Volume 5, Issue 8, August 2015 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Fast Pre-Calculated Path to Handle Failure in Network Tolopogy

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Abstract— Failure of network causes slow routing. So we propose new scheme called fast pre-calculated path(FPR) which allow quick recovery from the network failure. It stores some more routing path information than regular routing table information. So it can forward packet to destination using this extra routing path information whenever it detects any failure in IP network. Also it scheme gives the assurance of the connectivity after failure and it provide global free re-routing

Keywords— Fast routing, good load distribution, network stability, load balancing

I. INTRODUCTION

In recent years, the use of internet is widely used in every communication services. so it is important to give available and reliable internet services .The main aim is to provide recovery from failures .there are many techniques to handle this recovery but they have some drawbacks which gives network instability. so to solve this , in this paper we present a schema for handling failures in IP network which is called fast preconfigured route (FPR). It is local based proactive schema which works in mill seconds. FPR forward the data over alternative preconfigured paths immediately failure occurs. FPR always use shortest path routing schema and hop-by-hop forwarding based on destination.

The paper is arranged as, In second section we explain the basic concept of FPR. In third section we give the algorithm used to generate predefined routes. In fourth section we described working of FPR to handle the failures. In fifth section we describe the technique of distribution of load and last section we conclude topic.

II. BASIC OF FPR

Basic concept of FPR is based on to create set of pre-calculated routing paths which are used to send data on alternative routes after failure occurs. FPR is three step process. In first step we generate pre-defined pre-calculated routing paths. Then in second step we use routing algorithm to calculate shortest path for specific pre-calculated routing paths and generate table of routing in every router. So as to avoid loops in forwarding process. In third step we develop routing process which uses this pre-calculate paths to give the fast recovery from network failure.

III. CREATING PRE-CALCULATED ROUTING PATHS

Here we firstly give the details of requirements used in creating pre-calculated paths. Then we give the algorithm which is use to create such a pre-calculated routing paths.

I. Structure of pre-calculated routing path:

Here network topology is use to define the FPR configurations and also link weights are also defined which may vary among different configurations.
Following table shows the notation used.

TABLE I NOTATION USED

G_p=(N,L)	Graph with N nodes and links L
C_x	The graph having link weight in configuration x
S_x	Set of isolated nodes in configuration x
B_x	Backbone in configuration x
L(i)	Set of links from node i
(i,j)	Directed link from node i to j
P_x(i,j)	Shortest path between node i and j in C_x
Z	The total configuration to create i.e. it is algorithm input
W_p	Weight of restricted link

The configuration C_x is pair having orders in (G_p , W_x) of G_p graph and function W_x : L -> { 1, … W_{max} , W_p, ∞ } which have weight W_x (a) to each link a ε L .

The normal configuration C_n and pre-calculated configuration C_x where x >0 are different. In C_n all links consists of normal weight $W_0(a) \varepsilon \{ 1, \ldots W_{max} \}$. In FPR, inks and nodes which are selected not carry transit traffic. To regulate the traffic , use high weight on some links in pre-calculated configurations. Isolated link are not able to send traffic .Restricted link restrict to forward data or traffic from nodes.

The whole set of pre-calculated routing paths for used topology is prepared by different ways. Here we give an algorithm to achieve the aim.

II. Algorithm

In this algorithm, consider graph G_P and Z is number of pre-calculated routing paths which is created when algorithm works successfully. It generate the whole set of pre-calculated routing paths. This algorithm is implemented in routers. When all router contain some network topology, they generate same set of pre-calculated routing paths.

The algorithm is as below:

for x ε(1,2……Z) do
C_x <- (G_p, W_0)
S_x <- Φ
B_x <- C_x
end
q_n <- N
q_l <- Φ
x <- 1
while $q_n \neq \Phi$ do
i <- first (q_n)
y <- x
repeat
if connect ($B_x \setminus (\{i\} , L (i))$) then
C_t <- isolated (C_x ,i)
If $C_t \neq$ null then
C_x <- C_t
S_x <- S_x U {i}
B_x <- $B_x \setminus (\{i\}, L(i))$
X <- (x mod z) +1
Until i ε S_x or x=y
If i $\notin$ S_x then
abort
end

This algorithm going through all nodes in network topology and it isolate node at a time one through this looping. When nodes are isolated that time link are also isolated in same loop. When all nodes and links are isolated are restricted in one configuration then algorithm terminates successfully.

Firstly z pre-defined configurations are routing paths are generated. q_n and q_l are also initialized. Method first gives first element in queue and remove it from queue.

The connect method test that every neighbor of i is reach to each other excluding that i which is isolated in configuration C_x . Then it allow to restrict node i in pre-defined routing paths. Then isolate method is called to get correct list of isolated and restricted link for node i . When this test runs correct, isolate method returns a new modified configuration. When i node isolate then we try to isolate next node. If not then all z configurations are tested to isolate node i.

The algorithm go through the L(i) which is set of link from node i to isolate the links attached to i . The algorithm works successfully then the result of this is set of pre-calculated routing path $C=\{C_a, C_b, \ldots..C_z\}$ and here $C_x \varepsilon C$ are right . The algorithm go through available node in topology and try to make them isolate in one of pre-calculated routing paths. When any node is not able to isolate in anyone pre-calculated configurations then it end without success.

IV. ROUTING PROCESS

Here by using algorithm we create set of pre-calculated routing paths. By using this we use standard shortest path algorithm in every configuration to find configuration wise routing table.This table is used to skip the failed device and continue routing by alternative paths. Here when data comes to the point where the failure occurs, the node which is near is now ready to find the pre-calculated routing paths where this fail node is isolated. After this node marks the data is now available in new configuration and send that data. Now All routers know that available data is from this new pre-calculated routing configuration and by this it skip that fail node.

As show in above figure, let assume a situation where data came at i node and due to failure it is not able to send it to next node j. So now the neighbor node should find the correct pre-defined routing path configuration to forward traffic. Consider C(i) is pre-defined routing path configuration in this node i is isolated. Means $C(i) = C_x \Leftrightarrow i \varepsilon S_x$. Also C(i,j) shows the pre-defined routing paths configuration in this link (i,j) is isolated. Means $C(i,j) = C_x \Leftrightarrow W_x(i,j) = \infty$

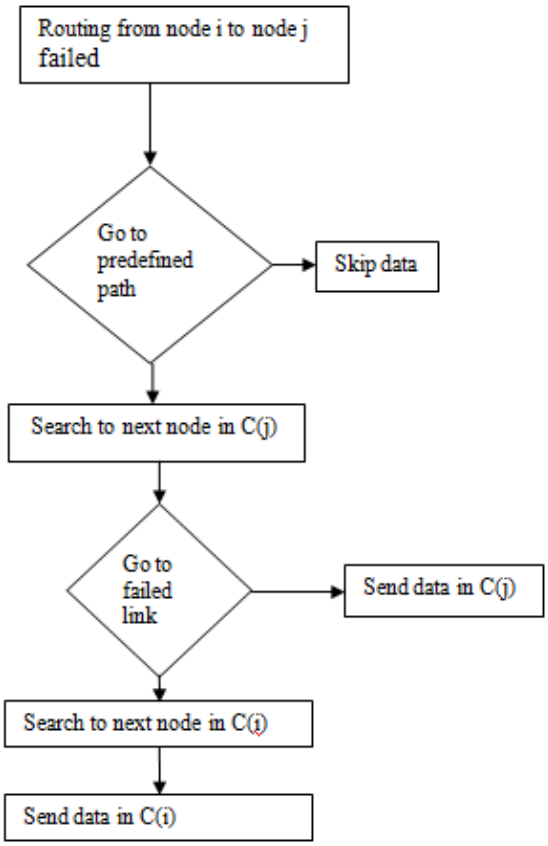

Fig 1: Process of data routing

Such routing process requires the neighbor node i to know pre-defined routing path configuration C(j) for its neighbor. All nodes in network know the structure of all available pre-defined configuration so that when failure occurs the node i find the correct pre-defined routing path configuration which is use for forwarding packets. Each packet have the information of which pre-defined configuration it have so that routers able to take correct decision about routing it.This is given by implicitly or explicitly. In explicitly method put value in DSCP of IP header which show the configuration. In implicit method , assign IP address to every configuration.

V. DISTRIBUTION OF LOAD AFTER RECOVERY

In this FPR which is local and the covered data is forwarded in pre-calculated configuration from failure point to destination node. So this process of transferring the traffic from first paths to pre-calculated routing paths affect the distribution of load in network and so result in congestion.

So to there is new approach used which minimize effect of this FPR process on such load distribution before failure.The distribution of load , during the failure depends on following

1. Weight of link used in original pre-calculated routing path configuration.
2. The entire structure of such a pre-calculated routing path configuration
3. The weight of links used in $B_1 \ldots B_z$ of pre-calculated routing path configuration.

Here FPR uses pre-defined configurations for the failure part and rest traffic are distributed according to them. So here link weights are very important which is use in normal pre-calculated routing path configuration. The structure of this pre-calculated routing path configuration use to identify which link is use for this recovery process for failure. The link assignment use in pre-defined routing path configuration are used to identify which pre-defined paths are used.

VI. RELATED WORK

Much work is already be done to handle failure occur in network. of important we discuss here. There is one technique which solve the rerouting problem after failure but in small basis. In this loops are avoided but not getting full solution to reroute data. So there is another approach called Not-way to get reroute packets .It is same as FPR scheme where next neighbors are found by shortest path algorithm and provide loop free routes. But this approach is less efficient for load adjustment after failure occur. There is another approach which is on local forwarding base, but in this it is not purely pre-defined schema. There are another technique call failure insensitive based forwarding. It is pre-defined and provide loop free routing but it is not able to solve last node problem.

So upto now all these schema are discussed not provide proper load distribution after failure are handled, so FPR is one of the best solution to achieve rerouting of packets on another paths to provide proper load distribution. So to balance all the available load.

VII. CONCLUSIONS

Here we have given the pre-calculated routing path configuration for recover the traffic and done fast routing after failure occur in network. Here it is based on created pre-defined routing path configuration which skip the failed components , so as to reroute traffic by skip that component. Main aim of this schema is to provide proper load distribution after recovery of data. And achieve the fast forwarding of packets on alternative paths which is pre-calculated in configuration.

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