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Computing of bandwidth necessary for ring creation

Introduction

The following text includes of a formula for creating ring with minimum bandwidth

that has obtained by experience and Research and is presented for using on Network

designing Strategy.

In the subject of Designing Networks Based on Ring and advantage compare to Star

network and How to organize it.

Content

In the state that several Center traffic Value is Completely Cleared,

According to the following figure:



A: Main Center

B, C, D: Tributary Centers

1, 2, 3: traffic Value for each tributary Center

Total traffic of A center is equal to 1 + 2 + 3 = 6.

Now if Number of Main Centers for example A be increased and target of designing how Centers topology as traffic exchange between several main Centers be is accepted.



In the above figure A, A', A" are Main Centers and suppose that traffic Value of each Main Centers wouldn't be foreseeable.

If in this state star topology is used for Connection of this Three Centers.



According to above figure now it's necessary to Consider a Communication on the average or more than total traffic of each main Center for relating these Centers. In above figure for example 6 are taken into account.

Now if in worse case A Center with A" Center Completely exchange traffic and any traffic come out of A' Center, there are no problem for accepted bandwidth.

Now if 2 units of total 6 units A' traffic be Communicated with A and 4 units of total 6 units also be Communicated with A'' According to the Following figure:



With due attention to this point that considered BandWidth for Main Center Communication is 6 units and A" Center would have intended Communication by 2 units Value free Capacity with A Main Center by 4 units Value free Capacity there is no Problem .

Because there are 4 units Value free Capacity of Bandwidth for AA' Communication and 2 units Value free Capacity of Bandwidth for A'A".

Now in this same Conditions if Bandwidth Between Main Centers (in above example) would be Considered each Value Less than 6 units.

There is a violation example that Considered Communication will have problem.

According to following traffic table:

Traffic communication	traffic value
A ←→A''	5
A ←→A'	1
A" ←→A'	1



Therefore when the traffic between centers isn't foresight able.

There is Problem to Determine Bandwidth and this Problem when traffic between centers is difference is aggravated too.

In the other hand in Designing star Method Restoration had to be considered always. Because there isn't any other way for traffic routing from one Main Center to other Main Center when Link is cut. The Best solution is using Ring topology.

In Designing with Ring topology is solved

Restoration Problem and different Method is used in World for Perform. As SNCP and MSP-Ring etc.

But the important subject in Ring designing is how to calculate the value of necessary bandwidth for installing the Ring and determine this Value is More important when according to previous example the output traffic value of each center and input traffic value to other center would not been clear and foresight able.



According to above figure if we form a Ring and obtaining the necessary bandwidth between centers would be aimed, the method suggested in this case, is using following formula.

Necessary minimum bandwidth For Ring installation.=
$$\frac{\sum maincentertrafic}{4}$$

By above method minimum necessary bandwidth between centers is obtained. In worse cases this formula has no problem.

So that each unforeseeable traffic between centers would be transferable. In final figure we'll have:

$$\frac{\sum(6+6+6)}{4} = \frac{18}{4} = 4.5$$

In the other hand if a Ring with capacity of 4.5 units would be installed:



And the purpose would be traffic transfer according to pervious example.



Traffic communication	traffic value
A' ←→A	2
A' ←→A''	4
A←→A"	2

According to the figure traffic routing is easily possible but you may say that if we take in to 4 instead of 4.5 is there any problem?

Yes that's true, even if the Ring with 3 units would be installed this was true but the important thing and really the main point is to mention this subject that the produced formula means that without knowing traffic value of each main center for sending to other center and independent of main center traffic Value we guess that What the Ring must be formed?

In the other hand we could establish a composition that it's total traffic According to previous example would be 18 but traffic transportation between its centers would not be performed as follows.



According to above figure total traffic of three centers is equal to 18. But if traffic distribution table would be as follows, Transportation would not be Performed.





So different example could be shown that using the above mentioned formula will be confirmed and proved.

Please attention to following example.

If the main Centers with Shown traffic Value is intended Have communication with other Centers according to following pointed transmission Matrix.

Traffic communication	traffic value
A' ←→A	2
A' ←→A''	4
A ←→ A''	0



Now if a Ring is created that is obtained from the formula.

$$\frac{\sum (8+2+6)}{4} = \frac{16}{4} = 4$$

So Ring Value is talked in to 4 units in this state according to following figure.



As observed, Traffic transmission has been down.

Now if we intend to install the Same Ring with the same total traffic but with following traffic distribution and in the Value of three units.

We will confront with Problem as follows.

Traffic communication	traffic value
A' ←→A	4
A' ←→A''	3
A ← →A''	0



So using the 4 units Ring according to shown formula is unavoidable and this theory could be generalized about four or more center Rings.

Conclusion

This theory with following formula Could be generalized about three, four or more center Rings.

Necessary minimum band width For Ring installation =
$$\frac{\sum maincentertrafic}{4}$$