

Conformance Testing of Link 16 Message Standard based on ATC-Gen

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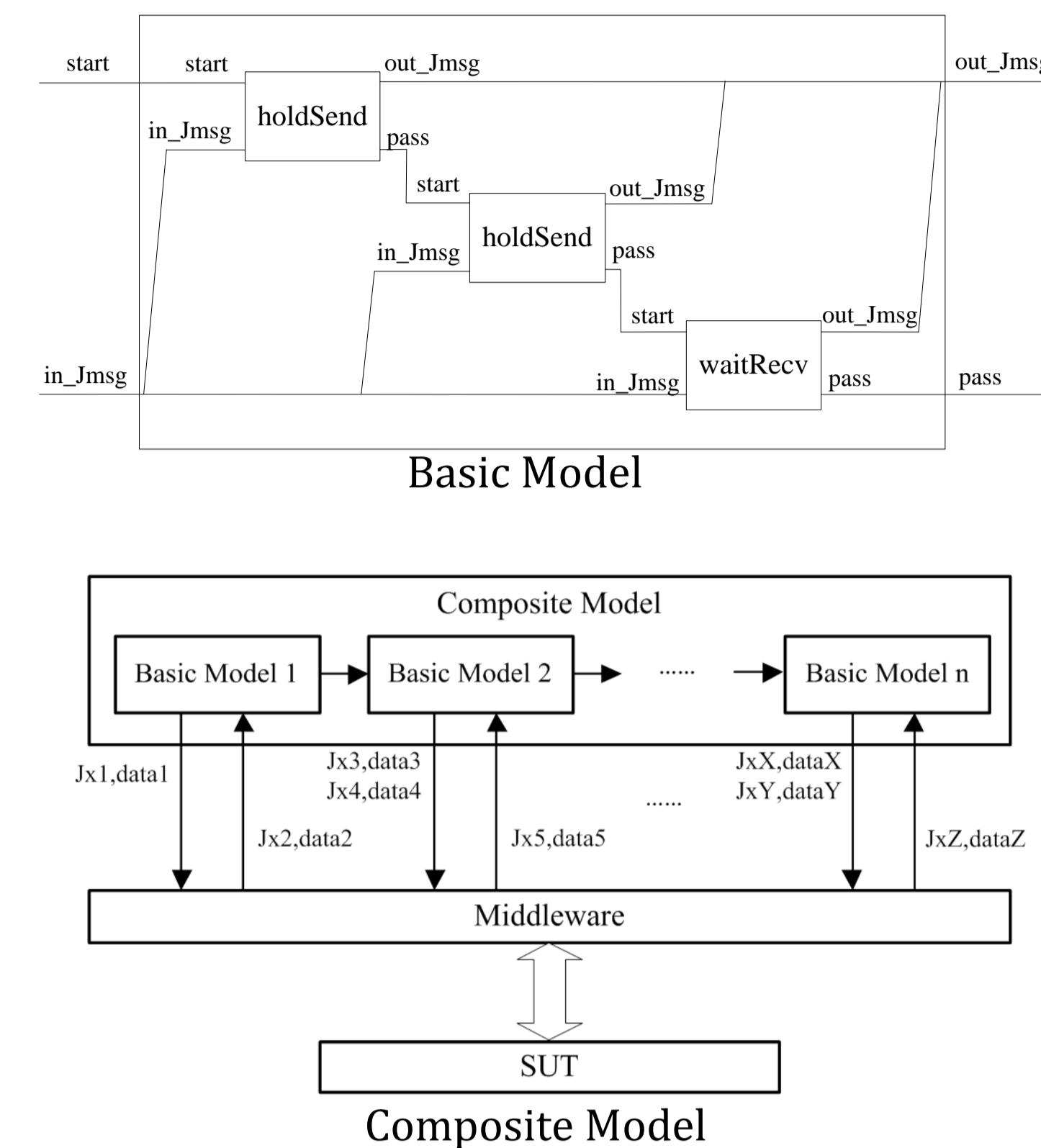
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INTRODUCTION

- Data link is an information system which automatically receives and transmits formatted tactical data conforming to specified message standard.
- Message standard includes a set of protocols consisting of data formats, element definitions, rules, procedures, and other conventions for information

exchange and related interactions to realize tactical functions.

- ATC-Gen applies M&S framework and DEVS specification to conformance testing of Link 16.
- DEVS specification is a tool that models discrete event systems modularly, hierarchically and formally. The DEVS model can be either basic or composite model.



ATC – GEN METHODOLOGY

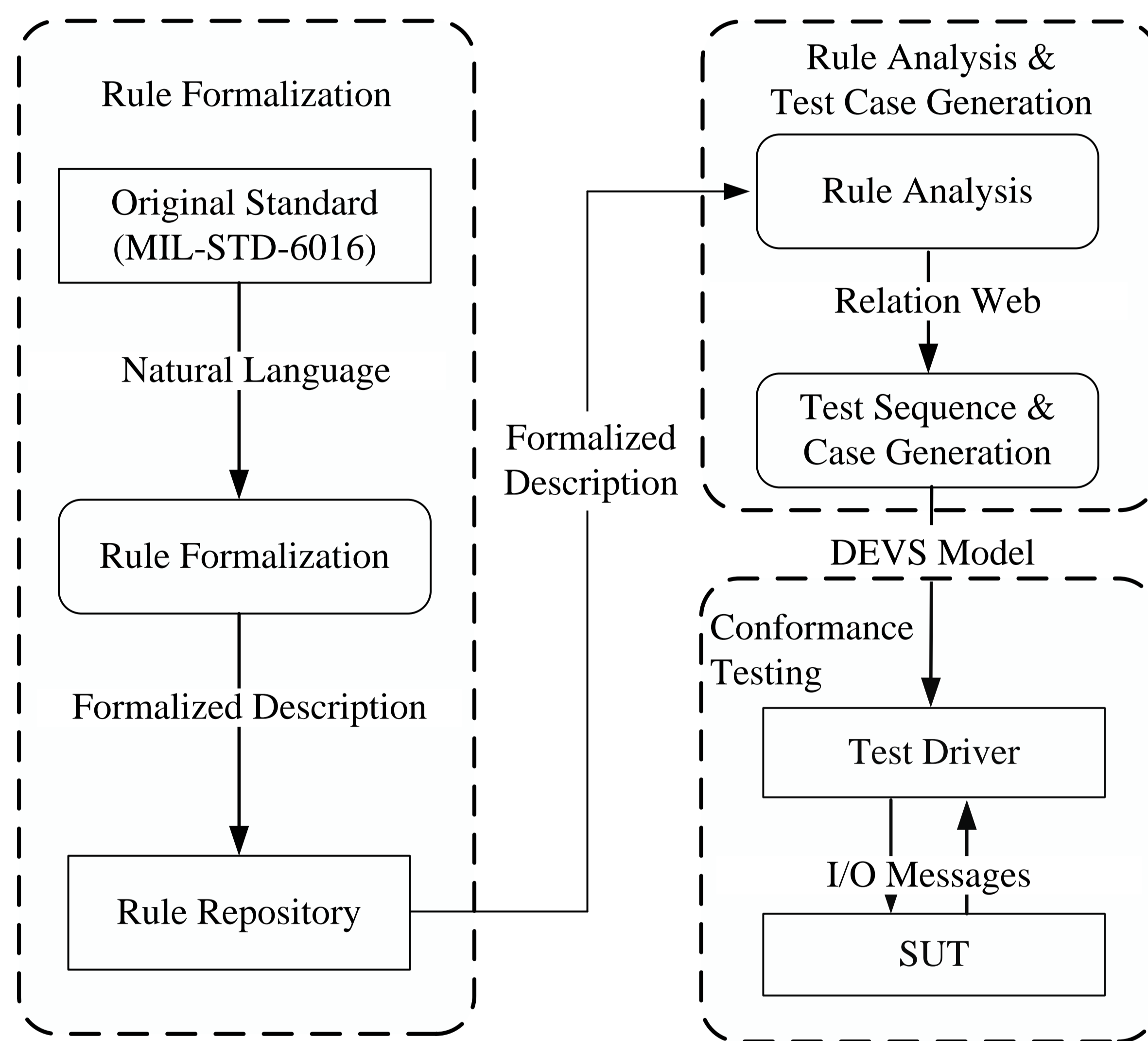
● Testing Process

Step 1: Rule Formalization. Translating the original rules to the formalized description language.

Step 2: Rule Analysis. Extracting the I/O state variables for single rule and determining the relation among rules by identifying shared I/O state variables.

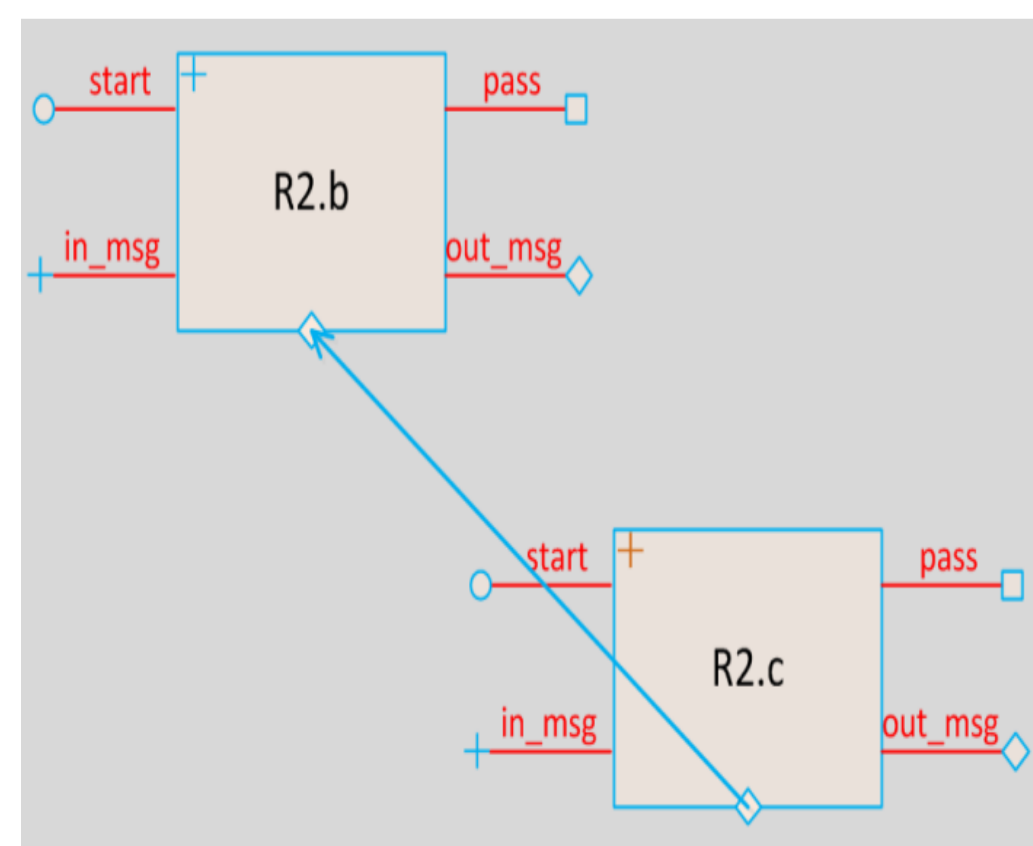
Step 3: Test Sequence & Test Case Generation. Selection and formation of test sequences and generation of test cases from test sequences.

Step 4: Conformance Testing. Generation and implementation of DEVS test models on test driver and SUT.



MODELING AND SIMULATION

Results of R2



- [TEST#1] Result: Correct
- [TEST#2] Result: Error
Error Level: Message
Error Level: J3.2 Altitude Undefined Value: -100
- [TEST#3] Result: Correct
- [TEST#4] Result: Error
Error Level: Rule
Error Level: R2.b
- [TEST#5] Result: Correct

Results of 4 Functions

Function	Quantity of test cases	
	Message test	Rule test
R2	120	75
Track correlation	135	35
Decorrelation	105	22
Handover	75	34

CONCLUSION

The method will reduce ambiguity of specification and be capable of improving the effectiveness and productivity of standard conformance testing.

FUTURE WORK

- Promoting automation of conformance testing process
- Applying NLP to reduce manual participation and improve automation and efficiency of testing