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## Challenge

### Key Factors of SOC(System On Chips) Design

- Performance
- Power
- Area

### Area Reduction: Abutted Design

- Chip area reduction by eliminating top level routing

### RTL update for abutted design

- Divide-and-conquer integration to a lot of functional blocks for full chip RTL generation due to limitation of tool capacity or computing resources
- Multiple functional blocks for abutted design should be updated due to divide-and-conquer integration
- The updates should be performed without human error simultaneously.
- Automation of RTL update for abutted design is inevitable.

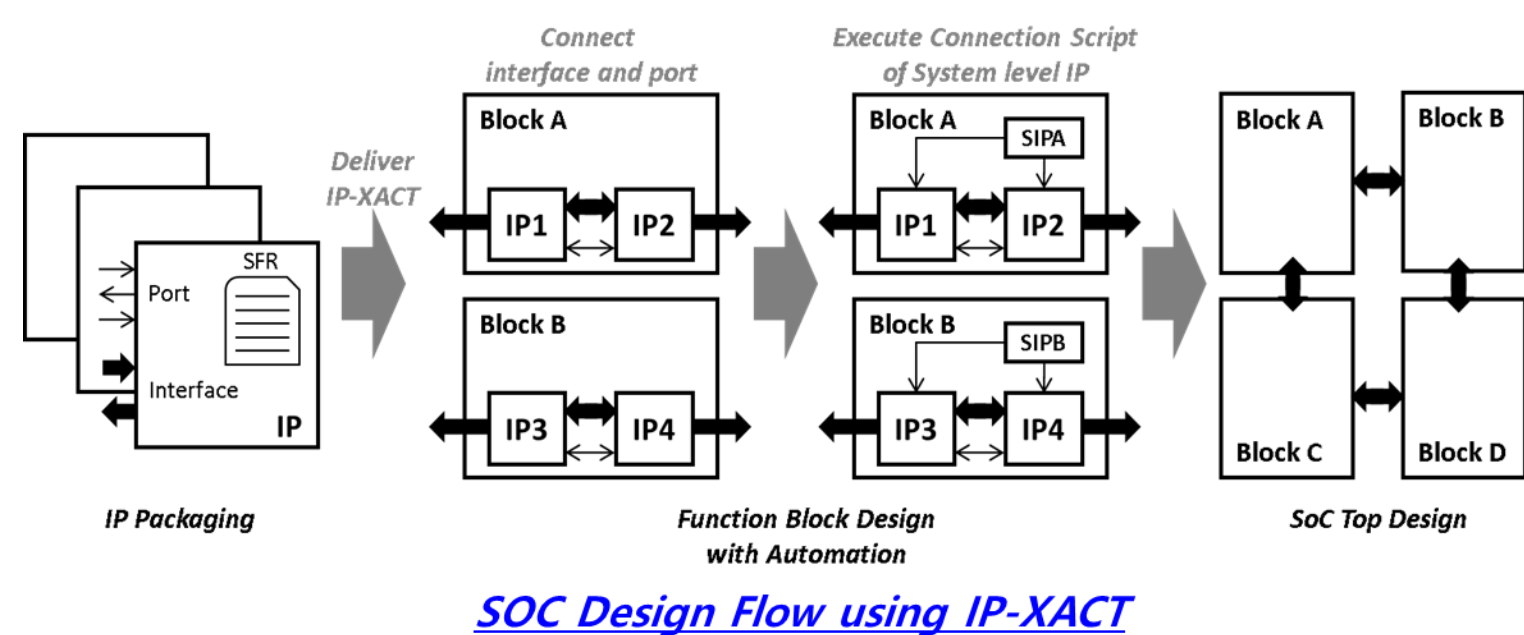
## Metadata Based Integration

### Metadata for SOC Design

- IP-XACT (IEEE-1685 as IEEE Standard)

### IP-XACT base integration

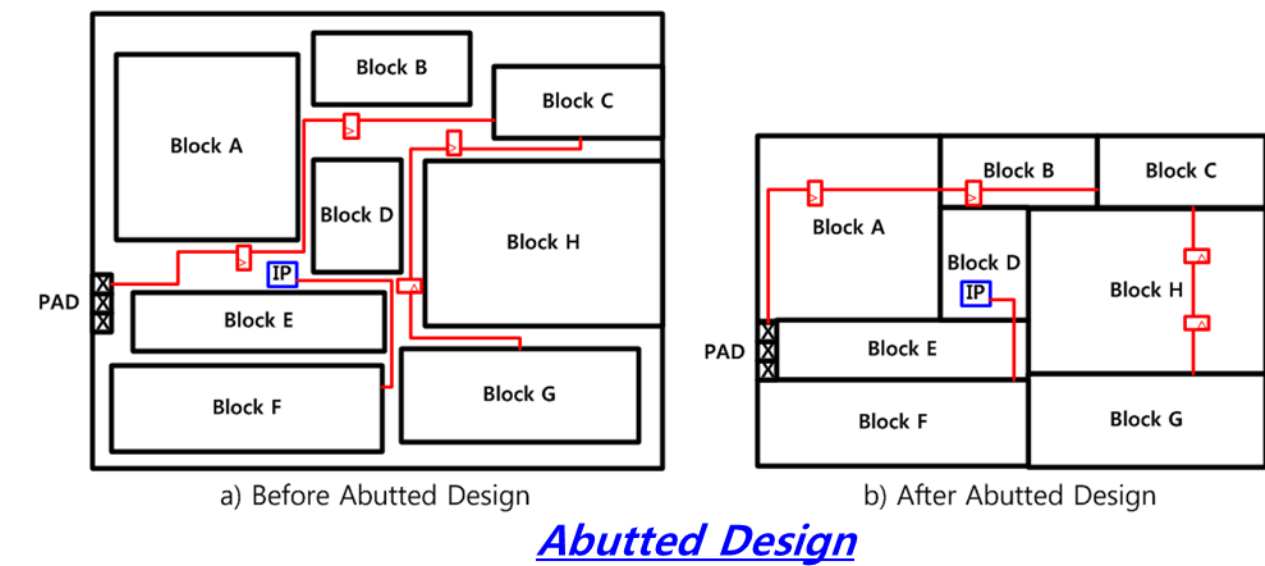
- IP Packaging using IP-XACT
- Connect IPs with interface and port in IP-XACT
- Integrate system level IPs with automation flow
- Create top design by connecting blocks



## Abutted Design

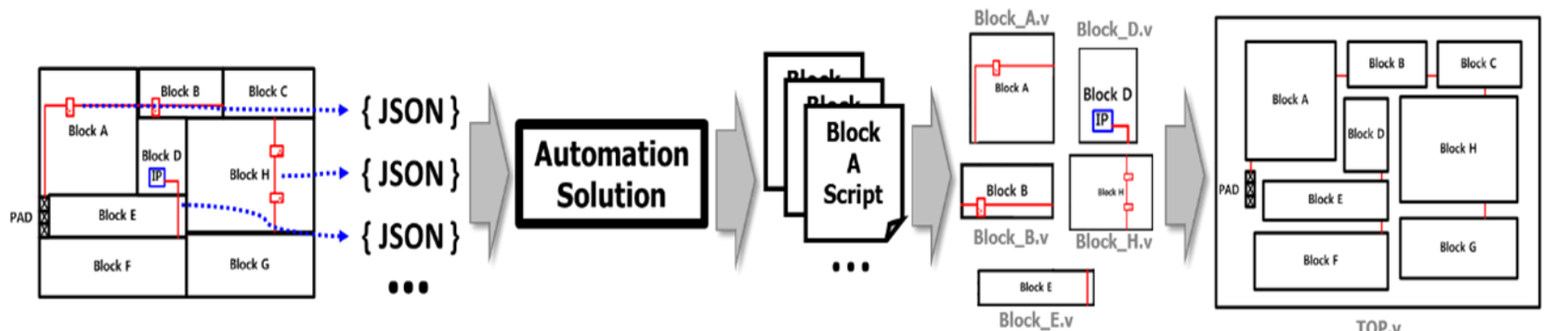
### Abutted Design

- Area reduction by eliminating top channel routing



## RTL Update Automation Flow

### RTL Update Automation Flow



- Generate Abutted Information to metadata
- Generate connection script for RTL update from the abutted information using automation solutions
  - Automation solutions are implemented with Python or JavaScript
- Execute the scripts at functional blocks and top design
- Generate updated RTL for functional blocks and top design

## Pilot Result

### Pilot Result

- Number of connection is increased due to abutted design.
- The huge connections are automatically connected in a short time.
- Function verification is performed at RTL level without abutted information due to no functional change due to abutted design.

	# Port Connection		Change Rate	Update Time
	Before	After	(Times)	(Second)
Test mode control IP	2157	4314	▲2.0x	1112s
Data communication	10240 (128 IF)	75520 (944 IF)	▲7.3x	162s <sup>1)</sup>
Test signal from pad	181	1248	▲6.9x	371s

1) Data channel is connected by bus interface(IF)

## Summary

### Conclusion

- To reduce area of SOC design, abutted design is required.
- For abutted design, a large amount of RTL code modification is required.
- It is difficult to apply the abutted design as a manual method.
- To prevent human error and reduce development time, automated RTL update solution is proposed and developed.
- **RTL changes could be made without any human error in a short time due to the proposed solution.**

Enable automated RTL update for abutted design without manual process using metadata based automation flow