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Acoustic Interference

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Kongsberg Maritime AS

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arranged by





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Presentation topics

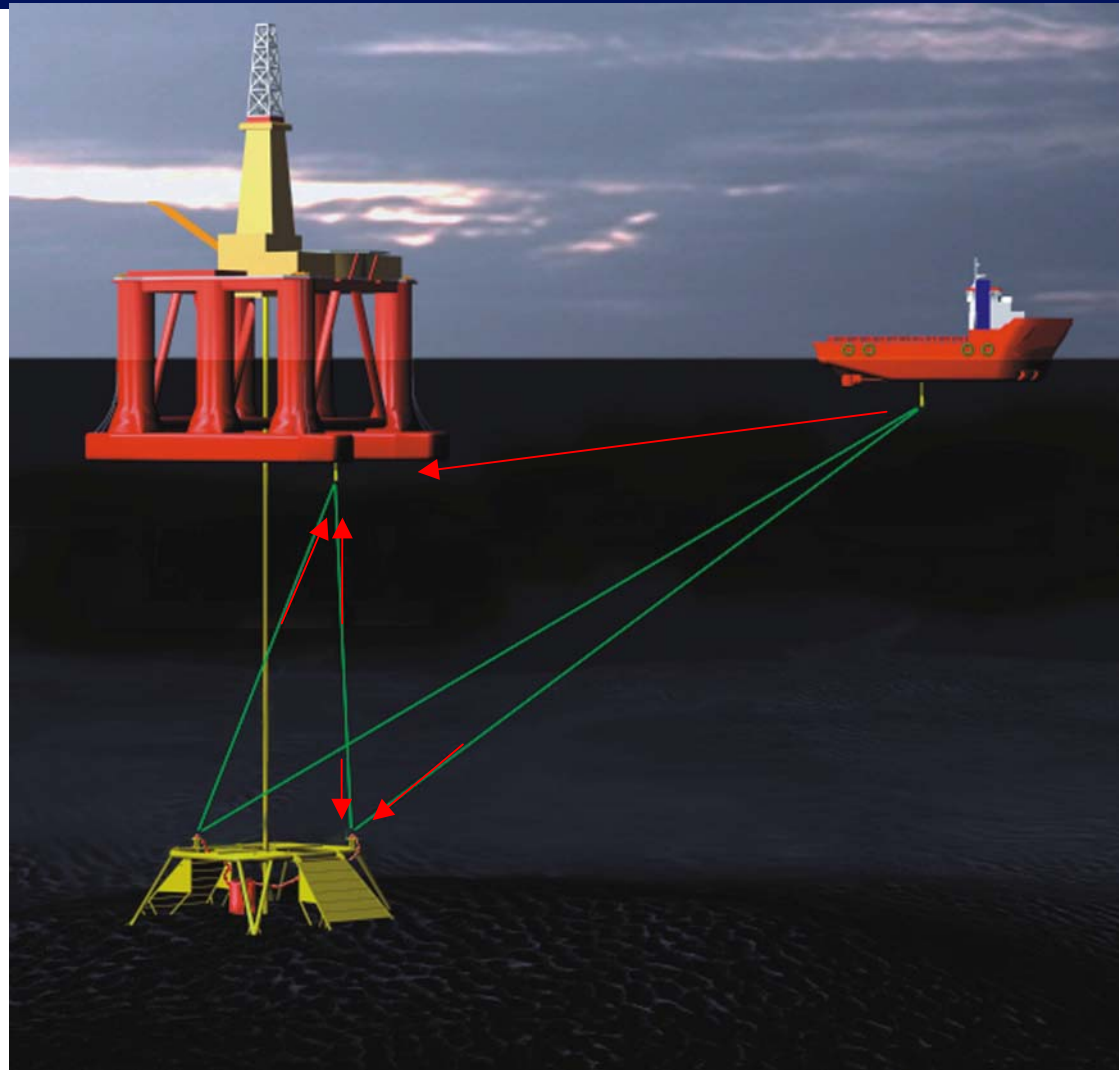
- Interference caused by other systems on one vessel or by systems on another vessels
 - Noise and multipath not discussed

- Interference on acoustic signals
- Consequences – reduced performance
- How to reduce acoustic interference?



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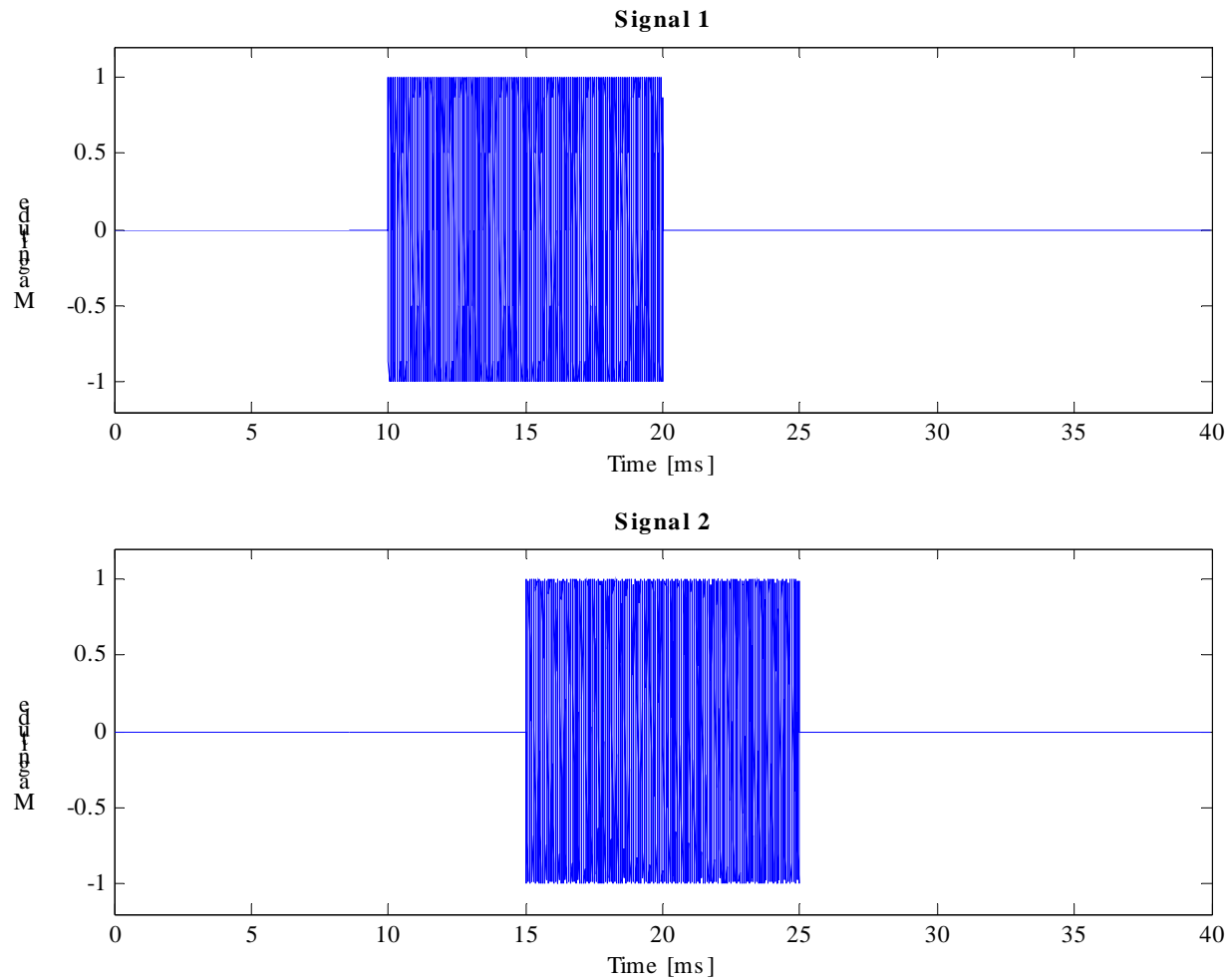
Acoustic interference





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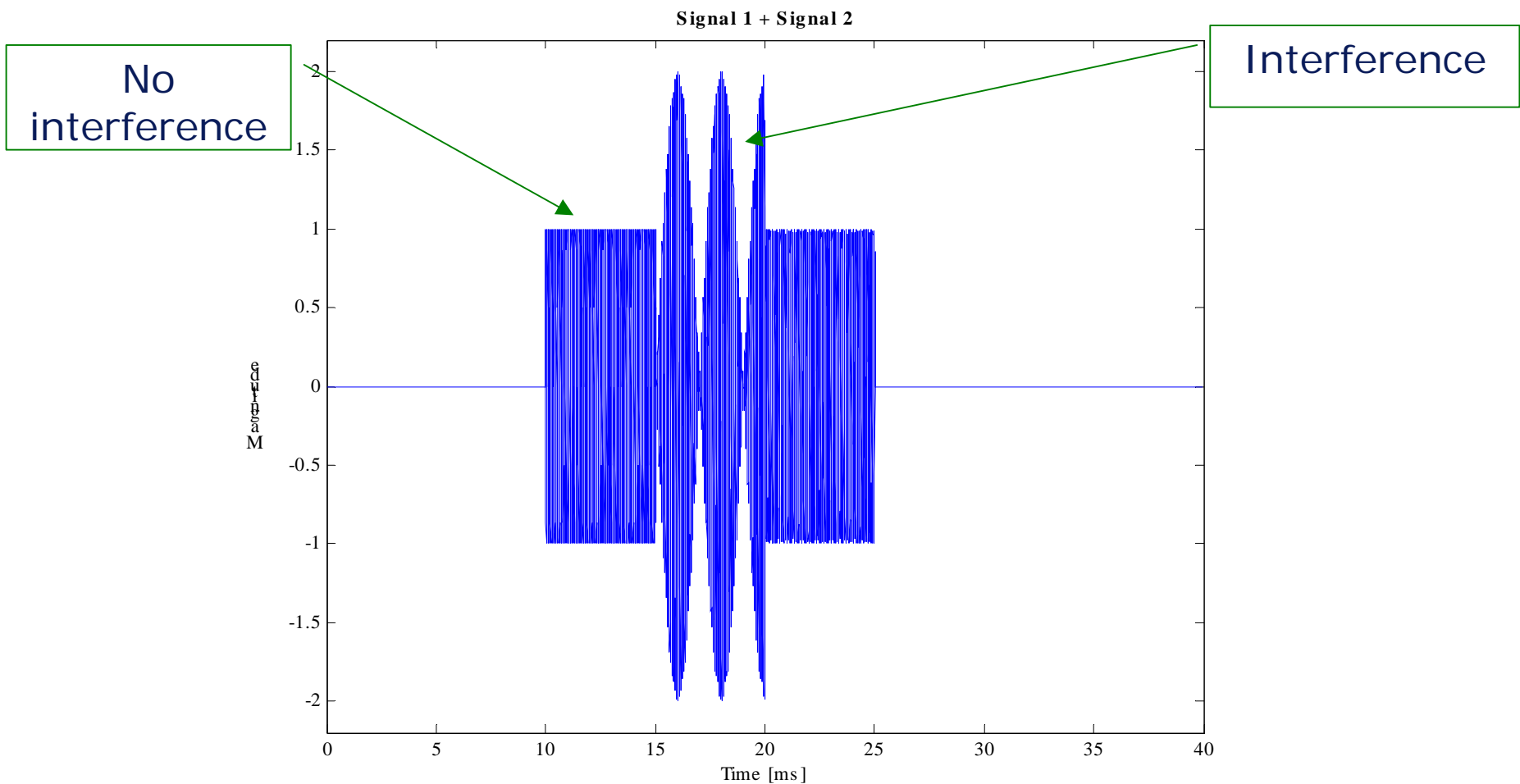
Two interfering signals 50% overlap





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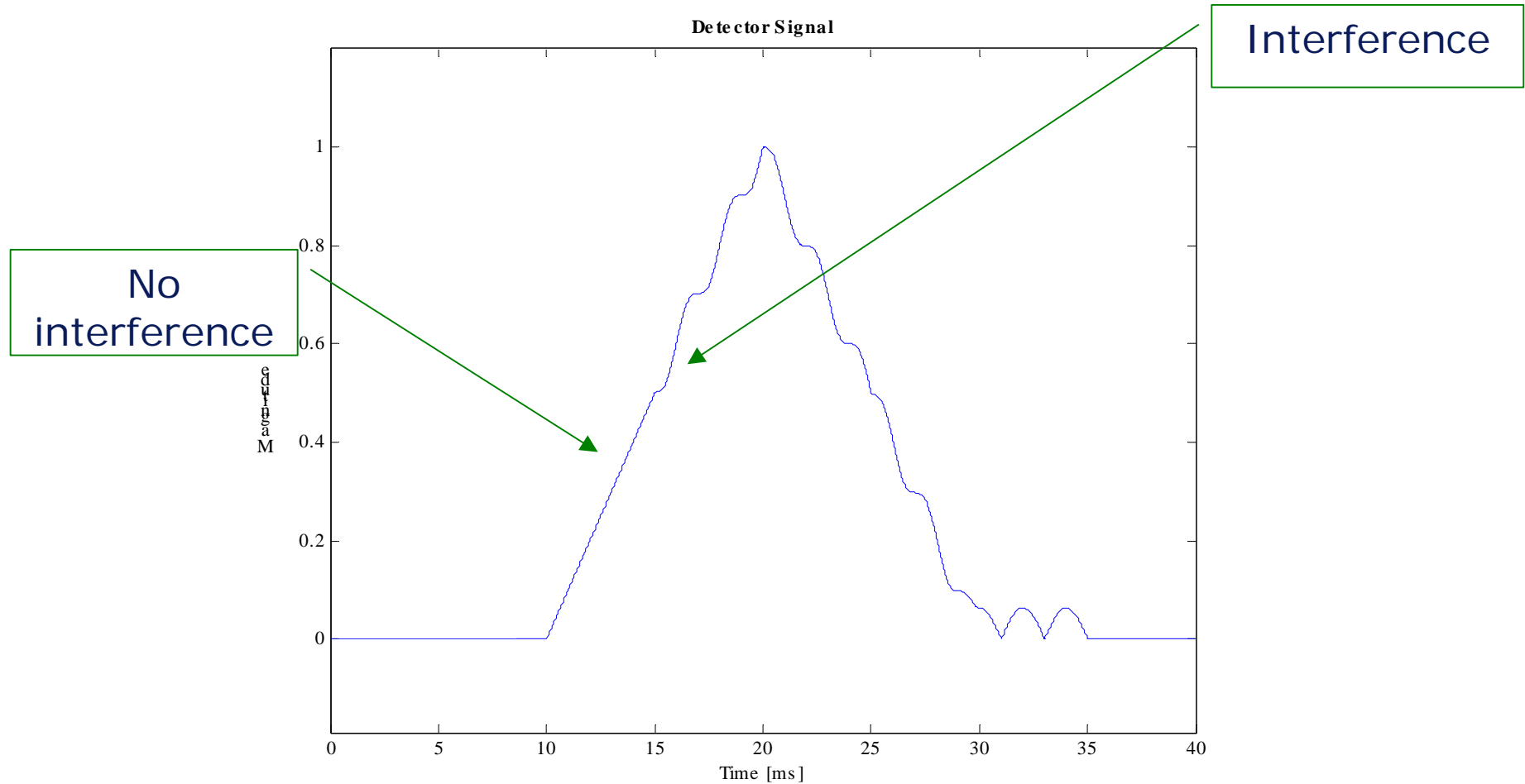
Receiver input signal; CW overlapping signal





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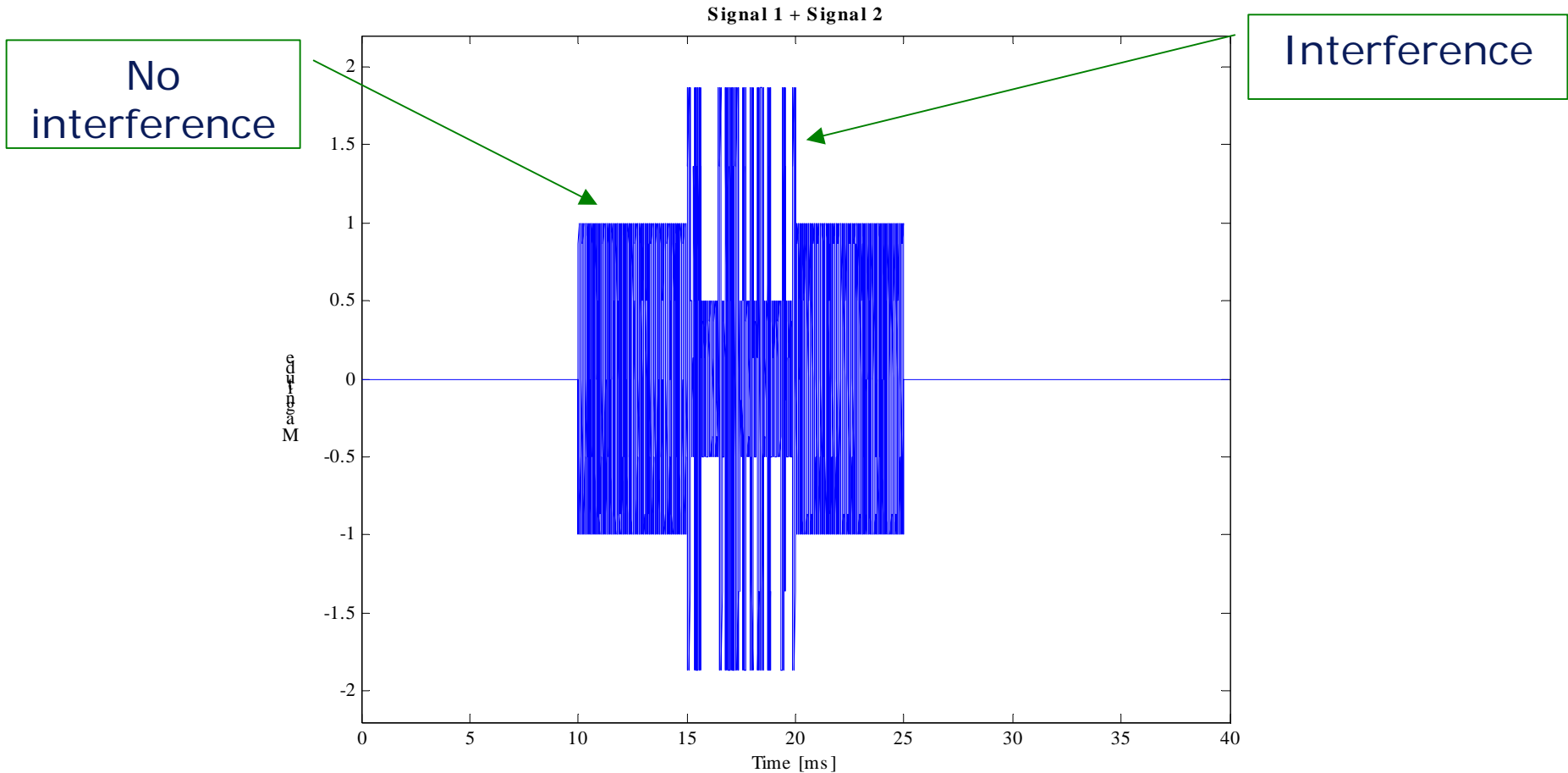
Detector input CW - overlapped signal





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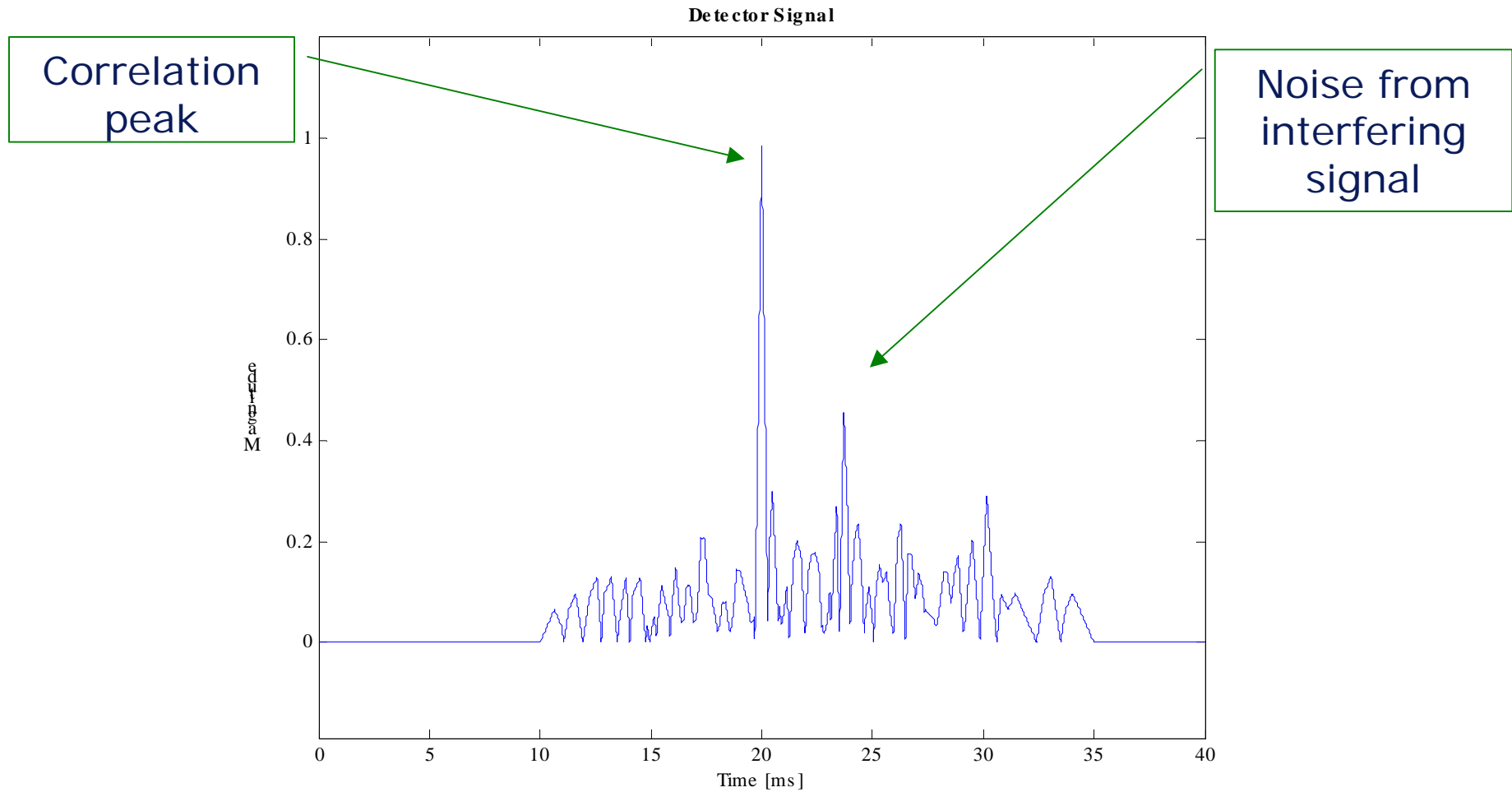
Receiver input signal; DSSS overlapped signal





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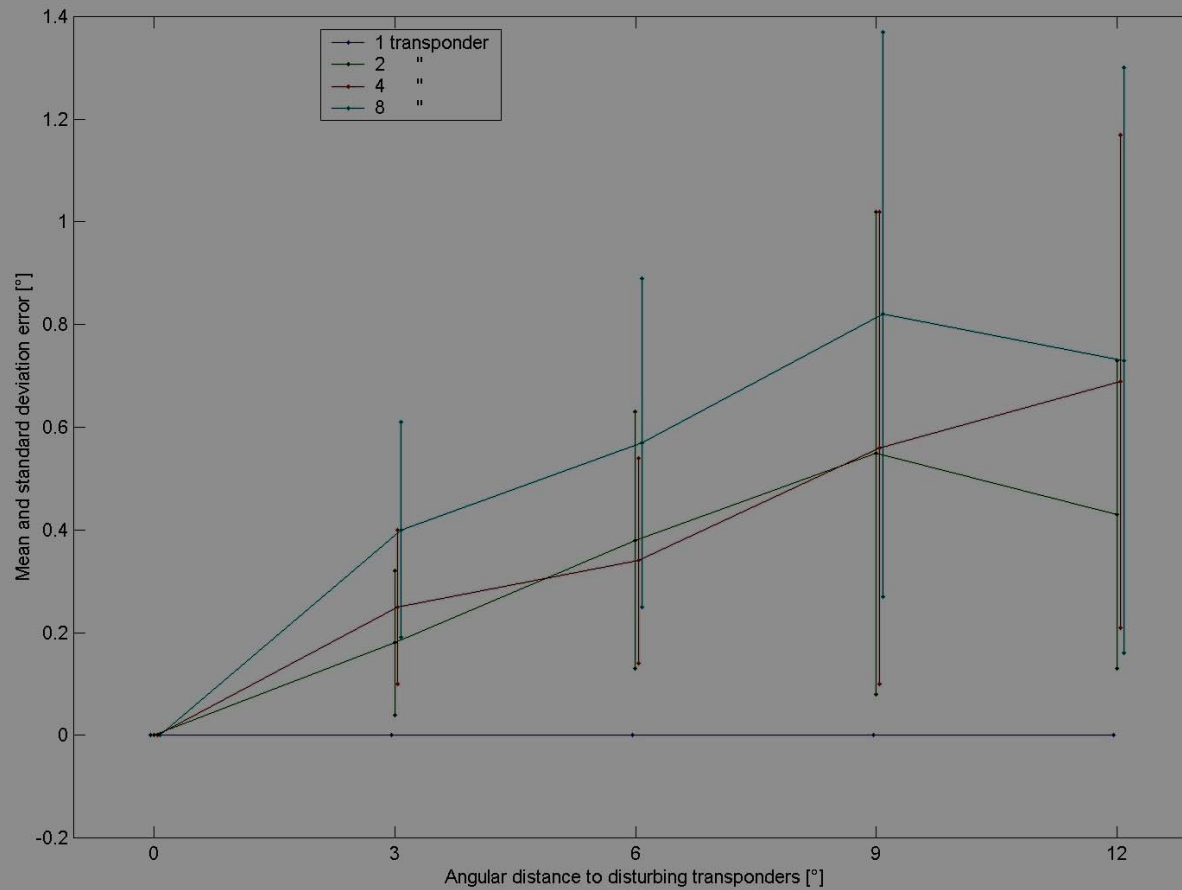
Detector input; DSSS Overlapped signal





Interference; Impact on directional measurement

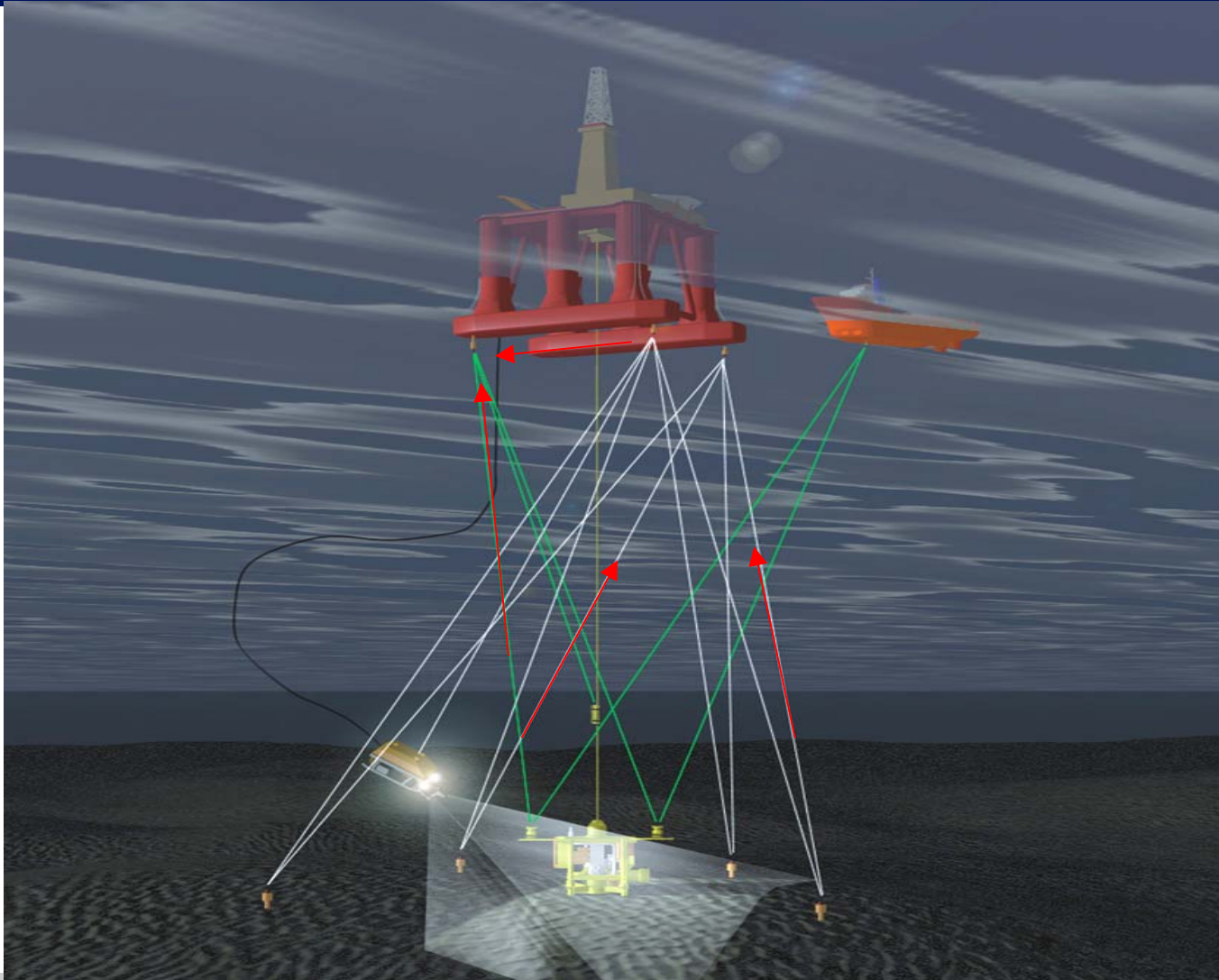
Simultaneous multiple replies





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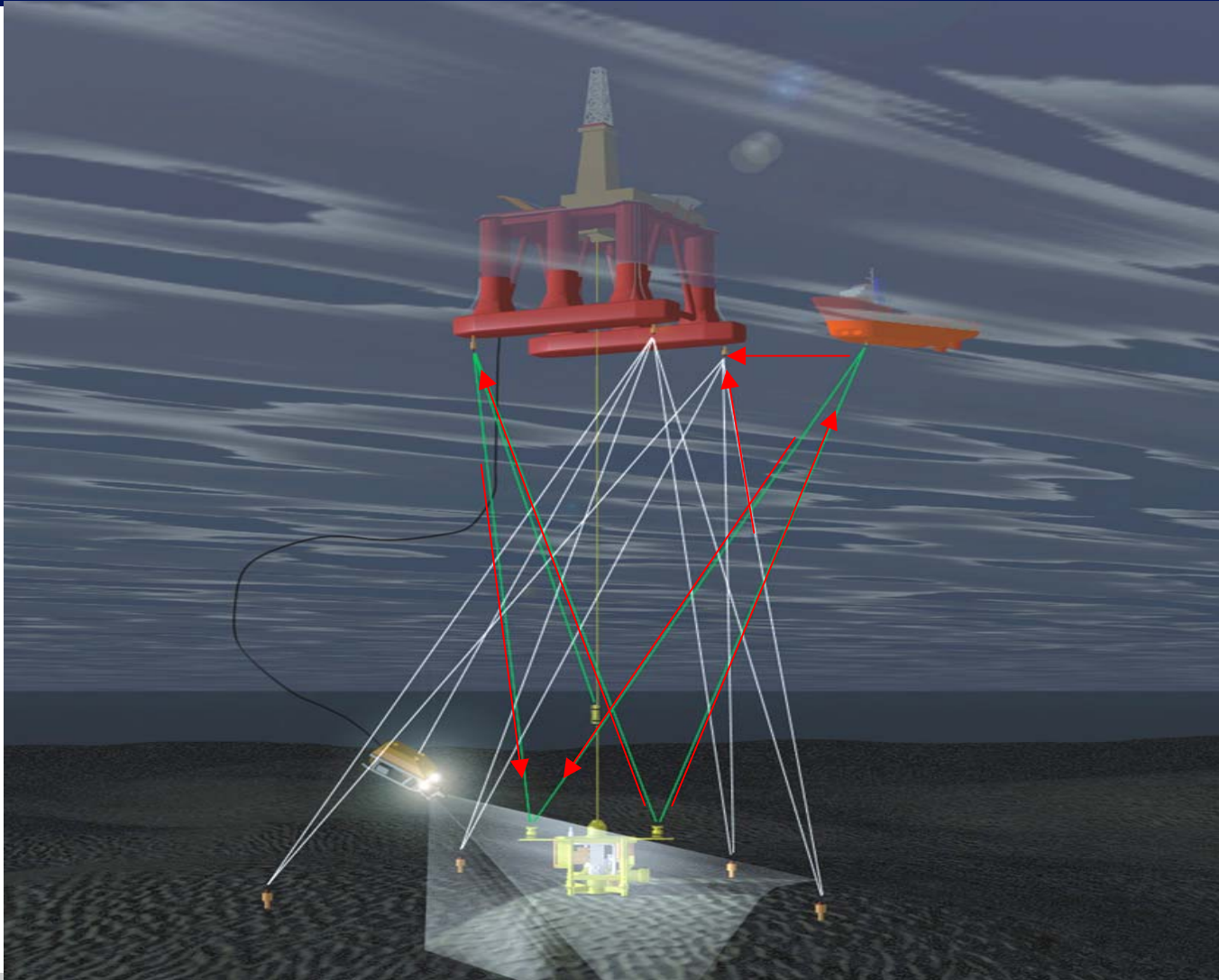
Intra system Acoustic Interference





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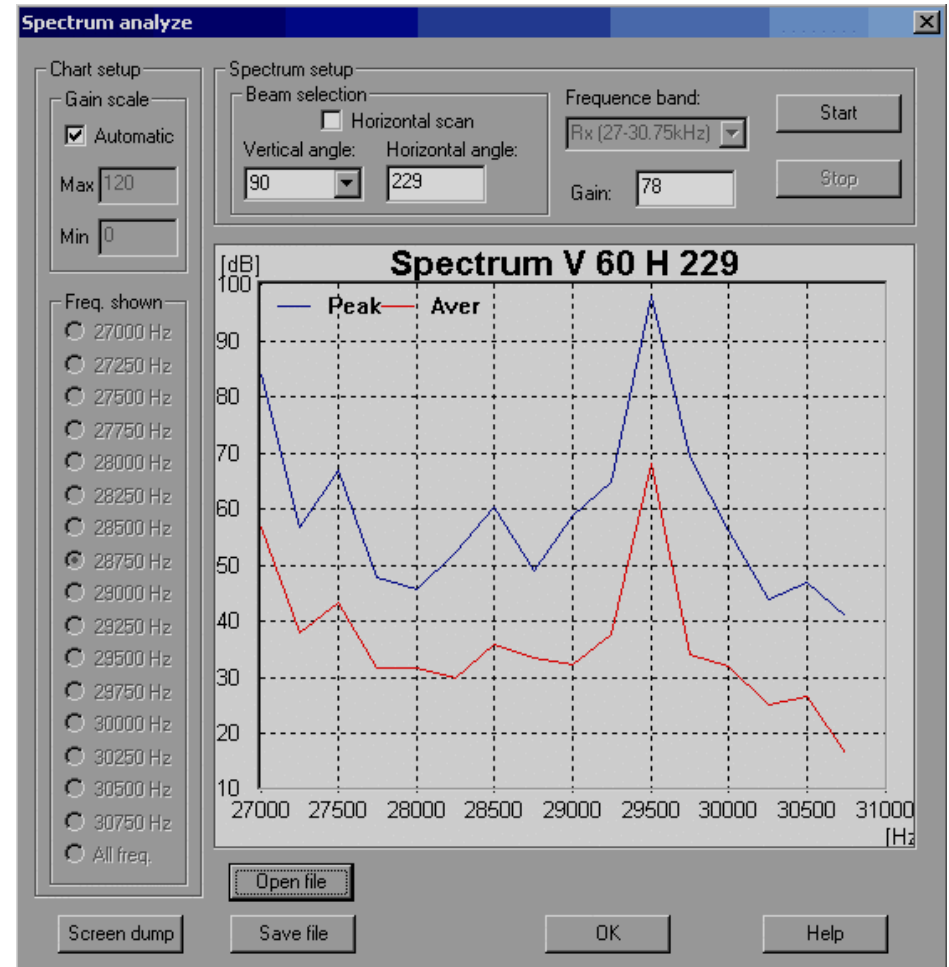
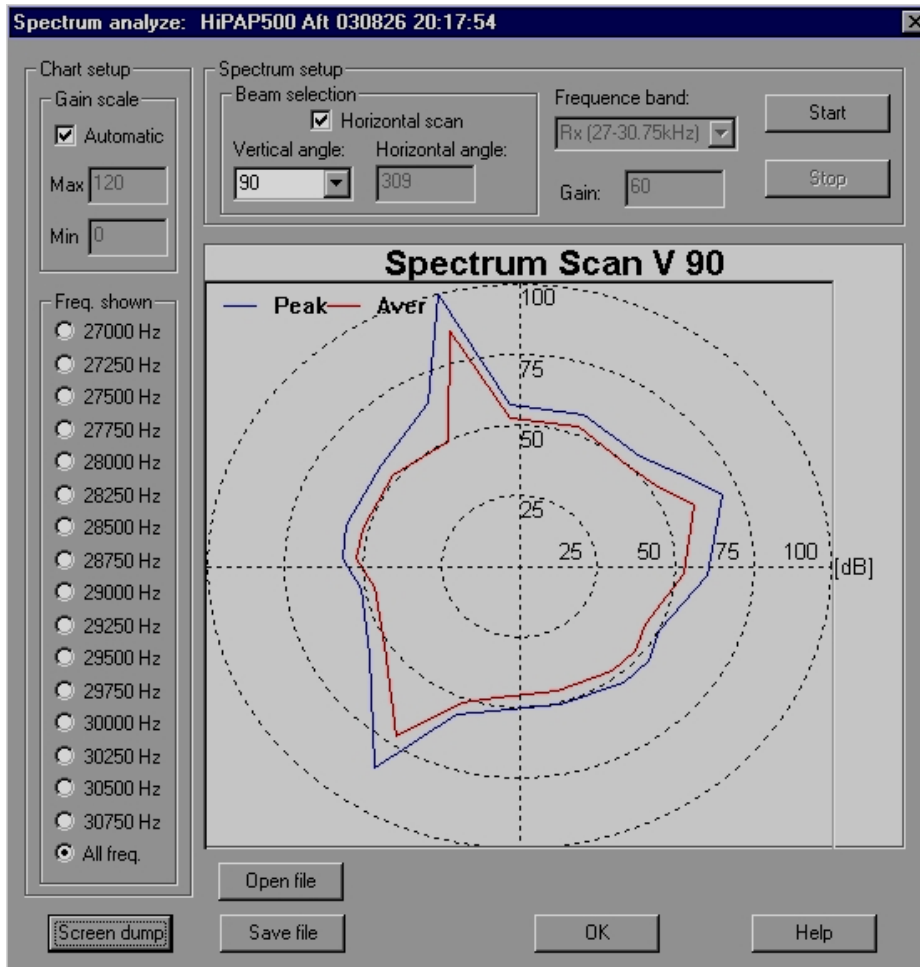
Inter system Acoustic interference





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Level & direction of received noise/interference





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Consequences for DP operation

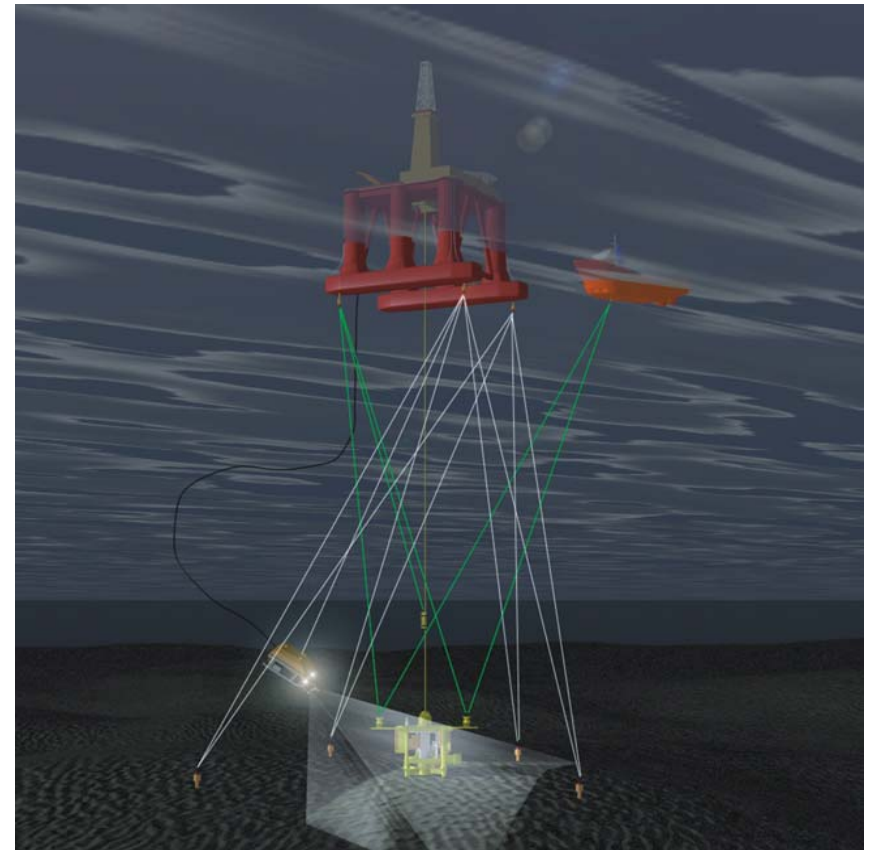
- Total loss of signal – no position
- Reduced accuracy – standard deviation increased
- Very unstable position – large position jumps
- Lock on wrong transponder – erroneous position



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Reducing acoustic interference

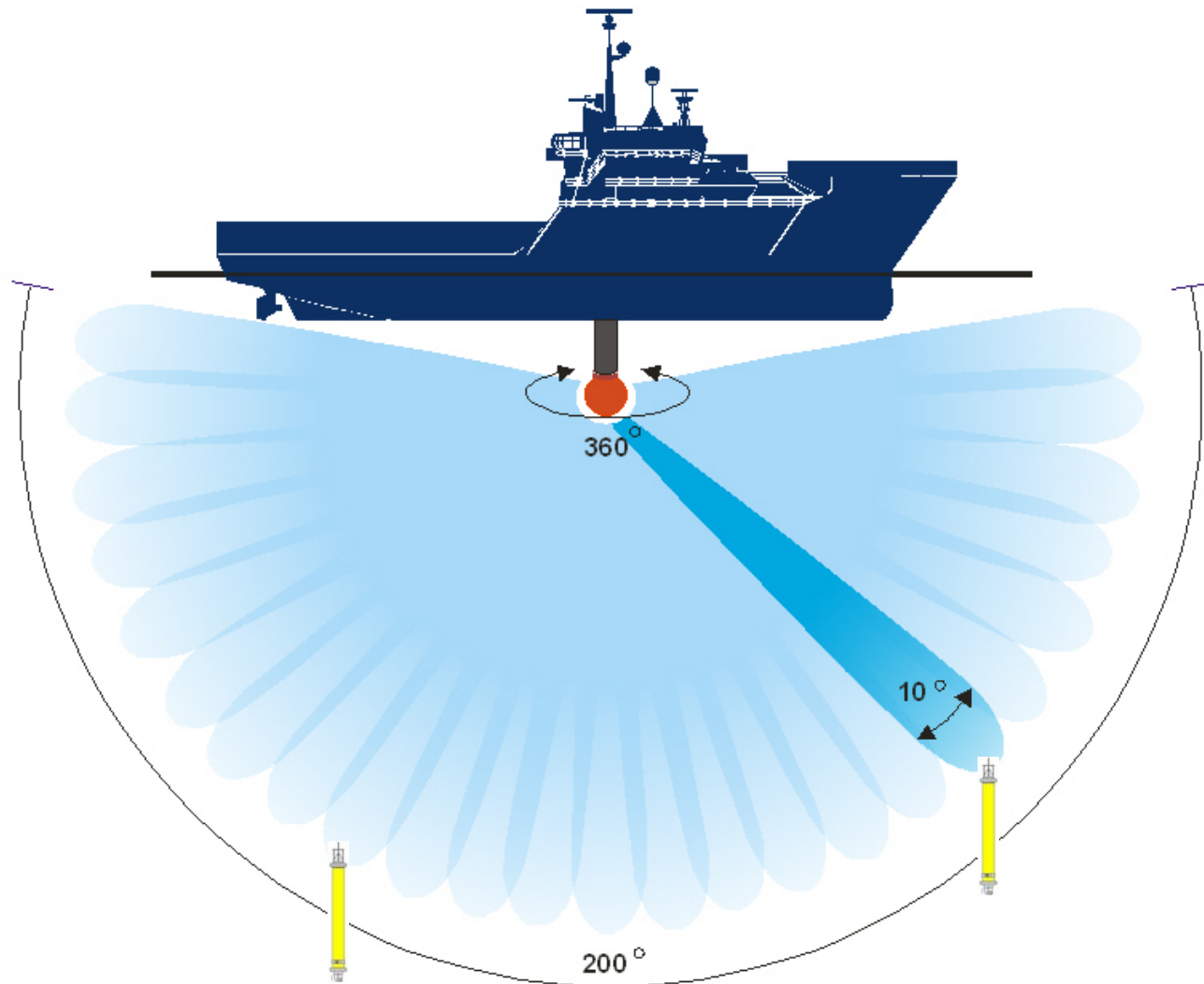
- Directivity on transmission and reception
- High channel separation
- Reduce number of transponders utilized
- Reduce interrogation rate





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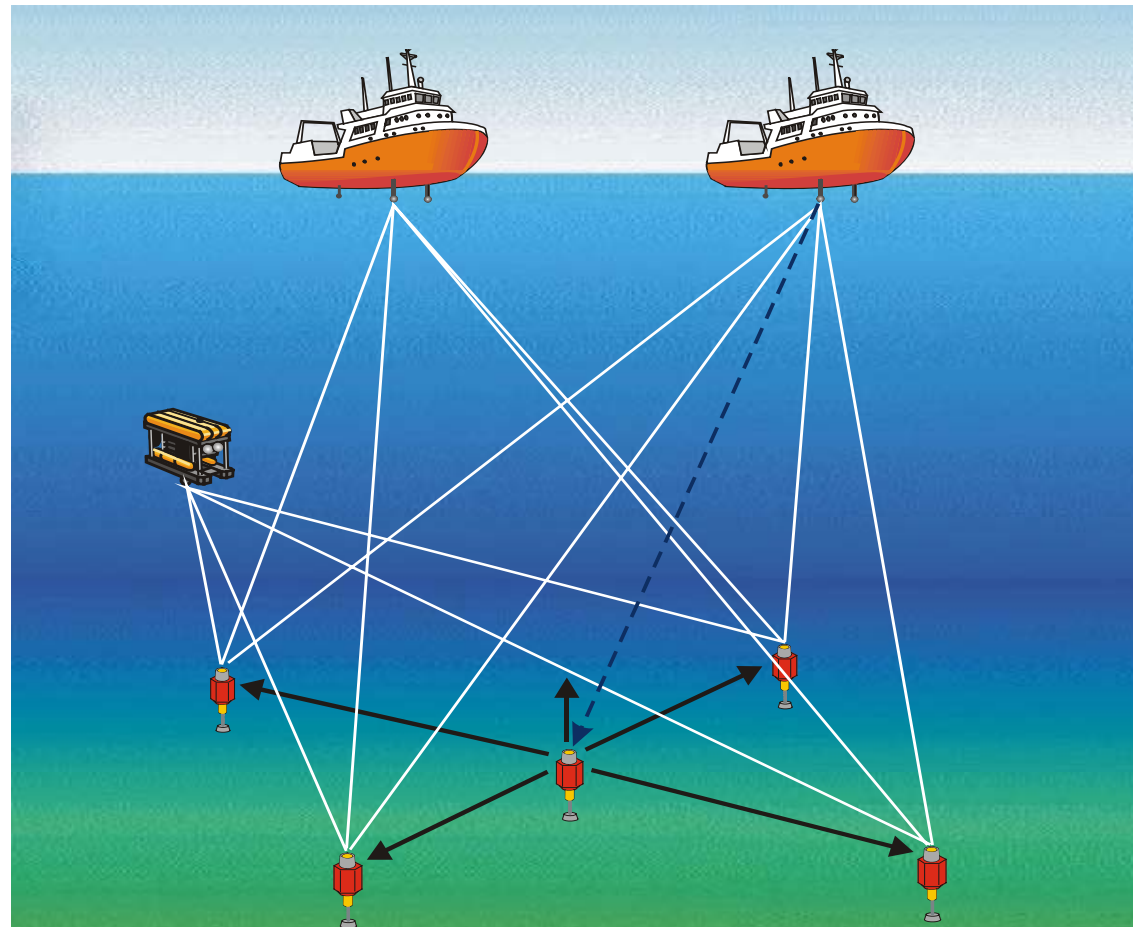
Narrow pointing beams



Multi User LBL



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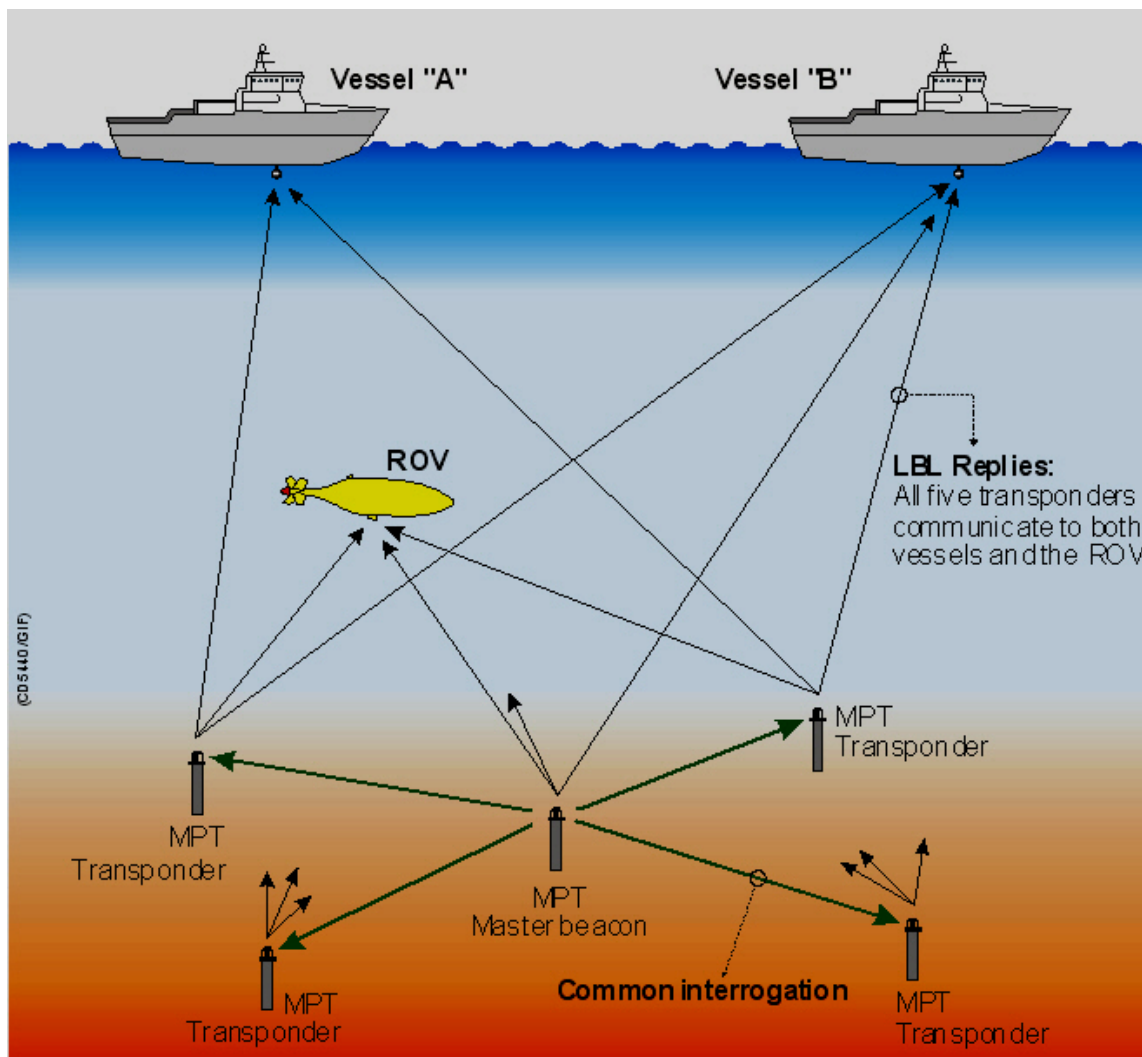
Several vessels uses the same transponder array

(CD4011)

Multi User LBL



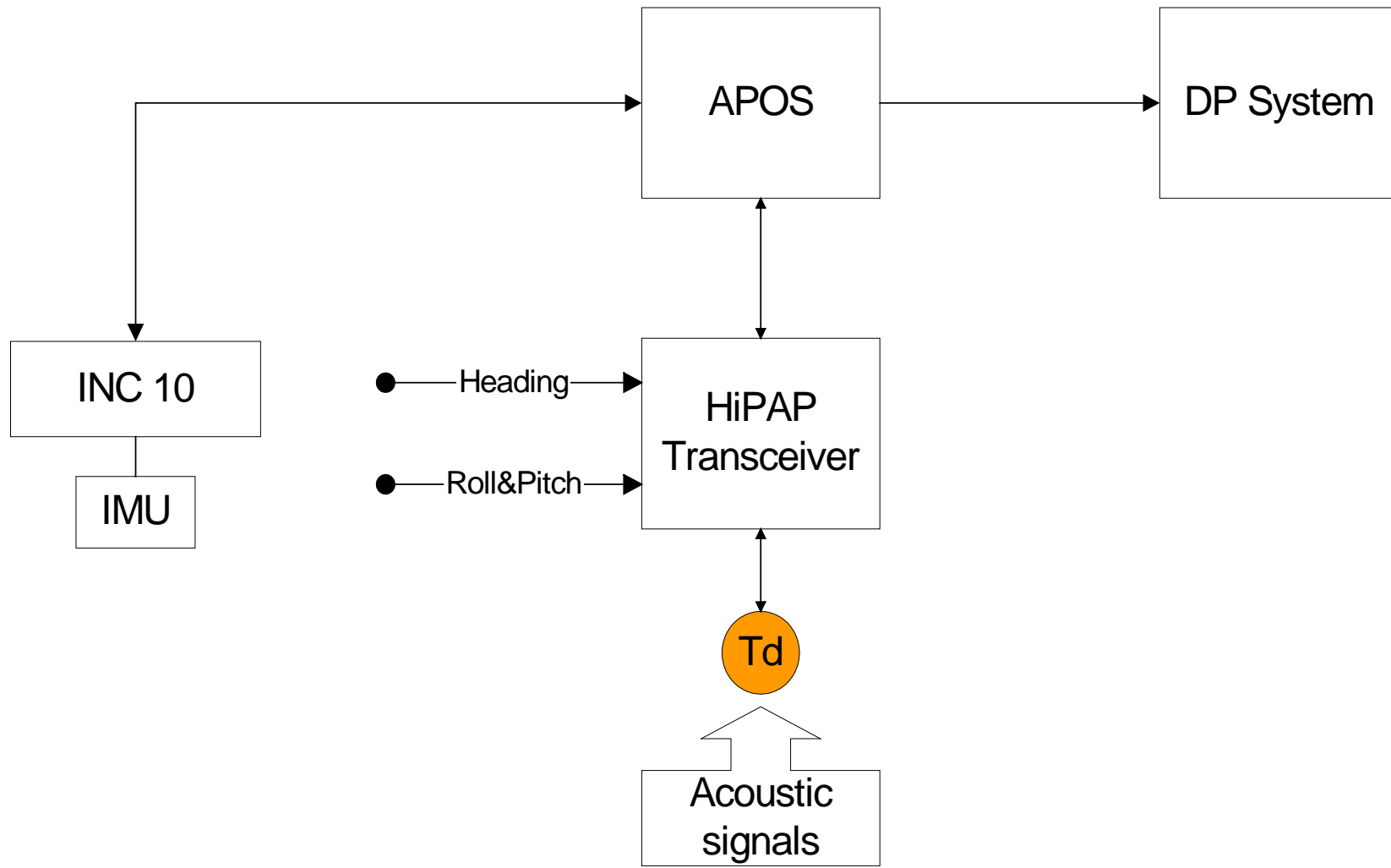
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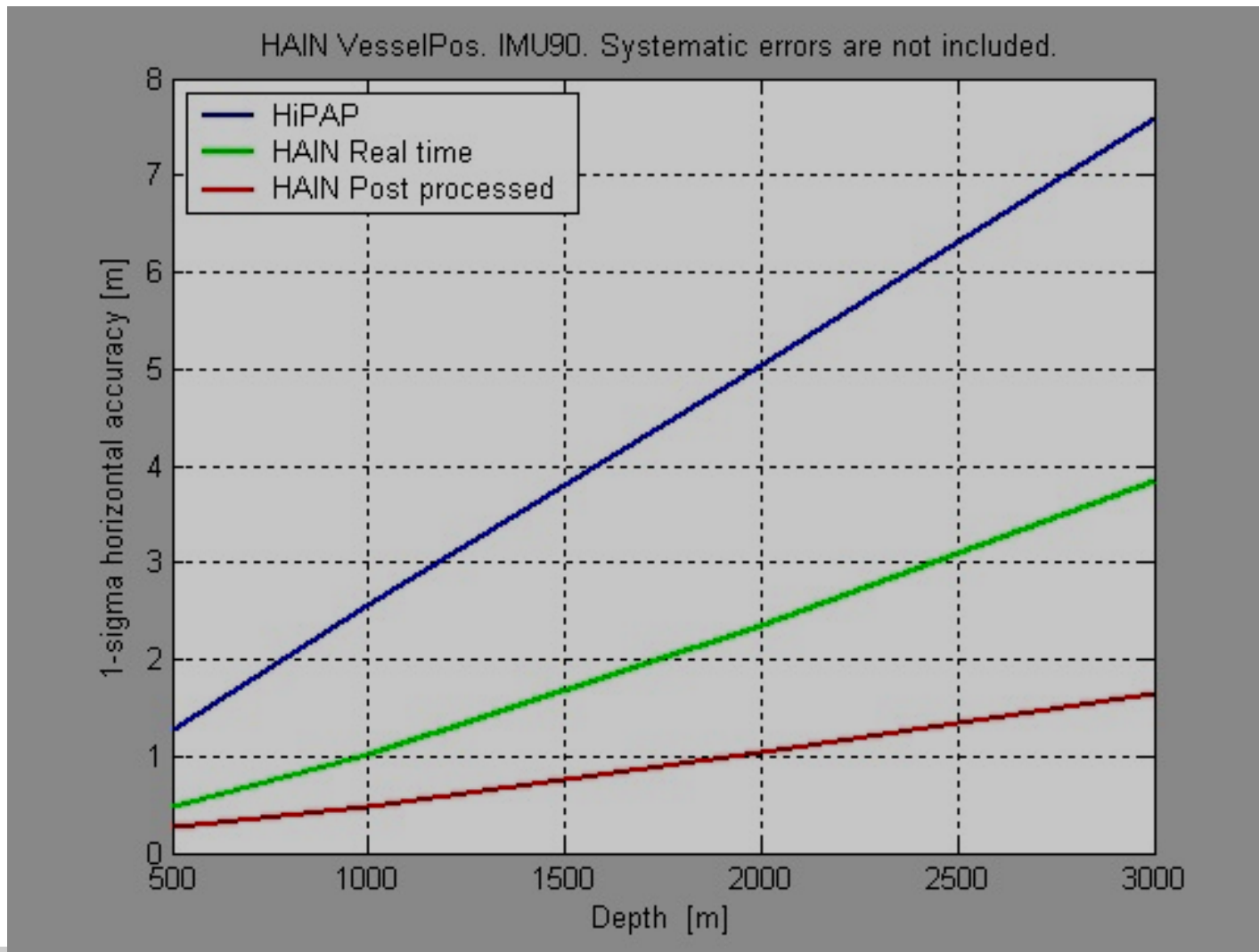
Hydro-acoustic Aided Inertial Navigation; HAIN





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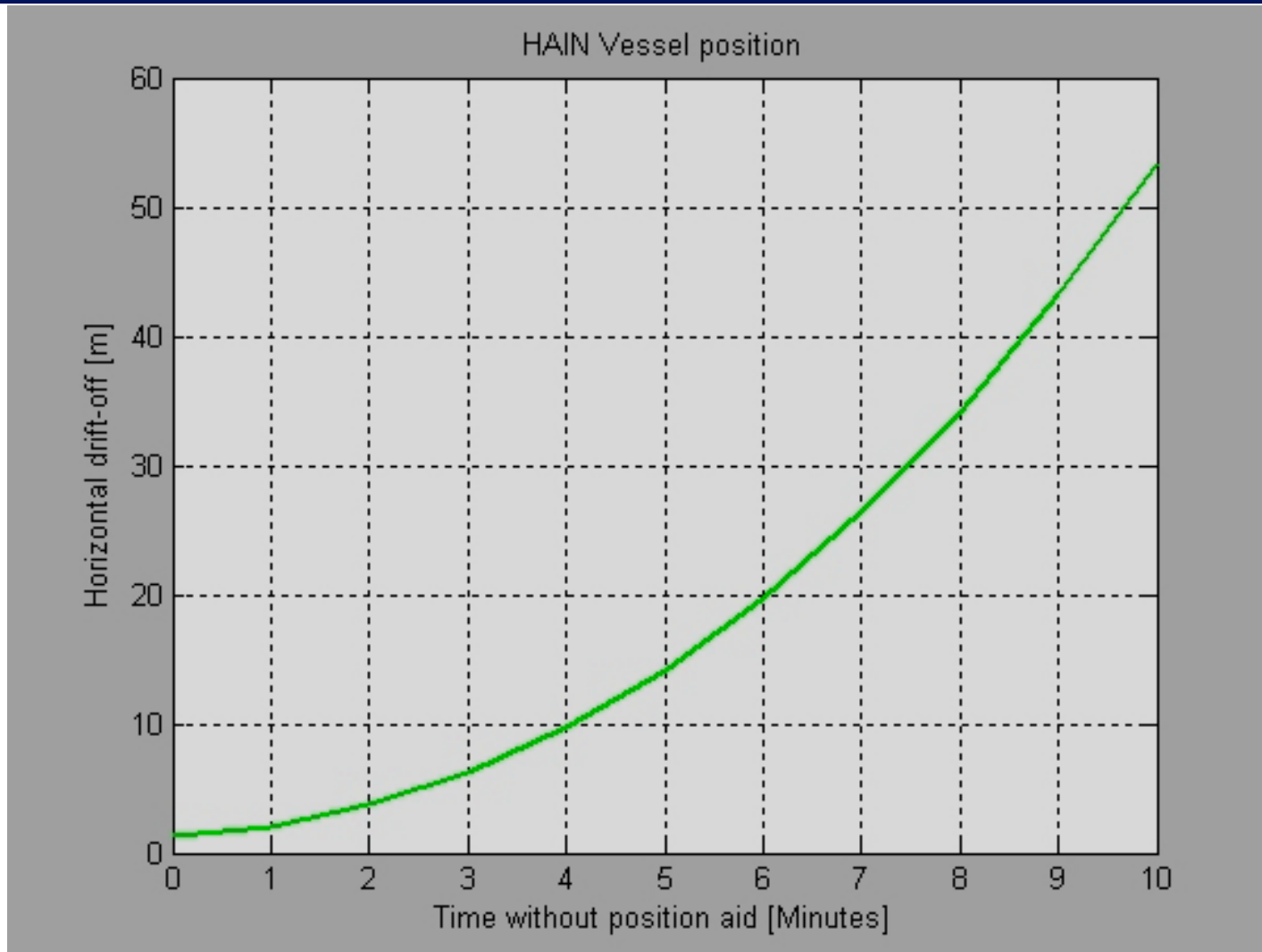
HAIN Accuracy. 1nmi/h IMU





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HAIN Accuracy during HiPAP dropout.





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Summary

- Planning and coordination
- System knowledge
- New functions / products can help

- Questions?

