

Investigation into the Main Defects of Base Stations and Sub Systems

Dayarathne SPS¹
Karunarathna MAA²

ABSTRACT

The main problem considered in this research is to find an answer to minimize the main defects of Base stations and Sub System (BSS). It is designed to find defects in sites down and to find a cost effective solution to reduce it. This research progresses to find a solution for RF loss call drops which customer complains the most. First class service is the customer service and in order to make more profit for the company and provide better service for customers, minimization of main defects of BSS is a very important fact.

In this research, data were collected in continuous 50 days and then analyzed according to the various categories. The results reveal that the best solution is to minimize the main defects of base station and sub system, installation of the fully automatic generators for each and every site. The other alternative solutions are also discussed in this paper.

INTRODUCTION

This research is based on investigation of the main defects of base stations and Sub Systems. Defects are the common term for a wireless mobile communication that is terminated unexpectedly as a result of technical reasons, including presence in a dead zone. In pursuit of the idea "First-class service, Customer service", and in order to make more profit and provide better service for customers, GSM Network Planning and Network Optimization are very important parts.

There were many customer complains regarding these defects. If the company observe that, they will be able to fulfil the customer demands. Normally it is possible to see customer complains daily, regarding RF loss call drops. It is not a good practice for the network providing company. So it is very important task; 'minimization of RF loss call drops'. This is the main barrier for the betterment of the organization. If the company is able to fulfill the customer demand, they can improve their customer base as well as the potential profit margin.

The views of the customers regarding to the problems were discussed with them. After getting their views, the problems were analyzed in this study.

Most of the call drop problems are caused by RF loss. Considering these problems, a decision was taken to do a research to find out the reasons for call drops. It is essential to identify the main reasons for the RF loss call drops and how it affects to company.

LITERATURE REVIEW AND THEORITICAL BACKGROUND

In mobile communication, call drop means loss of call or interrupted call due to certain reasons after the Traffic Channel (TCH) is allocated. Call drop, which causes a lot of inconvenience to users, is one of the faults that are mostly complained. If network is not in a high quality, it can be caused for call drops. So many subscribers feel echo, unwanted sounds during a conversation. Recently their Caller Line Identification (CLI) is not working properly. Call drops in GSM network can be caused due to the followings:

- i) Equipment Errors - GSM radios/Combiners can be a cause of this. A Mobile Station (phone) can also be a cause.
- ii) Impedance Mismatch - VSWR caused by poor connections on feeders, water penetration, fault on antenna etc.
- iii) Transmission problem - If transmission is not perfect, high B.E.R (Bit Error Ratio) or other factors causing inaccuracy of transmission.
- iv) Interference - when there's frequency interfere (either co-channel or adjacent channel interference).

¹ Graduate, Department of Electronics
Faculty of Applied Sciences, Wayamba University of Sri Lanka.

² Senior lecturer, Department of Electronics, Faculty of Applied Sciences, Wayamba University of Sri Lanka.

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v) Poor hand off systems - if hand-over between two sectors is not well defined.

Reasons for RF loss call drops

➤ **Weak Signal Coverage Area :**

There can be exist weak coverage area, and radio signal is weak too. Here exists interference, such as intra-network interference due to unreasonable frequency planning, and other external interference, etc.

➤ **Unreasonable radio parameter settings :**

- The cell's minimum access level is set too small, which causes Mobile Station call drop in weak coverage area.
- Unreasonable Frequency Hopping (FH) parameter setting.
- Unreasonable Maio configuration will cause co-channel interference and adjacent-channel interference within one site.
- Unreasonable handover parameter setting, which causes MS unable to handover in time in the case of very poor call quality to improve antenna quality, thus call drop occurs.

➤ **Antenna feeder system faults:**

- Two antennas in the cell have different inclination and azimuth respectively.
- VSWR of antenna feeder is larger.
- Antenna is too high or inappropriate inclination.

- i). Checked radio parameter settings and modify unreasonable radio parameter settings.
- ii). Checked indices such as BER and idle interference band grade to reduce radio interference.
- iii). Checked if there exists coverage problems through drive test. Especially troubleshoot hardware fault for cell with weak coverage; and especially troubleshoot power parameter, handover parameter, and antenna lower inclination for cross-cell coverage.
- iv). Investigated the equipment hardware faults and replaced the faulted devices.
- v). Checked the antenna feeder system and identified the faulty.

DATA COLLECTION AND ANALISIS

This research was done using the primary data collection strategy.

According to above discussion, the data was requested from network operation canter for a period of continuous 50 days with details of following failures against to the day.

- AC Power Failure
- Generator On load
- TRE Failure
- ANC Failure
- BTS Failure
- Microwave link Failure

Failures were being widen in the area, but for this research data was categorized as above for easy analyzation.

The sample of the data collection sheet is shown in the following table.

RESEARCH APPROACH AND METHODOLOGY

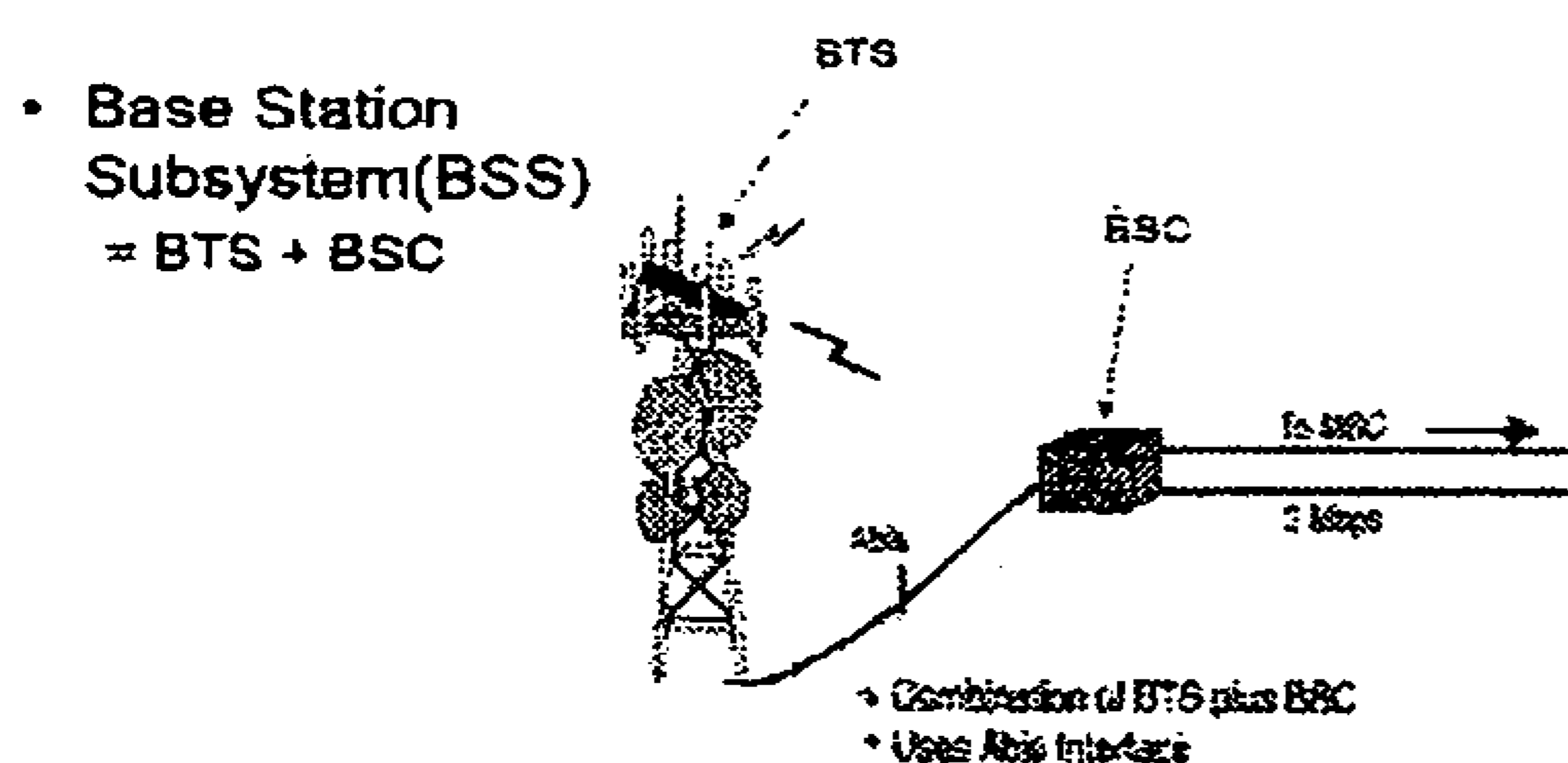


Figure 01: Base station Sub System

Initially the all defects of transceiver stations and base base station controller were examined. The analization part was done as follows:

Date	AC Power Faller	Generator On load	TRE Faller	ANC Faller	BTS Faller	Microwave Link Faller
2008/12/01	342	132	31	2	15	0
2008/12/02	352	176	27	3	21	0
2008/12/03	278	101	23	0	23	0
2008/12/04	246	181	34	1	24	0

Table 1: Sample of the collected data

Data Analysis Strategies with a Rationale

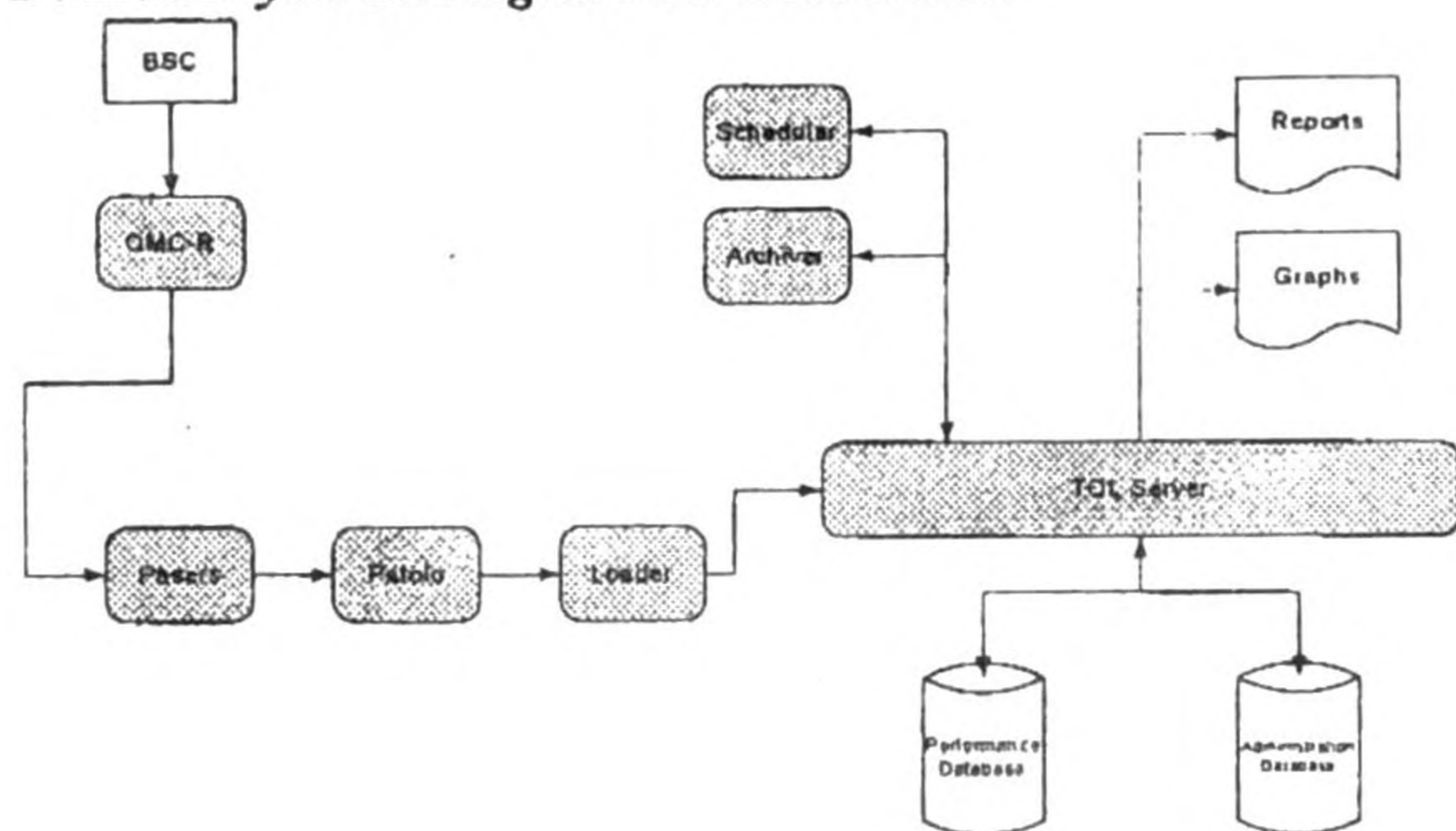


Figure 02: Analyzing Tools – NPA (Net work Performance Analysis)

1. OMC-R collects PM data from each BSC.
2. OMC-R transfers these performance management binary files to NPA.
3. These binary files are parsed to ASCII files. Output files from the Parser are saved in the Patolo directory.
4. The Patolo (Parser to loader) script further concatenates these files by raw type, time and BSC. The concatenated files are moved to the loader directory.
5. The loader computes hourly cell indicators. It loads raw counters and hourly cell indicators into the performance database through TQL (Technical Query Language) server.
6. Daily, weekly, monthly indicators are computed and aggregated per object (cell, LAC, BSC, Network) by the scheduler.
7. The archiver removes the old data.
8. PM data is available as reports or graphs for user.
9. Administration database holds information about user, user rights, settings, etc.

The data must be collected, organized, summarized, and described. After calculating the results or measures the results were graphically illustrated with the use of tables and graphs.

Details of Data Analysis

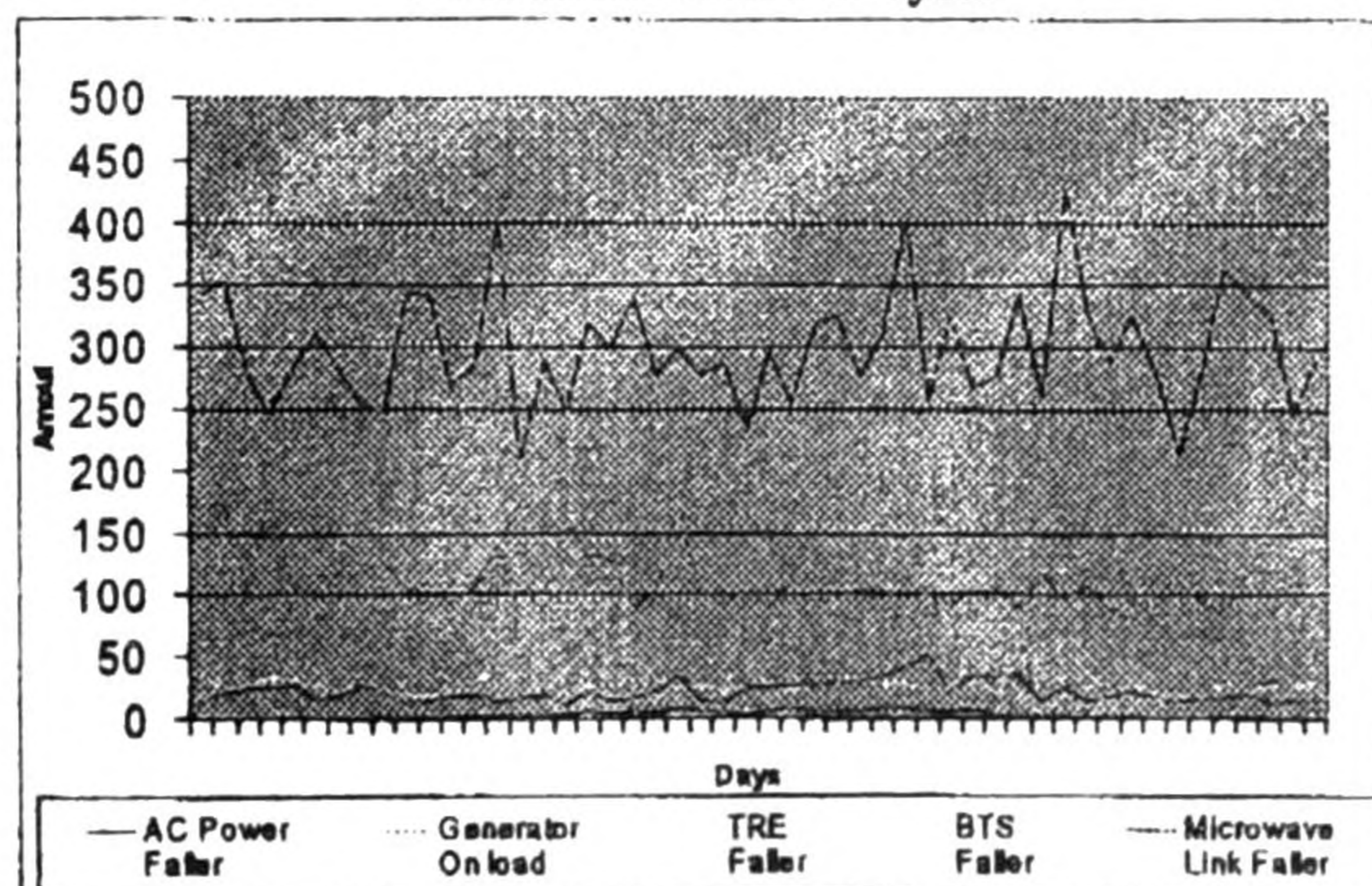


Figure 02: Graph of Failures Vs Days

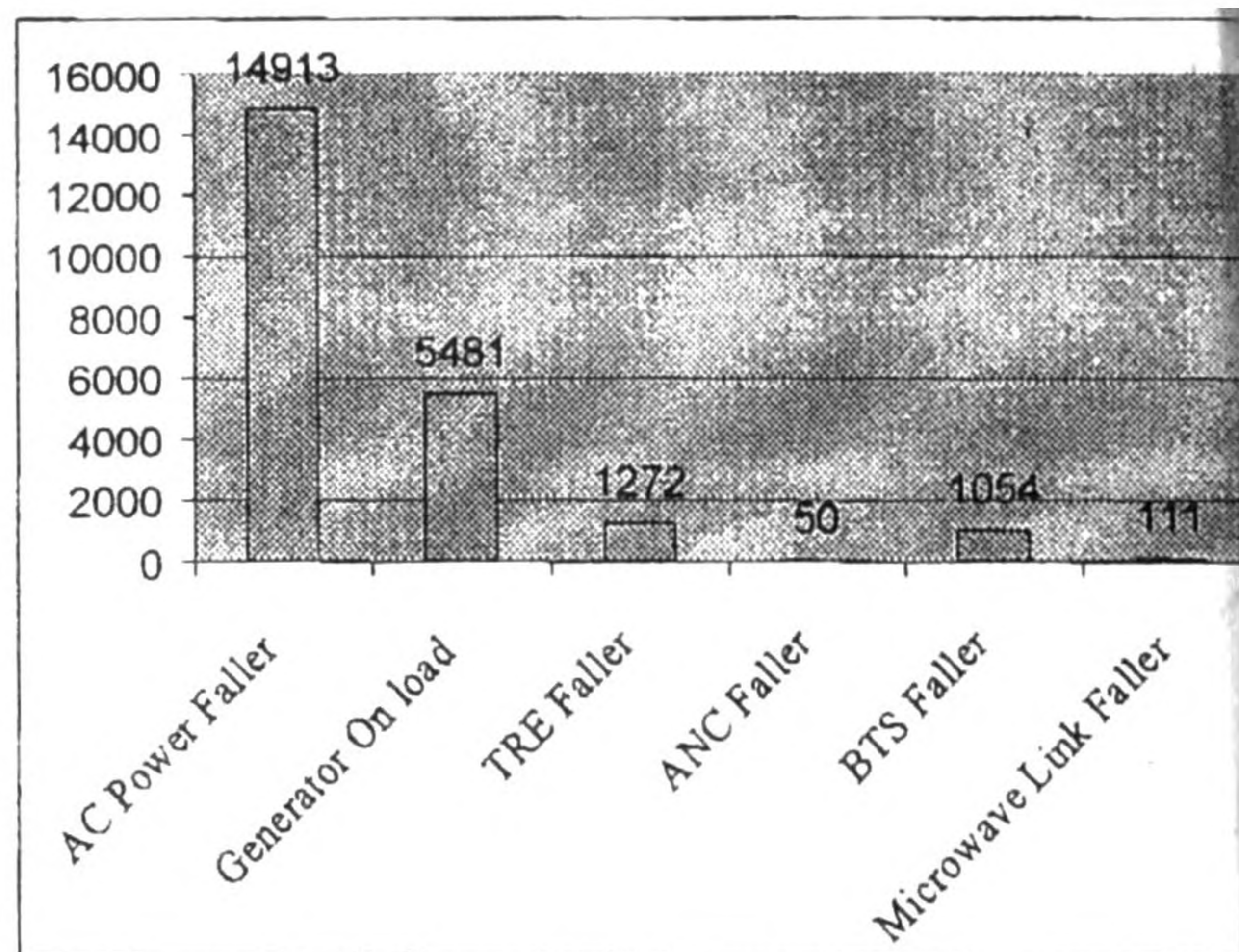


Figure 04: Bar Chart of Failures Vs Days

CONCLUSION AND DISCUSSION

List of alternative solutions & Further Research opportunities.

Continuous operation of the power generator is much expensive and it is a waste. So it must be investigated about optional power sources like;

- Wind Power
- Solar power
- Small hydro power station for up country work stations.
- Use tidal power for base stations close to the sea

Selection of Best Feasible Solution and Rationale

Installation of the fully automatic generator for each and every site is the best solution.

Limitations of Research

This research is mainly focused on technical side but some BTS have generators, sometimes these generators are not properly functioning because of the lack of fuel or incorrect ATX switching position. Such problems are out of concern for this study.

This research is mostly based on BSC and BTS. That alarm system is design to identify limited failures. Most identified problems are about existing system failures. There may be some other problems in the system which have to be discovered. With limited time, the above concerned are the most identified problems.

Due to the influences of economical crisis, today all the companies around the world are unable to make high profit as demand is very low. Hence, the all companies are temporarily diminishing on their businesses. Thus the market remains unpredictable. In

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this situation company will not invest money for Generators, so that it will badly affect to the company.

This research is more accurate if the data were collected by network operation engineers but communicate with them is much more difficult because of their busyness

Experiencing too many common customer complaint received by wireless service providers. They have attempted to address the complaint in various ways, including expansion of their home network coverage, increased cell capacity.

An active call cannot usually be maintained across a different company's network (as calls cannot be re-routed over the traditional phone network while in progress), resulting in the termination of the call once a signal cannot be maintained between the phone and the original network. Another common reason is when a phone is taken into an area where wireless communication is unavailable, interrupted, interfered with, or jammed. From the network's perspective, this is the same as the mobile moving out of the coverage area. Co-channel and Adjacent channel interference can also be responsible for dropped calls in a wireless network. Neighbor cells with the same frequencies interfere with each other, deteriorating the quality of service and producing dropped calls.

Transmission problems are also a common cause of dropped calls. Another problem may be a faulty transceiver (TRX) inside the base station. A great amount of money and time is invested by wireless operators in order to improve the network quality of service (QOS) to acceptable values.

The research to Minimization Radio Frequency Loss Call Drops started regarding customer complains. The research was begun to find reasons for RF loss call drops and found reasons. After considering all these facts decision was taken to find high RF loss call drops site in BSC. Finally all sites were selected to consideration.

Today high competition among Telecommunication industries. They always try to provide good service for the customers. This research helps the organization where the training was carried out to join this new trend. It costs very less and useful one.

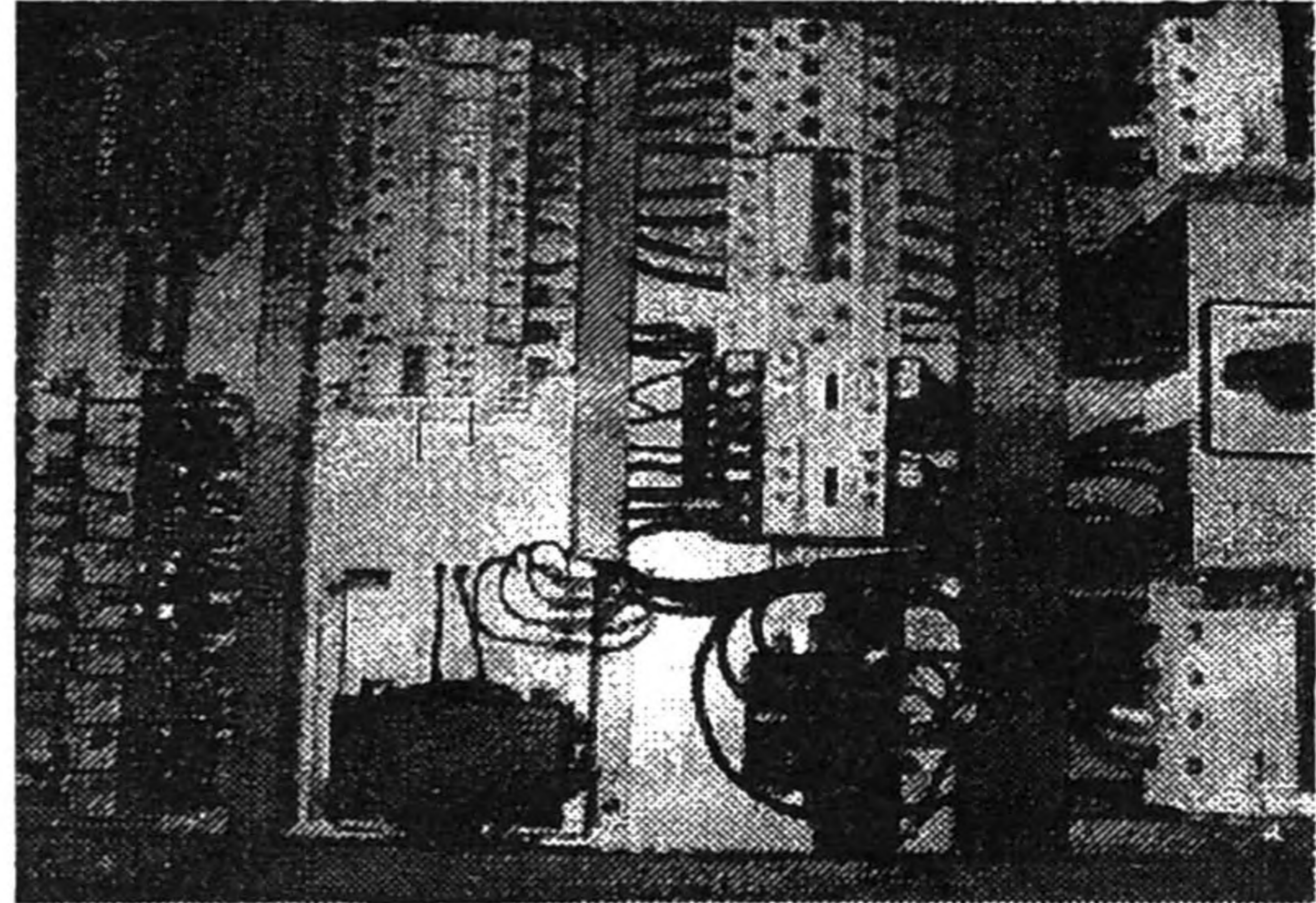


Figure 05: ATX Pannel

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