

Automated Toggle Coverage Framework for AURIX™ TC4xx Virtual Prototype

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Problem Statement

- To verify toggling of each SystemC model interfaces in AURIX™ TC4xx Virtual Prototype(VP)
- To identify the interfaces/ports that are not exercised in test case regression
- Manually reviewing the toggle of each interface is cumbersome
- No tool available to capture the interfaces which are toggled during test case regression run on VP
- No reusable solution available across VP tools

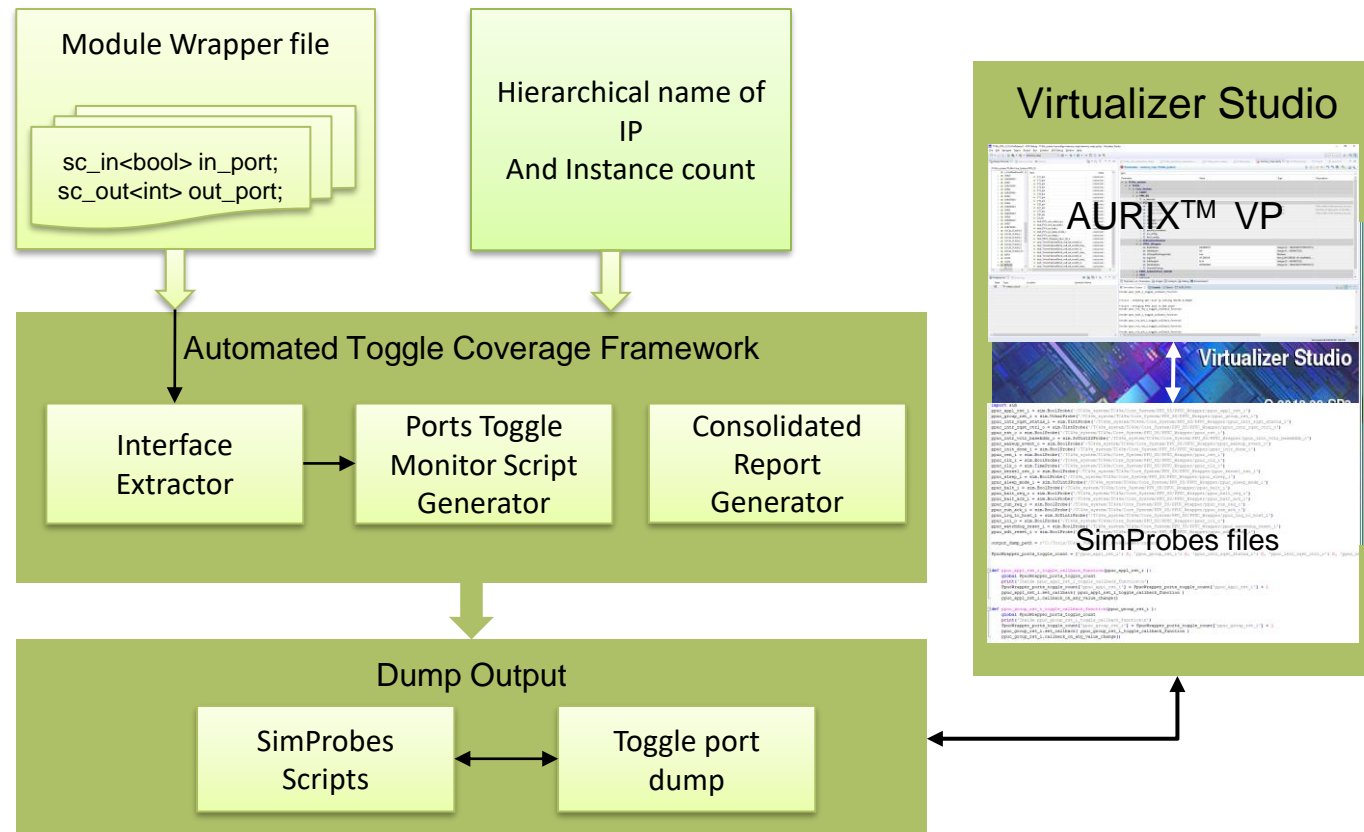
Proposed Methodology

Infineon developed an in-house utility called **Automated Toggle Coverage Framework (ATCF)** - Developed in combination with python interface/utilities supported by VP tool on which AURIX™ TC4xx VP is developed

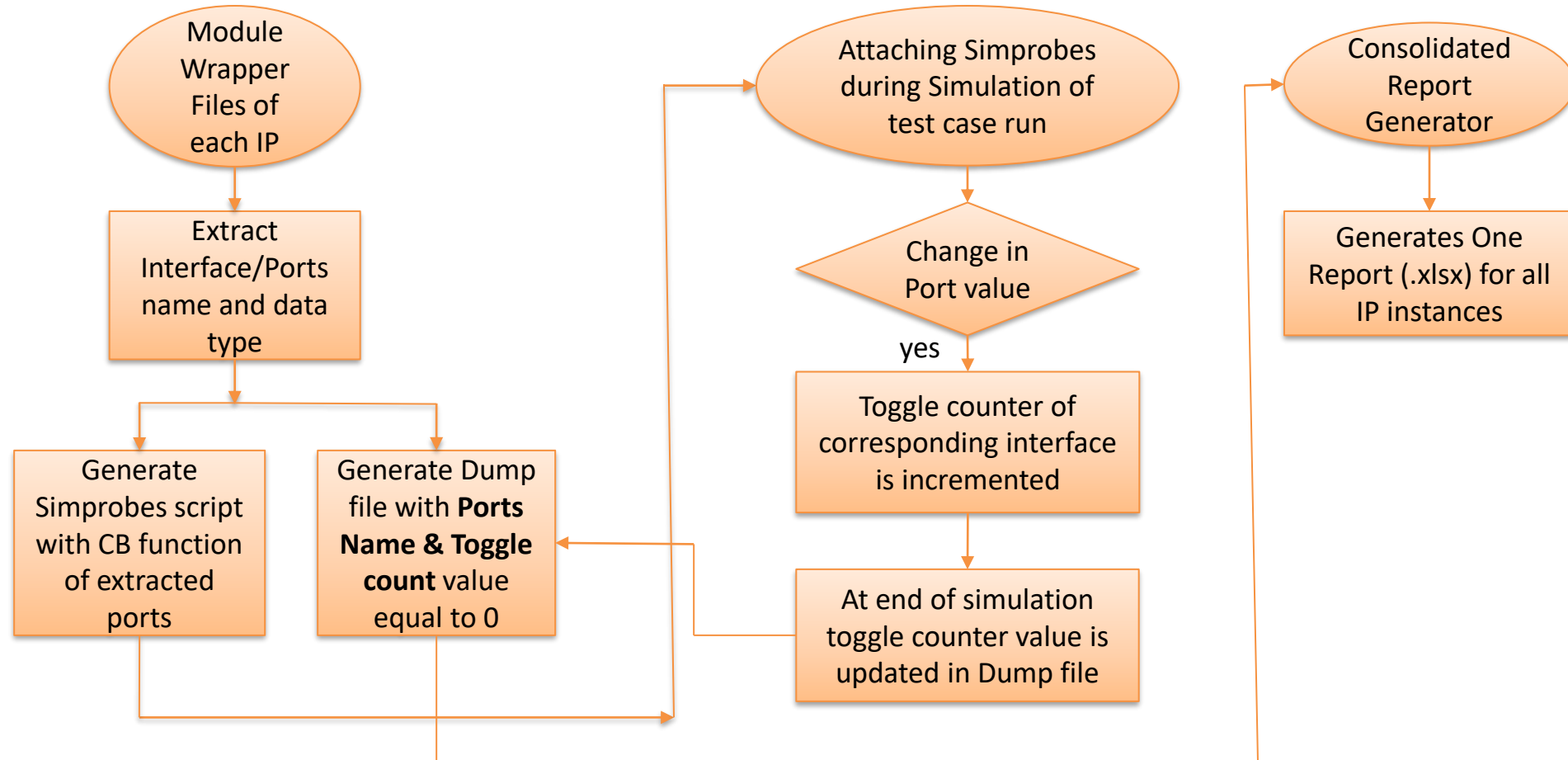
Automated Toggle Coverage Framework is a consists of :

- **Interface Extractor:** Extracts the interfaces/ports list and its data type of each IP
- **Ports Monitor Script Generator:** Generates Simprobes Python Scripts per module with call back function for each extracted ports, which are sensitive to any change in port value
- **Consolidated Report Generator:** Generates consolidated report which consists of interface name and toggle count of interface during the simulation for each IP

Implementation



Flow Chart



Result

- ATCF is deployed for some of the IP's in AURIX™ TC4xx VP
- With series of test case improvement for untested ports the coverage gap is improved

| Modules | Tested/Toggled Interface | | | Untested/Un toggled Interface | | |
|----------|---------------------------|---------------------------|---------------------------|-------------------------------|---------------------------|---------------------------|
| | 1 st Iteration | 2 nd Iteration | 3 rd Iteration | 1 st Iteration | 2 nd Iteration | 3 rd Iteration |
| PPU | 18(81%) | 20(90%) | 22(100%) | 4(19%) | 2(10%) | 0(0%) |
| CSCU | 12(85%) | 13(92%) | 14(100%) | 2(15%) | 1(8%) | 0(0%) |
| LMU | 5(83%) | 6(100%) | 6(100%) | 1(17%) | 0(0%) | 0(0%) |
| Clocking | 25(100%) | 25(100%) | 25(100%) | 0(0%) | 0(0%) | 0(0%) |

Conclusion

Verification gaps in interface level is identified and improved by developing test cases for untested ports

Any update/new in IP Interface will be extracted by framework and added to interface list for toggle coverage without much manual effort

ATCF is expected to be deployed for all other IP's

Questions ?