

# **An Exploration of Challenges to Implement Comprehensive ADSL Internet Connections in Sri Lanka for Improving Multimedia Signal Communication**

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## **ABSTRACT**

This study was carried out for analyzing the effecting parameters and to find out the possibilities for improving the transmission speed for Asymmetric Digital Subscriber Line (ADSL) internet connections through existing copper network in Badulla district. After analyzing the data, the aim was to propose better solutions for a good ADSL internet connection. Also with the use of the parameter analysis of the research study, the area with better reception of ADSL internet service was found in Badulla district. Badulla and Bandarawela areas were focused for this study. The main reason was that the Main Switching Units (MSU) of Badulla district are located in these cities. Basically speed of the ADSL connections mainly depends on the distance from the nearest exchange. The distance should be less than 4km. The other considering factors are the Attenuation, Signal to Noise Ratio (SNR), Transmission power and the condition of Copper cable network. These factors are critically affecting for the performance of an ADSL internet connection. Also those are the factors which determine download and upload speed of the line. The provided best SNR range is 20dB-28dB for a good ADSL connection. SNR values above that range are outstanding. However to give an ADSL connection SNR must be higher than 10dB. Attenuation should be 0-43 dB for connections with 2Mbps data rates. Also it should be less than 60 dB for connections with 512kbps data rates. Therefore study was conducted to find out the performance variations of the ADSL connection due to the variations of SNR margin, line attenuation based on the above ranges and distance from the nearest exchange.

**KEYWORDS:** Asymmetric Digital Subscriber Line, Attenuation, Main Switching Unit, Signal to Noise Ratio (SNR), SNR margin, Transmission power

## **INTRODUCTION**

Asymmetrical digital subscriber line, or ADSL, is technology that allows high-speed data transmission over a regular telephone line (i.e. a twisted copper pair) at higher speeds faster than dial-up internet connections. With ADSL technology, a telephone line can run analog voice signals and digital data signals at the same time. Therefore need only one communication link and it can be used to

talk and surf internet at the same time.

## **RESEARCH OBJECTIVES**

The main objectives of the study were identifying, comparing and overcoming the main difficulties of providing ADSL connections in Badulla district for better multimedia communication through the existing copper cable network.

## **LITERATURE REVIEW**

Main parameters which were mainly focused on the study are mentioned below.

- *Attenuation*  
Line attenuation is the loss of the signal power on the copper line.
- *Signal to Noise Ratio (SNR)*

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SNR is an indication of the quality of a signal.

- *Sync speed*

This is the speed at which the router synchronizes (connects) to the exchange equipment.

The parameters which are basically considered in an ADSL connection are known as ADSL statistics. Digital Subscriber line statistics from the ADSL tester are the main concerned parameters for troubleshooting ADSL problems and for minimizing line faults. ADSL line statistics are a set of various figures that can be used to give some indication about the status and condition of the ADSL connection. Basically Attenuation, Signal to Noise Ratio, Distance from the nearest exchange and Synchronization Speed were studied using ADSL tester.



Figure 1. ADSL Statistics

## DATA COLLECTION AND ANALYSIS

Data for the study were obtained from Badulla and Bandarawela area. This study would try to make decisions identifying problems encountered. Then suggesting the solutions and by analyzing the parameter measurements to avoid or minimize the problem by comparison of Bandarawela and Badulla area. Relevant data were collected by interviewing, by made of questionnaire and by studying past data. Following data were obtained and tabulated in Table1.

Table1. ADSL Statistics of Bandarawela

Bandarawela				
Tel. No	Distance from MDF(kft)	Parameter	Values	
			Up Link	Down Link
05722 32133	4.8	Link Rate(kbps)	133	510
		Maximum Rate(kbps)	994	8251
		SNR margin(dB)	34	35.5
		Capacity %	13.4	6.2
		Attenuation(dB)	22	47
		Transmission Power(dBm)	11.1	20.5

Table2. ADSL Statistics of Badulla

Badulla				
Tel. No	Distance from MDF(kft)	Parameter	Values	
			Up Link	Down Link
055222 9101	5.5	Link Rate(kbps)	126	506
		Maximum Rate(kbps)	1168	23140
		SNR margin(dB)	34	36.5
		Capacity %	10.8	2.2
		Attenuation(dB)	13	29
		Transmission Power(dBm)	11.9	20.5

## RESULTS

After analyzing above data SNR (dB) Vs Distance (kft) graphs were plotted for upload and download separately. The variation of SNR as follows. SNR range 20dB-28dB is excellent and above that range is outstanding for a good ADSL connection. However SNR should be higher than 10dB.

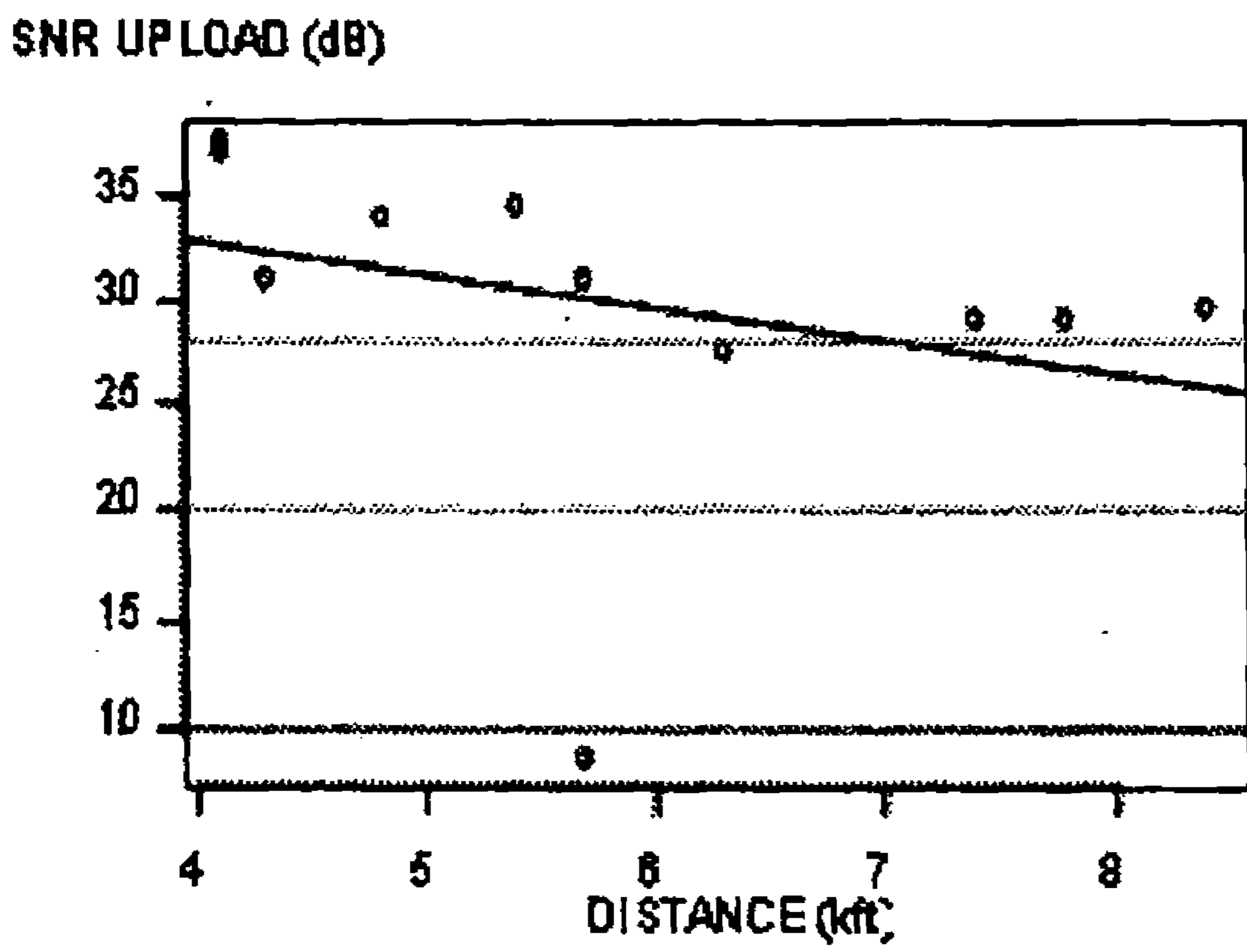


Figure 2. SNR Margin (dB) Vs Distance-Bandarawela

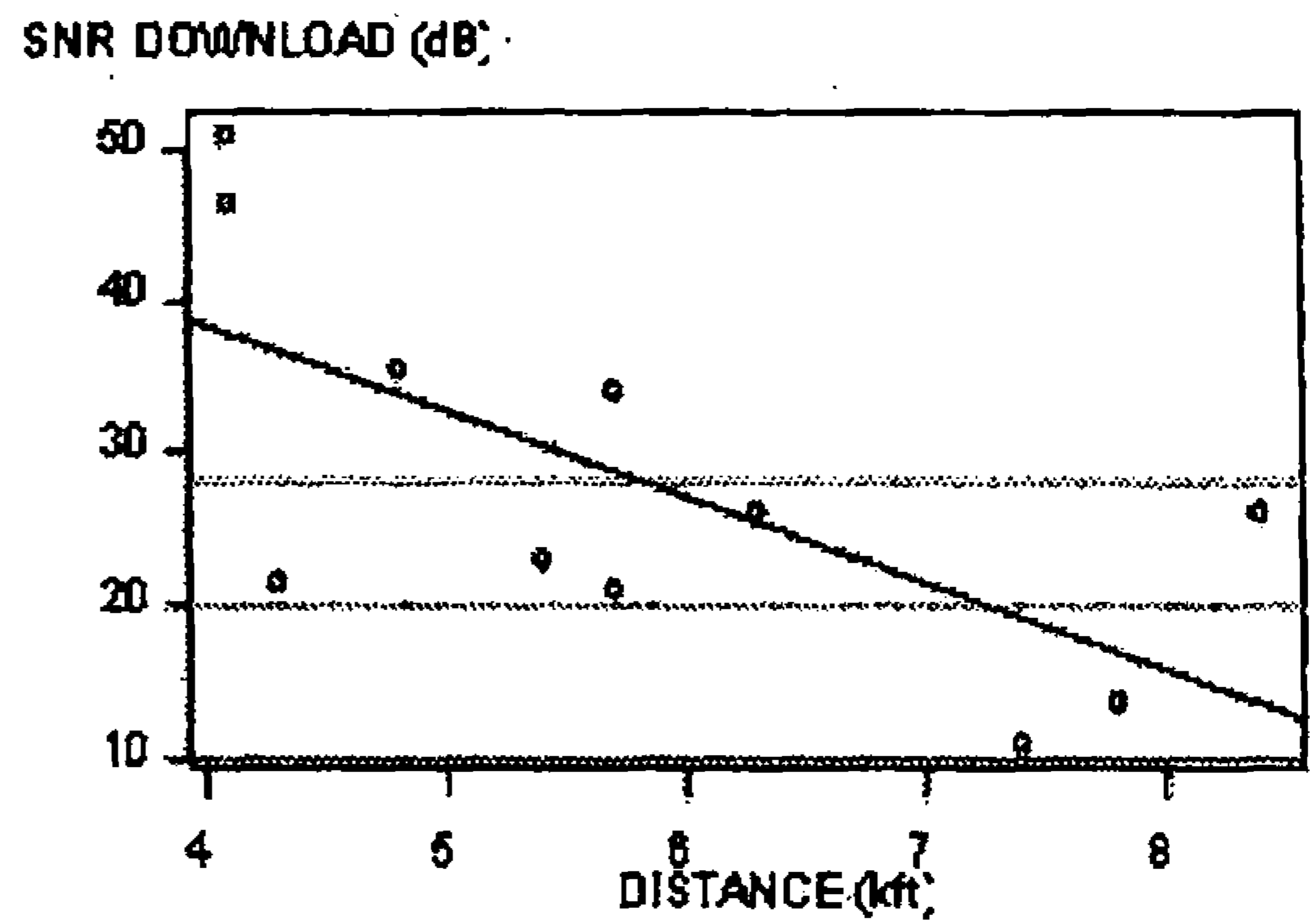


Figure 4. SNR Margin (dB) Vs Distance-Badulla

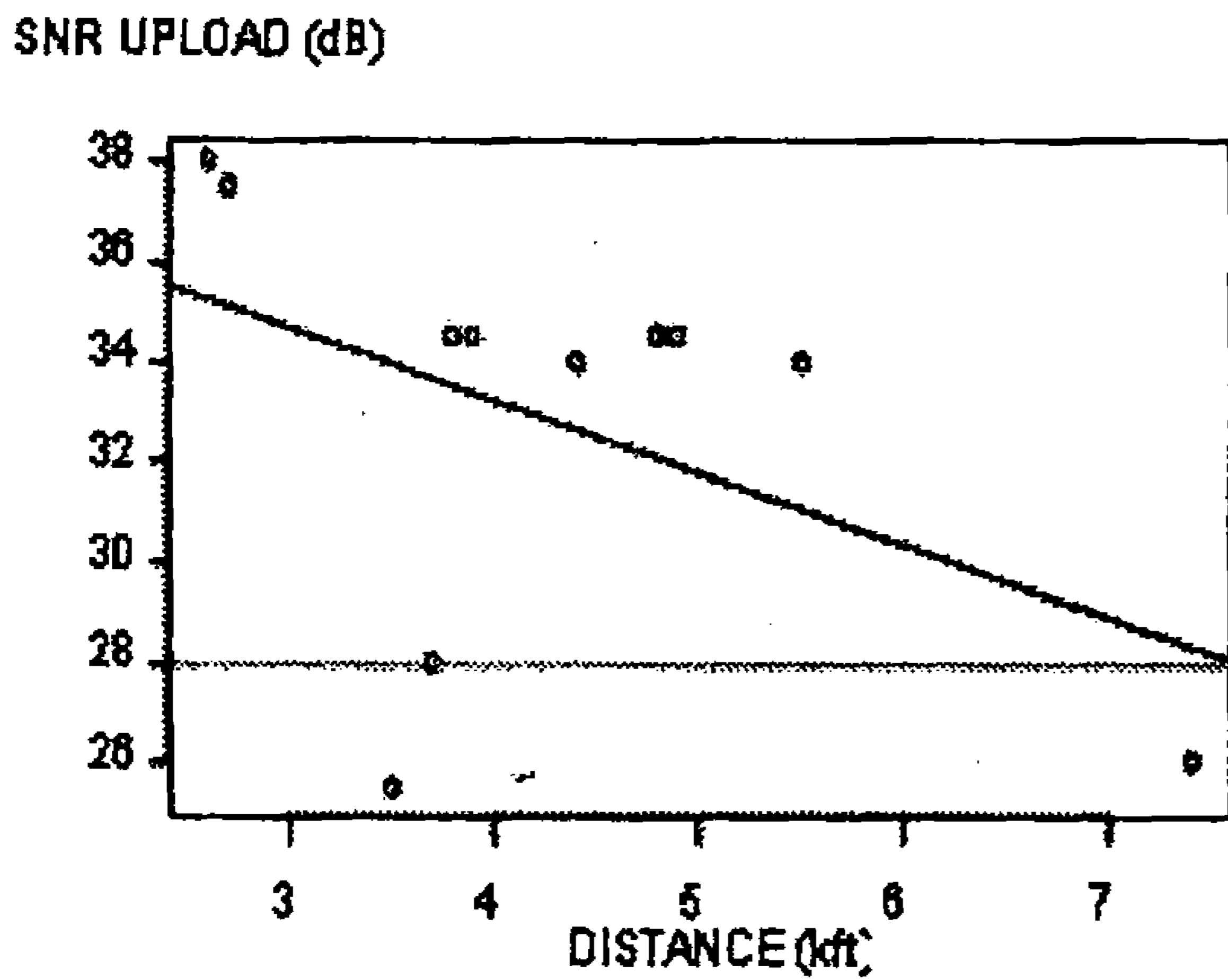


Figure 3. SNR Margin (dB) Vs Distance-Bandarawela

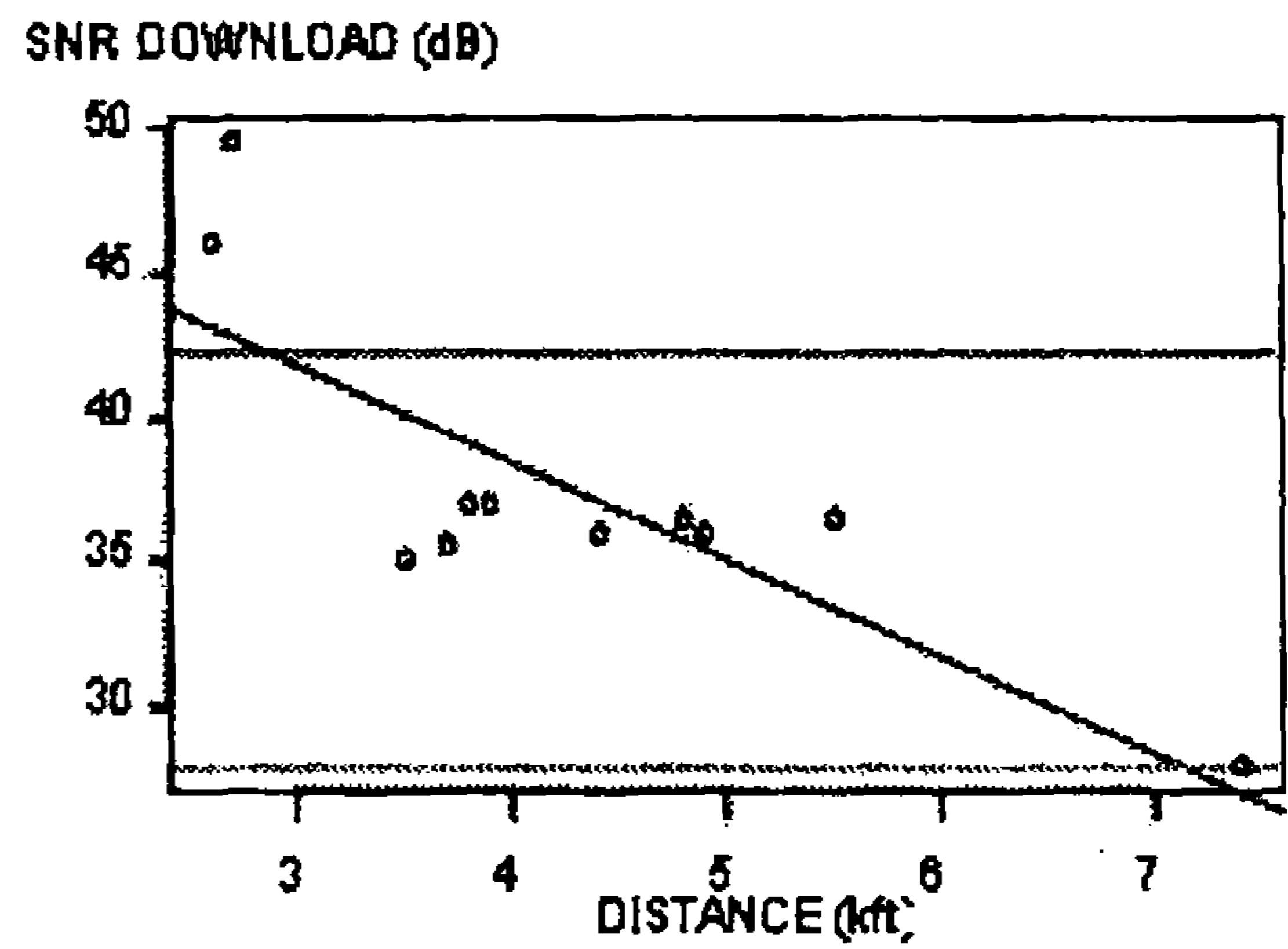


Figure 5. SNR Margin (dB) Vs Distance-Badulla

By analyzing above data Attenuation (dB) Vs Distance (kft) graphs were plotted for upload and download separately. The variation of attenuation as follows. Attenuation should be less than 60dB for 512kbps connections and 0-43dB for 2Mb connections.

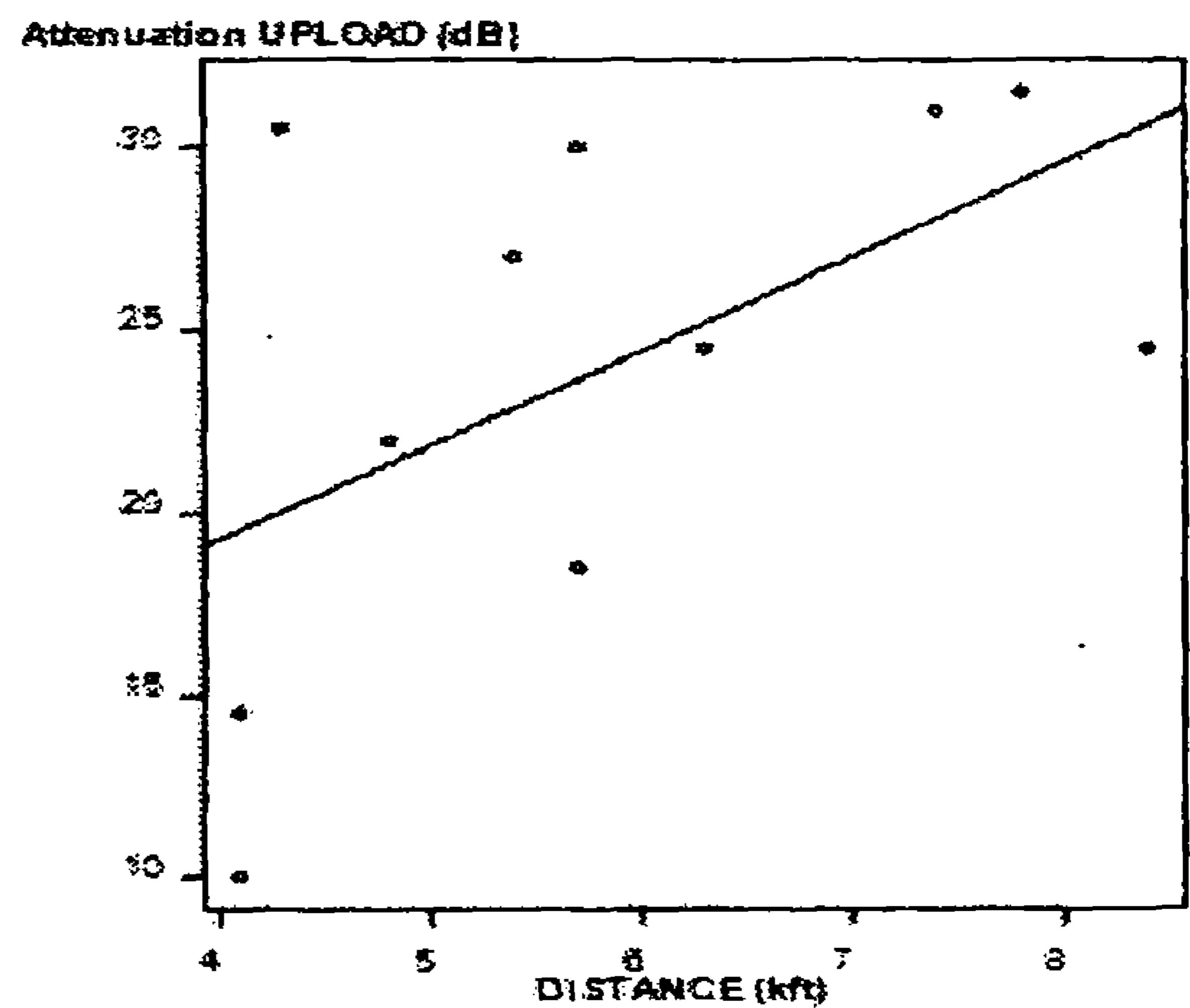


Figure 6. Attenuation (dB) Vs Distance-Bandarawela

## CONCLUSION

The data rates available to a particular ADSL subscriber are affected by many factors, and the quite significant reasons found by the study as indicated below:

These include:

- The length of copper wire from the exchange.
- The number and the type of, other services being used over copper in the same cable.
- The configuration and line quality of the copper wire pair between the exchange and the subscriber's premises.
- Electrical interference from outside sources (such as electric motors) or the proximity of the wires to radio transmitters may be caused as a significant disturbance for the speed of ADSL.
- The configuration of the copper wiring network within the subscriber's premises.
- The condition of subscriber's hardware; mainly the modem.

Due to these factors listed above, the actual speed receive on internet service can vary from the maximum stated speed.

- Quality of the phone line at subscriber's residence. Better copper wiring can achieve somewhat faster DSL speeds.
- Length of the phone line between the residence and the phone company hub. ADSL technology is distance sensitive, because its performance decreases significantly as get further away from this hub.

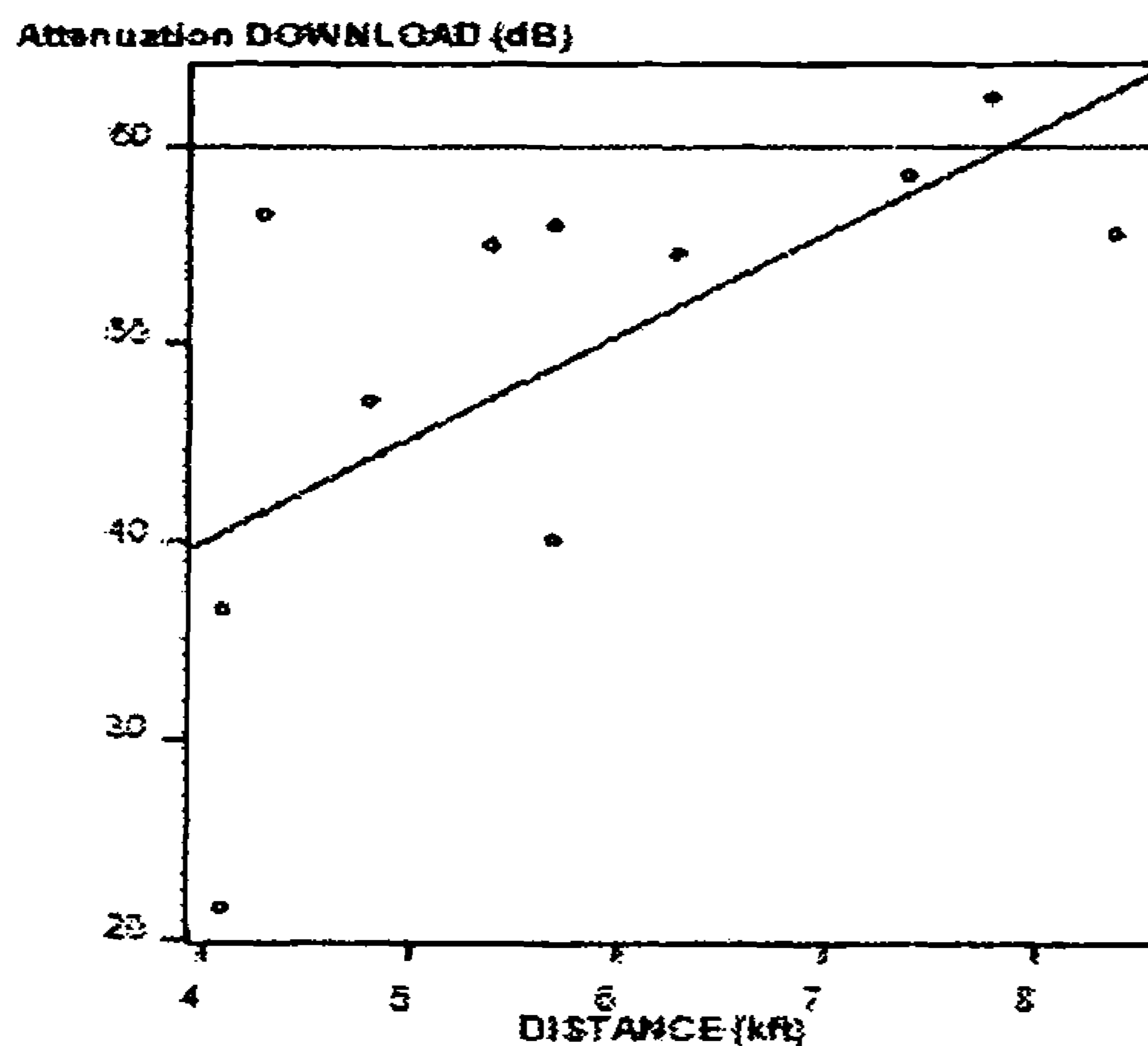


Figure 7. Attenuation (dB) Vs Distance- Bandarawela

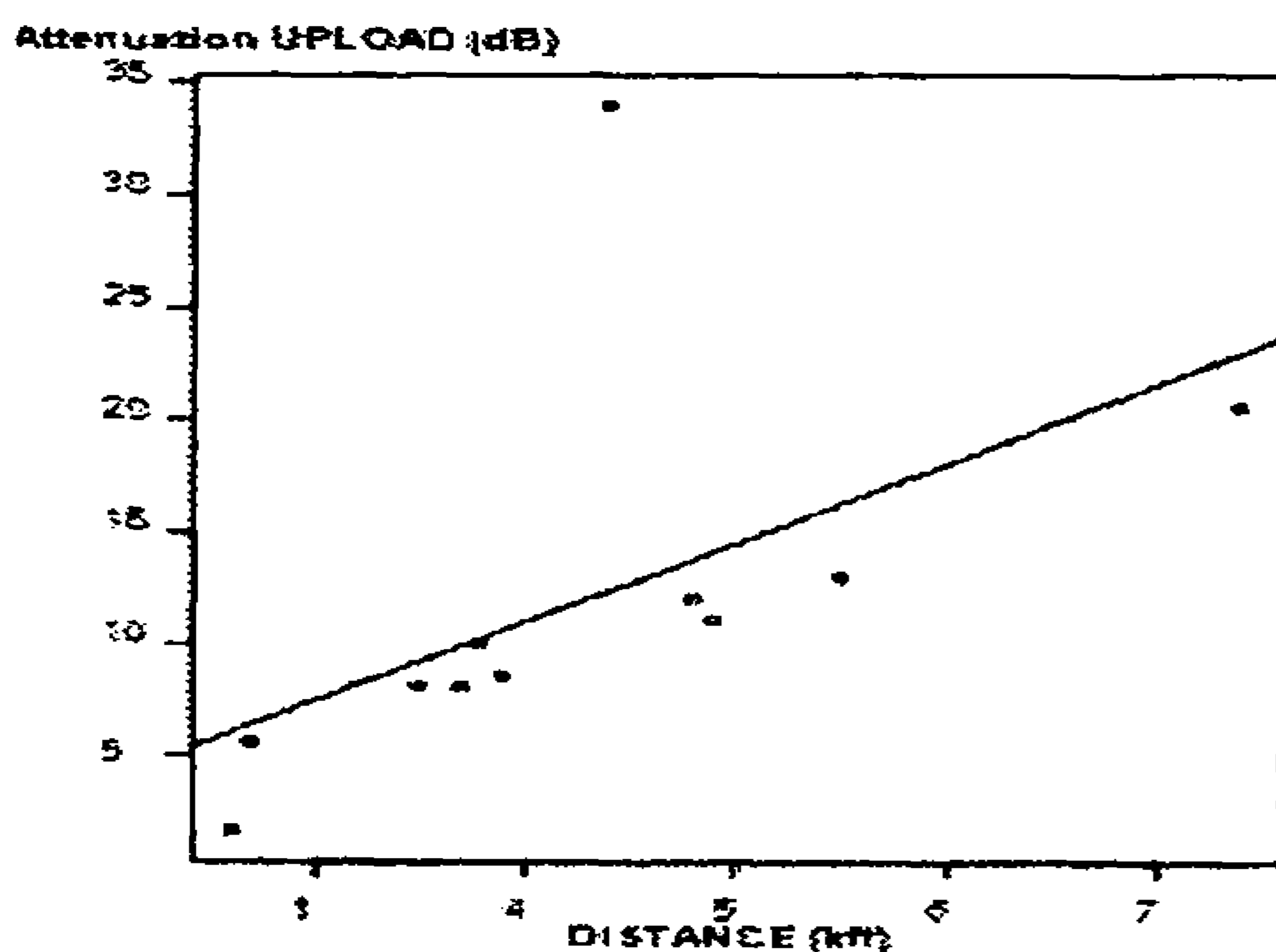


Figure 8. Attenuation (dB) Vs Distance- Badulla

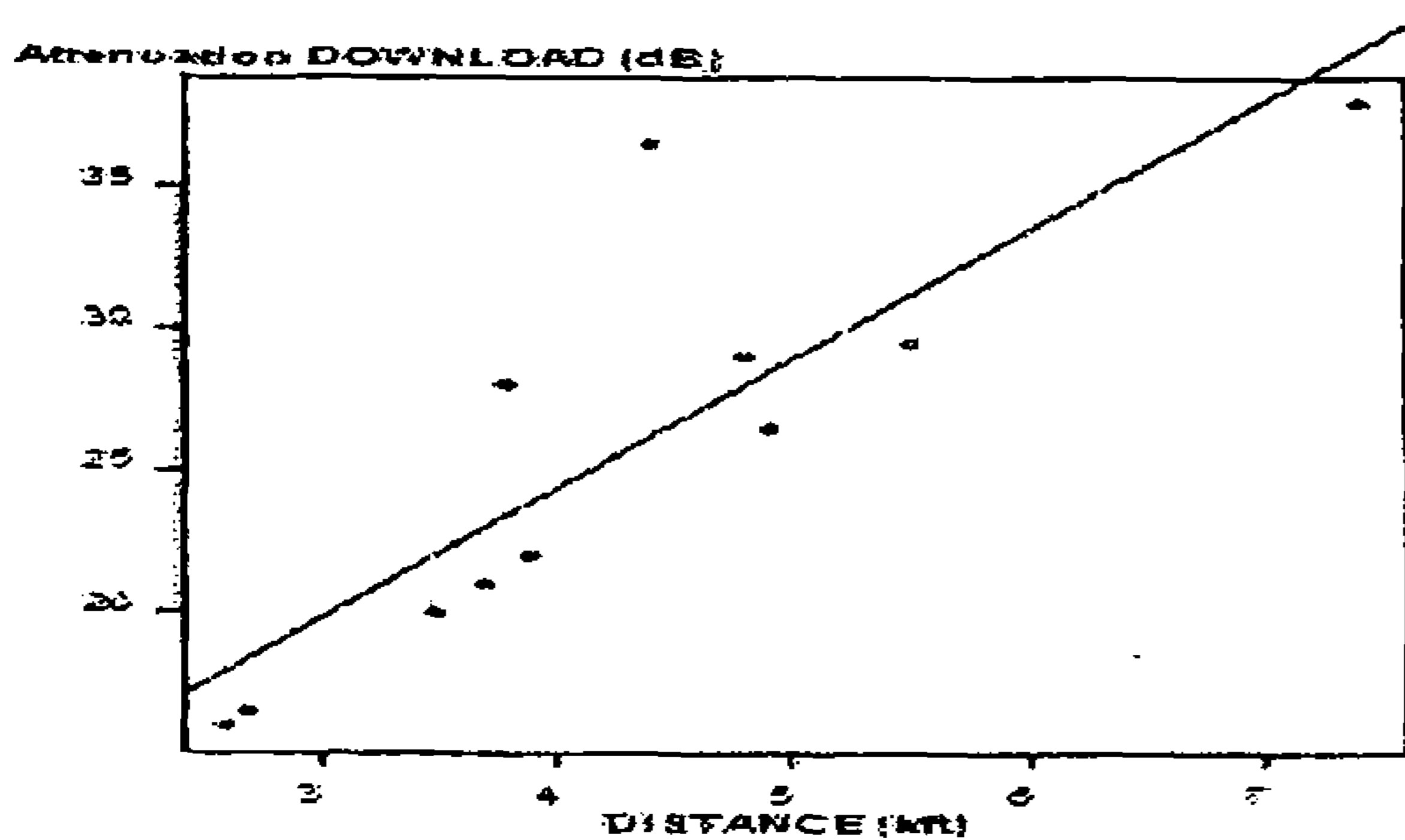


Figure 9. Attenuation (dB) Vs Distance- Badulla

- ISP's bandwidth capacity.
- Spyware on computer. Even when the ADSL network may be functioning at full speed, spyware programs may be consuming the bandwidth, robbing the DSL speed. Anti-spyware programs should be run regularly on networks to prevent this problem.

Finally according to the study, it can be concluded that Badulla area has the most effective ADSL connection speed when comparing Badulla and Bandarawela areas.

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