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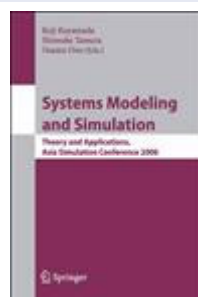
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Abstract

Managing complex ICT systems is a challenge for the service provider. We have been constructing a simulation environment to resolve the performance issues. We describe our framework for simulation analysis of ICT systems. In our framework, we consider three layers: network, application, and business processes. We consider two types of simulation modeling. One type deals with the complicated problem of one layer. The other type considers the mutual influences of the three layers. In order to deal with complexity, the simulation tool needs hierarchical-object-oriented modeling. We use OPNET, which has many standard protocol models and enables us to develop and expand protocol models. We show some case studies in which we resolved performance problems using this simulation environment.

Key Words ICT system - Performance evaluation -

Protocol - Modeling - OPNET

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Framework for Simulation Analysis of Information and Communication Technology Systems

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ABSTRACT

Managing complex ICT systems is a challenge for the service provider. We have been constructing a simulation environment to resolve the performance issues. We describe our framework for simulation analysis of ICT systems. In our framework, we consider three layers: network, application, and business processes. We consider two types of simulation modeling. One type deals with the complicated problem of one layer. The other type considers the mutual influences of the three layers. In order to deal with complexity, the simulation tool needs hierarchical-object-oriented modeling. We use OPNET, which has many standard protocol models and enables us to develop and expand protocol models. We show some case studies in which we resolved performance problems using this simulation environment.

KEY WORDS: ICT system, Performance evaluation, Protocol, Modeling, OPNET

NOMENCLATURE

ACK: acknowledgment
AS: autonomous system
BGP: border gateway protocol
EAI: enterprise application integration
ICT: information and communication technology
LAN: local area network
MAC: media access control
MPLS: multiprotocol label switching
SOA: service oriented architecture
UML: unified modeling language
VoIP: voice over IP
VPN: virtual private network

ICT systems consist of several components: the network, computers, and applications. The network has become larger and more complex. Multiple routing protocols and traffic control technologies are implemented on the network. Applications use various communication protocols: synchronous or asynchronous communication. Web service technologies enable several applications to work together. Some application servers exchange messages with different application servers according to the business logic, which is defined by the business process execution language. The complexity of the interactions among components affects the performance. Most users require the end-to-end performance to satisfy an

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References secured to subscribers.



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