•In

a binary transmission channel, a 1 is transmitted with probability 0.8 and a 0 with probability 0.2. The conditional probability of receiving a 1 given that a 1 was sent is 0.95, the conditional probability of receiving a 0 when a 0 was sent is 0.99. What is the probability that a 1 was sent when receiving a 1?

วิธีทำ หา Prob ของ $P(S_1|R_1)$

$P(S_0) = 0.2$ $P(R_0|S_0) = 0.99$

$P(S_1) = 0.8$ $P(R_1|S_1) = 0.95$

$P(R_0) = ?$ $P(R_1|S_0) = 0.01$

$P(R_1) = ?$ $P(R_0|S_1) = 0.05$

ใช้สมการ Bayes

$$P(S_1|R_1)P(R_1) = P(R_1|S_1)P(S_1)$$

$$P(S_1|R_1) = \frac{P(R_1|S_1)P(S_1)}{P(R_1)}$$

$P(R_1)$ →

$$P(R_1) = P(R_1|S_1)P(S_1) + P(R_1|S_0)P(S_0)$$

$$= \frac{P(R_1|S_1)P(S_1)}{P(R_1|S_1)P(S_1) + P(R_1|S_0)P(S_0)}$$

$$= \frac{0.45 \times 0.8}{0.45 \times 0.8 + 0.01 \times 0.2} = \frac{0.76}{0.76 + 0.002}$$

$$P(S_1|R_1) = 0.447$$

∴ ความน่าจะเป็นที่จะส่งข้อมูล bit 1 โดยรับ bit 1 = 0.447 %

64010315