



Fig 1.0: A typical Baseband unit for Base Transceiver Station

Maintenance of Telecommunication Network can be briefly classified into two types:

Preventive Maintenance: The responsibility of the Site preventive maintenance covers the failure prevention maintenance on all the Network elements which is been mentioned here to enable the provision of optimum life / infrastructure/ service cycle of active / passive equipment[2]. These are planned work that are carried out either weekly, monthly or yearly.

Corrective Maintenance: The responsibility of the Site correction maintenance covers the failure correction maintenance on all the network elements [2]. Passive/infrastructure Equipment Maintenance Include: Alarms and NMS: Sensors, Internal Alarms, External Alarms etc Energy Solar, Lighting, Battery, Grid Power Line, Grounding, Grid Transformer, Generator, PIU, AVR Cooling Air Conditioning Construction Tower, Fence, Building/Shelter, BTS Room, Foundations, Roof Conditions, Site Access, Grounding including Bus, Record

Tasks Carried Out Under Ericsson Technologies Nigeria Limited: Managing the entire gamut of maintenance and operations and Project Management to ensure the network availability $\geq 99.999\%$. The tables below shows that downtime which is allowed for a particular percentage of availability and also presuming that the system is expected

to continuously be operating. Service level agreements (SLA) which is often referred to as monthly downtime exist in order to calculate service credits to tally with the actual monthly billing cycles. The following table shows the translation from a given availability percentage to the corresponding amount of time a system would be unavailable.

Table 1.0: Availability Percentage to the Corresponding Amount of Time a System is Unavailable.

Availability (%)	Downtime (per year)	Downtime (per month)	Downtime (per week)	Downtime (per day)
55.555555	162.33 days	13.53 days	74.92 hours	10.67 hours
90	36.53 days	73.05 hours	16.80 hours	2.40 hours
95	18.26 days	36.53 hours	8.40 hours	1.20 hours
97	10.96 days	21.92 hours	5.04 hours	43.20 minutes
98	7.31 days	14.16 hours	3.36 hours	28.80 minutes
99	3.65 days	7.31 hours	1.68 hours	14.40 minutes
99.5	1.83 days	3.65 hours	50.40 minutes	7.20 minutes
99.8	17.53 hours	87.66 minutes	20.16 minutes	2.88 minutes
99.9	8.77 hours	43.83 minutes	10.08 minutes	1.44 minutes
99.95	4.38 hours	21.92 minutes	5.04 minutes	43.20 seconds
99.99	52.60 minutes	4.38 minutes	1.01 minutes	8.64 seconds
99.995	26.30 minutes	2.19 minutes	30.24 seconds	4.32 seconds
99.999	5.26 minutes	26.30 seconds	6.05 seconds	864.00 milliseconds
99.9999	31.56 seconds	2.63 seconds	604.80 milliseconds	86.40 milliseconds
99.99999	31.16 seconds	262.98 milliseconds	60.48 milliseconds	8.64 milliseconds
99.999999	315.58 milliseconds	26.30 milliseconds	6.05 milliseconds	864.00 milliseconds
99.9999999	31.56 milliseconds	2.63 milliseconds	604.80 milliseconds	86.40 milliseconds

- Leading the operations and maintenance team in an efficient, optimized, cost effective way, orientation towards KPI's, SLAs.
- The management of the operations for a smooth and seamless running of the daily activities which includes the following and more; surveillance management, fuel management, etc.
- The control and monitoring of the consumed energy and loss-making sites to maintain the cost and site stability.
- The monitoring of the performance of the equipment and its preventive maintenance.
- The troubleshooting, implementation of the corrective actions and root cause analysis to avoid the repetition of breakdowns.
- Execution of a comprehensive operation and also giving support by maintaining the following and many more; fault monitoring, handling, etc.
- Performing any other related duties as required. Ensure reduction in fuel consumption by close monitoring of the system. Ensure timely escalations of issues occurring at each site.
- Organizing safety training for field staff. Ensure safety guidelines are followed.
- Identifying high diesel consumption sites and their remedy action.
- Planning, creating and coordinating work schedule for maintenance team.

Common Passive problems and how they are resolved Due to the very pathetic state of electricity in Nigeria, most telecom sites have generators as the primary source of power for the transmission equipment, these generators run for 24 hours in most cases are serviced either weekly or monthly depending on the servicing kit whether 250 hours kit for weekly servicing or 100 hours kit for monthly servicing. Generator Failure: Batteries: Battery failure is the most common failure when it comes to generators. Always make sure the batteries, charges, and all cables and connections leading to;fro are in good condition. Failure to Start: If a generator doesn't start, one of the causes might be that the controls are not set to auto.

If the main control switch which is supposed to be on the "on" position has been placed in the "off/reset" position. In such scenario, the generator won't start automatically when required. Running out of fuel: sometimes, fuel gauges might not properly show the fuel levels and when this happens, it will result to the generators running out of fuel. It's advisable to check fuel levels manually and maintain onsite-storage or any other reliable means of securing fuel for emergency.

Routine Generator Servicing involves:

Changing the air filter

Changing the oil filter

Changing the fuel filter

Changing the oil Belt replacement

Water level check and topping if necessary

When there is an understanding of the most common generator problems and planned maintenance involved, prevention of downtime becomes easier. A regular inspection and a routine maintenance of the generator helps to avoid many of these commonly known issues from happening. High Temperature: High temperature is often as a result of air conditioner failure, routine air conditioner servicing is often carried out to ensure that outage is averted due to high temperature.

Routine Air Conditioner Servicing involves: Shut off the power Remove debris Clean the fins Clean area around the unit Change the blower filter Refill gas if necessary By ensuring air conditioners are serviced on regular bases, downtime due to shelter high temperature is eliminated. Common Active Problem: Faulty Transmission Card: This is mostly as a result of longtime usage, fault as a result of excess voltage/under voltage to the system, fault as a result of fluctuating voltage which can lead to loss of the card or electronic board as the case maybe. Some of the boards are MMU (Main Module Unit), NPU (Node Processing Unit) fan unit, RFU (Radio Frequency Unit) etc.

Loss of Configuration: This is a cause where the configuration or file save in a card or network is said to be missing where causing no communication with the back office/Network Operating Centre (NOC) and perceived to be network failure. Fiber Failure: This is a cause where the fiber optic cable transferring resources from the Base Service Center (BSC) to Base Transceiver Station (BTS) has been tampered or mechanically damaged.

CONCLUSION

This paper has successfully shown progress made by some of the Nigerian telecommunication tower owners and site managers in the area of steady power supply to base transceivers stations. However, there are a lot of efforts and competitions between the tower owners and site managers to manage the diesel consumption rate of telecommunication sites to the lowest minimum and also maintain steady power supply across the sites considering the economic situation of Nigeria. It is also a known fact that the majority of down-time or site down experienced across Nigeria is as a result of power failure, critical research should continue, directed towards discovering and deploying alternative, cheaper and sustainable energy sources and grids for use in telecommunication complexes across Nigeria.

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