a wireless communication system among video encoder, channel encoder and transmitter

Paper outline

- ▶ Introduction
- ▶ Models
 - H.263, Markov channel, RS code
 - Distortion models by Stuhlmuller
- ▶ Power consumption model & measurement
- ▶ Optimization of power allocation
- ▶ Results
- ▶ Future work

System Model



Objective

- ▶ Choose parameters
 - source coding parameters β, R_s
 - channel coding rate r
 - transmission parameter E_b
- ▶ minimize $P_{\text{tot}} = P_s + P_c + P_t$
- ▶ subject to $D_{\text{tot}} = D_s + D_v \leq D_0$

Source Model(1)

► Power Consumption

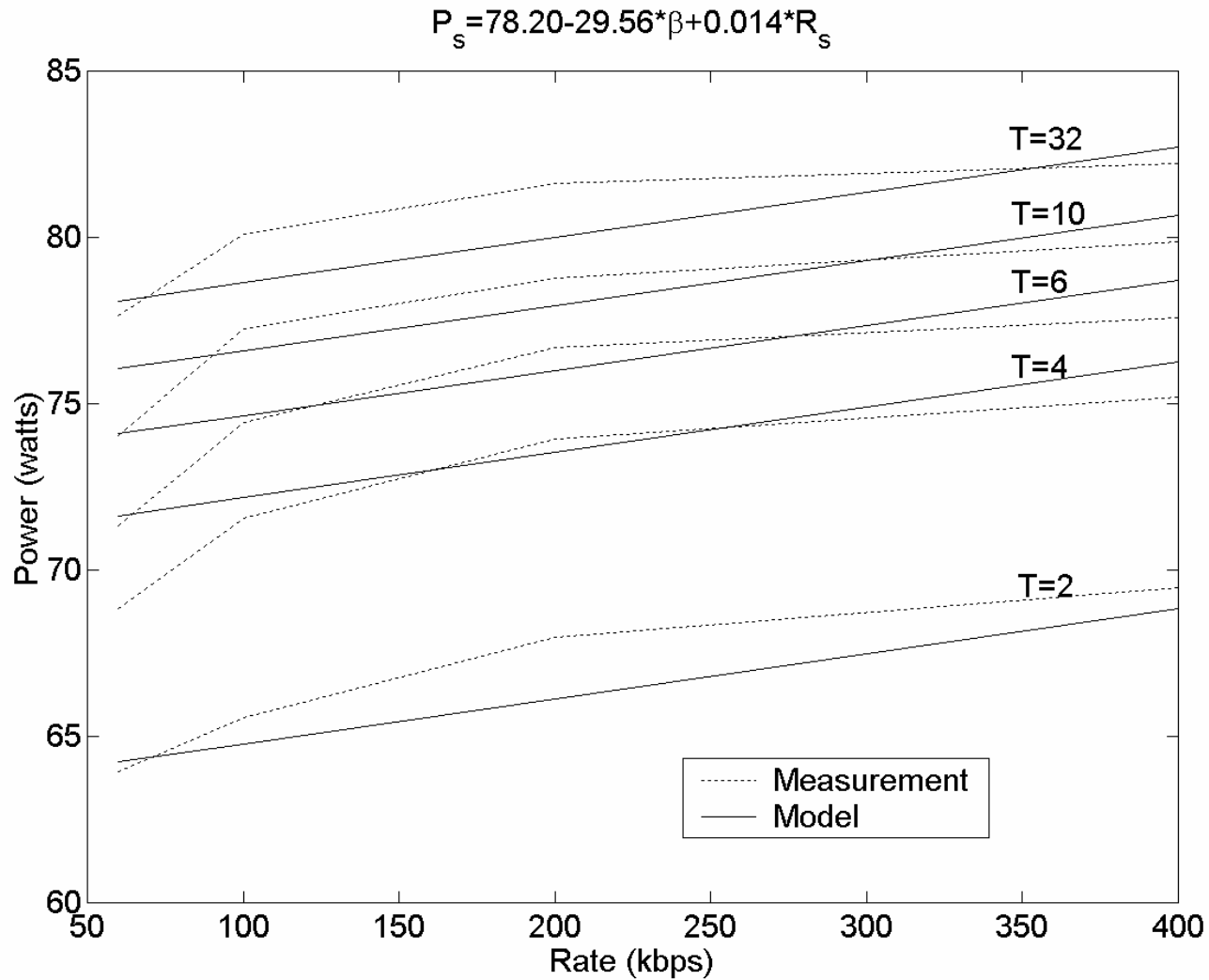
- Intra macroblock $P_I = P_{DCT} + P_Q$
- Inter macroblock $P_P = P_{DCT} + P_Q + P_{ME}$
- Assumption P_{DCT}, P_{ME} : Constant, $P_Q = C_Q \cdot R_s$

■ Average

■ Simulation

$$P_S = \frac{P_I + (T - 1)P_P}{T} = A_S - B_S\beta + C_S R_s$$

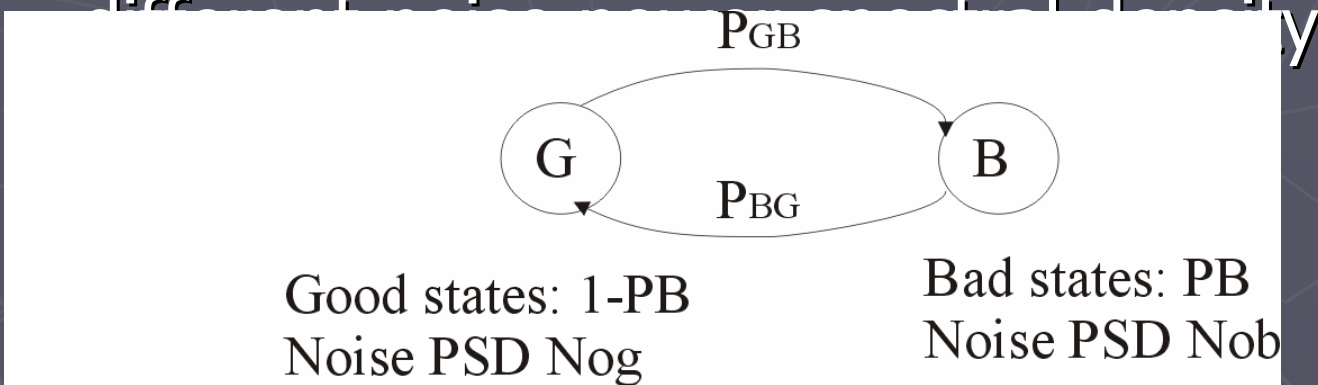
Source Model(2)



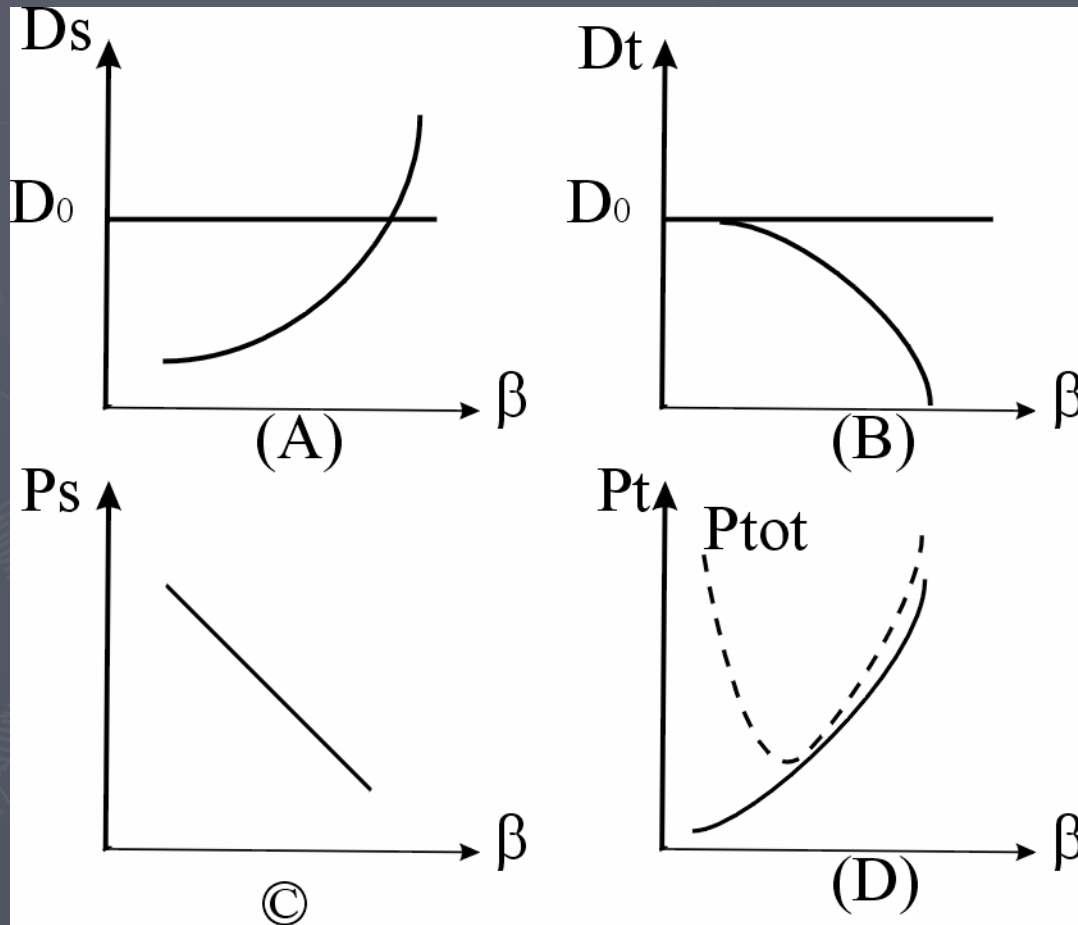
TRA rate
source rate(kbps)
TRA interval= $1/\beta$
source power
consumption

Markov Channel

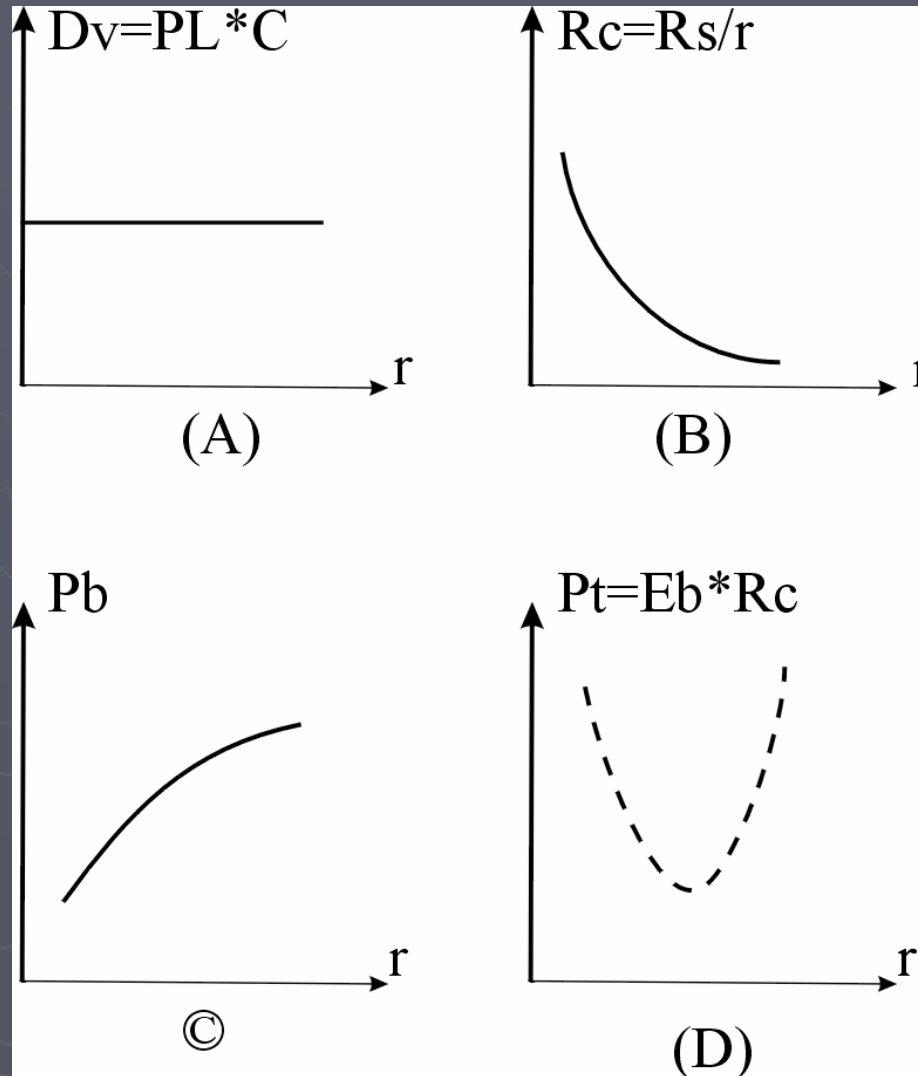
- ▶ Channel model: a two-state Markov model
 - bad state and good state
 - bits in one symbol are in the same states



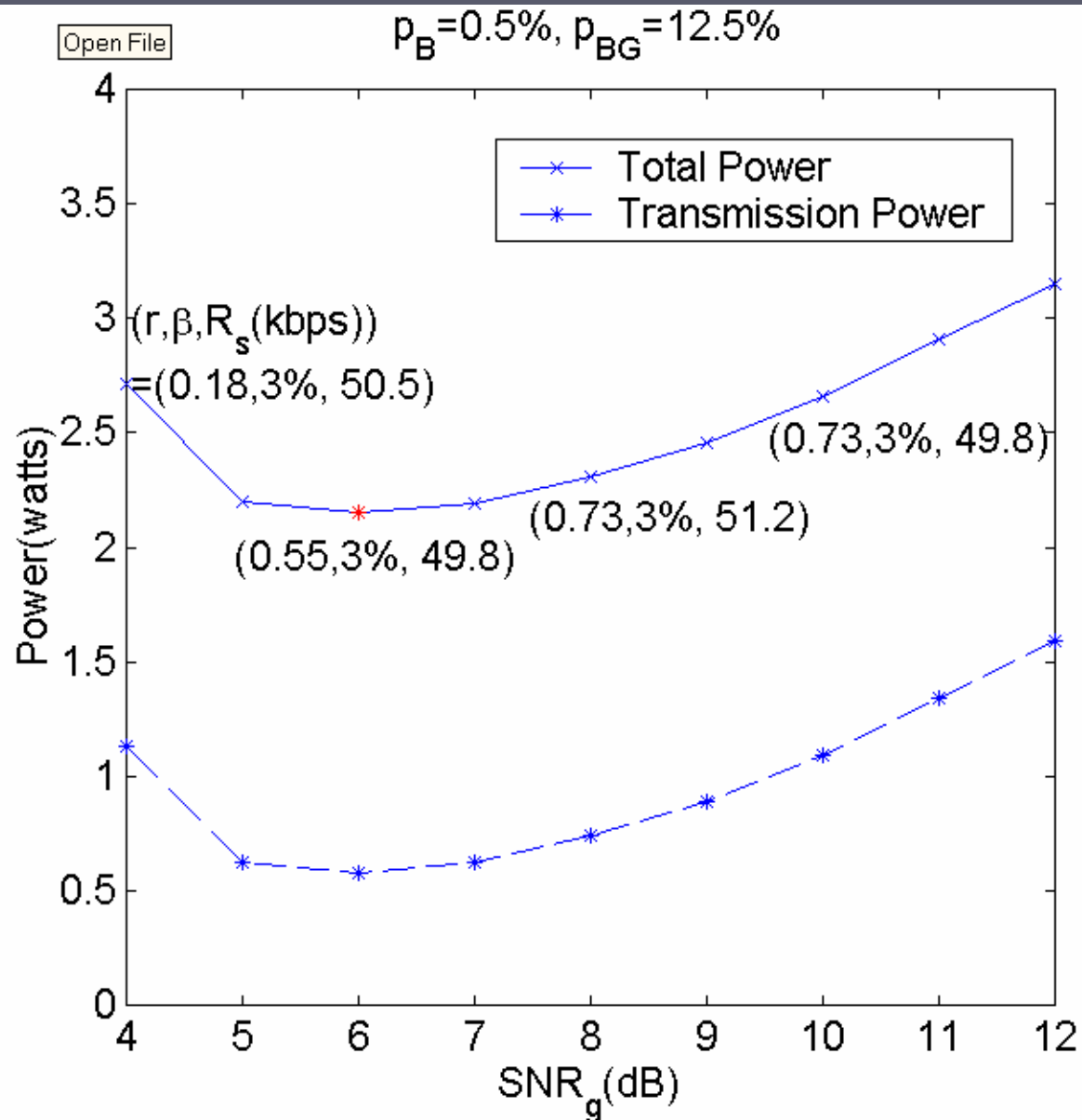
Using INTRA rate β as the parameter



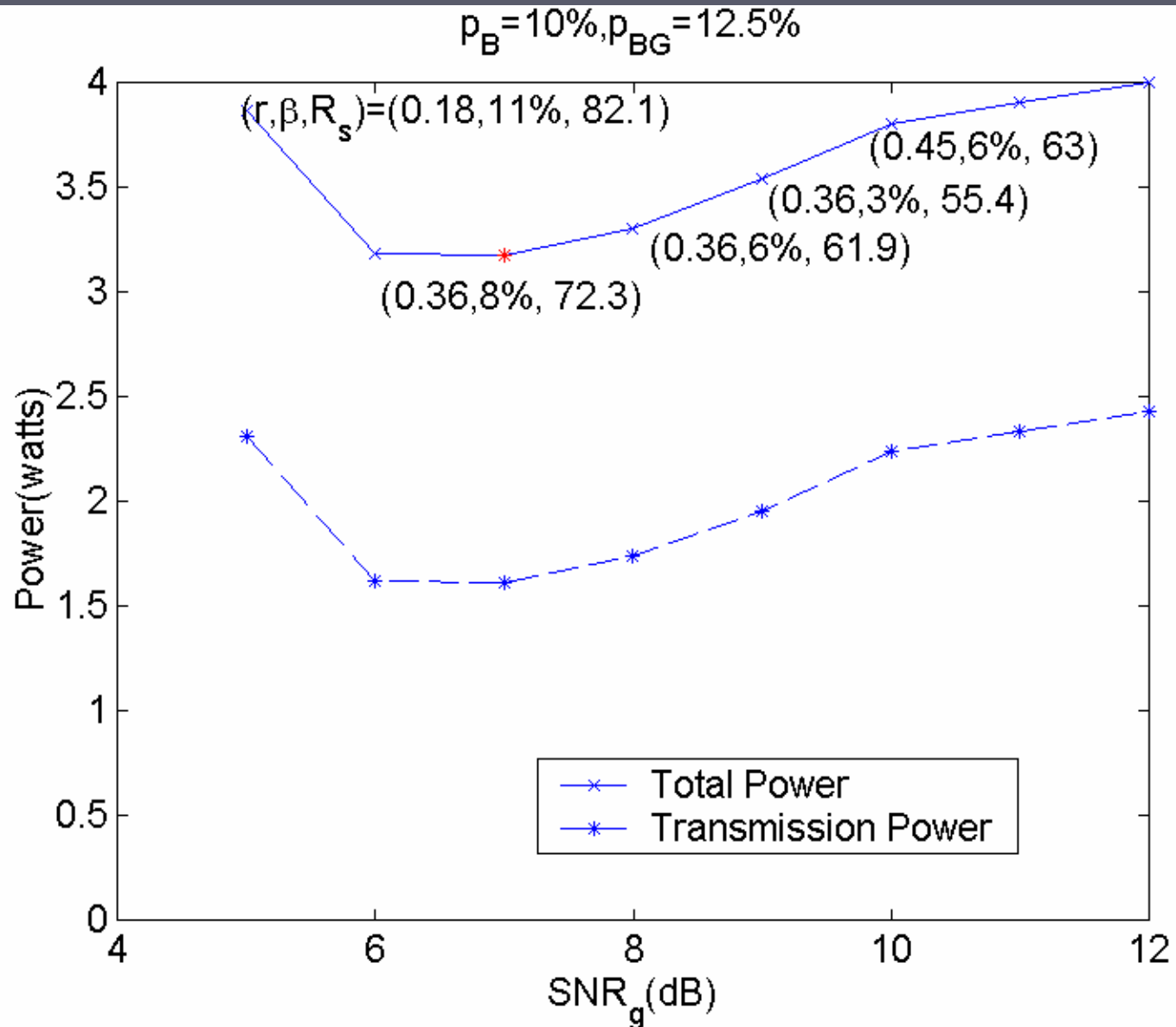
Using channel code rate r as the parameter



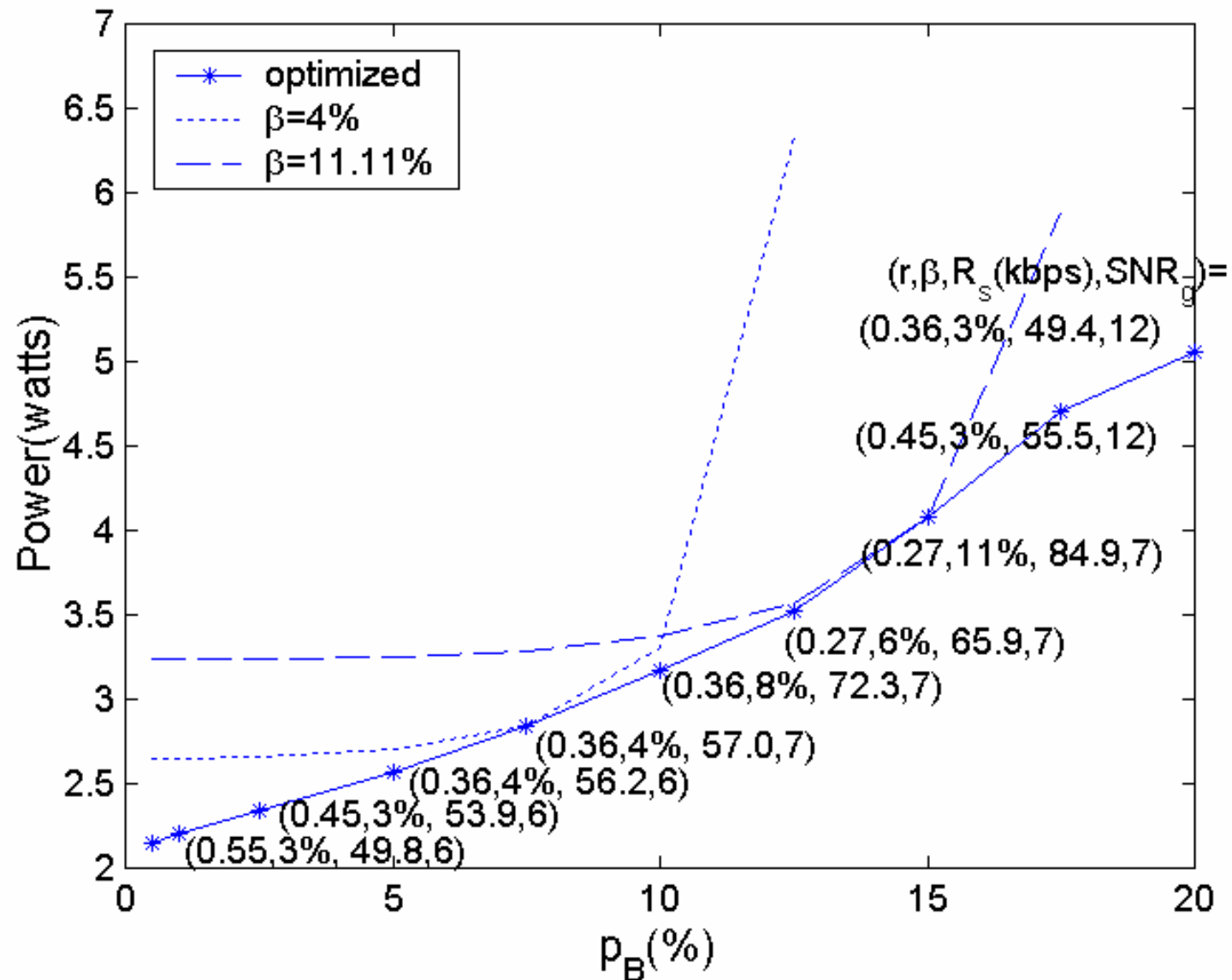
Results(1)



Results(2)



Results(3)



Future work

- ▶ Sequence specific for source model
- ▶ only encoder & transmitter are considered