PDF hosted at the Radboud Repository of the Radboud University Nijmegen

The following full text is a publisher's version.

For additional information about this publication click this link.
http://hdl.handle.net/2066/34748

Please be advised that this information was generated on 2017-11-18 and may be subject to change.
FORMALIZING SHIM6
AN IETF PROPOSED INTERNET STANDARD IN UPPAAL
Matthijs Mekking1, Wouter Wijngaards1, Frits Vaandrager2, Theo Schouten2
1 Foundation Nlnet Labs
2 Institute for Computing and Information Sciences, Radboud University Nijmegen

Revealed incorrectness upon receiving payload in I2-SENT or I2BIS-SENT.
Revealed possible deadlock with optional retransmitting I2 / I2bis messages.
Clarified confusion about responder nonce.

Revealed several other ambiguities, omissions and inconsistencies.
Acknowledged by SHIM6 draft authors. Will be incorporated in new IETF proposal.

How SHIM6 works

IP roles SHIM6 splits the two semantics of an IP address (end point identifier and locator role).
Initial contact Normal data communication between end point identifiers, no SHIM6 needed.
Context Establishment Communication to exchange multihoming information. Data communication remains normal.
Failure detection Messages are transmitted to detect a link failure.
Locator pair exploration In case of a link failure, a new locator needs to be selected. Locators are mapped back at the host to the
end point identifier. Transport session remains stable. Communication resumes with SHIM6 data packets that provide mapping information.

Formalization and Verification

UPPAAL
An integrated tool environment for modelling, validation and verification of real-time systems modelled as networks of timed automata, extended with data types.
Properties:
A[] not deadlock
exists(h1:HostType) exists(h2:HostType) 
(h1 != h2 and heuristics[h1][h2]) --> 
forall(h3:HostType) forall(h4:HostType) 
(h3 != h4 imply Context(h3, h4).established)

UPPAAL:
Improve model to verify on scale.
Add failure detection and exploration.
Extend UPPAAL verifier language. Indicate model state space.
SHIM6:
Implementations. Add HBA and CGA, Context Forking. INTEROP test.
Traffic engineering issues.