PIM-SM协议的建模与改进

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Abstract

PIM-SM (protocol-independent multicast-dense mode) is currently the preferred intra-domain multicast routing protocol. One problem that impedes its widely use is its high overhead of control messages. In order to improve and optimize the PIM-SM, its performance model should be established and the nicety performance analysis should be made above all. In this paper, the Stochastic Petri Net (SPN) model of the whole PIM-SM protocol is established, and the analysis and the experiments are made on the router processing load caused and the network bandwidth consumed by each type of the protocol messages, based on the model and router realization. It is discovered that register message and Join/Prune message cause most router processing load, while Join/Prune message and Bootstrap message consume most network bandwidth. According to the conclusion of performance analysis, an improvement is made on PIM-SM, which is achieving better performance compared with the former protocol.

摘要

PIM-SM(protocol-independent multicast-dense mode)协议是目前Internet首选的域内组播路由协议.影响其广泛应用的一个主要问题是该协议的控制报文负载比较大.为了对协议进行改进和优化,首先需要建立性能模型并进行准确的性能分析.利用随机Petri网(stochastic Petri net,简称SPN)模型对整个PIM-SM复杂的协议行为进行了建模,并在其SPN模型的基础上,结合路由器的实现,对协议中每种消息消耗的路由器处理负载和占用的网络带宽进行了分析和实验,发现Register消息和Join/Prune消息消耗的路由器处理负载比较多,而Join/Prune消息和Bootstrap消息占用

的网络带宽比较大.根据性能分析的结论对PIM-SM协议进行了改进.与原来的协议相比,改进后的协议性能明显提高.

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