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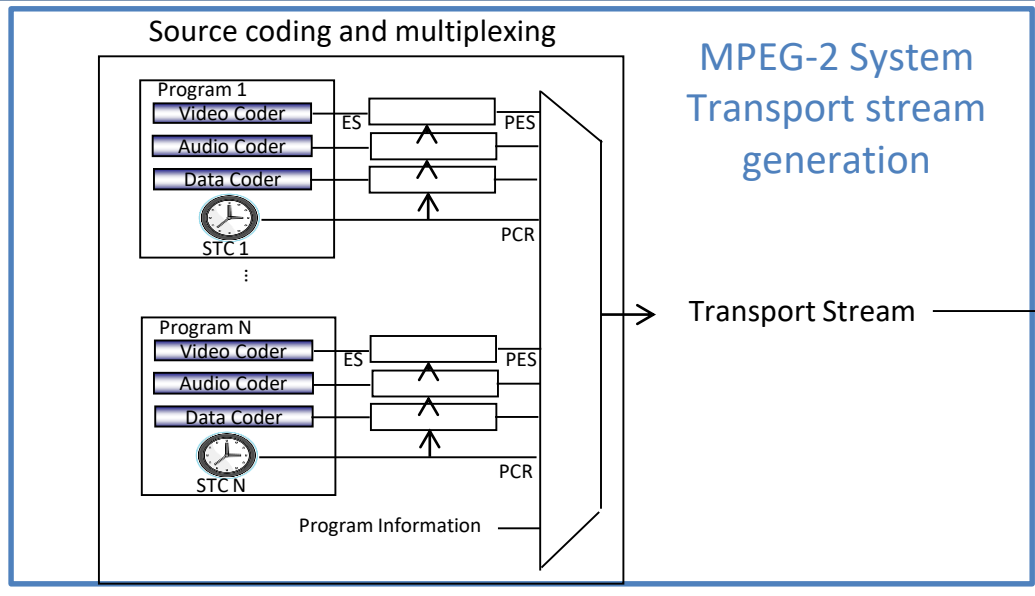
## Example of physical layer on an AWGN channel:

**Satellite Digital Video Broadcasting : DVB-S (1994)**

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# Satellite Digital Video Broadcasting : DVB-S

## Physical layer



Digital TV transmission must be « Quasi Error Free » (QEF)  $TEB < 10^{-10}$

## Physical layer

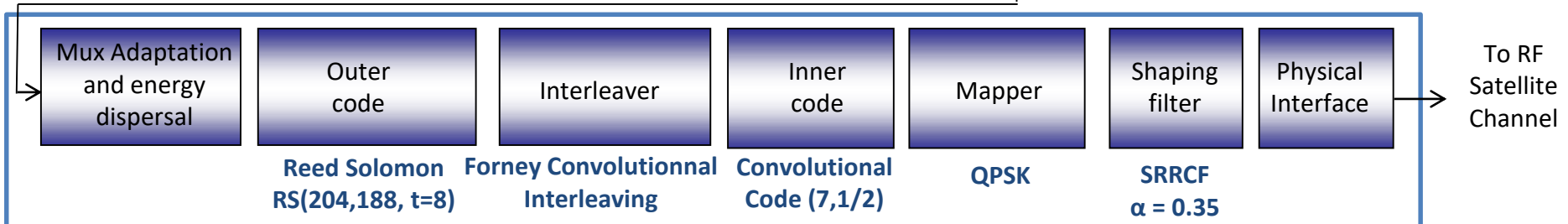


Table D.1: Example of System performance over 33 MHz transponder

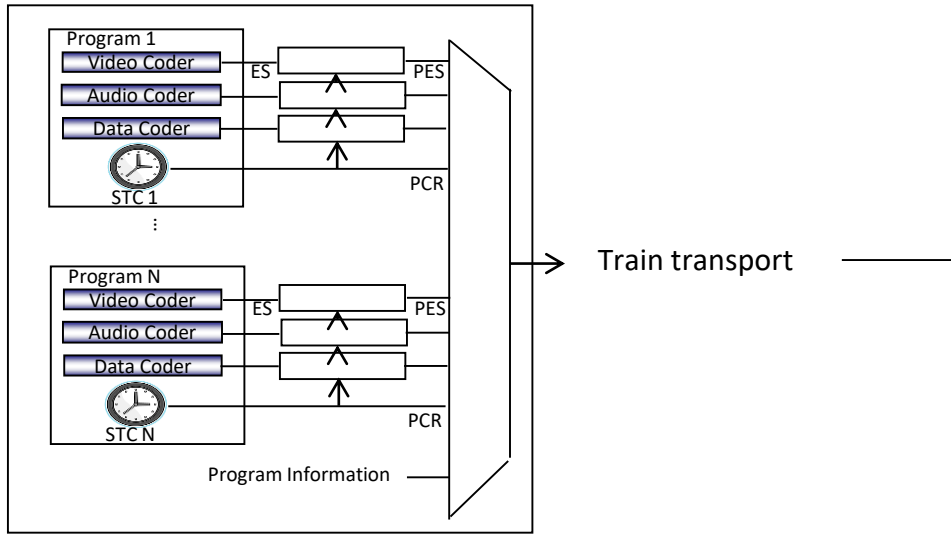
Bit rates

Bit Rate $R_u$ (after MUX) [Mbit/s]	Bit Rate $R'_u$ (after RS) [Mbit/s]	Symbol Rate [Mbaud]	Convolut. Inner Code Rate	RS Outer Code Rate	C/N (33 MHz) [dB]
23,754	25,776	25,776	1/2	188/204	4,1
31,672	34,368	25,776	2/3	188/204	5,8
35,631	38,664	25,776	3/4	188/204	6,8
39,590	42,960	25,776	5/6	188/204	7,8
41,570	45,108	25,776	7/8	188/204	8,4

# Satellite Digital Video Broadcasting : DVB-S

## Physical layer

### Codage source et multiplexage



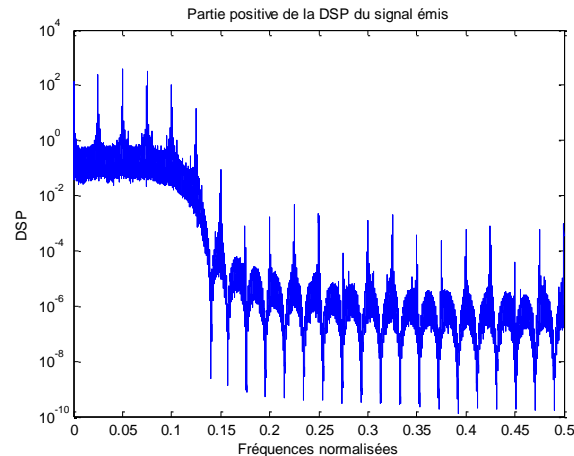
### Example on an image



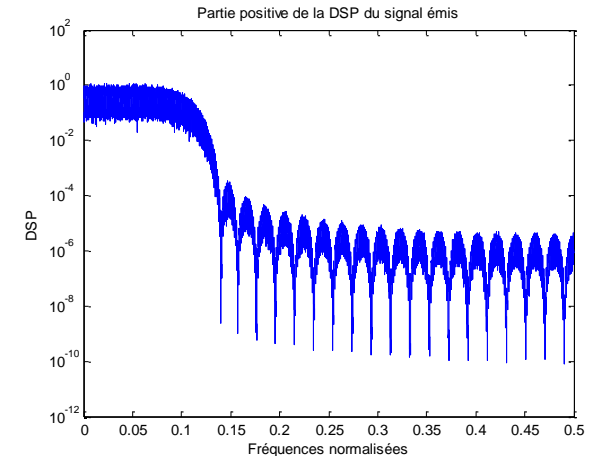
Mux Adaptation  
and energy  
dispersal

**Scrambling**

### PSD of the unscramble signal :



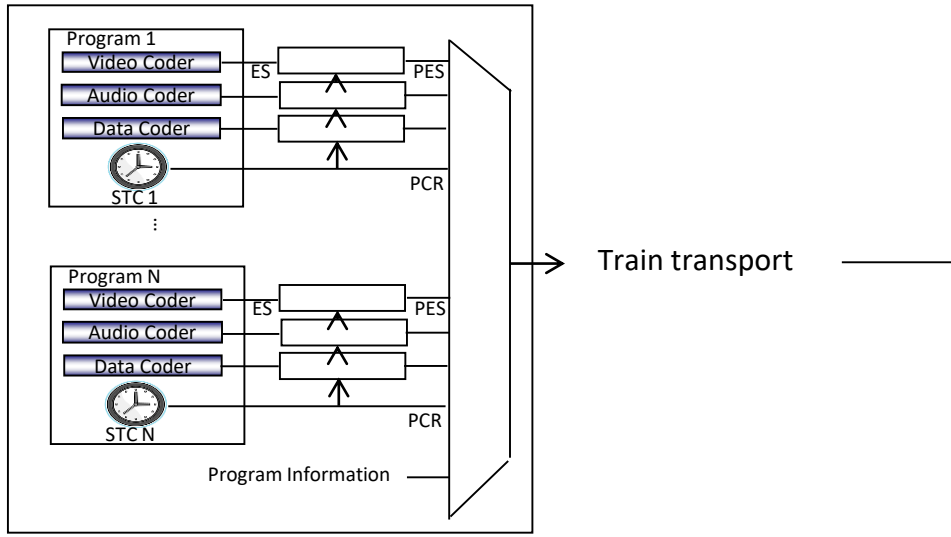
### PSD of the scramble signal :



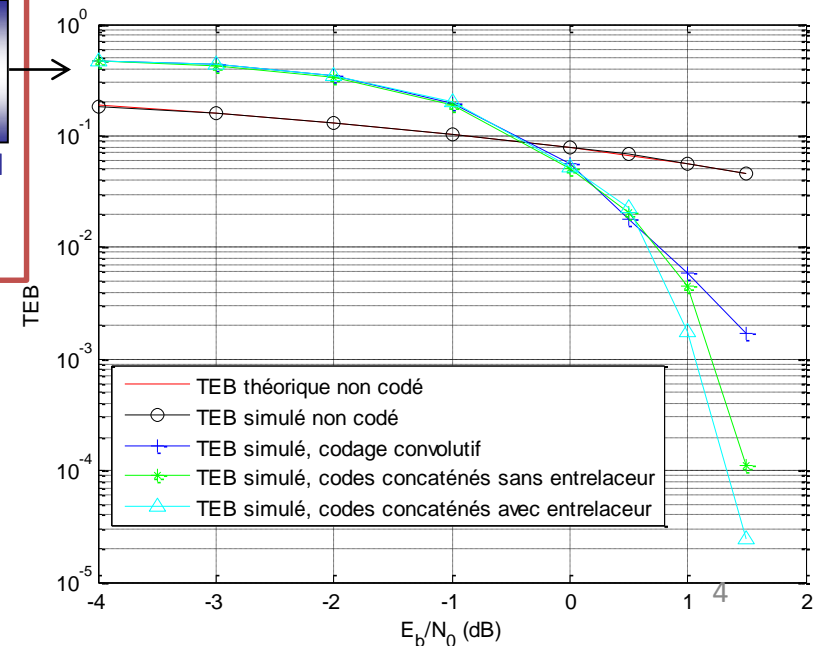
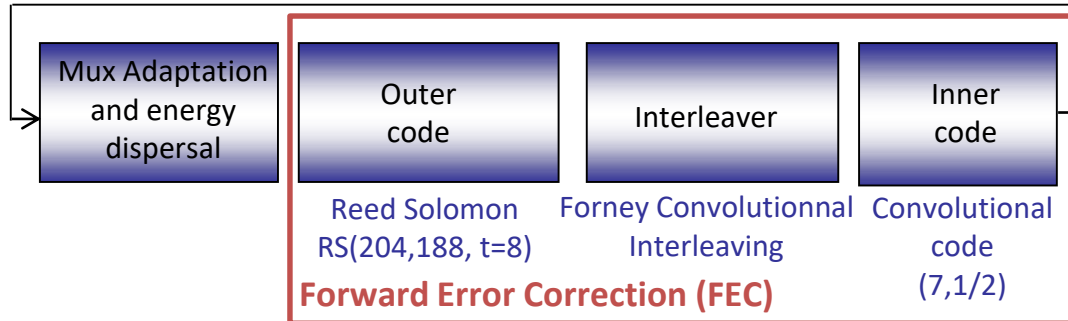
# Satellite Digital Video Broadcasting : DVB-S

## Physical layer

### Codage source et multiplexage



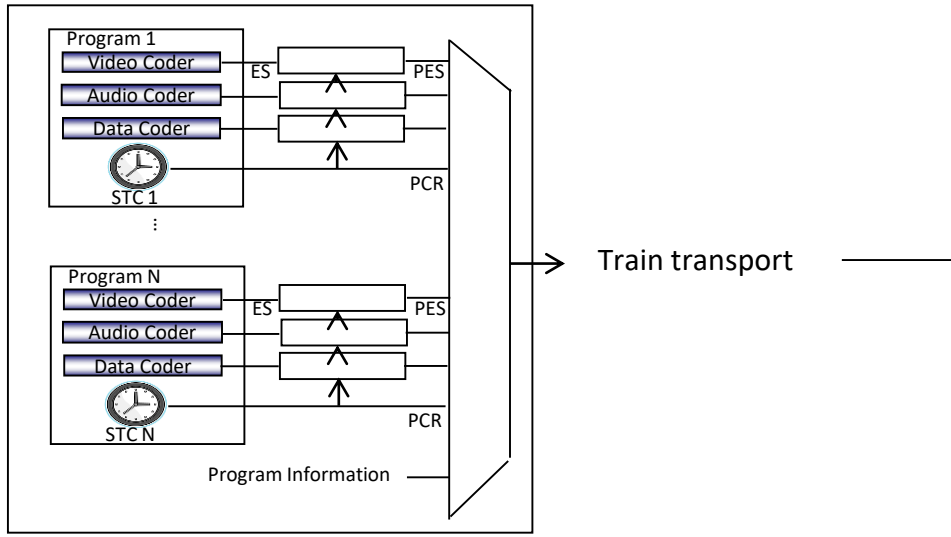
**A digital TV transmission must be « Quasi Error Free » (QEF) :**  
 **$TEB < 10^{-10}$**



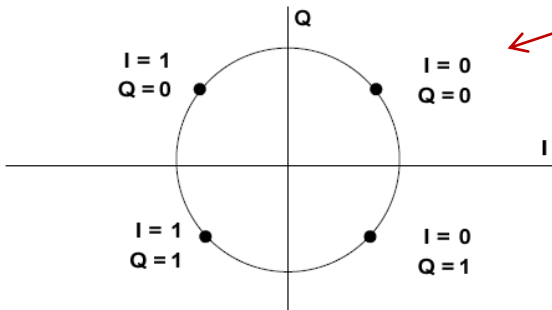
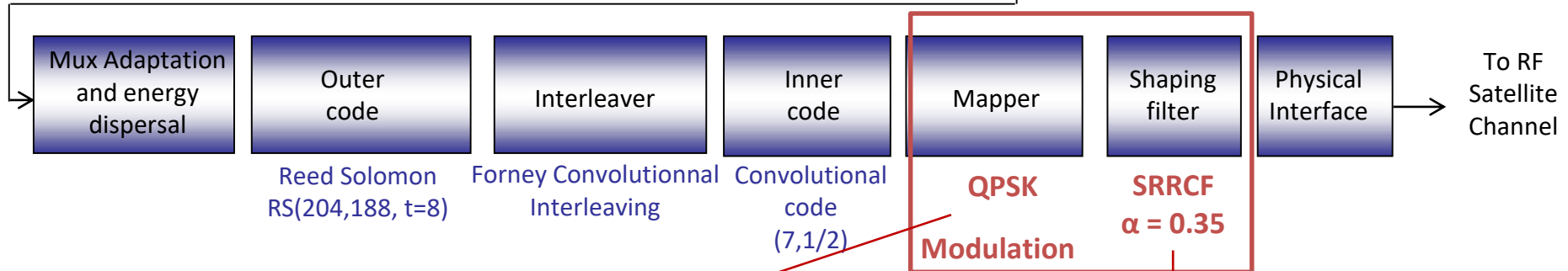
# Satellite Digital Video Broadcasting : DVB-S

## Physical layer

### Codage source et multiplexage



**AWGN channel  
with non linearities**



$$H(f) = \begin{cases} 1 & \text{pour } |f| < f_N(1-\alpha) \\ \left\{ \frac{1}{2} + \frac{1}{2} \sin \left( \frac{\pi}{2f_N} \left[ \frac{f_N - |f|}{\alpha} \right] \right) \right\}^{1/2} & \text{pour } f_N(1-\alpha) \leq |f| \leq f_N(1+\alpha) \\ 0 & \text{pour } |f| > f_N(1+\alpha) \end{cases}$$

# References

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- Digital Video Broadcasting (DVB): Framing structure, channel coding and modulation for 11/12 GHz satellite services, norme ETSI EN 300 421.
- Digital Video Broadcasting (DVB): User guidelines for the second generation system for broadcasting, interactive services, news gathering and other broadband satellite applications (DVB-S2), norme ETSI EN 102 376.