REPORT ON

Limited FCC CFR 47: Parts 15 C Testing in support of an
Application for Grant of Equipment Authorisation
of a Promethean ActivHub

FCC ID: QAM005

Report No OR612169/04 Issue 2 July 2004

TÜV PRODUCT SERVICE

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July 2004

PREPARED FOR

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EMC Signatory

DATED

28th July 2004

DISTRIBUTION

Promethean	Copy 1
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ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Parts 15 B & C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

T Guy

J Holcombe

UKAS TESTING
0141
Group

CONTENTS

SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Part 15 Testing in support of an
Application for Grant of Equipment Authorisation
of a Promethean ActivHub

Report OR612169-04 Issue 2 replaced Report OR612169-04 Issue 1.
Issue 2 contains typographical corrections and additional test results.

1.1 STATUS

EQUIPMENT UNDER TEST	Promethean ActivHub
OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
NAME AND ADDRESS OF CLIENT	Promethean Limited TDS House Lower Phillips Road Blackburn BB1 5TH
TYPE NUMBER	PRM-AH1-02 / TDS-AH1-02
SERIAL NUMBER	Unserialised
HARDWARE VERSION	537300003
DECLARED VARIANTS	None
TEST SPECIFICATION / ISSUE / DATE	FCC CFR 47: Part 15 C August 2002
NUMBER OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Commercial In Confidence
INCOMING RELEASE DATE	Declaration of Build Status 21st May 2004
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal Not Applicable Not Applicable
ORDER NUMBER DATE	PE1515 15th March 2004
START OF TEST	5th March 2004
FINISH OF TEST	17th July 2004
RELATED DOCUMENTS	ANSI C63.4 2001. Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. FCC Public Notice document (DA 00-705 released 30 March 2000)

1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the Promethean ActivHub to the requirements of FCC Specification Parts 15.109, 15.209 and 15.249.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of Promethean Limited.

1.2.1 DECLARATION OF BUILD STATUS

Manufacturer	TDS Promethean Ltd
Country of origin	United Kingdom
UK Agent	TDS Promethean
Description	ACTIVHub
Model No	PRM-AH1-02 / TDS-AH1-02
Part No	PRM-AH1-02 / TDS-AH1-02
Serial No	Unserialised
Hardware Version	537300003
Build Status	0
Software Issue	401-000-00

Signature	Andrew Oakley
Date	21st May 2004
D of B S Serial No	Y612169-02

Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

No responsibility will be accepted by TUV Product Service as to the accuracy of the information declared in this document by the manufacturer.

BABT Limited formally certifies that the manufacturer's declaration as reproduced in this report, is a true and accurate record of the original received from the applicant.

1.3 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out is shown below.

Test	Spec Clause	Test Description	Result	Levels/Comments
2.1	15.109	Spurious Radiated Emissions Receive	Pass	
2.2	15.209	Spurious Radiated Emissions Transmit (30MHz-1GHz)	Pass	
2.3	15.249(a)	Maximum Peak Carrier Field Strength	Pass	
2.4	15.249(d)	Spurious and Harmonic Radiated Emissions (30MHz – 10GHz)	Pass	

1.4 OPINIONS AND INTERPRETATIONS

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

1.5 PRODUCT INFORMATION

1.5.1 Technical Description

The Equipment Under Test (EUT) was a Promethean ActivHub, which offers 917MHz Short Range Device Functionality connectivity.

1.5.2 Modes of Operation

Modes of operation of the EUT during testing were as follows:

Applicable testing was carried out with the EUT transmitting at maximum power or receiving as detailed in Section 1.5.3 “Test Configuration”.

1.5.3 Test Configuration

1.5.3.1 Test Configuration – Transmit.

SRD Transmitting on the following channels and frequencies*;*
Hub Channel 1: 915.3MHz
Hub Channel 2: 917.8MHz
The Output Power level (controlled by application software) was set to Maximum

1.5.3.2 Test Configuration – Receive

SRD Receiving on the following channel and frequency;
Slate Channel 1: 917.3MHz

1.6 TEST CONDITIONS

The EUT was set-up simulating a typical user installation on the Alternative Open Field Test Site identified in Appendices A and tested in accordance with the applicable specification.

For all tests, the Promethean ActivHub was powered via USB connection to a test laptop utilising its own internal battery.

1.7 DEVIATIONS FROM THE STANDARD

Not Applicable

1.8 MODIFICATION RECORD

Not Applicable

SECTION 2

TEST DETAILS

Limited FCC CFR 47: Part 15 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Promethean ActivHub

2.1 SPURIOUS RADIATED EMISSIONS RECEIVE

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.109

2.1.2 Equipment Under Test

Promethean ActivHub

2.1.3 Date of Test

5th March 2004

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.1” within the Test Equipment Used table shown in Section 3.1.

2.1.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

The measurements were performed at a 3m distance unless otherwise stated.

2.1 SPURIOUS RADIATED EMISSIONS RECEIVE - continued

2.1.6 Test Results

Equipment Designation: Unintentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.109 for Spurious Radiated Emissions (30MHz – 1GHz).

EUT Rx on Channel 1 (917.3MHz)

No emissions were detected in Rx mode within 25dB of the limit peak.

2.1.7 Set Up Photograph

Set Up Photograph

2.2 SPURIOUS RADIATED EMISSIONS TRANSMIT

2.2.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.209

2.2.2 Equipment Under Test

Promethean ActivHub

2.2.3 Date of Test

5th March 2004 & 17th July 2004

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.2” within the Test Equipment Used table shown in Section 3.1.

2.2.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisation’s. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

The measurements were performed at a 3m distance unless otherwise stated.

2.2 SPURIOUS RADIATED EMISSIONS TRANSMIT - continued

2.2.6 Test Results

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.209 for Spurious Radiated Emissions (30MHz – 1GHz).

EUT Tx on Hub Channel 1 (915.3MHz)

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
60.0	V	100	301	37.0	70.8	40.0	100.0
130.0	V	100	220	41.0	112.2	43.5	150.0
144.0	V	100	337	40.2	102.3	43.5	150.0
168.0	V	100	275	36.5	66.8	43.5	150.0
300.5	V	179	077	38.8	87.1	46.0	200.0
408.0	V	117	152	41.2	114.8	46.0	200.0

EUT Tx on Hub Channel 2 (917.8MHz)

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
144.0	V	100	044	39.7	96.6	43.5	150.0
204.0	V	261	230	32.5	42.2	43.5	150.0
348.0	V	142	247	40.8	109.7	46.0	200.0
456.0	V	100	007	36.6	67.6	46.0	200.0
516.0	V	100	356	39.0	89.1	46.0	200.0
576.0	V	100	227	36.2	64.6	46.0	200.0

2.2.7 Set Up Photo

Set Up Photograph

2.3 MAXIMUM CARRIER FIELD STRENGTH

2.3.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.249(a)

2.3.2 Equipment Under Test

Promethean ActivHub

2.3.3 Date of Test

5th March 2004 & 17th July 2004

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.3” within the Test Equipment Used table shown in Section 3.1.

2.3.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

The EUT contains an integral antenna and therefore the Maximum Peak Carrier Power was made using the field strength method.

The Spectrum Analyser was tuned to the test frequency. The device Output Power setting was controlled as specified in the Product Information, Section 1.5 of this document. The device was then rotated through 360 degrees until the highest power level was observed in both horizontal and vertical polarisation. The device was then measured using a Peak Detector.

2.3.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Section 249(a) for Maximum Carrier Field Strength.

Measurements were made with the EUT Transmitting.

Carrier Frequency (MHz)	Measured (mV/m)	Margin (mV/m)	Measured (dBµV/m)	Margin (dBµV/m)
915.3	17.18	32.82	84.7	9.3
917.8	16.98	33.02	84.6	9.4
Limit	50mV/m		94.0 dBµV/m	

2.4 SPURIOUS RADIATED EMISSIONS

2.4.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.249(d)

2.4.2 Equipment Under Test

Promethean ActivHub

2.4.3 Date of Test

5th March 2004 & 17th July 2004

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.4” within the Test Equipment Used table shown in Section 3.1.

2.4.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 1GHz – 10GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.

2.4 SPURIOUS RADIATED EMISSIONS - continued

2.4.6 Test Results

30MHz - 1GHz Frequency Range

EUT Tx on Hub Channel 1 (915.3MHz)

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
60.0	V	100	301	37.0	70.8	40.0	100.0
130.0	V	100	220	41.0	112.2	43.5	150.0
144.0	V	100	337	40.2	102.3	43.5	150.0
168.0	V	100	275	36.5	66.8	43.5	150.0
300.5	V	179	077	38.8	87.1	46.0	200.0
408.0	V	117	152	41.2	114.8	46.0	200.0

EUT Tx on Hub Channel 2 (917.8MHz)

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
144.0	V	100	044	39.7	96.6	43.5	150.0
204.0	V	261	230	32.5	42.2	43.5	150.0
348.0	V	142	247	40.8	109.7	46.0	200.0
456.0	V	100	007	36.6	67.6	46.0	200.0
516.0	V	100	356	39.0	89.1	46.0	200.0
576.0	V	100	227	36.2	64.6	46.0	200.0

2.4 SPURIOUS RADIATED EMISSIONS - continued

1GHz - 10GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.249(d) for Radiated Emissions (1GHz – 10GHz).

EUT Tx on Hub Channel 1 (915.3MHz)

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
1.830	H	161	355	54.0	74.0	49.3	54.0
1.830	V	100	092	55.5	74.0	50.3	54.0
2.754	H	159	0	57.1	74.0	52.6	54.0
2.754	V	107	076	57.6	74.0	53.6	54.0
3.661	H	103	086	52.9	74.0	51.1	54.0
3.661	V	138	251	49.5	74.0	46.5	54.0

EUT Tx on Hub Channel 2 (917.8MHz)

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dBµV/m	dBµV/m	dBµV/m	dBµV/m
2.753	H	103	035	50.8	74.0	47.7	54.0
2.753	V	100	077	48.8	74.0	44.6	54.0
3.671	H	100	085	54.5	74.0	51.3	54.0
3.671	V	100	295	55.8	74.0	53.8	54.0

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

No other emissions above 3.671GHz were detected.

2.7 SPURIOUS RADIATED EMISSIONS - continued

2.7.7 Set Up Photograph

Spurious Radiated Emissions Set Up Photograph

SECTION 3

TEST EQUIPMENT USED

AND MEASUREMENT UNCERTAINTY

3.1 TEST EQUIPMENT USED

Instrument	Manufacturer	Type No	Serial No	EMC No	Cal. Due
Section 2.1					
Spectrum Analyser	Hewlett Packard	8542E	3617A00165_00154	2286	09/12/2004
Bilog Antenna	Schaffner	CBL6143	-	2965	12/09/2005
Turntable Controller	No Data	HD 050	050/396	2528	-
Screened Room 5	Siemens	EAC54300	NA	2533	-
Section 2.2					
Spectrum Analyser	Hewlett Packard	8542E	3617A00165_00154	2286	09/12/2004
Bilog Antenna	Schaffner	CBL6143	-	2965	12/09/2005
Turntable Controller	No Data	HD 050	050/396	2528	-
Screened Room 5	Siemens	EAC54300	NA	2533	-
Section 2.3					
Spectrum Analyser	Hewlett Packard	8542E	3617A00165_00154	2286	09/12/2004
Bilog Antenna	Schaffner	CBL6143	-	2965	12/09/2005
Turntable Controller	No Data	HD 050	050/396	2528	-
Screened Room 5	Siemens	EAC54300	NA	2533	-
Section 2.4					
Turntable Controller	No Data	HD 050	050/396	2528	-
Screened Room 5	Siemens	EAC54300	NA	2533	-
Low Noise Amplifier	Miteq Corp	AMF-3d-001080-18-13P	UNK	2457	-
HF Amplifier	Miteq Corp	AMF-4F-080180	492562	2430	-
EMI Test Receiver	Rohde & Schwarz	ESIB40	100142/040	2917	11/02/2005
Emco 3115 Drg Ant	Emco	3115	97015079	2397	07/07/2005
Signal Generator	Marconi	2031	119530069	2199	29/09/2004
Signal Generator	Hewlett Packard	8673B	2147A00423	411	02/03/2005

TU = Traceability Unscheduled.

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are: -

IN THE FREQUENCY RANGE 30MHz TO 1000MHz		
TEST	**FREQUENCY**	**AMPLITUDE**
For Radiated Emissions, Quasi-Peak Measurements taken in Zero Span using the Hewlett Packard EMI Receiver and Bilog Antenna	$\pm 2 \times 10^{-7}$ x Centre Frequency	5.15dB calculated in accordance with CISPR 16-4
IN THE FREQUENCY RANGE 1GHz TO 10GHz		
TEST	**FREQUENCY**	**AMPLITUDE**
For Spurious Radiated Emissions measurements	$\pm 2 \times 10^{-7}$ x Centre Frequency	±6.3dB

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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APPENDIX A

TITCHFIELD FCC SITE COMPLIANCE LETTER

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

October 18, 2002

Registration Number: 90987

TUV Product Service Ltd
Segensworth Road
Titchfield
Fareham, Hampshire, PO15 5RH
United Kingdom
Attention: Kevan Adsetts

Re: Measurement facility located at Titchfield
Anechoic chamber (3 meters) and 3 & 10 meter OATS
Date of Listing: October 18, 2002

Gentlemen:

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Thomas W Phillips
Electronics Engineer