Field Test Report

Comparison of H.264 (SD/HD) and MPEG-2(SD) Coding in Multiple Frequency Network

Jointly Submitted by

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Content

1 Test Background

We refer to the test report of Stanley Hill on 7 June 2011, this test transmission aims to verify the performance in respect of transmitting HD programmes in MFN channel using H.264 format. In this regard, test equipment with capability to select coding format, i.e. MPEG-2(SD) or H.264(SD/HD) was set up at Tung Chung station for field test purpose. Thus we can compare RF performance between MPEG-2(SD) and H.264(SD/HD) under same receiving environment.

2 Transmission Parameter

Transmitter:	Tung Chung
E.R.P:	0.1 W
Polarization:	Vertical
Frequency:	770MHz (CH58)
Channel Coding:	GB20600-2006
Source Coding:	MPEG-2(SD) or H.264 (SD/HD) by interval
Test Period and duration:	12 Dec 2011 to 15 Dec 2011 0900 – 1800 hours daily

3 Scope of Field Test

The scope of field tests was similar to the items listed in "Technical Test Report on the Digital Terrestrial Television System in Compliance with The National Standard" in June 2007. The test scale was trimmed down as H.264 just deployed in Single Frequency Network (SFN) already. Following categories and parameters were tested and measured:

3.1 Categories

1. Line of sight

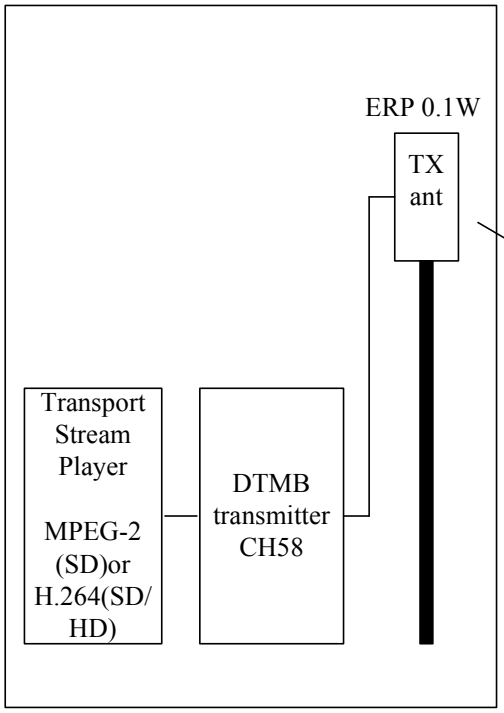
3.2 Parameters

1. Field Strength Level
2. Signal Margin
3. Modulation Error Ratio
4. Carrier to Noise Ratio
5. Bit Error Ratio before LDPC[1]

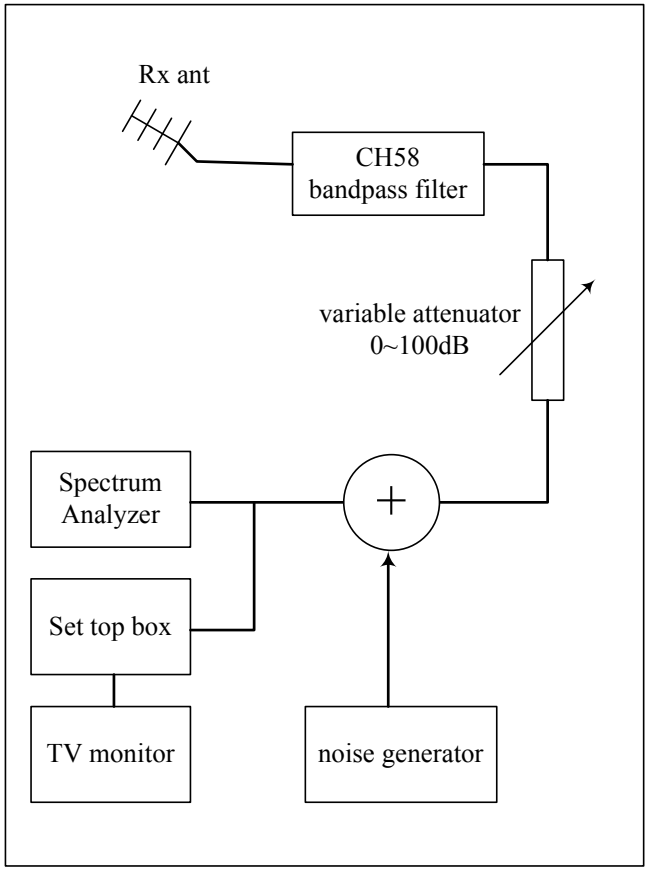
[1] The BER before LDPC is calculated by evaluating the error correction activity of the LDPC decoder, and in fact comparing the corrected data stream with the incoming (uncorrected) data stream. The BER provided by BER before LDPC reflects the situation in the transmission channel, before any forward error correction (FEC) was applied.

4 Field Test Result

4.1 Block diagram



Configuration at Tung Chung Station



Configuration at Receiving side

Equipment list at receiving side

i) R&S log periodic antenna AA-4
ii) ABE band pass filter (12 MHz bandwidth)
iii) Agilent variable attenuator 0~100dB with 1 dB step size
iv) R&S TV Analyzer, model: ETL
v) Micronetics Inc Noise Generator, model: NOD 5200
vi) Olevia Set top box, model: FT602
vii) Sharp 19” TV set

4.2. Survey Location

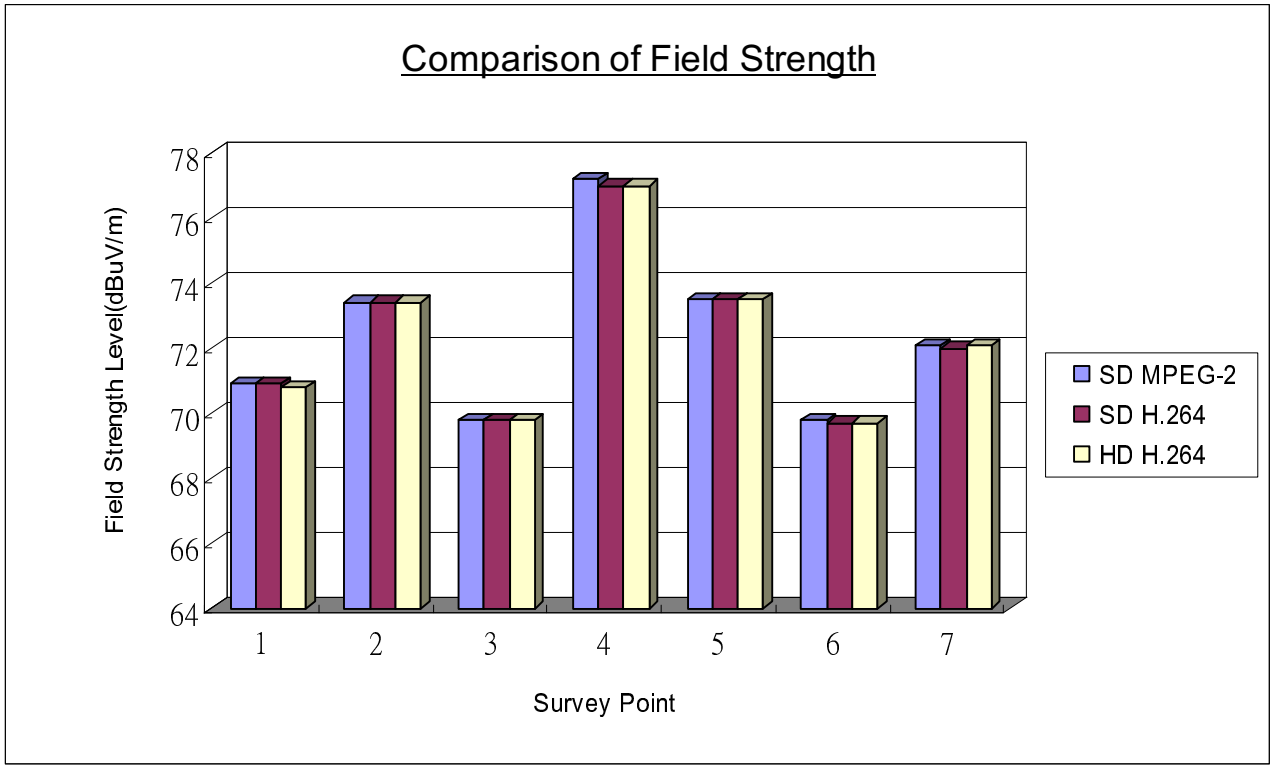
Details of location please refer to appendix B

No.	Location	Category
1	上嶺皮村村公所停車場	Line of sight
2	馬灣村 21 號地下停車場	Line of sight
3	霸尾村停車場	Line of sight
4	東涌鄉事委員會	Line of sight
5	下嶺皮村 7 號	Line of sight
6	東涌路（燈柱 BC0525）	Line of sight
7	龍井頭 12E 號	Line of sight

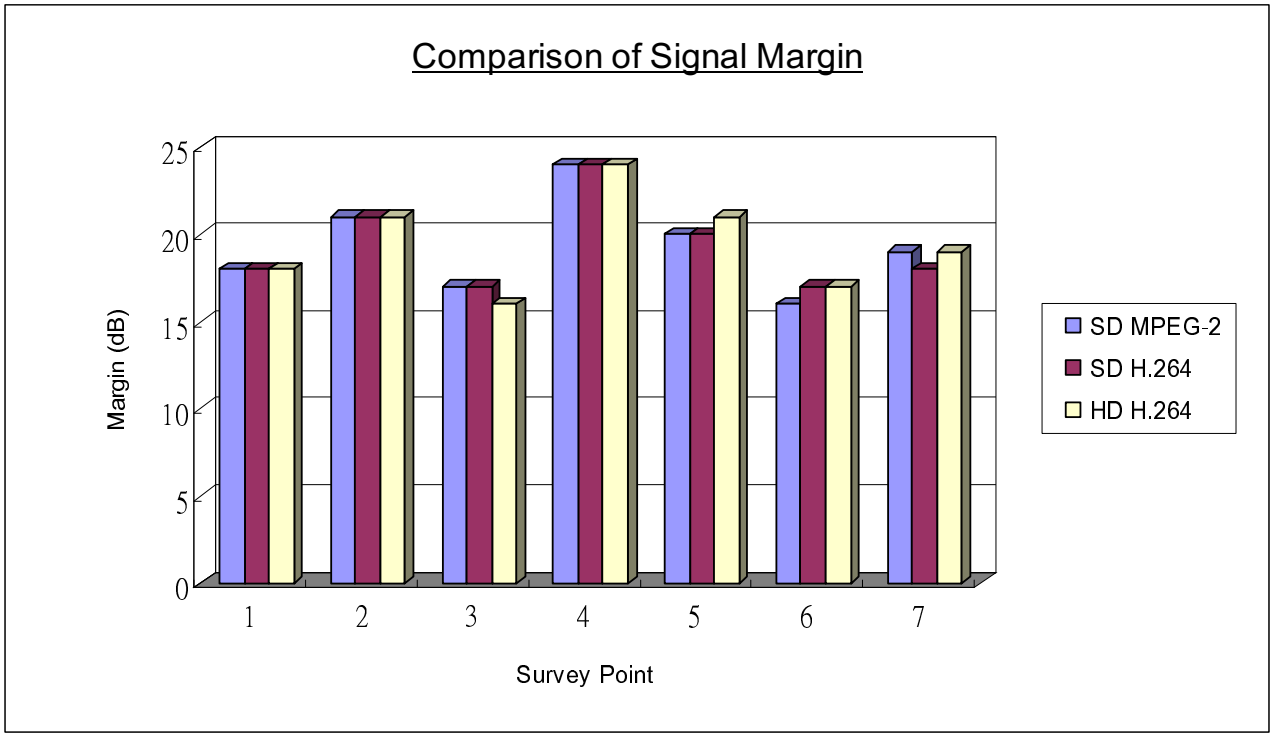
4.3. Measurement Result

Details of measurement please refer to appendix C

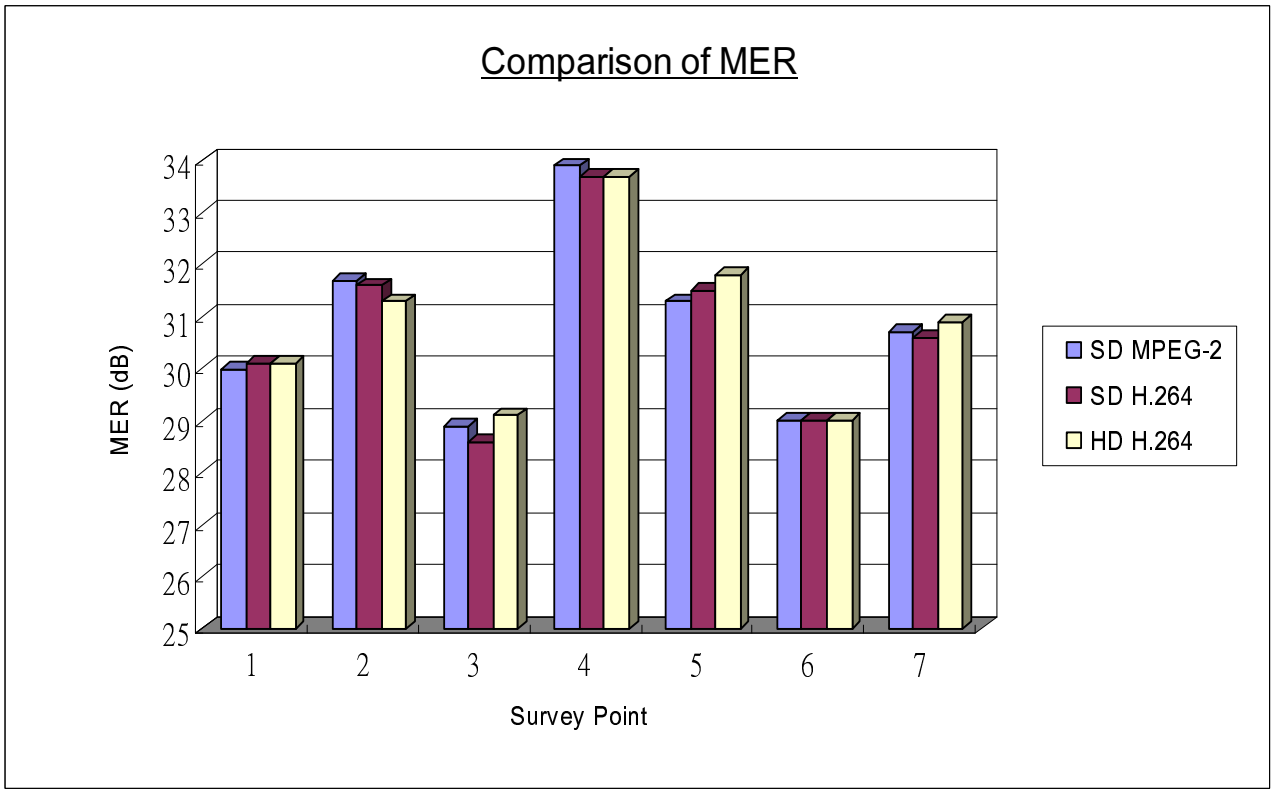
4.3.1 Field Strength Level



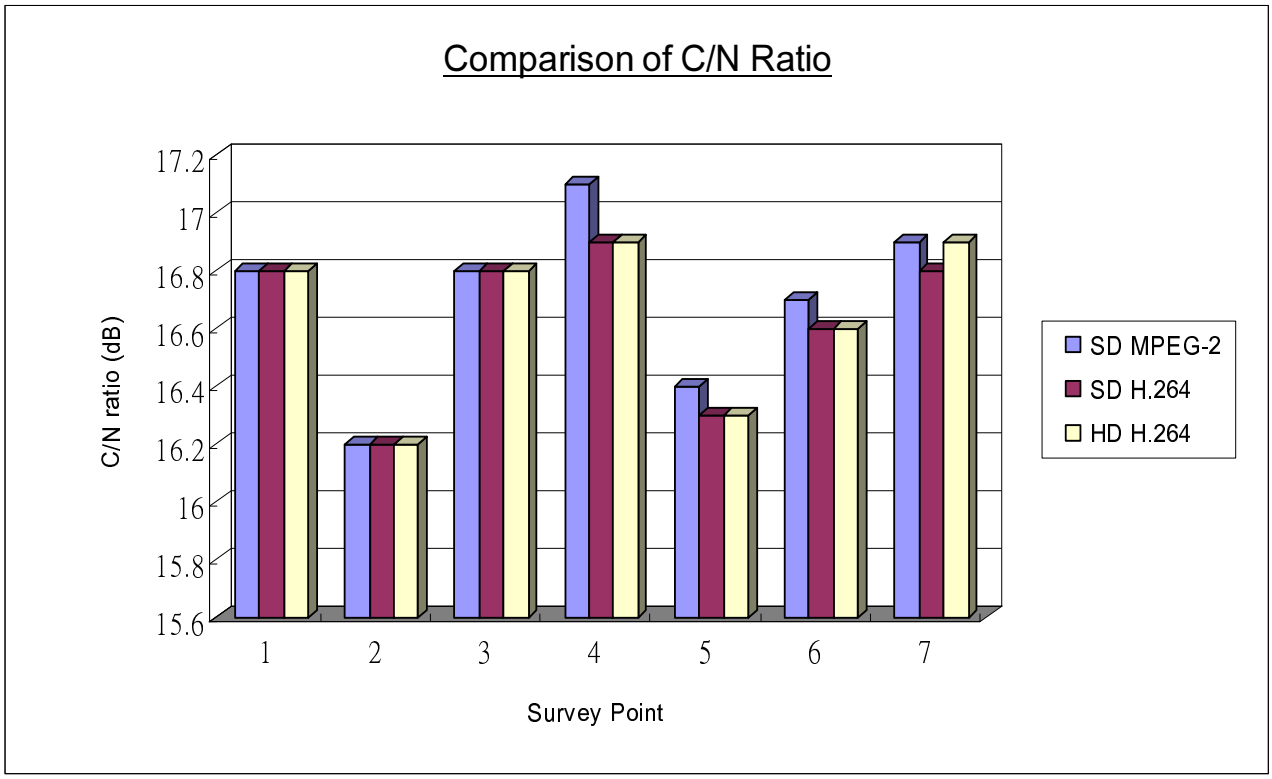
4.3.2 Signal Margin



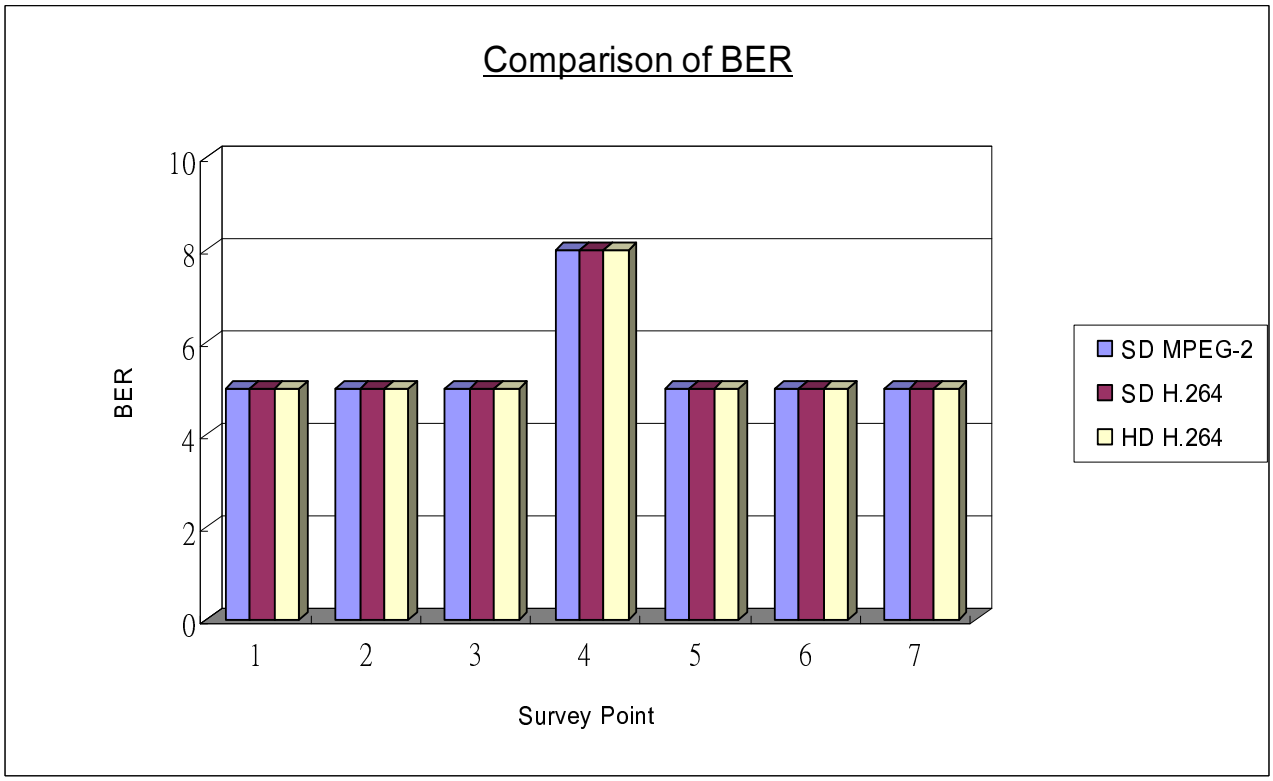
4.3.3 Modulation Error Ratio



4.3.4 Carrier to Noise Ratio



4.3.5 Bit Error Rate before LDPC



5 Result Analysis

With reference to test result, the deviation of measured figures in field strength, signal margin, modulation error ratio, carrier to noise ratio were within 1 dB. This small deviation seemed to be come from the limitation of 1 dB step attenuator used in receiving network.

6 Conclusion

The overall field performance under this test transmission was very close no matter coded by MPEG-2(SD) or H.264 (SD&HD). No significant degradation in field strength, signal margin, modulation error ratio, carrier to noise ratio and bit error ratio before LDPC were observed in these two coding format.

We concluded that MPEG-2(SD) and H.264(SD&HD) have no difference in RF transmission performance.

7 Appendix

7.1 Appendix A: Brief on Terms of Parameter used in Test

i) Field Strength (dBuV/m)
The value is equal to measured value at spectrum analyzer plus antenna factor.

ii) C (dBm)
It is the signal level of carrier at spectrum analyzer in this report.

iii) Nmax (dBm)
Maximum noise power generated by noise generator until failure of receiving reached.

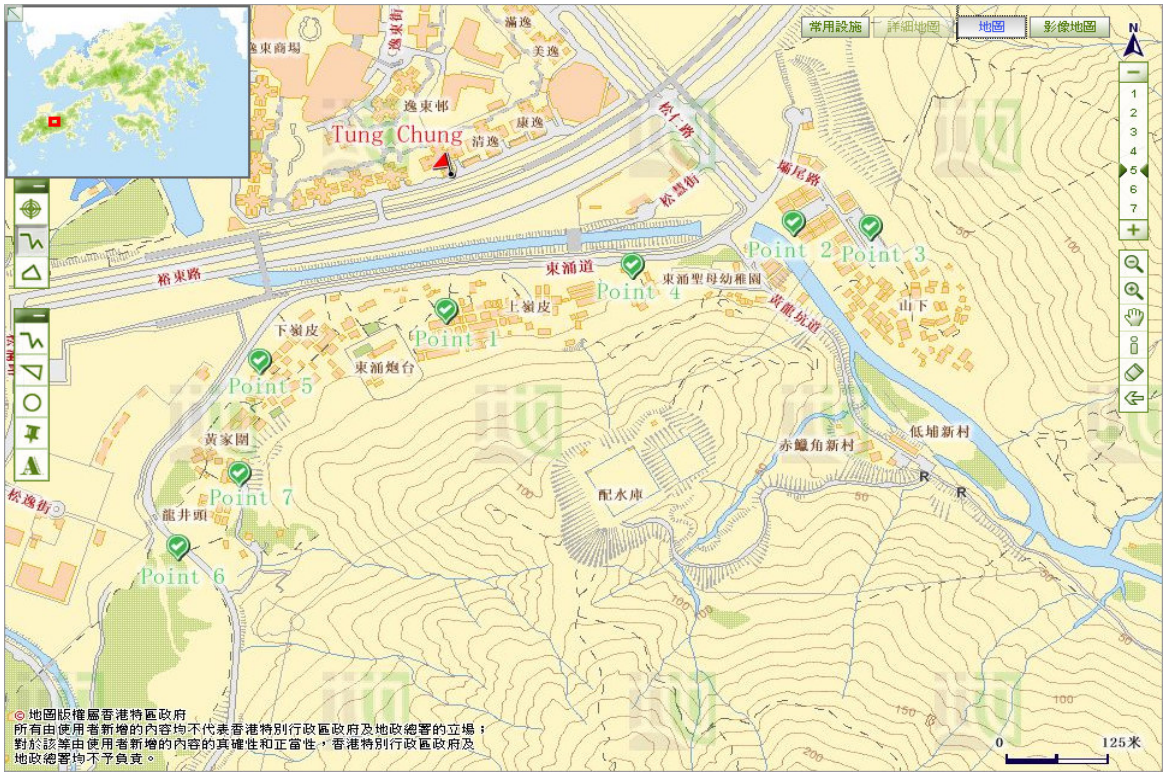
iv) Margin (dB)
C- Cmin

v) Cmin (dBm)
It is the threshold value of receiver. We can find it by adjusting the variable attenuator until failure of receiving.

vi) MER
Modulation Error Ratio

vii) BER
Bit Error Rate

7.2 Appendix B: Details of Survey Location



7.3 Appendix C: Details of Survey Result

Line of Sight

No.	Survey Location	Source Coding	Field Strength dBuV/m	C dBm	Nmax dBm	Margin dB	Cmin dBm	C/Nmax dB	MER dB	BER
1	上嶺皮村村公所停車場	SD-MPEG 2	70.9	- 64.3	-81.1	18	-82.3	16.8	30.0	10E-5
		SD-H.264	70.9	- 64.3	- 81.1	18	-82.3	16.8	30.1	10E-5
		HD-H.264	70.8	-64.3	-81.2	18	-82.4	16.8	30.1	10E-5
	Deviation: SD MPEG 2 – SD H.264		0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-
	Deviation: SD MPEG 2 -- HD H.264		0.1	0.1	0.1	0.0	0.1	0.0	-0.1	-
2	馬灣村 21 號地下停車場	SD-MPEG 2	73.4	- 61.8	-78.0	21	-82.8	16.2	31.7	10E-5
		SD-H.264	73.4	- 61.8	- 78.0	21	-82.8	16.2	31.6	10E-5
		HD-H.264	73.4	-61.8	-78.0	21	-82.8	16.2	31.3	10E-5
	Deviation: SD MPEG 2 – SD H.264		0.0	0.0	0.0	0.0	0.0	0.0	0.1	-
	Deviation: SD MPEG 2 -- HD H.264		0.0	0.0	0.0	0.0	0.0	0.0	0.4	-

3	霸尾村停車場	SD-MPEG 2	69.8	- 65.4	-82.2	17	-82.4	16.8	28.9	10E-5
		SD-H.264	69.8	- 65.4	- 82.2	17	-82.4	16.8	28.6	10E-5
		HD-H.264	69.8	-65.4	- 82.2	16	-81.4	16.8	29.1	10E-5
	Deviation: SD MPEG 2 – SD H.264 Deviation: SD MPEG 2 -- HD H.264		0.0	0.0	0.0	0.0	0.0	0.0	0.3	-
			0.0	0.0	0.0	1.0	-1.0	0.0	-0.2	-
4	東涌鄉事委員會	SD-MPEG 2	77.2	- 58.0	-75.1	24	-82.0	17.1	33.9	10E-8
		SD-H.264	77.0	- 58.2	- 75.1	24	-82.2	16.9	33.7	10E-8
		HD-H.264	77.0	- 58.2	- 75.1	24	-82.2	16.9	33.7	10E-8
	Deviation: SD MPEG 2 – SD H.264 Deviation: SD MPEG 2 -- HD H.264		0.2	0.2	0.0	0.0	0.2	0.2	0.2	-
			0.2	0.2	0.0	0.0	0.2	0.2	0.2	-
5	下嶺皮村 7 號	SD-MPEG 2	73.5	- 61.7	-78.1	20	-81.7	16.4	31.3	10E-5
		SD-H.264	73.5	- 61.7	- 78.0	20	-81.7	16.3	31.5	10E-5
		HD-H.264	73.5	-61.7	-78.0	21	-82.7	16.3	31.8	10E-5
	Deviation: SD MPEG 2 – SD H.264 Deviation: SD MPEG 2 -- HD H.264		0.0	0.0	-0.1	0.0	0.0	0.1	-0.2	-
			0.0	0.0	-0.1	-1.0	1.0	0.1	-0.5	-
6	東涌路（燈柱 BC0525）	SD-MPEG 2	69.8	- 65.4	-82.1	16	-81.4	16.7	29.0	10E-5
		SD-H.264	69.7	- 65.5	- 82.1	17	-82.5	16.6	29.0	10E-5
		HD-H.264	69.7	-65.5	-82.1	17	-82.5	16.6	29.0	10E-5
	Deviation: SD MPEG 2 – SD H.264 Deviation: SD MPEG 2 -- HD H.264		0.1	0.1	0.0	-1.0	1.1	0.1	0.0	-
			0.1	0.1	0.0	-1.0	1.1	0.1	0.0	-
7	龍井頭 12E 號	SD-MPEG 2	72.1	- 63.1	-80.0	19	-82.1	16.9	30.7	10E-5
		SD-H.264	72.0	- 63.2	-80.0	18	-82.2	16.8	30.6	10E-5
		HD-H.264	72.1	-63.1	-80.0	19	-82.1	16.9	30.9	10E-5
	Deviation: SD MPEG 2 – SD H.264 Deviation: SD MPEG 2 -- HD H.264		0.1	0.1	0.0	1.0	-0.9	0.1	0.1	-
			0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-