

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of

Revision of Part 15 of the FCC's
Rules Regarding Ultra-wideband
Transmission Systems

ET Docket 98-153

**Ex Parte Filing of Roke Manor Research Ltd.
A Siemens Company**

Roke Manor Research Ltd
Romsey
Hampshire,
SO51 0ZN
UK

May 30, 2001

Executive Summary

The attached presentation document, with the addition of commentary notes and some minor edits, was presented at the CEPT European Radiocommunications Committee Workshop on the Introduction of Ultra Wideband Services in Europe, held on March 20, 2001 in Mainz, Germany.

This submission includes a discussion of testing of the susceptibility of a high band GSM system to noise coded ultra wideband emissions. However, we do not have any plots to show the degradation of the performance for the GSM handset as none was ever detected, even when the UWB transmitter was in contact with the GSM handset.

An Independent Review of Time Modulated UWB

Originally Presented at:
European Workshop on UWB
Mainz, Germany
March 20th, 2001

Presented by:
Stephen P. Rowe
Principal Group Leader, Sensors Business Unit
Roke Manor Research
Romsey, England

Roke Manor Research

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Roke Manor Research is a 100% Siemens owned R&D laboratory in Romsey, UK.

Siemens is considering the application of UWB techniques in a future product.

Roke Manor Research is conducting an independent evaluation of prototype hardware made available by Time Domain Corporation in progress.



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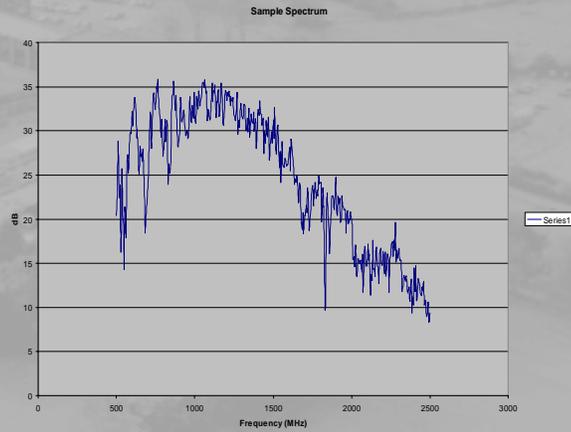
Roke Manor Research is a wholly owned subsidiary of Siemens. We are chartered to conduct advanced research, evaluation, and development for all divisions of Siemens. We are, in essence, an internal consulting resource.

With a technical staff of 500, Roke Manor has experts in communications and sensors theory and design. Past projects have included UWB radars and communications systems for civil and defence customers.

While Mustang Ventures, another Siemens subsidiary, has invested in Time Domain, other divisions of Siemens have asked Roke Manor to conduct an independent evaluation of Time Domain's time modulated UWB. We have been asked by these divisions to recommend how Siemens might best apply the technology and if there are critical technical issues, such as interference to existing systems, that must be considered.

UWB Evaluation Topics

- Indoor propagation
- Outdoor propagation
- Interference to comms systems
- Interference from comms systems
- Compare with theory
- Systems design

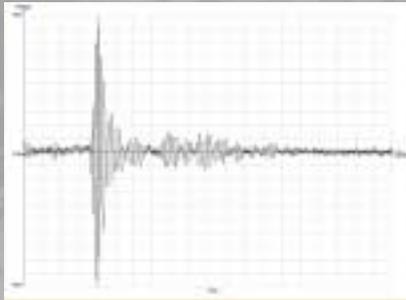


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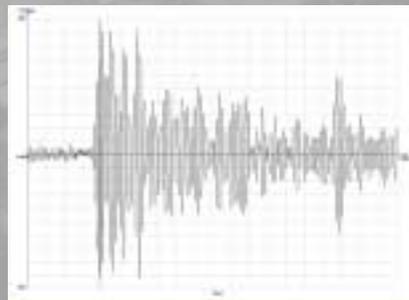
Our internal clients asked us to address these areas.

Examples from Propagation Measurements

Outdoor Waveform



Indoor waveform
(through several walls)



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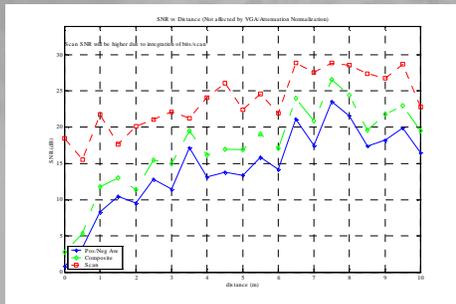
These waveforms were captured using a Time Domain radio system operating as an impulse response measurement instrument. The X-axis is time and the plots show the impulse response over 100 nanoseconds for outdoor and indoor environments.

In the out-door environment, where the path was relatively free from clutter, the signal is fairly tightly constrained in time.

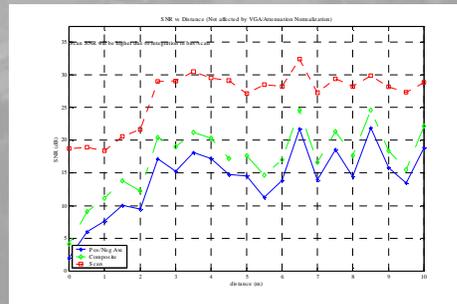
However, in the indoor environment where the signal had to pass through several walls, there is significant dispersion of the signal. In this case there are reflections more than 80 nanoseconds after the first arriving signal. This illustrates the value of UWB in cluttered environments.

Effects of GSM on UWB Receiver

Low band GSM



High band GSM (UWB receiver fitted with 1.9GHz notch)

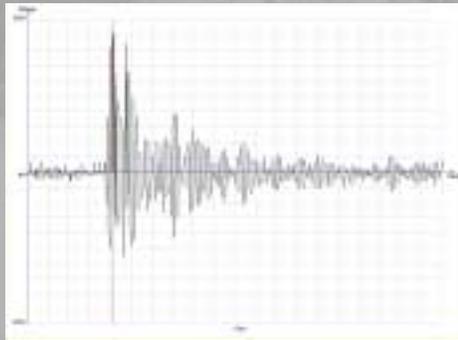


We measured the degradation in the signal to noise ratio in the UWB receiver as we brought a standard GSM handset closer in range. From 6m there were noticeable effects but even at zero range (touching) the UWB remained in lock under the configuration of the experiment. Obviously the performance of the UWB is affected by the GSM transmitter. High band GSM has less effect as the UWB receivers used had a notch filter fitted at 1.9GHz.

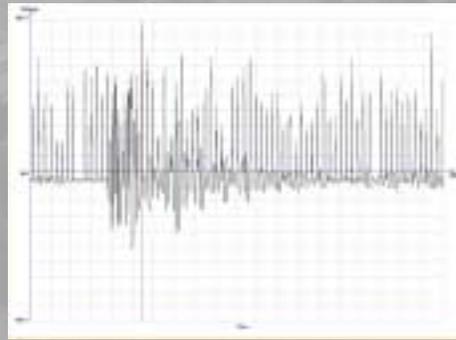
Effects of GSM on UWB Receiver

Effects of GSM on UWB receiver (Time Domain)

Low band at 10 m



Low band at 0m



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Signals falling within the passband of the UWB receiver are sources of interference to the UWB receiver. These plots show the impact of low-band (800 MHz) GSM emissions on the TM-UWB receiver.

When the GSM handset is 10 meters from the UWB receiver, the GSM emission is barely perceptible to the UWB signal. It can be seen as small spikes in the 20 nanoseconds prior to the arrival of the UWB signal in the plot on the left.

The GSM emission is quite perceptible as noise spikes when the GSM handset antenna is touching the UWB receiver antenna. The GSM emission creates the large time domain spikes shown in the plot on the right. (What is especially remarkable is that the UWB receiver remained synchronized in this case.)

Effects of UWB on GSM Handset

Effects of UWB on GSM handset (preliminary results)

Tests carried out on both high and
Low band GSM handsets



No filters in UWB transmitter

No steady state interference effects detected

Measurements made down to 0 metres



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Tests were carried out using a GSM handset modified to display RSSI and no effects were observed at any range of GSM to UWB. This test would have been better had we been able to display S/N ratio as we did in the previous experiment. The GSM handset was positioned in a location where reception of the base station signal was only just possible but even then it never dropped a call even when the UWB transmitter was touching. Neither was any degradation noticed on voice quality.

We don't have any plots to present showing the degradation of performance for the GSM handset as none was ever detected, even when the UWB transmitter was in contact with the GSM handset.

UWB Advantages & Applications

System Advantages

- Potential for high data capacity
- Flexibility to trade range for data rate
- Built in accurate position location

Potential Applications

- Short range (up to 10m) wireless LAN
- Short/medium range (10m to 100m) wireless LAN

Siemens is considering UWB for a range of possible future applications