Synthetic Traffic based SOC Performance Verification Methodology

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INTRODUCTION

What is Performance Verification (PV)?
- PV verifies all system IPs with spec performance.
- PV verifies SOC with customer's KPI performance.

Previous Work and Limits
- **Real Traffic based PV (RTB-PV)** uses the scenario's traffic to preview the performance in silicon.
- RTB-PV can be started when multiple interoperated IPs are ready and **there is not enough time to perform PV**.
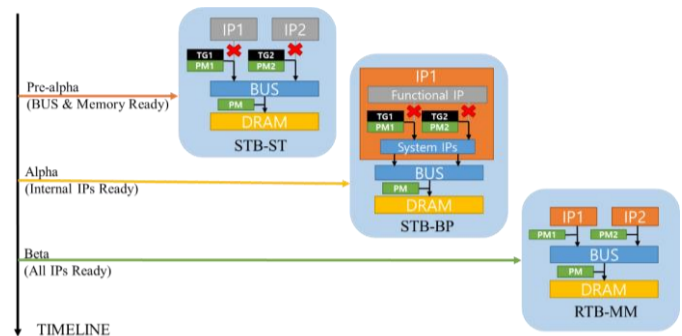- **Some performance bugs cannot be fixed in time** and even a silicon re-spin is required.

Goal
- Perform the **PV in early-stage** of project.
- Detect more bugs **before the RTL-freeze**.

PROPOSED METHODOLOGY

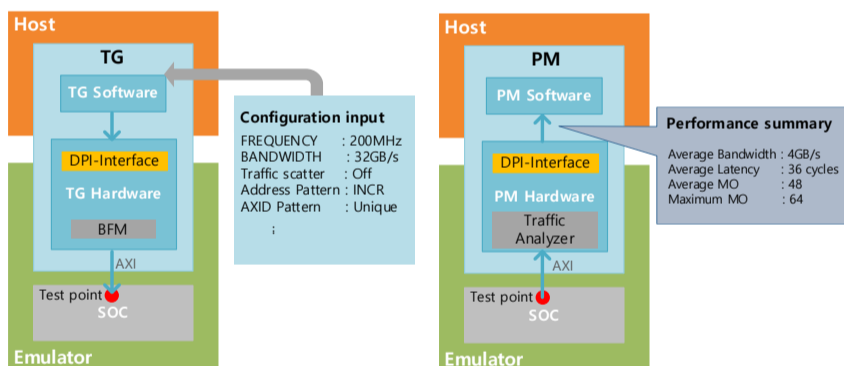**Synthetic Traffic based PV (STB-PV)**
- In the early-stage of project, **STB-PV** can be performed.
- **Stress Test (STB-ST)** verifies the system backbone performance.
- **Bus Performance Test (STB-BP)** verifies internal system IPs.

COMPONENTS of STB-PV

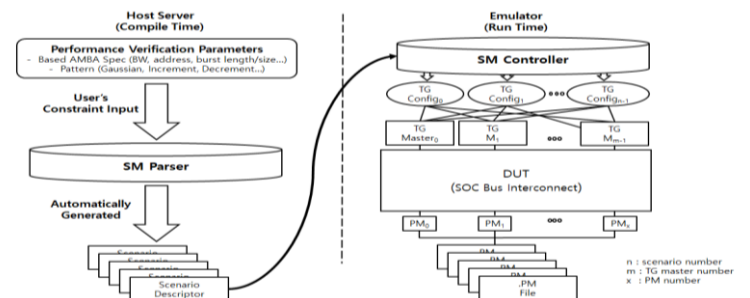**Enhanced Traffic Generator/Performance Monitor (TG/PM)**
- We **optimize the HW/SW communication overhead**.
- TG supports **various traffic patterns** and **replay**.

FEATURES of STB-PV

Scenario Manager and Automation with IP-XACT
- **Scenario Manager** automatically generates the configuration and controls TGs while monitoring each TG.
- **Automation with IP-XACT** places the TG for every verification points in a very efficient way.

RESULT

- **More precise test** detected performance bugs (e.g. ARQ buffer size, long latency issue caused by clock gating) which were not easy in previous time.

- TG and scenario automation time **decreased by 98%.**

- Scenario coverage has **increased 83 times**.

	Item	Previous (Manual conversion)	Current (IP-XACT & Automation)	Difference
Efficiency	TG Automation	8 hour	10 min	▼98%
	Sceanrio Genration with TG	8 hour	10 min	▼98%
	Total time	16 hour	20 min	▼98%
Coverage	Sceanrio(#)	50 (Max.)	4150	▲83 times

CONCLUSION

- STB-PV can catch the performance bugs **early in the project**.

- The enhanced TG/PM allows **more precise performance test to be performed with less run-time**.

- The automation flow can insert 400 TG/PM and execute/analysis 2000 scenarios in a timely manner with reducing human error.

- STB-PV can execute more test scenarios and check performance before RTL freezing.

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