Grey boxes are existing modules/packages. The *SPIN Trans* module in Bandera is modified.

SmartThings Front-End

Apps' code → *SmartThings Handler* → Standard Groovy → GParser → Groovy AST → *Translator*

Java Front-end

Java code → Parser → Java AST → Code Generator

IoTSan

Apps' configurations → *Model Generator*
User-defined properties → *Model Generator*
Promela code of event handlers → *Model Generator*
Model Generator → Promela model of the IoT system

Back-ends

SPIN Trans
dSPIN Trans
SMV Trans

Bandera

Code Generator → Jimple → BIR Constructor
BIR Constructor → BIR → *SPIN Trans*