

A Method for Determining End-to-End Congestions in Non-Hierarchical
Telecommunication Networks.

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With the introduction of non-hierarchical telecommunication networks new methods of analysing these networks must be discovered. An approximate method for calculating the traffics lost from these networks has been devised. This method is based around an iterative procedure in which the calculated results for the traffics lost approach certain values, these values are approximately equal to the exact results.

Given any telephone network, the routing rules associated with this network, the number of circuits on each link in the network and the arrival traffic offered to this network we want to find out how much of the offered traffic is lost. We do this by looking at each offered stream in turn calculating how much traffic is lost from this particular stream's first choice route and then its second choice route and so on. These results depend not only on the chain, (a series of links that the call may use), that is being looked at but the other arrival streams which use the links in this chain. Initially it is assumed that no traffic is offered to this network, then we offer the first stream to the network and the amount of traffic lost from this stream is calculated. Since no other traffic streams are taken into consideration the first approximation for the traffic lost from this first stream will be too small. The second stream is now investigated. For this stream the results obtained for the first stream will be taken into consideration. The accuracy of the initial result for the traffic lost from the second stream should be better than if the first stream's results had not been taken into account. We repeat this process for all the arrival streams. Once this first iteration has been completed we begin the second iteration. We return to the first stream and repeat the above process.

This result should be much more accurate than our initial approximation as now all the other streams can be taken into consideration. A more accurate result for this first stream should lead to more accurate results for all the other streams which in turn will lead to an even more accurate result for the first stream and so on. When the results for two succeeding iterations are sufficiently close to one another the procedure stops, the final results have been determined.

How accurate these results are depends mainly on how accurate the values of the lost traffics can be calculated. For networks in which the chains are more than one link long and in which other traffic streams are also offered to these chains this is a very difficult problem. An attempted solution has been to use the traffics carried on the chains in the network not associated with the arrival stream which we are looking at instead of the streams offered to these chains. We offer the arrival stream, for which the lost traffic is being calculated, to a link for which all the other traffics carried on this link are known. It is difficult to talk about traffic offered to a link in a chain as this depends on the other links in this chain and the other arrival streams in the network and so on. The traffic carried on any link in a chain from a particular arrival stream is the traffic carried on this chain from this arrival stream. It is not necessary when looking at a particular link in a chain to have to also look at the other links in the other chains which use this link. This method gives more accurate results than one which uses offered traffics from the individual streams that use this link but creates many problems which up until now few people have investigated.

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