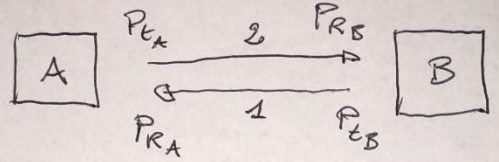
MRN - DTN

POWER CONTROL

OPEN LOOP



P_{RB}^{TARGET}

$P_R = P_T \cdot G = P_T / A$

1) $P_{RA} = P_{TB} \cdot G$

P_{TB} KNOWN, P_{RA} MEASURED

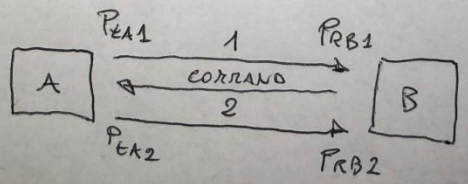
$G = P_{RA} / P_{TB}$

2) $P_{RB} = P_{TA} \cdot G$ (RECIPROCITY)

G KNOWN, $P_{RB} = P_{RB}^{TARGET}$

$P_{TA} = P_{RB}^{TARGET} / G$ (*)

CLOSED LOOP



P_{RB}^{TARGET}

$P_{RB1} > P_{RB}^{TARGET}$ → REDUCE P_{tA}

$P_{RB1} < P_{RB}^{TARGET}$ → INCREASE P_{tA}

OR, OTHER SCHEME (ALGORITHM)

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MRN - DTN

FEC, ARQ

- FEC

Assumption: independent errors (bit by bit)

$$\text{Prob}\{j \text{ errors in } m \text{ bits}\} = P_{j,m} = \binom{m}{j} BER^j \cdot (1-BER)^{m-j}$$

$$BLER = \text{Prob}\{\text{more than } t \text{ errors in } m \text{ bits}\} = \sum_{j=t+1}^{m} P_{j,m} = \sum_{j=t+1}^{m} \binom{m}{j} BER^j (1-BER)^{m-j} = 1 - \sum_{j=0}^{t} \binom{m}{j} BER^j (1-BER)^{m-j}$$

- ARQ

Assumption: independent errors (bit by bit)

$$BLER = \text{Prob}\{\text{more than ZERO errors in } m \text{ bits}\} = 1 - \binom{m}{0} BER^0 (1-BER)^{m-0} = 1 - (1-BER)^m$$

MRN – DTN

FEC, ARQ

PARITY BIT CODE

Example: K = 9 m = 10

TX: 011010001

TX: 0110100010

RX: 0110100010 CHECK: CORRECT

RX: 011010001X DISCARD REDUNDANCY

RX: 00110100010 CHECK: WRONG

Rx: xxxxxxxxx DISCARD DATA BLOCK

RX: 00100000010 CHECK: CORRECT

Rx: 001000001X DISCARD REDUNDANCY

PARITY MATRIX CODE

Example: K = 9 m = 15

Tx: 011010001

0110
0101
0011
000

Tx: 011001010011000

Rx: 001001010011000

0010 ← CHECK: WRONG
0101
0011
000
↑
CHECK: WRONG