Site Survey Measurements of the Received TV Signals in and Around the Colombo City for the Purpose of Customer Service

Ramachandra E.S [1]
Karunarathne M.A.A [2]

ABSTRACT

The site survey research was conducted to measure the received TV signals in and around the Colombo city for each and every TV channel (not only the company channels) for the purpose of customer service. Main reason for that is to make decisions regarding the receiving signal strengths and compare the company owned channels signal strengths with other channels from the other transmission stations. Then the company can make decisions regarding the own TV channels and their attributes and can improve the existing position of their TV channels to enhance the channels functioning level. Actually the Main tower transmitting signal power is not acquire by domestically .There are number of gains that are added to the signal. Also Loses such as environment losses, cable losses of the signal have to be reduced. The height of the receiving signal also has to consider. The major problem is transmitting signal power is not acquiring at the destination due to the losses and due to some gains. And when the distance is increased the density of the signal is also get decreased. That affect to the field density. Survey aims to Calculate actually receiving values, Calculate theoretically receiving values. Then compare values, identify reasons for that and provide some solutions. For this survey only at two places around the Colombo city were used for the data collection. In this research, there are few steps were used to conduct the research. Firstly the field strength meter, standard UHF and VHF antennas, a pipe of 2.4m height and relevant cables were used and acquire readings from channel 5 to 12. Then VHF antenna was connected to the 2.4m height pipe and then one edge of the cable were connected to the antenna and the other edge to the field strength meter. By Providing the power to the field strength meter in the outer environment with obstacles, a particular channel number was select from the field strength meter which is relate to the antenna type (Now the antenna type is VHF and the channels can select are CH5, CH7 and CH12) .Then by Moving or rotating the antenna, starting from a particular direction, through 360'angle horizontally. Then the maximum decibel micro volt values were noted down for the selected channel. Then the same procedure was repeated for all the VHF channel numbers and the VHF antenna was replaced with the UHF antenna. The above procedure was repeated for all the UHF channel numbers. Then all the maximum decibel micro volt values for the selected channel were noted down. Also the Power strength, field density and Voltage values were calculated using the above equations. Maximum and lowest values were calculated for each channel and has mentioned below. Finally the Calculated values were compared with other TV channels values.

KEYWORDS : Analog to Digital Converter , Audio Distribution Amplifiers, Broadcast Media Library, Digital to Analog Converter, Effective Radiated Power , Frequency Modulation , Media Client, Outside Broadcasting , Phase Alternating Line, Serial Digital Interface, Studio Transmission Link , Video Distribution Amplifier

INTRODUCTION

For this site survey research, has consider all the transmitted TV channels signals which are belonging to the organization and received those in and around the Colombo city for the purpose of customer service. Not only for that organization's channels but also for other TV channels in Sri Lanka also were considered for the purpose of comparison. This organization is one of the leading media organizations in Sri Lanka.

The TV channel belongs to Group of companies which are most probably the single largest companies in this country.

Its main business activities such as

- Manufacturing.
- Franchising.
- Entertainment.
- Communication.
- Media.
- Foods and Packaging.....etc

Reason for this research is to make decisions regarding the receiving signal strengths and compare the company owned channels signal strengths with other channels from the other transmission stations. Then the company can make decisions regarding the own TV channels and their attributes and can improve the existing position of their TV channels to enhance its channels functioning level. Actually the Main tower transmitting signal power is not acquire by domestically .There are number of gains are added to the signal and Loses such as environment losses, cable losses of the signal have to be reduced. The

[1] Graduate, Department of Industrial Management, Faculty of Applied Sciences, Wayamba university of Sri Lanka

[2]Senior Lecturer, Department of Electronics, Faculty of Applied Sciences, Wayamba university of Sri Lanka

height of the receiving signal also has to consider. Major problem is transmitting signal power is not acquire at the destination due to the losses and some gains. And when the distance is increasing the density of the signal also get decrease Distance that receiving the signal also affect to the field density. In this survey aims to Calculate actually receiving values , Calculate theoretically receiving values , Check whether there are any differences and compare values , Identify reasons for that and provide some solutions. Mainly there are two places has focused in the survey for the data collection step. In this research, there are few steps were used to conduct the research. First field strength meter, UHF and VHF antennas, a pipe of 2.4m height and relevant cables was used and acquire readings from channel 5 to 12 and for that, used the VHF antenna. During the given training period, few numbers of problems which are affecting for the TV signal receiving and transmitting, were Identified. Among those problems, one of a problem which is mostly affected for the TV signal receiving has selected. This problem analysis has planned to conduct a research as a survey which named as"Site Survey measurements of the received TV signals in and around the Colombo city for the purpose of customer service". Here TV signals were received and measures the signal strength using the field strength meter. Not only the field strength meter (TV Signal Level Meter), but also TV radio tested receiver (Katherine meter) and the spectrum analyzer also can use. Basically channel numbers 5 to channel no 58 were considered.

Rationale to Select the Research Question

In the repeater transmission station of the TV organization which is Locate in Union Place, receive all the audio and video signals coming from depanama as IF (Intermediate Frequency) signals and convert those signals into UHF and then transmitted island wide through Nuwaraeliya main tower. Then the UHF signals of the TV channels are domestically receive Island wide. For different areas receives through different channels. For an example CH25, audio frequency is 508.75MHz for one certain channel of the company at Gongala, Union place and Gammaduva towers. Likewise the video frequency for that channel is 503.25MHz in the same above mentioned towers in different frequencies. Under each frequencies Union place station transmit but the power measurement for the transmitting signals are measured under dBm. But in domestically signals receives as dBμV. The domestic induction of the TV system is 75 ohms and the receiving RF signal power adjusts through the local oscillators of the TV system and generates into the IF signals. Because the IF signals impedance is the only one matching with ccthe TV system. Actually the Main tower transmitting signal power is not acquire by domestically. There are number of gains added to the signal and Loses such as environment losses, cable losses of the signal have to be reduced. The height of the receiving signal also has to be considered. Due to the above mentioned facts transmitting power is not the same as when it is receiving.

Potential Benefits to the Organization by Solving the Questions

There are some benefits / outcomes to the organization due to the research done are;

- Can identify the strengths and densities of the own channels
- Can identify the strengths and densities of the other channels
- Can compare the signal features of the company channels with other channels in Sri Lanka
- Can identify the problems with the company channels signals
- Can Identify solutions for the problems
- Can invest financially for the new projects using the survey data
- Can introduce new equipments for the problems
- Can introduce new equipments for new functions and new purposes

All the audio and video signals (not separated and those are coming under multiplexed) which are coming from Depanama are received at transmitter section (Locate in Union Place) as IF(Intermediate Frequency) signals and convert those signals in to UHF and transmit. Then UHF signals are receiving domestically and for different areas receive through different channels. For an example CH25, audio frequency is 508.75 MHz for one channel at Gongala, Union place and Gammaduva towers and video frequency is 503.25 MHz in same above towers in different frequencies. Under each frequency, Union place station transmits but the power measurement for the transmitting signals were measured under dBm. But in domestically signals receives as dBμV. The domestic induction of the TV system is 75 ohms and the receiving RF signal power adjusts through the local oscillators of the TV system and generates into the IF signals. Because the IF signals impedance is the only, matching with the TV system. Actually the Main tower transmitting signal power is not acquired by domestically .There are number of gains are added to the signal and Loses such as environment losses, cable losses of the signal have to be reduced. The height of the receiving signal also has to be considered. The main problem is that the transmitting signal power is not acquired at the destination due to the losses and some gains. And when the distance is increasing the density of the signal also get

decrease. Signal receiving Distance also affect to the field density. Wishes to conduct is,

- Calculate actually receiving values
- Calculate theoretically receiving values
- Check whether are there any differences and compare values
- Identify reasons for that
- Provide some solutions

LITERATURE

This type of research was conducted in the past with Katherine meter and spectrum analyzer and with other required equipments. At that time also the survey has identified few no of problems which are affecting for the TV signal receiving and transmitting. Among those problems, one of a problem which is mostly affected for the TV signal receiving has been selected. For those problem analyses, it was planned to conduct a research as Site Survey measurements of the received TV signals in and around the Colombo city for the purpose of customer service. For those surveys also the TV signals were received and the signal strength also was measured using the field strength meter or Katherine meter or the spectrum analyzer. Also the UHF and VHF antennas and Cables were used. And from the channel no 5 to channel no 58 were considered. For those survey also dBμV (Decibel microvolt) values were measured for the given frequency value and Power/strength of the receiving signal, intrinsic impedance, Voltage of the receiving signal, field density has been calculated. Not only to the organization channels, but also for other channels also calculated, for the comparisons.

METHODOLOGY

$dBm = 10\log (P_o / P_{in})$.....; EQ07

P_o – Out put Power Strength of the signal

Pin – Input Power of the signal

$dBm/10 = \log (P_o / P_{in})$

$\text{antilog}(dBm/10) = P_o / P_{in}$

$P_o = \text{antilog}(dBm/10) * P_{in}$....., EQ08

$dBm = 20 \log (V_O / V_{in})$

V_o – Out put Voltage of the signal

Vin – Input Voltage of the signal

IF=Oscillator generating voltage+ RF.....; EQ09

IF- Intermediate Frequency

RF –Radio Frequency

$P=VI = V^2/R$..... ....; EQ10

P – Power of the receiving signal

V – Voltage of the signal

R – Impedance of the TV system (75ohms)

I – Current

$S=E^* H$.. .... ; EQ11

S – Strength of the signal

E – Field density of the signal

$\eta=E/H$..... .....; EQ12

η = Intrinsic Impedance

Receiving Power of the signal = (Transmitting power) + (Gains) – (Loses).....; EQ13

E (dBμV/m) =K (dBμV/m) + Vm (dBμV) + L (dB) - Length Loss (dB)

K =Antenna Factor

L =Cable Loss

Vm =received (measured value)

$E_{worst} = (3)^{1/2} E_{max}$;

where E_{max} is the E (dBμV /m) value.....,EQ14

$S_{worst}=(E_{max})^2 / \eta$;

Where η is intrinsic impedance=377ohm....., EQ15

In this survey, the dBμV (Decibel microvolt) values were measure and calculated, for the given frequency value and calculate Power/strength of the receiving signal, intrinsic impedance, Voltage of the receiving signal, field density. Not only for this organization, but also for other channels also calculated for the comparisons.

DATA COLLECTION AND ANALYZING

In this research, functioning steps to measure the values are,

- Take the field strength meter , UHF and VHF antennas , a pipe of 2.4m height and relevant cables
- To have readings from channel 5 to 12, used the VHF antenna
- Connect the VHF antenna to the 2.4m height pipe
- Connect the one edge of the cable to the antenna and the other edge to the field strength meter
- Provide the power to the field strength meter
- Keep the setup in the outer environment which is having less obstacles
- Select a particular channel no from the field strength meter which is relate to the antenna type (Now the antenna type is VHF and the channels can select are CH5 , CH7 and CH12)
- Move/rotate the antenna starting from a particular direction , through 360'angle horizontally
- Note down the maximum decibel micro volt value for the selected channel
- Repeat the same procedure for the all VHF channel numbers
- Shift the VHF antenna with the UHF antenna and proceed the above procedure for all the UHF channel numbers
- Note down the maximum decibel micro volt value for the selected channel
- Using the above equations and the measured values, calculate the Power strength , field density and Voltage
- Compare calculated values with other TV channels values.

For this survey only at two places around the Colombo city were used for the data collection. There are some equipments of the organization used and organization management helped me for this. Research problem was identified which is the organization is currently facing and the organization management allowed me to conduct the survey or a research to solve the above found problem. To measure the signal strengths of the organization channels and are those weaker than other channel signals in Sri Lanka and also how can avoid the problems and if the signal strengths are weaker, how can make uplift the signal strength were the man problems of the survey. Some of the equipments of the company and some other few facilities as two or three staff officers help and transport facilities for the equipments from depanama to union place were received to conduct the survey. Then equipments were as Field strength meter, UHF and VHF dipole antennas, cables and a 2.4m height pipe were used. With the help of the transmitter section officers, site survey was conducted at Depanama and could collect data using the equipments with in a half of a day. Then after another day with the help of staff officers, all the equipments were carried to Union place and completed the survey at Union place. Then maximum possible readings were collected from both of the places and calculations were carried out.

Depanama Measurements (Both UHF and VHF – Island wide Transmission)

Channel Number	Power (KW)	Video (MHz)	Audio (MHz)	dBμV
CH5	20	175.25	180.75	64.5
CH7	10	189.25	194.75	62.5
CH12	10	224.25	229.75	61.2
CH27	05	519.25	524.75	68.4
CH33	-	567.25	572.75	65.0

Table 1: Depanama Measurements (UHF/VHF)

Depanama Measurements (Both UHF and VHF Repeater Station Transmission)

Channel Number	Power (KW)	Video (MHz)	Audio (MHz)	dBμV
CH12	10	224.25	229.75	65.2
CH21	1	471.25	476.75	50.7
CH23	2	487.25	492.75	53.3
CH25	2	503.25	508.75	55.2
CH28	1	527.25	532.75	69.5
CH30	.05	543.25	548.75	71.2
CH31	2	551.25	556.75	52.4
CH35	-	583.25	588.75	41.9
CH37	-	599.25	604.75	54.9
CH48	-	687.25	692.75	43.4
CH58	-	767.25	772.75	44.0

Table 2: Depanama Measurements (UHF/VHF)

1. Field Strength Mater (TV Signal Level Meter)
   Type :"Leader"
   Range : 46MHz – 870MHz / Max=120 dBμV /AC=100V max /DC=50V max

2. UHF Dipole Antenna
   Type : IE Techniques
   Range : 47MHz – 870MHz
   Output Impedance : 75 Ohm

3. VHF Dipole Antenna
   Type : IE Techniques
   Range : 88MHz – 230MHz
   Output Impedance : 75ohm or 30 ohm

4. Antenna Mounted Level From ground level: 2.4m

5. Antenna Length
   UHF antenna (Dipole) (14 elements) :43cm
   VHF antenna (Dipole) (5 elements) :74cm

6. Antenna Factor(K/dB/m)
   UHF antenna (Dipole) (14 elements): Gain 15dB
   VHF antenna (Dipole) (5 elements): Gain 12dB

7. Cable Loss
   75 ohm antenna cable (5C2V) RG6U Cable =13m
   100ft- 1.6dB at 50MHz
   2.6dB at 170MHz
   4.6dB at 400MHz

Union Place Measurements (Both UHF and VHF – Island wide Transmission)

Channel Number	Power (KW)	Video (MHz)	Audio (MHz)	dBμV
CH5	20	175.25	180.75	57.2
CH7	10	189.25	194.75	53.2
CH12	10	224.25	229.75	50.3
CH27	05	519.25	524.75	45.4
CH33	-	567.25	572.75	28.1

Table 3: Union Place Measurements (UHF/VHF)

Union Place Measurements (Both UHF and VHF – Repeater Station Transmission)

Channel Number	Power (KW)	Video (MHz)	Audio (MHz)	dBμV
CH12	10	224.25	229.75	50.3
CH21	1	471.25	476.75	52.5
CH23	2	487.25	492.75	75.2
CH25	2	503.25	508.75	73.0
CH28	1	527.25	532.75	54.7
CH30	0.05	543.25	548.75	41.6
CH31	2	551.25	556.75	61.2
CH35	-	583.25	588.75	48.4
CH37	-	599.25	604.75	71.9
CH48	-	687.25	692.75	45.2
CH58	-	767.25	772.75	67.8

Table 4: Union Place Measurements (UHF/VHF)

Details of Responses

Maximum values for the each dBμV value and for other facts could obtain under the calculations and all the reposed values has cate4gorized under the results section.

Details of Data Analysis

Depanama (Both UHF and VHF – Island wide Transmission

Channel Number	dBμV	E max (dBμV /m)	E_{worst} (dBμV /m)	S_{worst} (dBμV /m)/ohm
CH5	64.5	80.625	139.64	17.242
CH7	62.5	78.625	136.17	16.397
CH12	61.2	77.325	133.92	15.859
CH27	68.4	82.39	142.69	18.005
CH33	65.0	78.99	136.81	16.550

Table 5: Depanama Calculations (UHF/VHF)

Depanama (Both UHF and VHF – Repeater Station Transmission

Channel Number	dBμV	E max (dBμV /m)	E_{worst} (dBμV /m)	S_{worst} (dBμV /m)/ohm
CH12	65.2	81.325	140.85	17.543
CH21	50.7	64.69	112.04	11.100
CH23	53.3	67.29	116.54	12.010
CH25	55.2	69.19	119.83	12.698
CH28	69.5	83.49	144.60	18.489
CH30	71.2	85.19	147.54	19.250
CH31	52.4	66.39	114.98	11.691
CH35	41.9	55.89	96.80	8.285
CH37	54.9	68.89	119.31	12.588
CH48	43.4	57.39	99.39	8.736
CH58	44.0	57.99	100.43	8.92

Table 6: Depanama Calculations (UHF/VHF)

Union Place (Both UHF and VHF – Island wide Transmission

Channel Number	dBμV	E max (dBμV /m)	E_{worst} (dBμV /m)	S_{worst} (dBμV /m)/ohm
CH5	64.5	73.443	127.20	14.307
CH7	62.5	69.44	120.27	12.790
CH12	61.2	66.54	115.24	11.744
CH27	68.4	59.83	103.62	9.495
CH33	65.0	42.53	73.66	4.797

Table 7: Union Place calculations (UHF/VHF)

Union Place (Both UHF and VHF – Repeater Station Transmission)

Channel Number	dBμV	E max (dBμV /m)	E_{worst} (dBμV /m)	S_{worst} (dBμV /m)/ohm
CH12	65.2	66.543	115.25	11.745
CH21	50.7	66.93	115.92	11.882
CH23	53.3	89.63	155.23	21.309
CH25	55.2	87.43	151.42	20.275
CH28	69.5	69.13	119.73	12.676
CH30	71.2	56.03	97.04	8.327
CH31	52.4	75.63	130.99	15.172
CH35	41.9	62.83	108.82	10.471
CH37	54.9	86.33	149.52	19.768
CH48	43.4	59.63	103.27	9.431
CH58	44.0	82.23	142.42	17.935

Table 8: Union Place calculations (UHF/VHF)

RESULTS AND DISCUSSION

According to the calculations conducted in above can identify some results as below.

Depanama (UHF/VHF channels)

- Highest received signal voltage(dBμV) is 68.4 for the CH27
- Lowest received signal voltage(dBμV) is 61.2 for the CH12
- Highest receiving power of the signal (dBμV /m) is 82.39 for the CH27
- Lowest received power of the signal(dBμV /m) is 77.325 for the CH12
- Highest receiving worst power of the signal (dBμV /m) is 142.69 for the CH27
- Lowest received worst power of the signal(dBμV /m) is 133.92 for the CH12
- Highest strength of the signal (dBμV /m) is 18.05 for the CH30
- Lowest strength of the signal(dBμV /m) is 15.859 for the CH35

5.4.2 Depanama (UHF/VHF channels)

- Highest received signal voltage(dBμV) is 71.2 for the CH30
- Lowest received signal voltage(dBμV) is 41.9 for the CH35
- Highest receiving power of the signal (dBμV /m) is 85.19 for the CH30
- Lowest received power of the signal(dBμV /m) is 55.89 for the CH35
- Highest receiving worst power of the signal (dBμV /m) is 147.54 for the CH30
- Lowest received worst power of the signal(dBμV /m) is 96.80 for the CH35
- Highest strength of the signal (dBμV /m) is 19.250 for the CH30
- Lowest strength of the signal(dBμV /m) is 8.285 for the CH35

5.4.3 Union Place (UHF/VHF channels)

- Highest received signal voltage(dBμV) is 68.4 for the CH27
- Lowest received signal voltage(dBμV) is 61.2 for the CH12
- Highest receiving power of the signal (dBμV /m) is 73.443 for the CH5
- Lowest received power of the signal(dBμV m) is 59.83 for the CH27
- Highest receiving worst power of the signal (dBμV /m) is 127.20 for the CH5
- Lowest received worst power of the signal(dBμV /m) is 73.66 for the CH33
- Highest strength of the signal (dBμV /m) is 14.307 for the CH5
- Lowest strength of the signal(dBμV /m) is 4.797 for the CH33

5.4.4 Union Place (UHF/VHF channels)

- Highest received signal voltage(dBμV) is 71.2 for the CH30
- Lowest received signal voltage(dBμV) is 41.9 for the CH35
- Highest receiving power of the signal (dBμV /m) is 89.63 for the CH23
- Lowest received power of the signal(dBμV /m) is 56.03 for the CH30
- Highest receiving worst power of the signal (dBμV /m) is 155.23 for the CH23
- Lowest received worst power of the signal(dBμV /m) is 97.04 for the CH30

Highest strength of the signal (dBμV /m) is 21.309for the CH23

- Lowest strength of the signal(dBμV /m) is 8.327 for the CH30

Figure 1: Depanama results

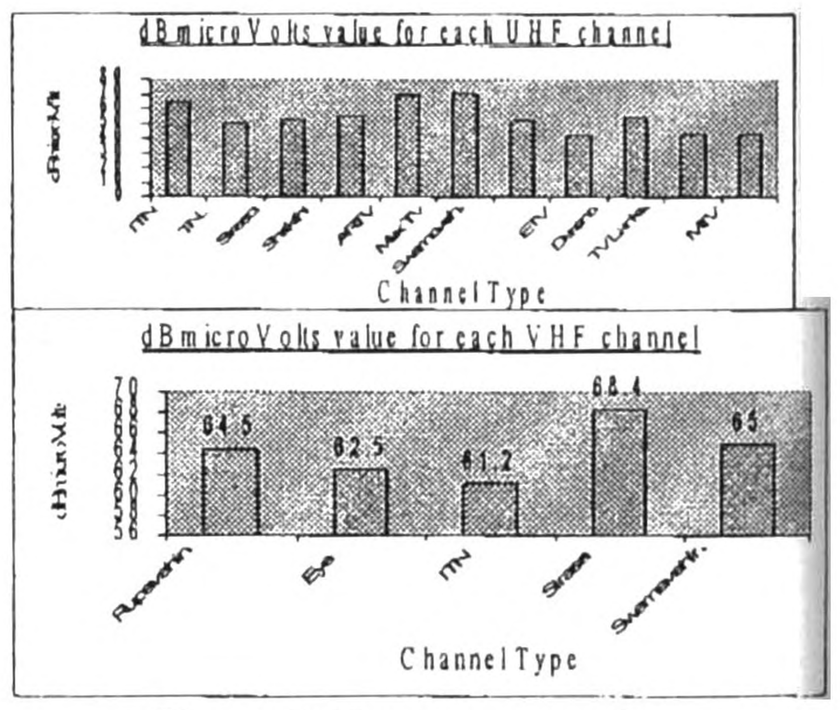

Figure 2: Depanama resul

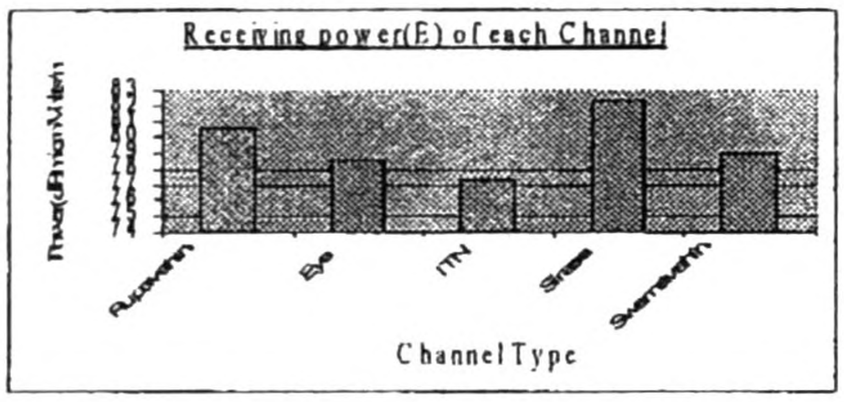

Figure 3: Depanama results

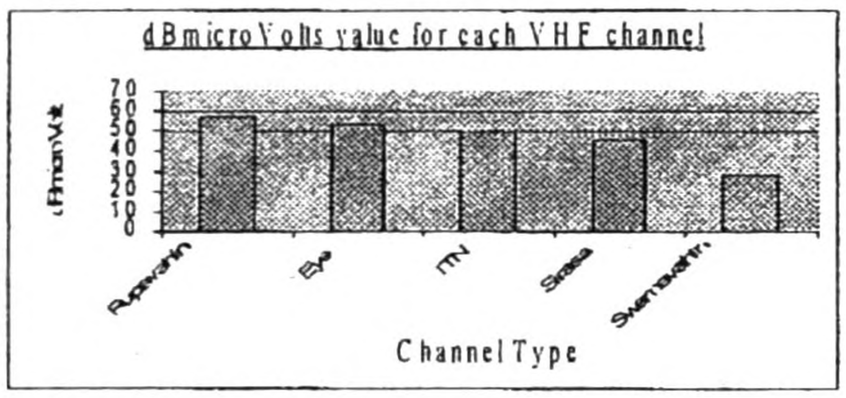

Figure 4: Union Place results

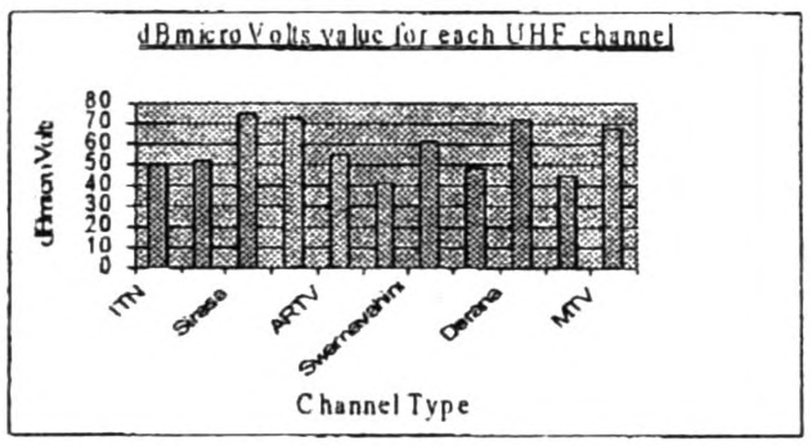

Figure 5: Union Place results

Selection of Best Feasible Solution

By considering the above alternative solutions for the problems that uncounted from the site survey results, could identify a solution as the feasible solution is use repeater stations with highest transmitting gain/strength Even there are transmitting stations to transmit signals with a particular strength, there should have repeater stations near by and also around the country and those transmitting signal strengths also should be high. Because there are lots of obstacles are in the middle of the signal transmission and those are heavily affected to the receiving signal strength. The transmitting signal strengths also should be with highest values by using more sophisticated equipments with those repeater stations, can chive the maximum target from those repeater stations. Even the development cost is associate with some what high, it can maintain with a low cost and can achieve targets also. It helps to increase the channel visions

CONCLUSION

Limitations of the Research Study

Number of limitations was arising when conducting a survey for the study. It was plan to conduct the survey at more than ten places in and around the Colombo city. But when starting and conducting the survey, there were number of limitations are arised .Those due to the company rules and regulations and some due to the survey condition. Those limitations are

o To conduct the survey using the Spectrum analyzer. Because the spectrum analyzer is a modern technological device. So the spectrum analyzer is the equipment which depicts more accurate and quality results for the measurements of the receiving signals for each channel. Not only for the measurement of signal maximum voltages, it can uses for different tasks to obtain different facts. But due to the company rules and regulations, couldn't use the spectrum analyzer for the site survey. This is the main Limitation that faced.

o To conduct the site survey, it was planned to visit number of places with the equipments. For that, needed to carry equipments, at least for two day. But due to the company rules and regulations, couldn't achieve the target. Due to that, couldn't collect data at different places.

o For the research, it is necessary to use standard UHF and VHF antennas. But the division hadn't standard antennas .The used UHF and VHF antennas are not in the standard level. With some antennas there was not total number of directors also. Due to that, there were not manuals for those antennas and to find out the antenna factors and other related data ,had to search internet details for the Kelani cables and Kevilton company

o Before conduct the survey at Depanama premise, (After conducting at Union place) organization had used cables and antennas for their outside broadcasting program and due to that few parts of the cable which was used at depanama was damage .So had to use another cable also at union place for the survey. This also a limitation was faced

o When conducting the survey there were number of buildings at both Depanama and Union place. Due to the obstacles, receiving signals were not in the correct voltage values. And also the other

environmental effects such as humidity, wind , rain... etc are not considered in the survey

Problems Encountered and Alternative Actions should have been taken

Encountered problems have been mentioned in the above topic and had some alternative actions for those problems as

- Due to the inability of use spectrum analyzer for the site survey, field strength meter was used to measure the receiving signal voltage Even it is not accurate and not quality as in spectrum analyzer, had to use the field strength meter for the survey

- Due to the problems arisen to carry the equipments in to number of places, decided to limit the survey only for two places as Depanam and Union place. Organization management agreed to provide transport facilities to carry survey equipments from Depanama to Union place and after the survey, return those through that way to Deapanam again.

- Could used the antennas with the existing directors and by searching the internet, could find antenna factors and other related details for the used antennas

- There were some problems arise regarding the cables. Due to the usage of joined cables for the survey, it had to calculate the total length and due to the join, cable length loss also was calculated. It was reduced from the received signal voltage to avoid the problem

- Environmental effects an obstacles has neglect fro the calculations of the survey

Further Future Research Opportunities

All the receiving signal voltages (dBμV) for each an every channel in the channel spectrum from CH1 to CH68, have been measured in this site survey. And data were collected using the field strength meter and only at two places inside the Colombo city. Numbers of environmental obstacles were met in the survey. But for further future researches, spectrum analyzer or the Catherine meter can use to collect mostly accurate and quality facts. To obtain perfect results and accurate site survey, it is require conducting the survey more than twenty places in and around the Colombo city. It helps to make correct decisions by considering calculated values using more number of readings. In my calculations environmental obstacles and other environmental effects were not consider for the calculations. But have a better survey, it is require consider those. By considering the above facts, it is relevant to conduct this type of site surveys annually by the company to find out the own channel positions and can avoid the problems with the signals. Then company can uplift their position among the media and can increase their standards also and also it is more require conducting a survey to find out the human exposure to the microwaves and other waves and can conduct researches how those affects to the human.

Discussion and Recommendations

In the documentation mainly focus on the research / site survey and this survey can uplift by adding more findings in future and it can nourish by adding more calculations with more results. Here wishes to conduct more site surveys with more factorials

REFERENCES

Books

- Daily Diary
- Engineers Pocket Book

Internet Notes

- Search Engines
- WWW.Google.com
- WWW.Yahoo.com
- WWW.maharaja.lk

Other Notes

- Provided by the company (About their process) ant Television related theories
- Manuals of the equipments