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Study on Network Theory

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ABSTRACT: Network theory has vast fields, network theory basically studies the function of different fields like business, electrical and electronics circuits and in computer networks. In different fields of work it has an operation which is graphical representation of the data. Network theory is able to graph the symmetrical and asymmetrical relation between discrete objects (discrete object is something which has its boundary means it has its starting and ending point). Network theory has different meanings in different domains, for example in computer science domain network theory defined as graphical representation of the system having edges and nodes. In this paper discussed the network theory meaning, its application in different domains and its drawbacks and advantages. In this paper discussing how network theory in electrical is used to solve electrical engineering networks. Network theory first finds the number of voltage and current components in circuit then simplifies it by using network theory. This paper gives an idea on complex network analysis (CNA), and also gives brief knowledge about the micro grid in the electric distribution system by using complex network analysis. Network theory is the study of electrical networks which helps in future like this study can increase the stability of the network of some big power station, also it enhances grid resilience and protects power stations from blackouts. In this paper MATLAB software is used to show the analysis of network theory.

KEYWORDS: centralized control, complex network analysis (CNA), controlled delivery grid, gridresilience, Networks, business, Computer network.

I. INTRODUCTION

Network theory has different meanings in different domains, for example in computer science domain network theory defined as graphical representation of the system having edges and nodes. In this paper discussed the network theory meaning, its application in different domains and its drawbacks and advantages. In this paper discussing how network theory in electrical is used to solve electrical engineering networks. Network theory first finds the number of voltage and current components in circuit then simplifies it by using network theory. This paper gives an idea on complex network analysis (CNA), and also gives brief knowledge about the micro grid in the electric distribution system by using complex network analysis. Network theory is the study of electrical networks which helps in future like this study can increase the stability of the network of some big power station, also it enhances grid resilience and protects power stations from blackouts

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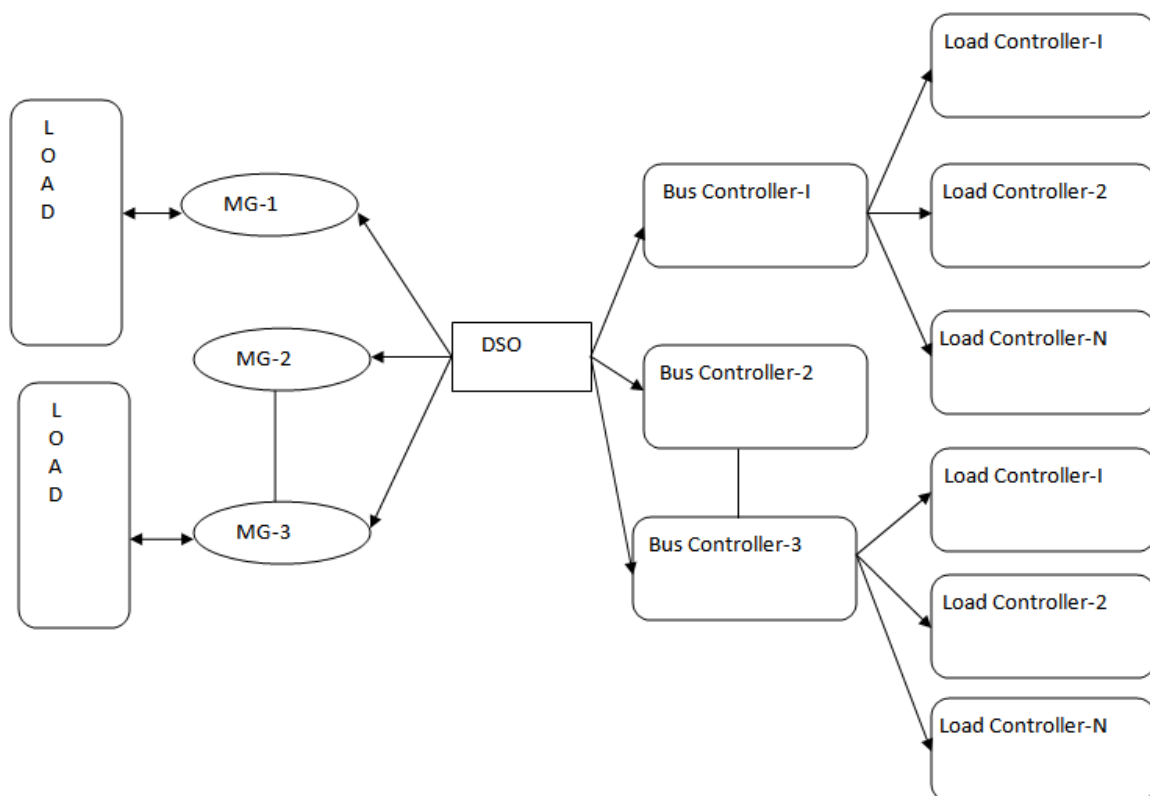


Figure 1: Grant/request process in the distribution network

Fig 1 shows how distribution networks work, distribution network is the final stage of transmission line, it transmits the power or electricity from transmission line to the individual user or loads[1].

Network Theory is a very important tool for many domains like it is also important in electrical engineering, in the electrical domain it is used to solve circuits or power network problems or faults. By analyzing circuits, the engineer looks to determine the various voltages that currents can exist within the network[2].

When looking at solving any circuit, a number of methods and theories exist to assist and simplify the process. This post briefly lists some of the more common network theories. For more detailed analysis of any particular theory you can search the myElectrical site or find more information on one of the many other sources available on the web[3].

Typically in network theory, we deal with linear and passive elements – most commonly:

- Resistors add resistance, R to a circuit. The inverse of resistance ($1/R$) is the conductance, G .
- Capacitors add capacitance, C to a circuit.
- Inductors add inductance, L to a circuit.

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- Reactance, X is a product of having capacitance or inductance in an alternating current (ac) circuit. The inverse of reactance ($1/X$) is the susceptance, B .
- Impedance, Z is the combination of resistance and reactance in an ac circuit. The inverse of impedance ($1/Z$) is the admittance, Y .
- Voltage source is a source of voltage within the circuit. An ideal voltage source contains no internal series resistance.
- Current source is a source current within a circuit. An ideal current source contains no internal parallel resistance.

There have been many methods to solve the electrical network problem, some of those methods are:

What is Ohm's Law

Ohm's law is a basic law for electrical networks, it states that current across two points is directly proportional to the voltage across those two points[4].

II. LITERATURE REVIEW

Network theory is a very important study in electrical engineering also it has many applications in different sectors like electrical, mechanical, computer science and in business also. There have been many papers published in the field of network theory among all those papers titled Applications of Complex Network Analysis in Electric Power Systems by Mahmoud Saleh [1], Yusef Esa [1] and Ahmed Mohamed discusses the history of network theory and its uses in electrical engineering. This paper examines the electric power system from an abstract perspective, also gives a brief description of Modified IEEE 30 bus system and how a complex network of electrical systems is solved by using network theory, and gives an introduction about the grant/request process in the distribution network. In network theory complex network is very tough to solve and handle so to simplify this complex network network theory used which is known as complex network framework, bus bar is a conductive rod used to pass the electrical power supply throughout the network in this paper shows the IEEE 30 bus network and its graphical representation, also discussed what is closeness centrality, and between centrality. Also the result using MATLAB software which is software used to solve electrical circuits gives results conducted using complex network analysis (CAN) in a complex network framework[5].

In a research paper titled modern network theory in electrical engineering discussed the network theory's meaning, its application in different domains and its drawbacks and advantages. In this paper discussing how network theory in electrical is used to solve electrical engineering networks. Network theory first finds the number of voltage and current components in circuit then simplifies it by using network theory. In this paper discussed the modern network theory and its significance in electrical engineering, also give review about the British overseas information services[6-8].

A book titled electrical network theory by Norman Alabamian Theodore A. Bickart discussed different types of network in electrical engineering also different methods to solve the problem of complex circuit, in this book writer discussed fundamental concept of electrical networks in which discussed the elementary matrix of algebra, basic operations, types of matrices, determinants, the inverse of a matrix, pivotal condensation, linear equations, characteristic equation, similarity, Sylvester's inequality, norm of a vector, notation and notation and references, network classification, linearity, time-invariance, passivity, reciprocity, network components, the transformer, the gyrator, independent sources, graph theory network equations, network functions, integral solutions, state equations, representations network power functions, fundamentals network synthesis, signal flow graphs and feedback the scattering parameters, linear time variant and nonlinear network and theory of Laplace transformation[9][10].

III. CONCLUSION

This paper is a brief study about the electrical distribution system of the grid, electric distribution system is the final stage of power delivery system, it is the last stage of power distribution from transmission line which carries electricity

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and delivers it to individual users. Network theory is an important tool for electrical circuits; it gives a simple analysis of cost and types of material and amount of load (load analysis) of any network. In this study of distribution system of grid gives information about rupees and types of conductor used to make distribution network and amount of current drawn by different types of conductor also shown the different values of resistance and reactance in distribution circuit, as per the knowledge more the opposition (resistance, reactance, inductance, capacitance, impedance) less will be the current in the circuit. In this paper discussing the different types of conductors used in distribution networks also gives the cost analysis of the load distribution. Network theory has vast fields, network theory basically studies the function of different fields like business, electrical and electronics circuits and in computer networks. In different fields of work it has an operation which is graphical representation of the data. Network theory is able to graph the symmetrical and asymmetrical relation between discrete objects (discrete object is something which has its boundary means it has its starting and ending point). Different types of instruments used for the testing of any electrical equipment also in distribution systems include some common equipment like ohm meter, multimeter, capacitor and denser network used to measure and calculate load in the network.

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