



Photo:Åkerströms

## Reliable Wireless Machine-to-Machine Communications in electromagnetic disturbed Industrial and Hospital Environment

# Wireless communication in industries/hospitals

- ❖ Wireless communication technologies offers increased flexibility and does not require any pre-installed infrastructure (e.g. cables)
- ❖ Wireless technologies are vulnerable to electromagnetic interference.
- ❖ Incidents in industrial-/hospital environments clearly show the need of characterize the electromagnetic interference to prevent the risks for incidents.
- ❖ A characterization of the electromagnetic interference creates knowledge for choosing wireless technologies with the largest robustness against these interferences.
- ❖ Increased knowledge of the electromagnetic interference decreases the risk for incidents where personnel and material can be harmed.



Photo:Åkerströms



Photo:Philips

# Reliable Wireless Machine-to-Machine Communications in electromagnetic disturbed Industrial and Hospital Environment

Three main phases in the project:

- Characterization of the electromagnetic interference in selected frequency bands for wireless applications in industrial-/hospital environments. Focus on measurements and model development.
- Assessment of the sensitivity of present wireless technologies to this interference.
  - Risk analysis for commonly used technologies.
  - Guidelines for choice of wireless systems for these applications.
- Improvement of present communication technologies in order to increase the robustness of these interference environments. Methods for dynamic spectrum access to handle the environment will be studied.

# Phase 1: Characterization

## Activity

- Measurements of the electromagnetic interference in selected frequency bands (ISM/GSM/3G/GPS)
  - Time sequences, statistical properties
  - Electric fields strength vs frequency (Peak/RMS/Average)

## Deliverable

- Models for the electromagnetic interference

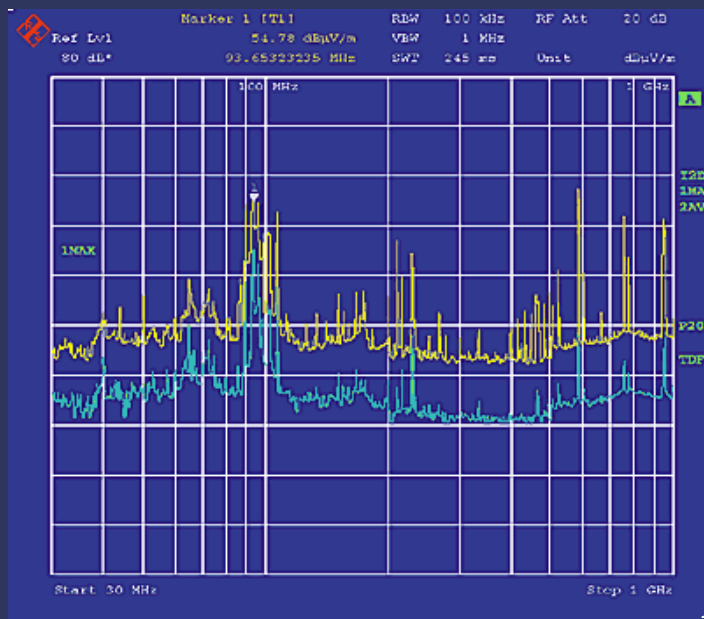


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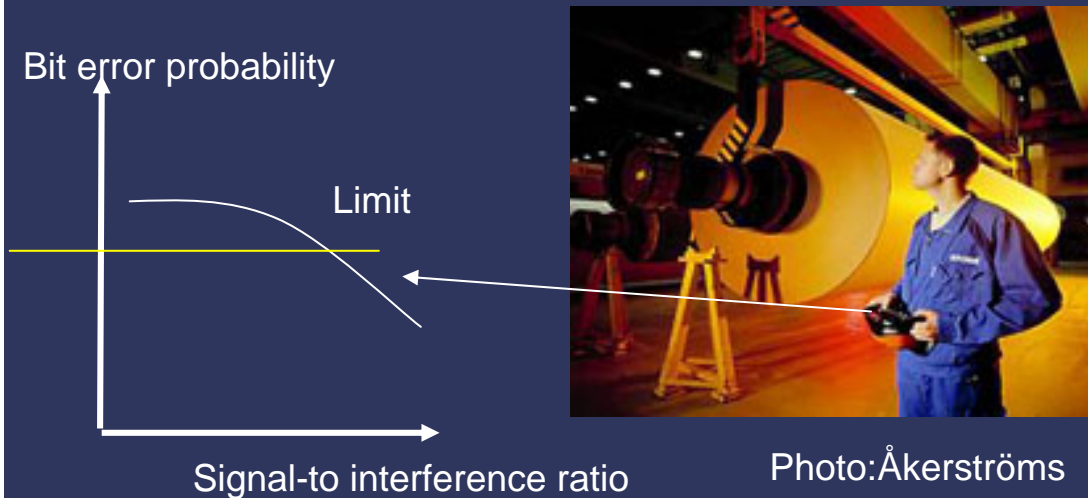
# Phase 2: Assessment

## Activity

- ❖ Risk analysis for some commonly used communication technologies exposed to the characterized interference.

## Deliverable

- ❖ Vulnerability analysis of some commonly used technologies
- ❖ Guidelines for choice of wireless technologies in these environments.



System	Low	Medium	High
Bluetooth	X		
802.11			X
TETRA		X	
GSM			X

# Phase 3: Improvement

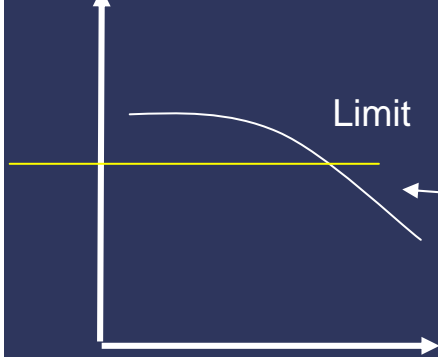
## Activity

- Development of present communication technologies to increase the robustness against the interference environment.

## Deliverables

- Signal-processing algorithms
- Filter technologies
- Technologies for dynamic interference control.

Bit error probability



Signal-to interference ratio



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System	Low	Medium	High
Bluetooth	X		
802.11			X
TETRA		X	
GSM			X

## Communication plan

- Reference group with representatives from industries/hospitals.
- Website with actual information about the project.
- Publications in scientific and popular science journals/conferences.
- Every phase of the project is terminated with a seminar day (workshop) where representatives from industries, hospitals and other interests will be given a thorough presentation of the results from the project.
- The project will produce design rules for the choice of wireless communication technologies in severely disturbed industrial-/hospital environments. These design rules can be used for planning and modification of wireless technologies in these environment so that the risk of incidents with damage on personnel and material will be minimized.