

# Novel Approach in Differential CDC Analysis of Parameterized IP



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Authors: Ashish Soni, STMicroelectronics, Greater Noida, India (ashish.soni@st.com)

Amit Goldie, Synopsys, Noida, India

Navneet Chaurasia, Synopsys, Noida, India

Anubhav Arora, STMicroelectronics, Gr Noida, India



# Agenda

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  - Pros and Cons
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# Problem statement

- IPs are heavily parametrized and each parameter can unroll complex pieces of code thereby increasing the complexity of the IP
- Performing CDC verification for these parameter sets/configurations is itself a daunting task in the given time frame
- Designers may not spend diligent time to perform CDC analysis for all configurations and may depend upon heuristics/experience

# Conventional Flow

## Setup Phase



## Analysis Phase



CDC Clean IP  
for 1st Cfg

Effort to clean  
1<sup>st</sup> Configuration

- For Cfg1
  - Designer creates setup for cfg1
  - Analyzes reports for cfg1
  - Gets Clean IP for cfg1

Independent Effort applied  
on N.. configurations

Leads to

Multifold Increase in  
Analysis Time

## Setup Phase



## Analysis Phase



CDC Clean IP  
for Nth Cfg

Effort to clean  
Nth Configuration

- For CfgN
  - Designer creates setup for cfgN
  - Analyzes reports for cfgN
  - Gets Clean IP for cfgN

# Pros and Cons of Conventional Flow

- Pros:
  - Generic Approach
- Cons:
  - Time consuming:

A lot of time is spent in analyzing reports of each configuration runs
  - Error prone:

Designers rely heavily on applying their learning heuristically. Difficult to prove that their learning from previous configuration runs is indeed applicable to current configuration
  - Impact:

Designer may not be fully aware of the impact of parameter on CDC analysis leading to potential bugs in design

# Proposed Solution

## Setup Phase

Designer provides parameters, constraints and waivers (if any) for all requisite configurations and runs SpyGlass to write out various reports used in Import phase.

## Import Phase

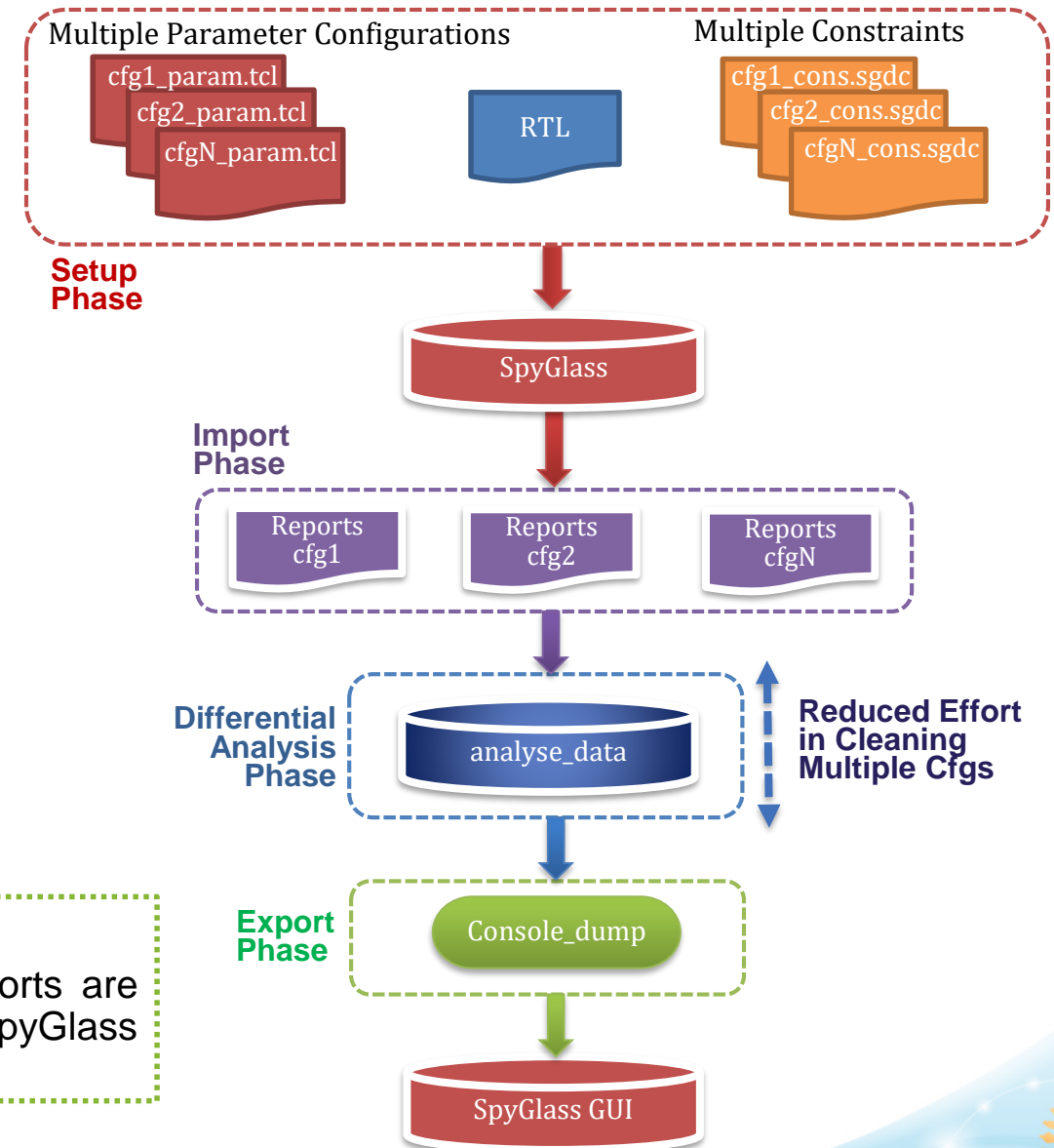
In this phase, proposed solution parses through the violation reports and the user applied waiver files.

## Differential Analysis Phase

In this phase, solution performs in depth differential analysis on requisite configurations and generate results.

## Export Phase

In this phase, various analysis reports are written for user to be imported in SpyGlass tool for debug in GUI mode.



# Results of Proposed Solution

## Snapshot of Results

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Differential Analysis Phase  
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Table 1: Parameter differences across configurations

Parameter Name	config_2	config_1	config_0
param_1	10	9	2
param_2	"F0"	"00"	"F4"
param_3	5	11	8
param_4	"00"	"10"	"11"

Table 2: Violations reported for each configuration

Config	Total	Displayed	Waived
config_2	443	258	185
config_1	339	199	140
config_0	327	200	127

Table 3: Differential analysis

Config	Common	Unique	Additional Common
config_2	131	104	4
config_1	131	61	4
config_0	131	47	--

## Explanation of Results

Table 1: Displays Parameters which have differences across configurations

	config_N	config_2	config_1	config_0
param_1	w	x	y	z
param_2	b	a	c	b
param_3	p	q	r	n
param_N	l	m	m	o

Table 2: Displays the total number of violations (T) = Displayed (D) + Waived errors (W)

	Total	Displayed	Waived
config_2	T2	D2	W2
config_1	T1	D1	W1
config_0	T0	D0	--

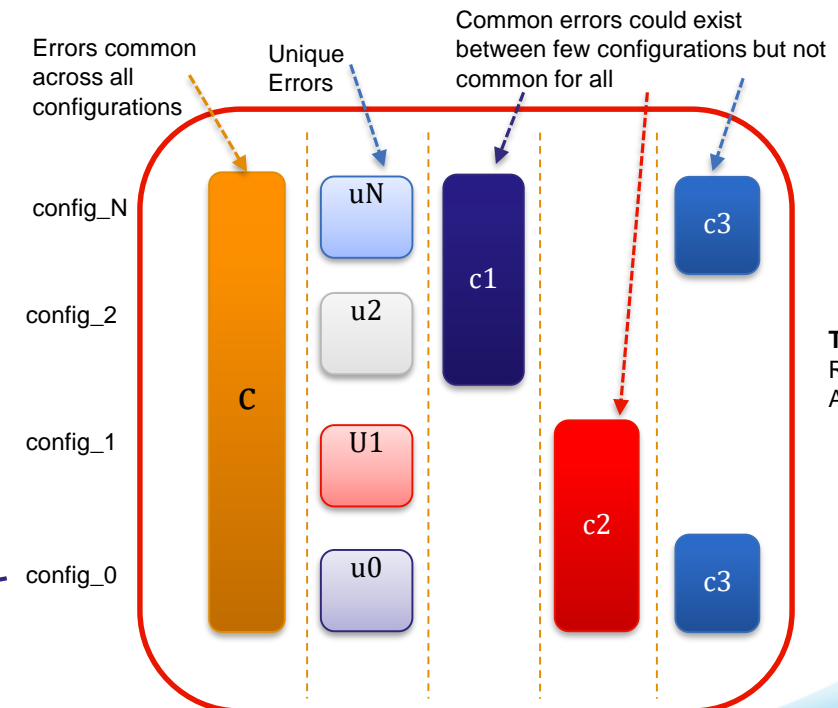
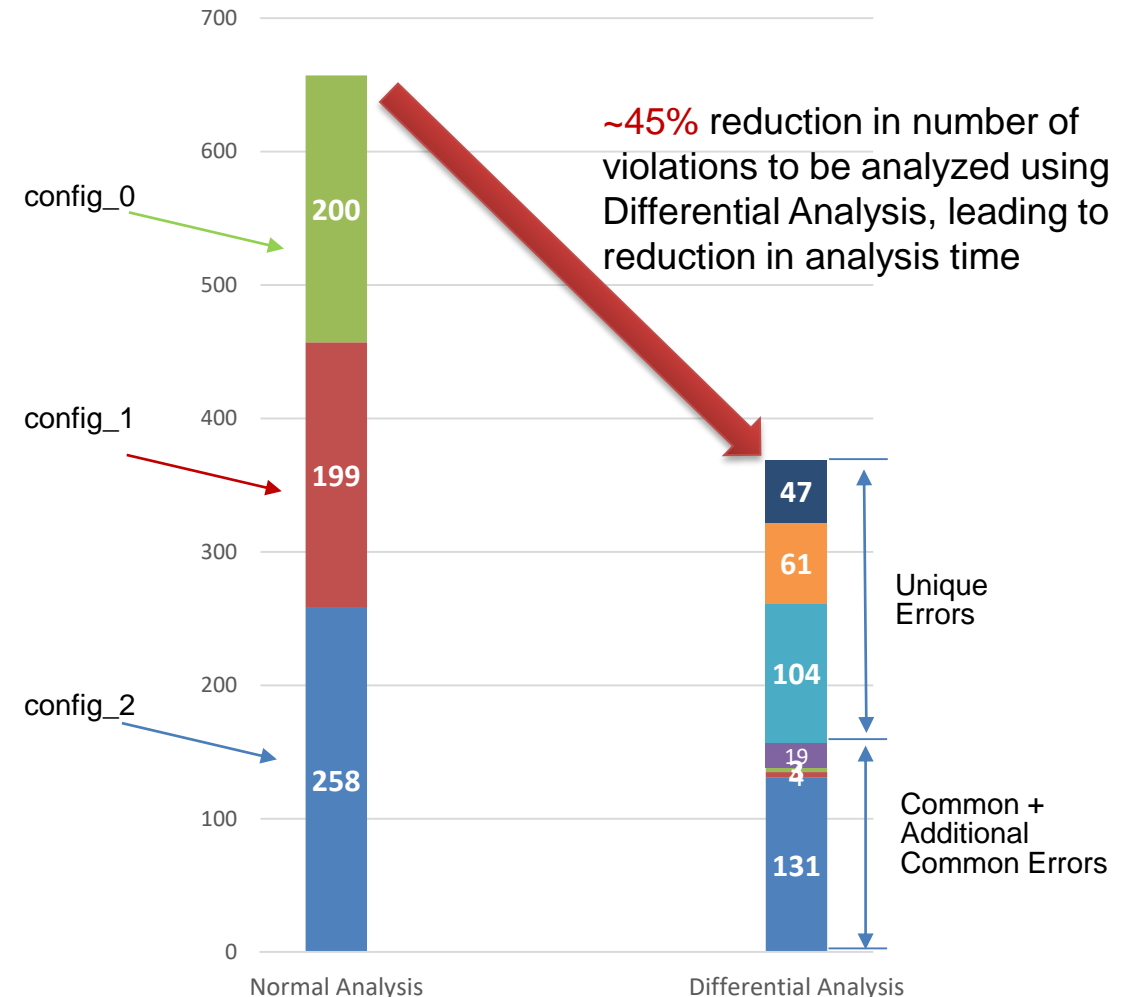


Table 3: Displays Results of Differential Analysis



# Gains observed using Proposed Solution

- We can see in Normal/Conventional Analysis flow
  - total number of violations reported for 'config\_0', 'config\_1' and 'config\_2' are 200, 199 and 258 respectively
- In the **Differential Analysis flow**,
  - user will start analyzing/cleaning the '131' common violations, which is an effort **common for all configurations** and covers:
    - Around **~65%** of violations for 'config\_0' (131/200)
    - and same **~65%** for 'config\_1' (131/199)
    - Also, **~50%** of violations are getting covered for config\_2 (131/258)
- Additional advantage comes in by further analyzing the **additional common violations** among configurations,
  - for e.g. 'config\_2 & config\_0', 19 are additional common violations





# Conclusion

- Proposed solution eases out the designers effort of figuring out the complete parameterization impact on CDC closure
- Easy and Reliable re-use of previous analysis drastically reduces the effort and time for signing –off IP CDC
- Focused Effort on cleaning critical violations common to all configurations
- Helps in Prioritizing the analysis of violations
- Only one time effort is spent on identifying the violations to be waived off, designer need not to worry about the duplication effort of putting the waivers for individual configuration

# Thank You

