Review on Pricing and Tracing of Congestion in Power Transmission

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Abstract-*In power system the transmission network is the key mechanism for generator to complete in supplying large user & distribution companies. In this paper propose a new method for tracing AC power flow .The issue of power tracing helps to evaluate a fair & transparent tariff .A power tracing method would make4 it possible to charge the generator & consumer on the basis of actual transmission used. Power tracing method help to find which line is having more transmission losses. Power tracing help & support efficient operation of power system.The tracing of power flow using common method & node method. The result obtained from these method are not perfect & time required is more Bialek proposed topological approach for allocating the power flow. So, that loss calculation is the important problem which reduces transmission performances.*

Keywords-power tracing, Bialek's method, Transmission pricing congestion.

I. INTRODUCTION

In such a structure a transmission system is being used by multiple generation and load entities that do not own the transmission system formerly. When electric network was operated by one vertically integrated utility, there was not much interest in this subject. With the unbundling of generation and transmission facilities and with accompanying deregulated of the power the topic acquired new significance as the different parties acting in the power grid are interested in a fair operation and fair allocation of transmission costs. In view of market operation it become more important to know the contribution of individual generator and loads to transmission lines and power transfer between individual generator and loads.

The tracing of power flow using common method and node method. The result obtained from these method are not perfect and time required is more. Bialek proposed topological approach for allocating the power flow from a particle generator or a load in every branch flow based on an electricity tracing method. Bialek and Kattuman a tracing methodology is based on the assumption the the incoming flows are proportionally distributed among the ot coming flows at any network node introduced the modified Topological load distribution factor(TLDF) method trace the power flow in the transmission losses to enable the decoupling of the extended matrix a new method using direct path from buses to buses by multiplying with the incidence matrix and to find the power transfer from individual generator to loads and branches.

The optimization technique based tracing algorithms using the continuity equations for lossy flow network with modified bus incidence matrix to discriminate the power flow between the sending end and reciving end. Node method and common method for allocation of power flow in the power system network. Introduced a concept of load tracing and generator tracing using Evolutionary Programming (EP). The power flow From generator to all system loads is traced and losses are allocated in the transmission lines, these methods have the advantages of no assumption to formulate the tracing of power flow.Transmission congestion is encountered initially in the form of thermal limits on transmission lines. However, even if each individual line meets the thermal limit, the system could be unstable because of angular stability problem. Power system operation faces new challenges due to deregulation and restructuring of electricity markets. The old system known as monopoly base is substituted by a competitive market place. Power-flow tracing should be done separately for both active and reactive power the direction of the reactive power flow from a generator through a particular line may not be same as the direction of the active power flow.Bialek 's tracing method which is applicable to both active & reactive power.

II. PROPOSED METHODOLOGY

A new method for determining the transmission congestion cost.The congestion cost has been calculated based on power flow tracing principle.

Bialek's tracing principle is implemented in this paper to find the power flow from generator to transmission lines and from generator to load upstream algorithm and downstream algorithm is used in The power flow tracing problem is formulated in two way. The real power generation is kept as similar in the load buses.The congestion in deregulated market is created by maximizing the real power

demand at load buses. The power flow in base case and in congested condition is found using the optimization technique. The transmission congestion pricing and congestion pricing is estimated from the fixed cost of generator, load and loss occurrence in the transmission lines.The power flow from generator to load and from generator to transmission lines has been obtained using power flow tracing principle Power flow tracing is achieved by maximizing the real power generation. The power flow at congested condition is obtained by maximizing the real power demand. The congested power from the load to the transmission lines has been found using downstream algorithm.

Power flow tracing concepts

Tracing is the important process in a power system network. Due to the unbundling of the power system network, the power flow from the generator to load and from the generator to transmission lines become an important issue. Tracing gives a clear pictureabout the total power flow of the power system network. Power flow tracing comprises of two cases namely generator tracing and load tracing. In generator tracing, power transfer from generator to transmission lines are found. In load tracing, the power transfer from the load to transmission lines is determine

Concept Of Generator Tracing:

An optimization technique based power flow tracing is implemented to determine the power flow from generator to transmission lines and from generator to load. The contribution of lineflow by the generator.

Concept Of Load Tracing:

The generator that is connected to the line is categorized as an Involved generator of that load. The involved generators and lines Can be interpreted as the source and path used by a load in extracting real power from generation to load side.

Power Tracing:

It is very important to know the function of individual generator and load to transmission line & power transfer between individual generator to load in power system The power transfer between individual generator to load in power system. Tracing methods determine the contribution of transmission user to transmission usage.It is also used for transmission pricing . The method proposed for tracing the power flow are upstream & downstream algorithms[1]

Power Tracing Method:

- Node Method
- Graph Method
- Method of Common
- Bialek ‘s tracing algorithm

Node Method

In meshed transmission network there are number of possible by which electrical power can flow from source to sink. It is possible to determine relation between the generator /load & flow in transmission line ,that is by determining how a change in nodal generation & demand influence the flow in a particular line[2].

III .GRAPH METHOD

This method assumes that has the preeminence to provide power to the load on the same bus.The remaining power will enter the network to supply other loads in the network to avoid unnecessary losses. Lines carrying the outflows for a generator bus with all incident[2]

IV. METHOD OF COMMON

This technique can be applied to both active & reactive power.The objective is to calculate the contribution, the percentage of a given flow or load in the given flow or load in the network supplied by a certain generator

V. BIALEK’S TRACING METHOD

In bialek’s tracing method it is assumed that nodal inflows are shared proportionally among nodal outflows. This method determines the contribution of individual generator or loads to every line flow based on the calculation of topological distribution factors. This method can be used to find contribution of both active & reactive power flows. Bialek’s tracing method is used to determine how much of a particular generator output supplier a particular load or how much of a particular load is supplied by a particular generator.

VI. DOWN STREAM

(Flow Tracing From A Generator To Load)

In downstream looking algorithm the transmission usage charge is allocated to individual loads and losses are allocated to generator[7]

UP STREAM

(Flow Tracing From A Load To Generator)

In the upstream looking algorithm the transmission supplement charge is allocated to individual generators and losses are allocated to load[7-10]

VII.PROPORTIONAL SHARING PRINCIPAL

The proportional sharing principal is based on Kirchhoff's current law.It deals with a general transportation problem and assume that the network node is perfect of incoming flows. The only requirement for the input data is that kirchh off's current law must be satisfied for all the nodes in the the network. The nodal sum i.e total incoming and total outgoing power at node is equal. The main principal used to trace the flow of electricity will be that of proportional sharing fig.1.Four lines are connected to node A, with two inflow and with two with outflow.

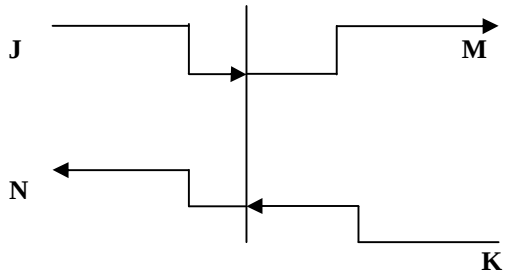

Fig.1. Prortional Sharing Principal

VIII. FLOW TRACING FROM A GENRATOR TO A LOAD

(Down Stream Trace)

In the upstream looking algorithm the transmission usage charge is allocated to individual generator and losses are allocated to loads. Upstream tracing gives the information about the contribution of each transmission line and the load. When the distribution of power flow has been assigned starting from the load node. Power flow paths & the contribution factor of each node, the relation of load & line flow. [7]

$Pi = (\Sigma i\acute{e}\mu \left| pi\text{-}l \right|) + PLi$ for i=1,2,3….n

The total flow Pi the outflow to the ith bus is the sum of all the outflow through the line connected to the bus & the local bus load. Where μ is the node directly supplied from node i, implying power flowing from the ith node. If the line losses are neglected

Where $Cli = \left| \frac{Pl\ -i}{Pl} \right|$

expressing relationship between line flow & the nodal flow at lth node & using proportional sharing principal

Pl - i =Cli Pl

Pi - { Σlέμ Cli Pl }= PLi

Ad=PL

P is the vector of net nodal power PL is the vector of nodal load demand.

Transmission Congestion Cost

The congestion cost reflects the charge for the incremental electrical power delivery through the constrained transmission networks. It includes operating cost for generation dispatch and transmission rescheduling, reinforcement cost for capital costs of new transmission facilities and opportunity cost or benefits caused by antecedent transaction planning of utilities due to operational constraints.

IX. CONCLUSION

This project to find transmission congestion pricing on power networks with flow gate-based stability constraints. basic congestion pricing methods, namely nodal pricing and flow-based pricing and Bialek's principle. To considered for analyzing the effects of a flowgate-based stability constraint on prices. The optimization models related to these methods have been formulated and solved for a sample test system . The difference of these pricing models is the allocation of the total congestion costs to the lines on the network. In the flow-based method. The nodal pricing method a line that induces a price differential, between its sink and source nodes, is allocated a congestion cost. Effects of the stability constraint on the total cost of generator dispatch, total cost to load, and total congestion cost were analyzed. The total congestion cost varies depending on the maximum flow gate value.The transmission loss associated with the generator, the results corresponding to the bialek's tracing algorithm. The method is of a topological nature and works on the results of optimal load flow program. The method results in a table allows one to assess how much of the real and reactive power output from a particular station goes to a particular load. This can be done by accumulating the losses as the power flows to individual loads.

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