RATE-COMPATIBLE PUNCTURED CONVOLUTIONAL CODES

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Introduction

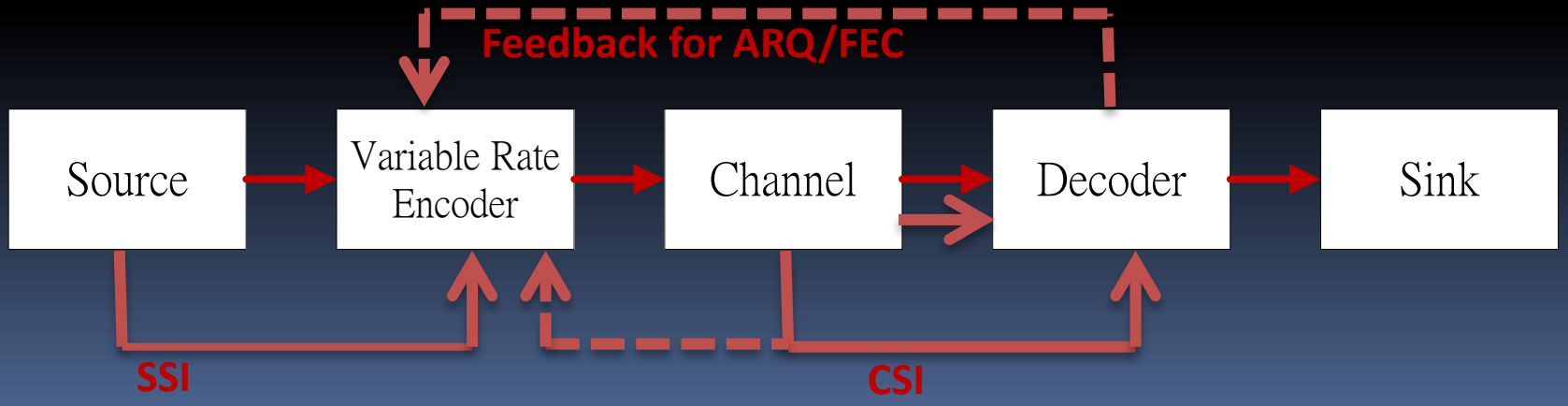
- Why RCPC codes?

	Normal Error control coding system	RCPC system
Code rate	Fixed	Changeable according to source and channel
Channel condition	Adapt to average or worst	
Correction capability	match to the spec	Using punctured table to provide flexibility
Other features		More practical one encoder and one decoder, remain the basic structure

=>suitable for time varying channel

System Structure

- SSI carried by information transmitted.
- CSI varies with the environment, eg. mobile
- CSI can improve decoder together with soft/hard decision
- Use ARQ/FEC scheme to ask for retransmission from encoder



Source Significance Information

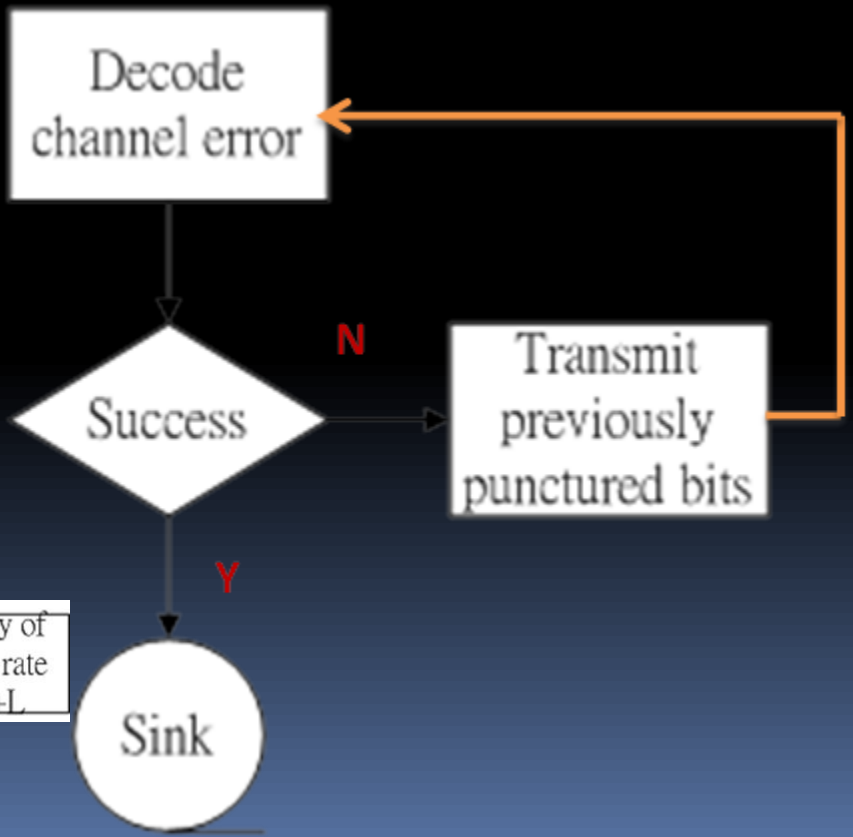
Channel State Information

Puncture Rule

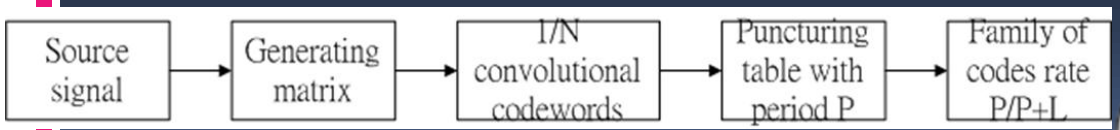
- High rate codes are included in low rate ones.
- Unequal error protection

$$a(1)=\begin{pmatrix}1 & 1 & 1 & 0\\ 1 & 0 & 0 & 1\end{pmatrix}$$

Puncturing table with period 4



Encoder



Where $1 \le L \le (N-1)P$

Conclusion

- Final goal for error control coding is to apply for real world channel.
- With RCPC codes, we can model channel in a more general way, considering time varing.
- Plus window mechanism and ARQ/FEC, we can both narrow down BER and improve efficiency.