

Additional hints based on your solutions of the single carrier project

Telecommunications Circuits Laboratory
EPFL

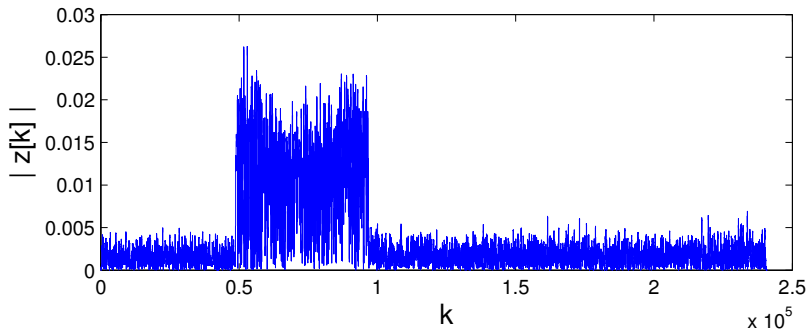
December 6, 2013

Modular implementation

- Implement your transmitter and receiver **block by block**
- **Test** each block **before** you proceed to the next block
- For testing, it is often best to use a perfectly distortionless channel
⇒ `conf.audiosystem = 'bypass'`;

Use plots to debug

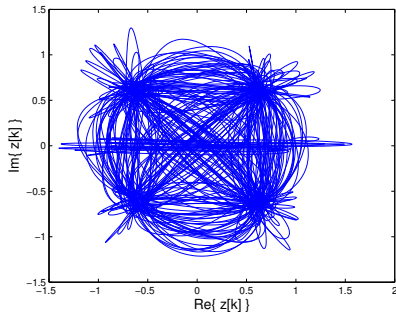
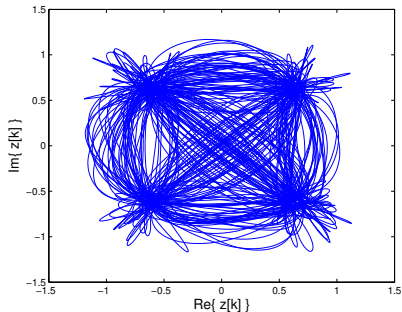
- Example: Signal after matched filter



800 data bits (QPSK), 100 preamble bits (BPSK),
oversampling factor 96

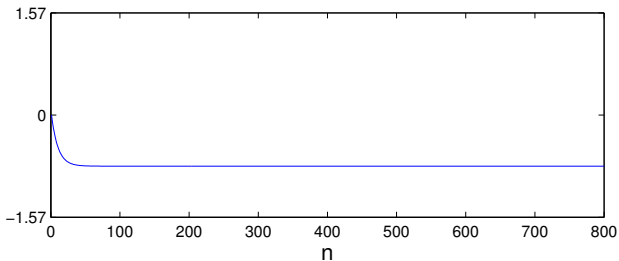
Use plots to debug

- Example: Signal after frame synchronization



Use plots to debug

- Example: Estimated phase error



- Use waveplot.m

Adapt code when reusing it

- **Phase synchronization:**
 - Viterbi-Viterbi for BPSK is not the same as for QPSK
 - Your receiver should also work in BPSK mode
 - Check the exercise script to see where QPSK was assumed, then modify these steps
 - Test your solution

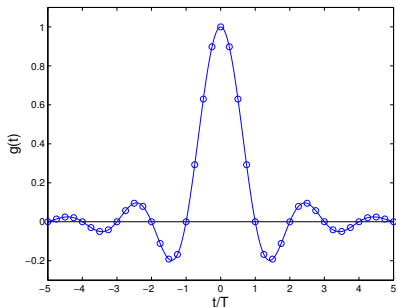
Adapt code when reusing it

- **Time synchronization:**
 - Chapter 4 assumed an oversampling factor of 4
 - Check the exercise script to see where this assumption was used, then modify these steps
 - Test your solution

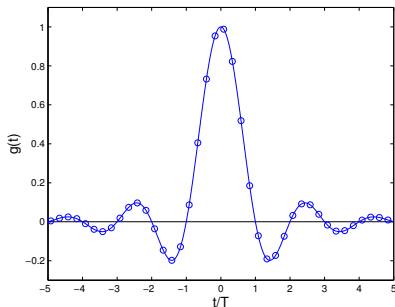
When do we need the time synchronization block?

- Example: oversampling factor of 4

no timing offset



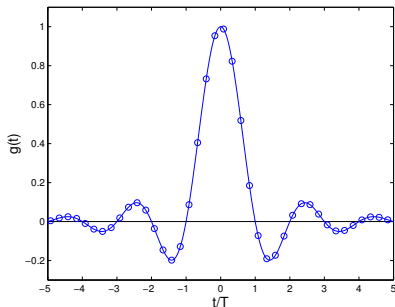
timing offset



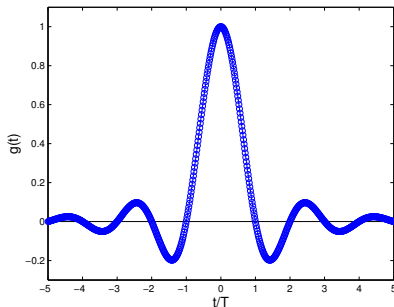
When do we need the time synchronization block?

- Compare oversampling factors of 4 and 60

$L = 4$



$L = 60$



Are your results intuitive?

- Examples for counter-intuitive results:
 - BER > 0.5
 - A higher symbol rate leads to a lower BER
- Check if you need more simulation runs
- Check your code for errors
- If the effect remains, discuss it in the report

Report

- Discuss results:
 - Give explanations
 - Mention what is counter-intuitive
- Provide plots
- Provide the code that created the plots