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**IEEE P802.11  
Wireless LANs**

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**Report of April 20-21 1998 meeting of CEPT Project Team 24  
Higher Power regulation for RFID devices in CEPT countries**

**Date:** April 23, 1998

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**Summary**

The RLAN device constituency was better represented then at previous meetings. Telxon The person in charge of the collection of the survey reports and the preparation of a report did not bring any of the material into the meeting and did not have a report, because there are still reports being brought to him.

The plan is now to prepare interference tests between RLAN devices and RFID devices through conducted measurements as provided in the report of the relevant drafting group below. Based on those results, the decision can be prepared.

The measurement tests are planned on May 25 and 26, 1998. The tentative place is subject to management approval.

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## 2.45 GHz RFID Drafting Group Report

The group started with drafting the following skeleton for the discussion

1. What is the need of the RFID devices (Power/bandwidth)
2. Compatibility / Co-existence with existing services in the band
3. Informal results, uncertainty
4. List of references and applicable documents
5. What is reasonable to test

### Report

#### **1. What is the need of the RFID devices (Power/bandwidth)**

This question was not answered at the meeting, but RFID manufacturers were asked to provide input before the next SE 24 meeting.

#### **2. Compatibility / Co-existence with existing services in the band**

The group discussed this item at length and decided to do initial interference tests between RLANs and RFID systems. In order to eliminate unpredictable effects from antenna, antenna positioning and distances, the group agreed to perform conducted measurements instead of radiated measurements. In the final analysis the antenna characteristics, path loss, etc .. will be taken into account again.

#### **3. Informal results, uncertainty**

One of the responses to the survey started at the Graz meeting was a test report with very optimistic results. It reported that 2 RLAN devices at 50 m distance, would not be influenced by an RFID device deployed more than 3 m above one of the RLAN devices. It was felt that the report provided insufficient description of the set-up, like antenna positioning, used power levels and antenna characteristics.

#### **4. List of references and applicable documents**

The drafting group did not complete this item, however, the writer of this report provided the list given in annex 2.

#### **5. What is reasonable to test**

After some discussion it was decided that the variables in conducting such tests would make the tests too complicated and expensive, if performed at a test house. Instead, the group decided to perform the test themselves as described in the test plan below and the description of the test given in annex 1.

#### **6. New items**

Sigurd committed to distribute the input and the report of the Survey of the 2.45 GHz band devices started at the Graz meeting to the members of this group, before May 15, 1998.

## The Test Plan

### Test Location

The group decided that the test would be conducted, subject to approval by the management, at the premises of :  
Lucent Technologies Nederland B.V.

WCND  
Zadelstede 1-10  
3431 JZ Nieuwegein  
the Netherlands

### Schedule:

First test                      May 25-26, 1998.  
Second test                    June 4-5, 1998  
Test Report distribution    June 15-16, 1998 at the meeting of SE24

### Approach

To investigate whether the test set-up as described in annex 1 would provide the required information, the group decided to do initial testing with a limited number of RFID and RLAN devices involved on May 25<sup>th</sup> and 26<sup>th</sup>. If this is the case, more manufacturers and equipment are invited to conduct the second test on June 4<sup>th</sup> and 5<sup>th</sup> that will lead to the report to the next SE24 meeting.

Before the second test is conducted, the RLAN performance degradation must be clearly defined.

### Participants for the first test.

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### Test Set-up

Provided in document SE24 (98)74

### Attendance list:

Sigurd Bolt Sørensen	Bolt Consult	Chair
Jaques Hulshof	Nedap	

### Edgard Vangeel

**Telxon**

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Richard van Nee	Lucent Technologies Nederland B.V.	
Vic Hayes	Lucent Technologies Nederland B.V.	Writer of this report
John Greaves	Symbology Strategy	
Steve Bishop	Micron	
Lajos Horváth	Communication Authority, Hungry	
Matti Meuronen	Telecommunications Administration Centre, Finland	

## Annex 1 : Description of test

The group decided to schedule a test in the following way:

A wired link will be established between RadioLAN devices (1) and (7) according to the figure provided in document SE24(98)74,

The RLAN device (1) power output will be split by splitter (2), so power meter (4) and peak power meter (5) can monitor the RLAN signal.

The other output of splitter (2) is lead to variable attenuator (3) so that the attenuated RLAN signal is submitted through 2-way combiner (6) to the RLAN device (7). The RLAN device (7) is connected to a notebook PC (15) to evaluate the quality of the RF link.

Interference will be generated by an RFID device (8). Again a 2 way splitter (9) will enable the monitoring of the RFID power output by power meter (11) and the peak power and duty cycle by the peak power meter (12).

A fixed and variable attenuator (10) enables the attenuation of the RFID signal before it is combined with the RLAN signal in the 2 way combiner (6).

If the RFID device is unable to select the different duty cycles, a pulse generator (13) and (e.g) a pin diode switch (14) will simulate a duty cycle.

1. Duty cycles of the RFID device (8): 0.1 %, 1 %, 10 % and 100 %. If the device can not control the duty cycle, see 4.
2. Attenuator (3) variation between 40 and 120 dB in steps of 10 dB
3. Attenuator (10) variation between 40 and 120 dB in 3 dB (10 dB) steps.
4. RFID device (8) transmits power at 30 dBm with Duty Cycles mentioned above, or it will be modified to transmit continuously in which case the Duty Cycle will be simulated by the equipment (13) and (14). The intention is to simulate RFID interference levels between -20 dBm and -90 dBm.
5. RLAN device (1) is expected to transmit power at a level of 17 dBm. Different settings of the attenuator (3).
6. RFID devices in the test. The following units are planned, subject to availability:
 

NEDAP	Narrow band	(test 1)
MICRON	DSSS and FHSS	(test 1 & 2 ?)
ERS	FHSS	(test 2 ?)
INTERMEC	FHSS	(test 2 ?)
7. RLAN devices in the test. The following RLAN devices are planned, subject to availability:
 

Lucent Technologies	DSSS	(test 1)
TELXON	FHSS and DSSS	(test 1)
Symbol Technologies	FHSS	(test 2 ?)
INTERMEC	FHSS	(test 2? )

### ***Aim of the Test***

The aim of this testing is to investigate the effect of 2.4 GHz RFID systems on the performance of RLAN systems as a function of :

- RFID signal level (distance to RLAN system)
- Type of RFID system (NB, FHSS, DSSS, ..)
- Type RLAN system (FHSS, DSSS)
- Frequency of RFID versus frequency of RLAN DSSS systems
- Distance between RLAN systems

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The conclusion of this testing will be reported at the next SE24 meeting

**Annex 2 : Documents relevant to the 2.45 GHz RFID compatibility study**

document number	Source	Title or subject	Electronic copy avlbl
(96)55	Netherlands' HDTP	Joint use of the 2.4-2.5 GHz band. frequency allocation plan based on interference analysis	
(97)14 rev7		Proposals for future use of 2.4-2.48 GHz band based on compatibility studies	
(97)163	ERC	CEPT/ERC Recommendation 70-03 (Tromso 1997) Relating to the use of short range devices (SRD)	
(97)173	Lucent Technologies	Letter concerning the request to allow 500 mW spread spectrum RFID systems in the 2.4 GHz band	
(97)179	Chairman	Minutes SE24 November meeting	
(98)13	Sensormatic	RFID and EAS at 2.45 GHz	
(98)18a	Chairman	Minutes SE24 January meet0ing	
(98)32	SRD/MG	Summary of Survey Responses to RFID Questionnaire	
(98)22	Micron Communications	Response to TagMaster letter Nov 23, 1997, Correspondence on the Proposed RFID Annex to CEPT 70-03	
(98)28	IEEE P802.11	Comments to CEPT SE24 on raising the RFID Power level	
(98)34	Secretary	Spreadsheet on separation distances at 2.45 GHz	
(98)36	Nedap	description of 200 mW reader for Vehicle and Container identification tags in the 2.4-2.48 GHz band	
(98)39	ISO/IEC JTC 1/SC31	Proposed activity regarding CEPT 70-03	

# 2.4 Ghz RFID <--> 2.4 Ghz RLAN System Interference test set-up

