Modulation Basics
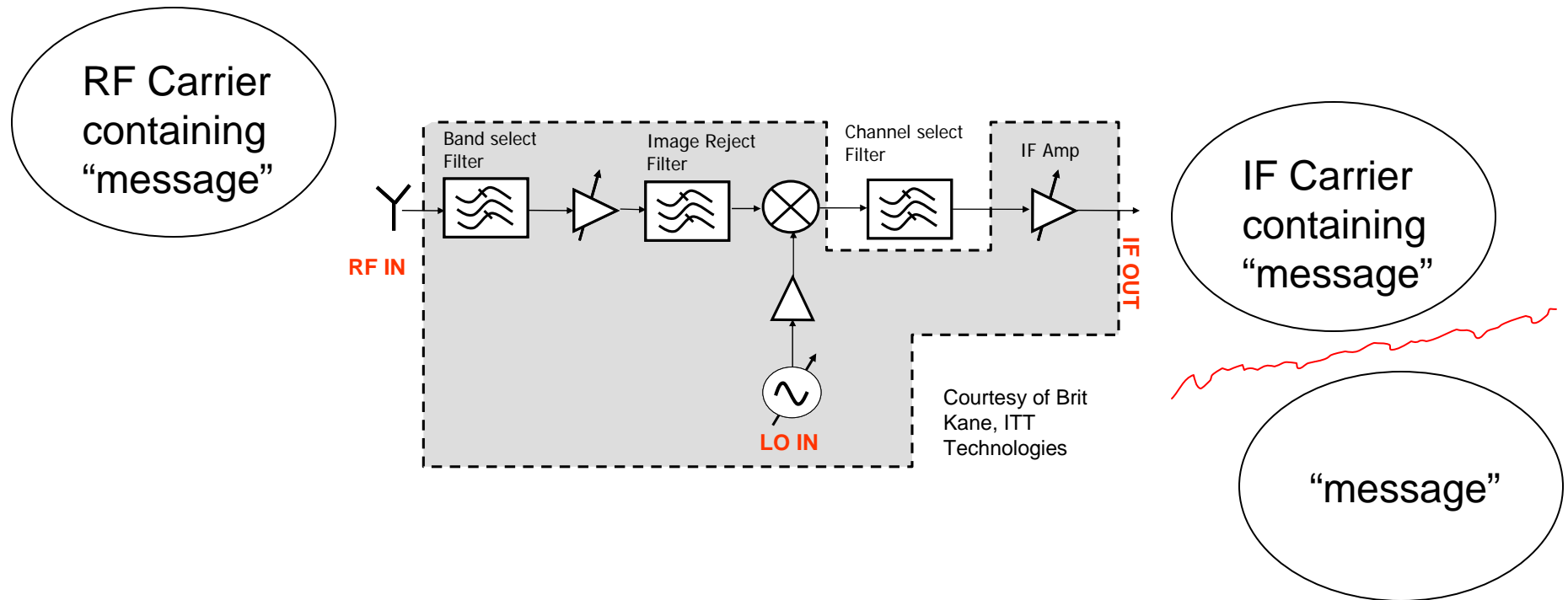
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Modulation Basics

- Functional description
- Implementation
- System-level implications

Functional Description

RF Carrier containing "message"

Band select Filter

Image Reject Filter

Channel select Filter

IF Amp

RF IN

LO IN

IF OUT

IF Carrier containing "message"

"message"

Courtesy of Brit Kane, ITT Technologies

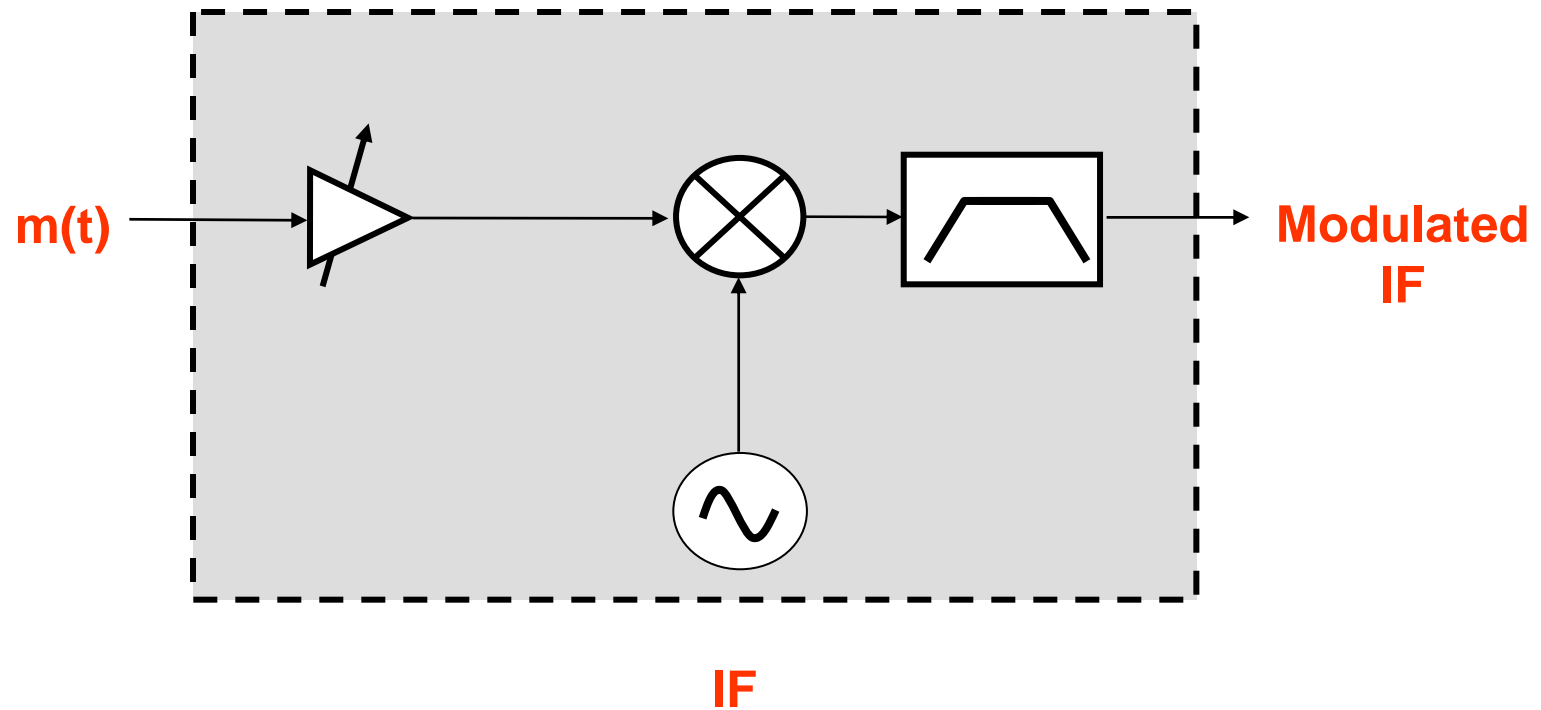Demodulation in a receiver / Modulation in a transmitter

Interface between the Message Signal and the IF Signal
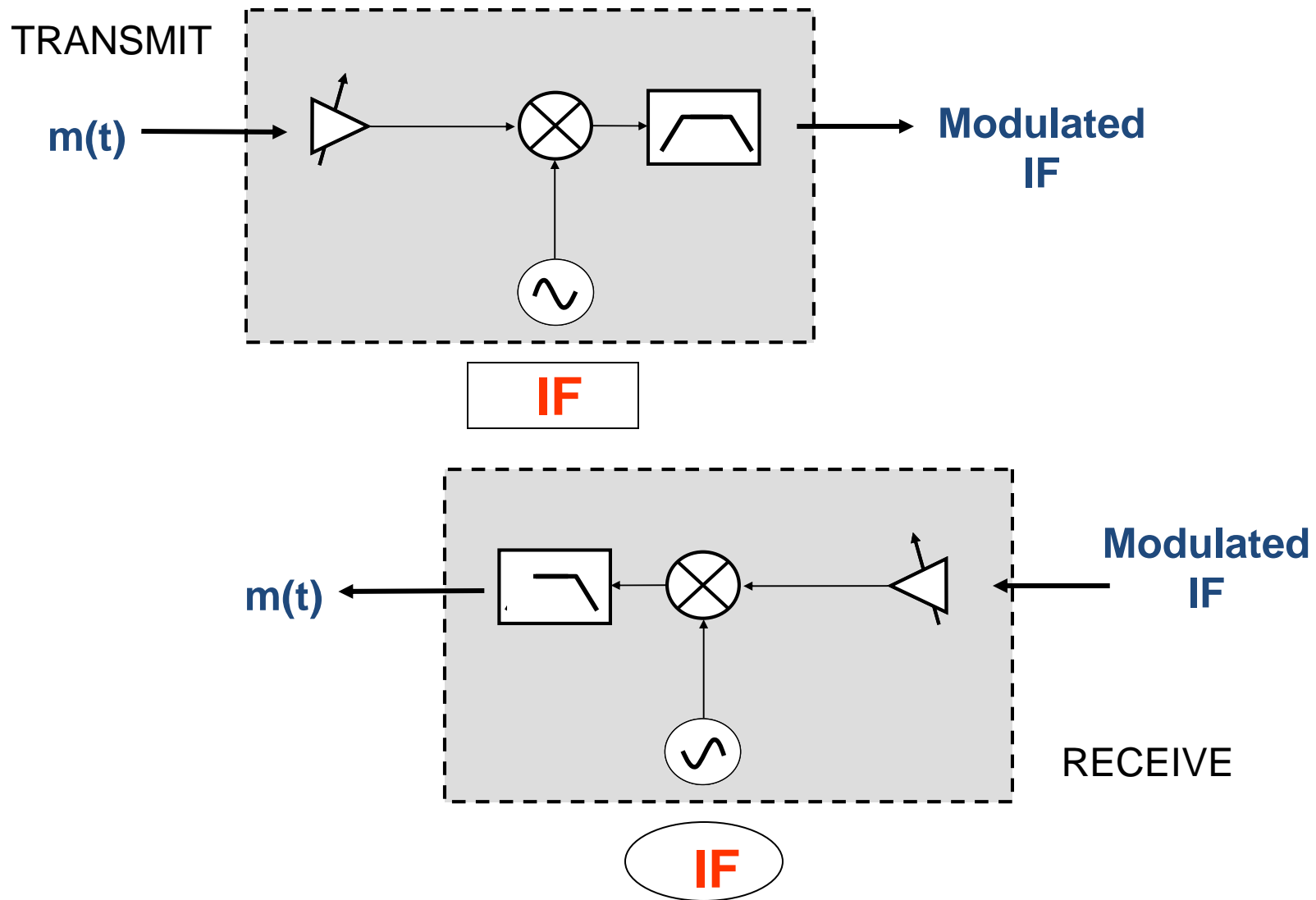
Implementation – Modulator

- Message Signal:

- IF Carrier Signal:

- Ideal Modulator Output:

- Real Modulator Output:
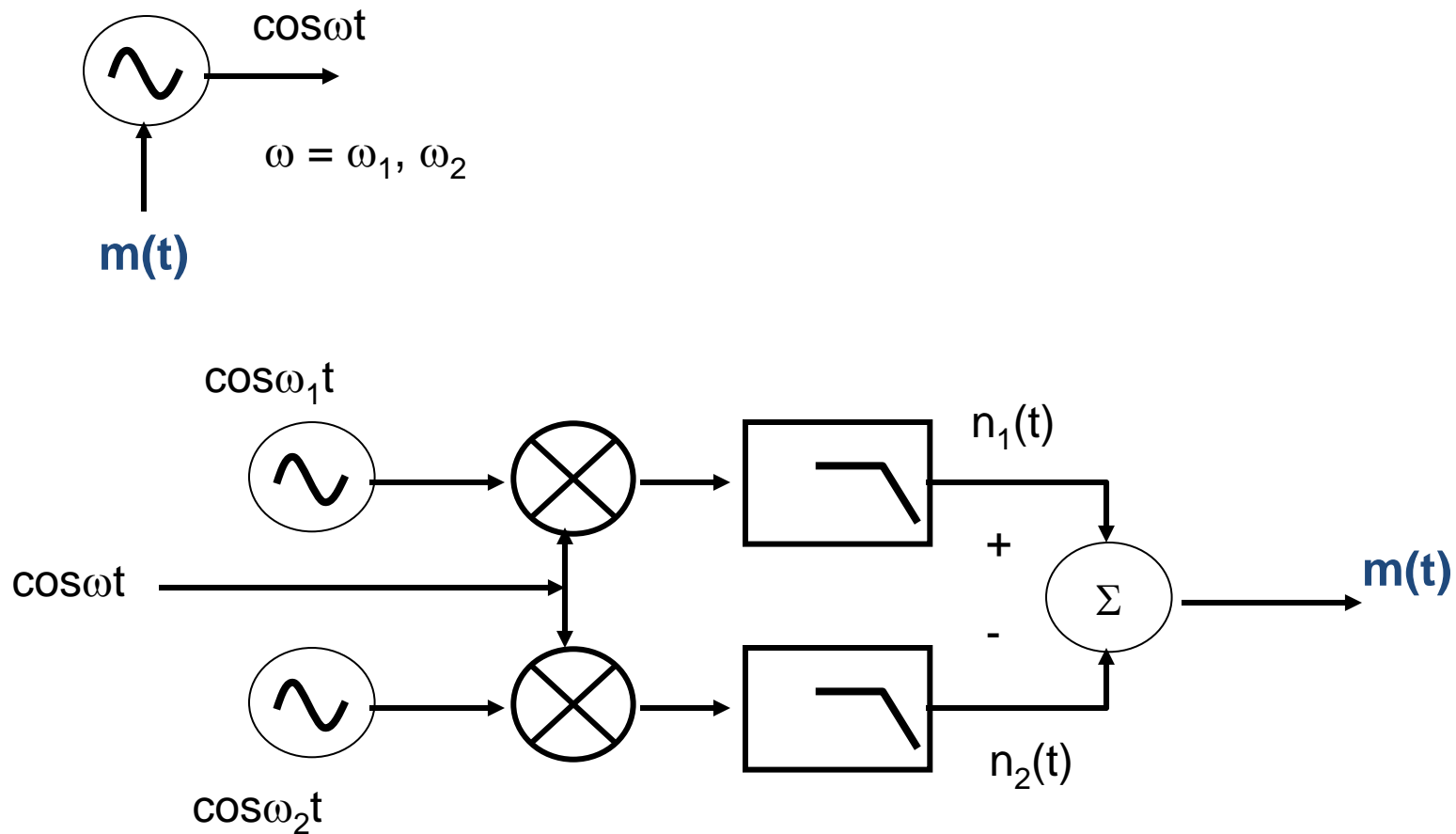

→ How do we accomplish this?

Implementation – Modulator

Mod/Demod Synchronization

Frequency-Shift Keying

System-Level Implications

- DC power requirement (IF signal)
- Conversion loss → amplifier gain
- Noise → detection limits

Modulation Basics – Conclusions

- Signal processing stage between "message" and IF carrier signal
- Most approaches use mixers but many types of modulation are used (both analog and digital types)
- Filtering important in signal shaping/selection

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References

- Microwave and RF Design of Wireless Systems, David M. Pozar, Wiley, 0-471-32282-2