Way to improve design Traffic in Distributed Systems

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Summary
The performance of a mobile network is considered in the context of the given parameters QoS (Quality of Service). A method of organizing a distributed control system based on agent-based technology. Based on the principles of technology overlay set of agents together in a distributed system of traffic engineering Modern computer systems are characterized by a sharp increase in traffic volume and the wide use of applications running in real-time multimedia applications, multicast applications. In this case there is a steady increase in the share multimedia traffic [1, 2, 3]. Each type of traffic has its own requirements for quality of service (QoS) [4]. Unlike the multimedia traffic data is transmitted, usually with non-uniform flux density, in batches, and arrive at unpredictable intervals. In this connection, the bandwidth used for multimedia traffic, should be protected from data traffic, and vice versa. One of the main objectives of the operation management of computer networks in the transmission of multimedia traffic is to organize an effective system of information delivery, which becomes especially important in distributed systems [5]. This task is carried out using the procedure of constructing the traffic (TE - Traffic Engineering) [6], whose main purpose is to provide a uniform network load. That is its main difference from the problem of optimal routing.

Key words:
a mobile network, Quality of Service, TE - Traffic Engineering, traffic control agents

1.Introduction

Tools of the traditional route does not meet the requirements of QoS, the request load balancing of communication channels do not provide enough speed when you change routes on the network caused by the movement of subscriber systems[7]. Another drawback is the need to send regular updates of routing information even with a slight vibration load channels or by changing the topology of the system.[8].
One approach to solving this problem is to optimize the network by dynamic allocation of traffic, i.e. in real time to solve the problem of the dynamic assignment of routes that meets the requirements to the parameters of QoS, and to ensure uniform loading of the network.
For large-scale computer systems there is no single effective routing algorithm. In this regard, computer systems are broken into separate subsystems - clusters. In this routing problem is divided into the intracluster and intercluster task routing. In this case, the efficiency of the routing problem and, in general, the task of constructing the traffic largely depends on the optimal partition of a computer system for clusters.
In[9], an adaptive algorithm for partitioning the network into clusters, providing less time routing. One of the main ways of reducing the total time is to use a simple routing.
As one of the main conditions to reduce the complexity in[10] a restriction on the number of hops between any two subscriber systems in the cluster. It is assumed that within each cluster subscriber systems can communicate with each other at most two charges. In this algorithm should divide the network into disjoint clusters.
One characteristic feature of modern computer systems is their dynamic reconfiguration. This is reflected in the structure of the cluster computer system[11] and, in most cases, the impact on the effectiveness of traffic engineering.
In fact, during the dynamic reconfiguration changes the structure of clusters, this leads to the need for reconfiguration of the system construction traffic, and existing methods of traffic engineering does not allow you to do it. In this connection it is necessary to develop a way of organizing a distributed adaptive traffic control system.

2.Theoretical Consideration

Review of existing planning methods The formation of the structure of a distributed traffic control system

2.1. Determination of the number and location of traffic control agents

To solve the optimization problem of distributed control systems, we use agent-based technology, is currently the most promising technology. However, there are several problems, such as determining the number and location of agents, and the choice of a path that meets the requirements of stability and a minimal time delay.
Total time taken to update the routing information depends on the frequency of the procedure and the routing time complexity. In turn, the frequency of the routing information is determined by the stability of the selected routes. By stability we mean the property of the route the route to ensure the transfer of information (chat session) without reconfiguration. In forming the most sustainable way possible to use the algorithm for finding minimal path by Dijkstra. In this case, the task of reducing the time update of routing information is reduced to the formation

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of stable routes. Consider the solution of the problem on the example network. Present the network as a graph.

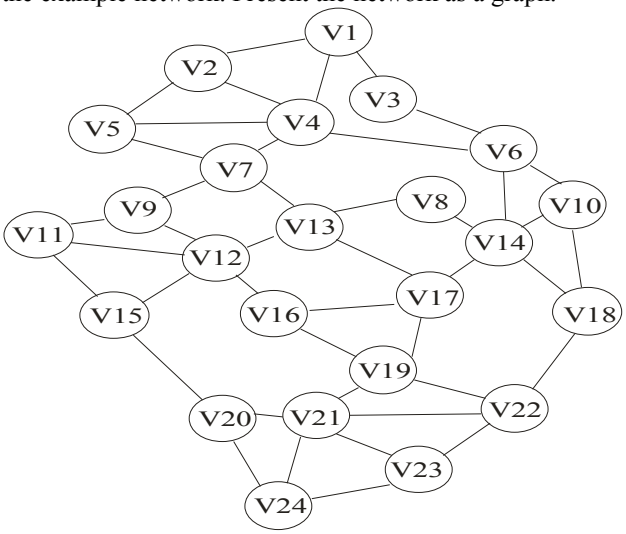

Figure. 1say of 24 peaks

To solve the problem of determining the number and location of agents, we define the degree of connectivity of each vertex of the graph. The top, which is an agent of the cluster head. The head of the cluster contains information about the members of the cluster also contains a table of adjacency, which contains information about the neighboring clusters. For each adjacent cluster table has a record that contains the gateway through which a cluster can be achieved, and the head of the cluster.

Most of the known methods of forming the clusters are centralized, as it implies the choice of a vertex as the initial one. A distributed algorithm for cluster formation determines the choice of an arbitrary vertex as the starting vertex. The paper is offered as a cluster head to choose the vertex with maximal degree.

An example of a graph on 24

Table 1 shows the values of the degree of connectivity for the vertices of the graph shown in Fig. The degree of connectedness of the vertices

№ Verse.	Coherently.	№ Verse.	Coherently.	№ Verse.	Coherently.
V1	3	V9	3	V17	4
V2	3	V10	3	V18	3
V3	2	V11	3	V19	4
V4	5	V12	5	V20	3
V5	3	V13	4	V21	5
V6	4	V14	5	V22	4
V7	4	V15	3	V23	3
V8	2	V16	3	V24	3

After analyzing the results, we define the number of agents, i.e. peaks with the highest connectivity, such vertices in this case four, namely, V4, V12, V14, V21. Combine multiple computers in a cluster of Ai, and will use them as a whole, where i - number of vertices with maximum degree of connectivity. Routing from one vertex to another shall consist of routing within a cluster and routing from cluster to cluster .

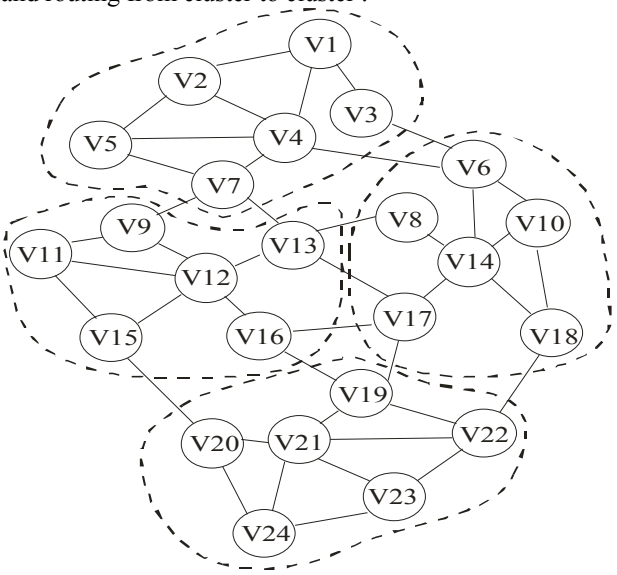

Figure 2. Graf, clustered

2.2.The formation of virtual paths between agents traffic

The next task is to create a virtual path between the agents in charge of the specified requirements of stability and minimum delay.

If the organization structure of the cluster network routing total time consists of time, routing within the cluster and the time the routing between the clusters. Depending on the partition of the network into clusters routing total time will be different. In this regard, as a criterion for partitioning the network into clusters will be considered during routing. It should be noted that among the agents forming a single virtual channel. However, the exchange of information between the agents will be implemented through the same channels as the transmission of information, and therefore less efficient. To do this, perform resource reservation, and load balancing.

Load balancing manages bandwidth channel logical route, thereby adjusting the bandwidth of the proposed traffic. Due to unforeseen changes in the network, some logical routes can be used is not rational, while others may be overcrowded. In this case, and there arises the problem of load balancing, for example, when bandwidth is loaded

low priority traffic, at a time when important data have been rejected due to lack of bandwidth.
The logical separation of the bandwidth at the data link enables you to split the traffic control algorithms, simplifying management functions. It is proposed to implement a logical division of the bandwidth for control traffic and information flow.
In this connection it is necessary to determine the cost of data transmission channels, which will be equal to: proposed to implement a logical division of the bandwidth for control traffic and information flow.
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$$Q_{\Sigma} = Q_{out} + nKQ_{in}$$

n- the diameter of the network;

Q_{Σ} - The average cost of data transmission channels;

Q_{out} - The cost of the channel routing between clusters;

Q_{in} - The cost of channel routing in the cluster;

K - Channel load factor, which depends on the graph.

We define the load factor links

$$K = \frac{Q_d + Q_c}{Q_d} > 1$$

Q_d -The volume of transmitted information

Q_c -The amount of control information

As a result, we can say that the load factor increases with ties of the nonlinear dependence

2.3. The formation of virtual paths between agents traffic engineering

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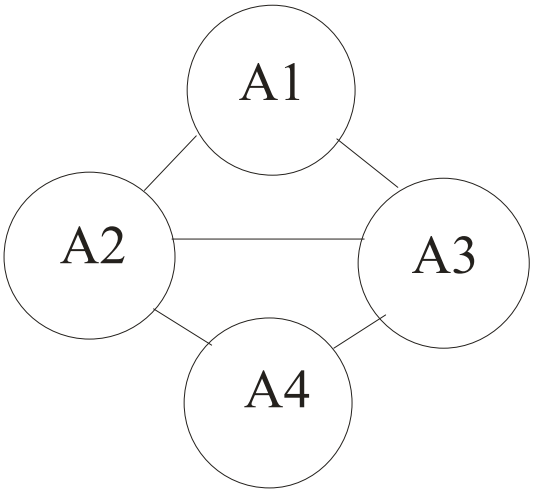

Fig. 3. The graph overlay system

The main advantage of overlay networks is that they allow you to develop and exploit the new large-scale distributed services without making any changes to the basic network protocols. If you develop an overlay network, which would have some sort of backup mechanism for the channel, it will be possible to establish logical routes for the physical environment. Then the user connection will be established through logical. Routes The main feature of the overlay network - its flexibility. The logical network can also be used as a mechanism of protection against failures, then there is some logical routes can be established as the backup. Also, the important point is the routing algorithm, with which the transmission through the network management information. For example, the most common algorithm is flooding, which does not require knowledge of network topology. Source node sends a broadcast packet to all its neighbors. Each node receives packet passes it on to all their output channels of communication, in addition, a packet arrived, and so on until the package reaches all

nodes in the network. A significant disadvantage of using an algorithm to generate an avalanche of routing information in the network is that with an increase in the number and mobility of nodes dramatically increases the amount of routing traffic on the network. To improve the functional capabilities in distributed systems with agents appropriate to use broadcast routing information.
The main disadvantage of this approach are the increased costs for the transfer of information from an additional level of packet processing.

3..Conclusions

A method of organizing a distributed system based on traffic engineering agents using overlay technology, in which the agent is given an opportunity to perform reconfiguration of the system structure
The problem of determining the number and location of agents, and select the path that meets the requirements of stability and a minimal time delay.

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