



**TEST REPORT CONCERNING THE COMPLIANCE
OF A 2.4 GHZ MICROWAVE ID SYSTEM, BRAND
NEDAP, MODEL TRANSIT EDGE WIRELESS
WITH INSTALLED ETHERNET RADIO DATA LINK
(902-928 MHZ)
WITH THE FOLLOWING REQUIRMENTS:**

47 CFR PART 15 (JULY 10, 2008).

FCC listed : 90828
Industry Canada : IC3501A
VCCI Registered : R-1518, C-1598
R&TTE, LVD, EMC Notified Body : 1856

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MEASUREMENT/TECHNICAL REPORT

N.V. Nederlandsche Apparatenfabriek "Nedap"

Model : TRANSIT EDGE WIRELESS

FCC ID: CGDTRANSED

November 06, 2008

This report concerns:		Original grant/certification	Class 2 change	Verification
Equipment type:		2.4 GHz Microwave ID system (Field Disturbance Sensor)		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?		Yes	No	n.a.
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (July 10, 2008) and the measurement procedures of ANSI C63.4-2003. TÜV Rheinland EPS B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: November 06, 2008

Signature: 
 H.J. Pieters
 Project Manager TÜV Rheinland EPS B.V.

Description of test item

Test item : 2.4 GHz Microwave ID system (Field disturbance sensor)
Manufacturer : N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand : Nedap
Model(s) : TRANSIT EDGE WIRELESS
Serial number(s) : n.a.
Revision : n.a.
Receipt date : July 16, 2008

Applicant information

Applicant's representative : Mr. J.A.M. Hulshof
Company : N.V. Nederlandsche Apparatenfabriek "Nedap"
Address : Parallelweg 2
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City : Groenlo
Country : The Netherlands
Telephone number : +31 544 471 162
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Test(s) performed

Location : Niekerk
Test(s) started : July 18, 2008
Test(s) completed : September 17, 2008
Purpose of test(s) : Equipment Authorization

Test specification(s) : 47 CFR Part 15 (July 10, 2008)

Test engineers : R. van der Meer 

Report written by : R. van der Meer 

Report date : November 06, 2008

This report is in conformity with NEN-EN-ISO/IEC 17025: 2005
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The test results relate only to the item(s) tested.

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1 General information.

1.1 Product description.

1.1.1 Introduction.

The 2.4 GHz Microwave ID System, brand Nedap, model TRANSIT EDGE WIRELESS, is designed to operate in the 2.4 GHz ISM frequency band, channels 1 to 32 (2438.4 MHz to 2457.0 MHz), as specified by the Federal Communications Commission in the USA. It also consists of point to multipoint long range wireless Ethernet radio-datalink module designed to work in the frequencyband 902-928 MHz. This module is already FCC and IC certified, see 1.3 Auxiliary equipment 2 for details.

The 2.4 GHz Microwave ID System, brand Nedap, model TRANSIT EDGE WIRELESS, incorporates an integral antenna, having a gain of 8 dBi. The material is of PTFE and is 1.6 mm thick. The external antenna is added for the wireless Ethernet radio module.

1.2 Related submittal(s) and/or Grant(s).

For the installed Ethernet Radio Data Link an FCC grant was issued under FCC ID: R4N-AW900M and IC ID: 5303A-AW900M. The TRANSIT EDGE WIRELESS was provided with this certified modem.

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	2.4 GHz Microwave ID system (Field disturbance sensor)
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand	:	Nedap
Model	:	TRANSIT EDGE WIRELESS
Serial number	:	n.a.
Voltage input rating	:	24V dc
Current input rating	:	not provided
Antenna	:	Integral and an external antenna for wireless connectivity
Remarks	:	None
Auxiliary equipment 1	:	Linear AC/DC Power Supply
Manufacturer	:	Power-Win Technology Corp.
Brand	:	Power-Win Technology Corp.
Model	:	PW-065A-1Y24F1
Serial number	:	3668466
Voltage input rating	:	100-240V , 50-60Hz
Current input rating	:	2A
Voltage output rating	:	24Vdc
Current output rating	:	2.7A
Remarks	:	Used to power the EUT

For auxiliary equipment 2 see page 6.

Auxiliary equipment 2	:	900MHz Wireless Ethernet Radio
Manufacturer	:	Avalan
Brand	:	Avalan
Model	:	AW900m
Serial number	:	n.a.
Voltage input rating	:	4.5-48VDC
Current input rating	:	No data provided
Remarks	:	FCC ID: R4N-AW900M IC ID: 5303A-AW900M
Auxiliary equipment 3	:	Linear AC/DC Power Supply
Manufacturer	:	Deutronic
Brand	:	Deutronic
Model	:	ESC10-5
Serial number	:	n.a.
Voltage input rating	:	100-240V , 47-63Hz
Current input rating	:	0.4A
Voltage output rating	:	5VDC
Current output rating	:	1.6A
Remarks	:	Used as power source for Auxiliary equipment 2

1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (July 10, 2008), sections 15.205, 15.207 15.209, 15.245.

The test methods, which have been used, are based on ANSI C63.4: 2003.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters. Radiated emission tests below 30 MHz were performed at a measurement distance of 3 meters and 10 meters. To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the distance extrapolation factor of 40dB/decade is used.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.5 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS B.V., located in Niekerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 23, 2000.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

1.6 Test conditions.

Normal test conditions:

Temperature (*) : +15°C to +35°C
Relative humidity(*) : 20 % to 75 %
Supply voltage : 110VAC/60Hz to the AC/DC Power Supply – the DC output was varied across the voltage range specified by the manufacturer
Air pressure : 950 – 1050 hPa

When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately

2 System test configuration.

2.1 Justification.

The system was configured for testing in a typical fashion (as a customer would normally use it).

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2003.

Tests were performed at the lowest operating frequency (channel 1: 2438.4 MHz), the operating frequency in the middle of the specified frequency band (channel 17: 2448 MHz) and the highest operating frequency (channel 32: 2457 MHz). Further details may be found in table 1 below.

Channel	Operating frequencies (MHz)	Rated output power (mV/m)	Test performed
1	2438.4	425.0	yes
17	2448.0	425.0	yes
32	2457.0	425.0	yes

Table 1 - Specification of channels and rated maximum radiated field strength

The EUT could be enabled to transmit on channels 1 (2438.4 MHz), 17 (2448.0 MHz) and 32 (2457.0 MHz) by means of dipswitches.

2.2 EUT mode of operation.

The EUT has been tested while continuously transmitting in Subband 5 and 6 on channel 1 (2438.4 MHz), channel 17 (2448 MHz) and channel 32 (2457MHz) and the wireless Ethernet module transmitting on a frequency in the band 902-928MHz. As mentioned in section 1.1 and 1.4 of this report the wireless Ethernet radio module is already FCC and IC approved.

The EUT was not tested in receive mode due to the fact that the device only operates in a transmit mode.

The intentional radiator tests (47 CFR Part 15 sections, 15.207, 15.209, 15.245) have been performed with a complete functioning EUT and interconnections.

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance.

2.4 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance.

3 Radiated emission data.

3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

Frequency (MHz)	Measurement results dB(μV)/m @ 3m Quasi-peak		Limits dB(μV)/m @ 3m Quasi-peak	Result
	Vertical	Horizontal		
30.0-88.0	<30	<30	40.0	PASS
88.0-216.0	<30	<30	43.5	PASS
except for: 150.000 276.500 300.000	36.4 30.1 33.3	36.2 34.8 36.4	43.5 43.5 43.5	PASS PASS PASS
216.0-950.0	<40	<40	46.0	PASS
> 950.0	<40	<40	54.0	PASS

Table 2 Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209, are depicted in table 2.

Notes:

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. "<<" means that measurement values are much lower than the value determined for the other polarization.
3. The reported field strength values are the worst case values at the indicated frequency. The EUT was varied in three positions, the antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
4. Resolution bandwidth for QP: 120 kHz
5. Measurement uncertainty is ±5.0dB
6. Values obtained are the worst case values from test performed at Ch1: 2438.4 MHz, Ch 17: 2448 MHz and Ch 32: 2457 MHz.

Test engineer

Signature :



Name : Richard van der Meer

Date : September 11, 2008

3.2 Radiated field strength measurements (frequency range of 1 GHz – 26.5 GHz, E-field)

Frequency (GHz)	Remark	Measurement results Average dB(µV)/m @ 3m Vertical	Measurement results Average dB(µV)/m @ 3m Horizontal	Limits Average dB(µV)/m @ 3m	Measurement results Peak dB(µV)/m @ 3m Vertical	Measurement results Peak dB(µV)/m @ 3m Horizontal	Limits Peak dB(µV)/m @ 3m	Result (PASS/ FAIL)
1 – 2.4	Spurious	<48	<48	54	<50	<50	74	PASS
1.812 *(5)	Harmonic	44.7	43.3	-	50	45.6	-	-
2.4384	Fundamental	113.2	113.2	114	114.7	116.5	134	PASS
4.8768	Harmonic	40.2	40.2	54	53.4	44.8-	74	PASS
7.3152	Harmonic	39.2	39.2	54	59.2	64.5	74	PASS
9.7536	Harmonic	40.2	40.2	54	46.2	49.2	74	PASS
12.192	Harmonic	39.2	39.2	54	48.2	54.4	74	PASS
2.5 - 4	Spurious	41.4	40.1	54	<45	<45	74	PASS
4 - 10	Spurious	32.8	37.2	54	<50	<50	74	PASS
10 – 26.5	Spurious	28.2	28.2	54	<55	<55	74	PASS

Table 3a Radiated emissions of the EUT operating in Ch1: 2438.4 MHz

Frequency (GHz)	Remark	Measurement results Average dB(µV)/m @ 3m Vertical	Measurement results Average dB(µV)/m @ 3m Horizontal	Limits Average dB(µV)/m @ 3m	Measurement results Peak dB(µV)/m @ 3m Vertical	Measurement results Peak dB(µV)/m @ 3m Horizontal	Limits Peak dB(µV)/m @ 3m	Result (PASS/ FAIL)
1 – 2.4	Spurious	<48	<48	54	<50	<50	74	PASS
1.812 *(5)	Harmonic	44.7	43.3	-	50	45.6	-	-
2.448	Fundamental	113.2	113.2	114	114.7	116.5	134	PASS
4.896	Harmonic	32.7	30.2	54	53.2	47.2	74	PASS
7.344	Harmonic	40.2	43.2	54	56.7	63.2	74	PASS
9.792	Harmonic	35.2	35.2	54	45.2	45.2	74	PASS
12.240	Harmonic	38.2	37.2	54	54.7	51.2	74	PASS
2.5 - 4	Spurious	41.4	40.1	54	<45	<45	74	PASS
4 - 10	Spurious	32.8	37.2	54	<50	<50	74	PASS
10 – 26.5	Spurious	28.2	28.2	54	<55	<55	74	PASS

Table 3b Radiated emissions of the EUT operating in Ch17: 2448 MHz

Frequency (GHz)	Remark	Measurement results Average dB(μV)/m @ 3m Vertical	Measurement results Average dB(μV)/m @ 3m Horizontal	Limits Average dB(μV)/m @ 3m	Measurement results Peak dB(μV)/m @ 3m Vertical	Measurement results Peak dB(μV)/m @ 3m Horizontal	Limits Peak dB(μV)/m @ 3m	Result (PASS/ FAIL)
1 – 2.4	Spurious	<48	<48	54	<50	<50	74	PASS
1.812 *(5)	Harmonic	44.7	43.3	-	50	45.6	-	-
2.457	Fundamental	113.2	113.2	114	114.7	116.5	134	PASS
4.914	Harmonic	32.6	34.2	54	53.4	44.8	74	PASS
7.371	Harmonic	42.6	45.7	54	64.6	66.8	74	PASS
9.828	Harmonic	45.2	35.2	54	45.2	49	74	PASS
12.285	Harmonic	36.8	37.7	54	55.1	55.8	74	PASS
2.5 - 4	Spurious	41.4	40.1	54	<45	<45	74	PASS
4 - 10	Spurious	32.8	37.2	54	<50	<50	74	PASS
10 – 26.5	Spurious	28.2	28.2	54	<55	<55	74	PASS

Table 3c Radiated emissions of the EUT operating in Ch32: 2457 MHz

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209 and 15.245, are depicted in tables 3a, 3b and 3c.

Notes:

1. Values noted are of the worst case emissions, field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. "<<" means that measurement values are much lower than the value determined for the other polarization
3. In the range 1 GHz – 10 GHz a residual bandwidth of 1MHz is used, above 18 GHz a 100kHz bandwidth.
4. The reported field strength values are the worst case values at the indicated frequency. The EUT was varied in three positions, the antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
5. This is a harmonic of the Wireless Ethernet Radio module.
6. Measurement uncertainty is ±5.0dB

Test engineer

Signature : 

Name : Richard van der Meer

Date : September 15, 2008

3.3 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field)

Frequency (MHz)	Measurement results dB μ V		Antenna factor dB	Cable loss dB	Measurement results dB(μ V)/m for 30 m (calculated)	Limits Part 15.209 dB(μ V)/m
	3 meters	10 meters				
0.009 - 0.490 except: 0.305	n.i. 25.8	n.i. n.i.	20.1 20.1	1 1	n.i. -33.1 (@300m)	48.5 – 13.8 (300 m) 7.86
0.490 - 1.705	n.i.	n.i.	20.1	1	n.i.	33.8 - 22.9 (30 m)
1.705 – 30.0 except:	<25	<25	20.1	1	<26.1	29.5 (30 m)
2.635 3.855 4.310 5.365 21.70	13.5 21.0 22.1 19.5 9.5	n.i. n.i. n.i. n.i. n.i.	20.1 20.1 20.1 20.1 20.1	1 1 1 1 1	-6.5 2.0 3.1 0.5 -9.5	29.5 (30 m) 29.5 (30 m) 29.5 (30 m) 29.5 (30 m) 29.5 (30 m)

Table 4 Radiated emissions of the EUT.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 sections 15.205 and 15.209, with the EUT operating in continuous transmit mode, are depicted in table 4.

Notes:

1. Calculated measurement results are obtained by using the distance extrapolation factor of 40dB/decade, antenna factor and cable loss. For example: at 305.00 kHz: 25.8 + 20.1 + 1 – 40 -40 = -33.1 dB(μ V)/m
2. Frequency range:
 - a. 9- 90 kHz Average detector used during measurements
 - b. 110-490 kHz Average detector used during measurements
3. n.i. Indicates that no field strength values could be measured on the listed frequencies or in the listed frequency range.
4. A resolution bandwidth of 9 kHz was used.
5. Field strength values of radiated emissions at frequencies not listed in table 4 are more than 20 dB below the applicable limit
6. The EUT was varied in three positions, the loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
7. Measurement uncertainty is ± 5.0 dB
8. Values obtained are the worst case values from test performed at Ch1: 2438.4 MHz, Ch 17: 2448 MHz and Ch 32: 2457 MHz.

Test engineer

Signature : 

Name : R. van der Meer

Date : September 11, 2008

4 Conducted emission data.

4.1 Conducted emission data of the EUT

Frequency (MHz)	Measurement results dB(μV) Neutral		Measurement results dB(μV) Line 1		Limits dB(μV)		Result
	QP	AV	QP	AV	QP	AV	
0.2005	47.0	40.0	46.7	34.7	63.6	53.6	PASS
0.20859	47.2	43.2	46.7	33.4	63.2	53.2	PASS
0.26719	41.2	26.2	39.2	38.0	61.1	51.1	PASS
0.32969	33.8	22.9	31.6	25.2	59.5	49.5	PASS
0.4045	29.0	21.9	26.0	20.7	57.9	47.9	PASS
2.1500	<20	<20	<20	<20	56.0	46.0	PASS
2.888	<25	<25	<20	<25	56.0	46.0	PASS
4.564	27.8	21.5	31.5	25.8	56.0	46.0	PASS
12.82187	40.4	36.2	40.4	36.1	60.0	50.0	PASS
23.099	25.1	19.6	28.3	23.3	60.0	50.0	PASS

Table 5 Conducted emission measurements.

The (worst-case) results of the conducted emission tests at the 110 Volts AC mains connection terminals of the EUT, carried out in accordance with 47 CFR Part 15.207 are depicted in table 5.

Notes:

1. The values of conducted emissions at frequencies not listed in table 5 are more than 20 dB below the applicable limit
2. The resolution bandwidth used was 9 kHz
3. Measurement uncertainty is ± 3.5 dB
4. Values obtained are the worst case values from test performed at Ch1: 2438.4 MHz, Ch 17: 2448 MHz and Ch 32: 2457 MHz

Test engineer

Signature : 

Name : R. van der Meer

Date : September 10, 2008

5 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last Cal. Date (mm/yyyy)	Cal. Due Date (mm/yyyy)
12476	Antenna mast	EMCO	TR3	NA	NA
12477	Antenna mast 1-4 mtr	Poelstra	NA	NA	NA
12482	Loop antenna	EMCO	6507	04/2008	04/2009
12484	Guide ant. 1-18GHz	EMCO	3115	04/2008	04/2009
12503	Amplifier 25dB 30MHz – 1GHz	HF techniek	HFT100/B	NA	NA
12504	Filter 1-4 GHz	BSC	MH1288	NA	NA
12512	LISN	EMCO	3725/2	01/2008	01/2010
12640	Climat chamber	Heraeus	VEM 03/500	01/2008	01/2009
14340	Biconilog antenna	EMCO	3143	NA	NA
15275	Spectrum analyzer	HP	8594E	10/2007	10/2008
99538	Spectrum analyzer	R&S	FSP40	04/2008	04/2009
99580	Open Area testsite (FCC)	Comtest	NA	09/2006	09/2009
14051	Anechoic room	Comtest	NA	NA	NA
15453	Active loopant. 60 cm	Chase	HLA6120	05/2008	05/2009
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2008	02/2009
15667	Measuring receiver	R&S	ESCS 30	04/2008	04/2009
99045	Power supply	Delta	E030-3	04/2008	04/2009
99069	Coax 5m RG213 OATS	NMi Certin B.V.	RG213	10/2007	10/2008
99070	Coax 15m RG213 OATS	NMi Certin B.V.	RG213	02/2008	02/2009
99071	Coax OATS ground	NMi Certin B.V.	NA	10/2007	10/2008
99076	Filter 4-10GHz	Reactel Inc.	7AS-7G-6G-S11	NA	NA
99077	Adjustable line voltage regulator, VARIAC	RFT	LTS006	NA	NA
99136	Filter 10-26.5GHz	Reactel Inc.	9H-10G/26.5G-S11	NA	NA
99161	Variac 110Vac	RFT	LTS001	NA	NA
99318	Digital multimeter	HP	34401A	10/2007	10/2008
99547, 99548 & 99613	Temperature-Humiditymeter	Europe supplies	WS-7082	09/2007	09/2008
99596	Preamplifier 0.5 GHz - 18 GHz	Miteq	AMF-5D-005180-28-13p	11/2007	11/2008
99623	Power supply	EA	PS 2016-050	12/2007	12/2008
99667	Laptop computer	Dell	Latitude	NA	NA

NA= Not Applicable