ASP	:	Abstract Service Primitive.	54
ATS	:	Abstract Test Suite.	53
CCS	:	Calculus of Communicating Systems.	5
CSP	:	Communicating Sequential Processes.	5
CTS	:	Conformance Test Suite.	53
DCE	:	Data Communicating Equipment.	62
DS	:	Distinguishing Sequence.	64
DTE	:	Data Terminating Equipment.	IV
EFSM	:	Extended Finite State Machine.	2
FCS	:	Frame Check Sequence.	33
FDT	:	Formal Description Technique.	IV
FSM	:	Finite State Machine.	2
I	:	Information.	31
IPT	:	Interactive Protocol Tester.	62
ISLA	:	Interactive System for LOTOS Applications.	7
ISO	:	International Organization for Standard.	1
IUT	:	Implementation Under Test.	53
LAPB	:	Link Access Protocol Balanced.	IV
LOTOS	:	Language of Temporal Ordering Specification.	IV
LST	:	Labeled Symbolic Tree.	76
NTS	:	Network Test System.	62
OSI	:	Open System Interconnection.	1
PCO	:	Point of Control and Observation.	54
PDU	:	Protocol Data Unit.	29
PICS	:	Protocol Implementation Conformance Statement.	57
PIXIT	:	Protocol Implementation eXtra Information for Testing.	57
S	:	Supervisory.	31
SP	:	Service Primitive.	54
SS	:	Synchronizing Sequence.	63
SST	:	Simplified Symbolic Tree.	77
T	:	Transition	64
TCP	:	Test Coordination Procedures.	55
TR	:	TRansfer Sequence.	64
TS	:	Transport Service.	69
TTCN/GR	:	TTCN Graphical Representation.	58
TTCN/MP	:	TTCN Machine Processable.	58
TTCN	:	Tree and Tabular Combined Notation.	58
U	:	Unnumbered.	31
UIO	:	Unique Input Output.	64

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Abstract

Conformance Testing and Formal Description Techniques (FDT) are two areas which appear to be very related. Unfortunately however, this relation has not been exploited in practice. People dealing with testing usually use informal or semi-formal notations for generating test cases. On the other hand, FDT experts design formal specifications which are not used in test generation. Since test suites have already been obtained without using FDTs and proposed as standards, it seems natural to validate these test suites against formal specifications.

The topic of this thesis is to validate the test suite of the data link layer of X.25, the Link Access Protocol Balanced mode (LAP-B) of a Data Terminating Equipment (DTE). This validation is done by generating test cases from a specification in the FDT LOTOS (Language Of Temporal Ordering Specification) of the DTE LAPB and by comparing test cases obtained with those proposed as standards. Since no complete LAPB specification existed at the time this work was done, such a specification had to be written and debugged. This is the first time the LAPB protocol has been completely specified in LOTOS; thus, formulating this specification is a significant contribution of this thesis.

The thesis is structured as follows: in chapter 1, overviews of FDTs and Conformance Testing are presented, together with the thesis objective. The next chapter covers concepts related to the LOTOS language. Chapter 3 describes the design of the DTE LAPB in LOTOS. In chapter 4, test suite generation is discussed. Finally, the conclusion of the thesis follows in chapter 5. The LAPB specification written in LOTOS is given in Appendix A. In Appendix B, we present trees used in the case generation from the LOTOS LAPB specification.

Acknowledgments

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Derivation of Test Cases for LAP-B from a Formal Specification in LOTOS

By

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