

应用

IPv6邻居发现协议的一致性测试序列生成

陈守宁,郑宝玉,李璟,赵玉娟

南京邮电大学 通信与信息工程学院

摘要:

自1998年互联网工程任务组(IETF)提出下一代互联网标准规范以来,IPv6已经历了十多年的发展。现今已有越来越多的IPv6产品被投入到了开发与应用中。而如何提高不同产品间的互通性和可靠性则成为了一个关键问题。进行协议一致性测试是提高IPv6实现可靠性的一种有效方式。本文就重点针对IPv6邻居发现协议进行了一致性测试分析。本文首先简要分析了IPv6邻居发现协议的主要功能及实现原理,并据此抽象出其有限状态机(FSM)模型。进而结合一种现有基于有限状态机(FSM)的一致性测试序列改进算法生成了该协议的抽象测试序列。本文在最后对得到的测试序列进行了有效性和可靠性分析,分析表明,使用该算法得到的测试序列不仅在序列长度上较传统UIO序列法有了明显的缩短,同时对测试过程中可能发生的输出错误及末状态转换错误也具备良好的检测能力。本文获得的抽象测试序列可对相关IPv6协议开发者提供有效参考。

关键词: IPv6; 协议一致性测试; 有限状态机(FSM); UIO序列

Generating of Conformance Testing Sequence for IPv6 Neighbor Discovery Protocol

CHEN Shou-ning,ZHENG Bao-yu,LI Jing,ZHAO Yu-juan

College of Telecommunications & Information Engineering

Abstract:

Since the Internet Engineering Task Force (IETF) put forward the next generation of Internet standards in 1998, IPv6 (Internet Protocol version 6) has gone through ten years of evolution and nowadays more and more IPv6 devices have been put into development and application. So how to improve the reliability and interoperation between different IPv6 implementations has become a key point. Conformance testing is an effective method to improve the reliability of IPv6 implementation and this paper will focus on the conformance testing of IPv6 Neighbor Discovery Protocol (NDP).In this paper we first analyze the major function and principle of NDP and present the finite-state machine (FSM) model. Based on an existing improved algorithm for conformance testing we derive the abstract conformance testing sequence for NDP. We also also analyses the validity and reliability of this algorithm. The analysis results show that the length of the testing sequence obtained by using this algorithm is shorter than traditional U-method and the detection coverage for output error and tail state error is favourable.The abstract conformance testing sequence we derived in this paper can provide meaningful reference to Ipv6 protocol developoers.

Keywords: IPv6 conformance testing finite-state machine (FSM) UIO sequence

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通讯作者:

作者简介:

作者Email: njuptchensn@gmail.com

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