Expanding System-Level Power Simulation Modeling in IBIS

Zhiping Yang, Google

Randy Wolff, Micron Technology

IBIS Open Forum Teleconference

June 5, 2020

https://www.ibis.org/

Outline

- Current power modeling in IBIS
- Collaboration with IEEE EMC Society
- Power Integrity modeling needs
- Future work

Current Power Modeling in IBIS

- Focused on I/O power supply
  - BIRD95.6 "Power Integrity using IBIS"
  - BIRD98.3 "Gate Modulation Effect"
- Improvements for PDN modeling
  - BIRD189.7 "Interconnect Modeling Using IBIS-ISS and Touchstone", on-die and package PDN models
  - BIRD198.x "Keyword additions for On-Die PDN Modeling", simplified core & I/O decoupling caps

Collaboration with IEEE EMC Society

- IBIS virtual participation in 2020 IEEE EMC + SIPI Symposium, August, 2020
  - https://www.emc2020virtual.emcss.org/
  - Introducing IBIS to a new audience
- Potential for power modeling standardization
  - IEEE EMC society power integrity and power consumption sandpit event
  - IBIS specification → IEEE standardization
  - Additions to existing IBIS spec or separate spec

System Power Delivery Architecture
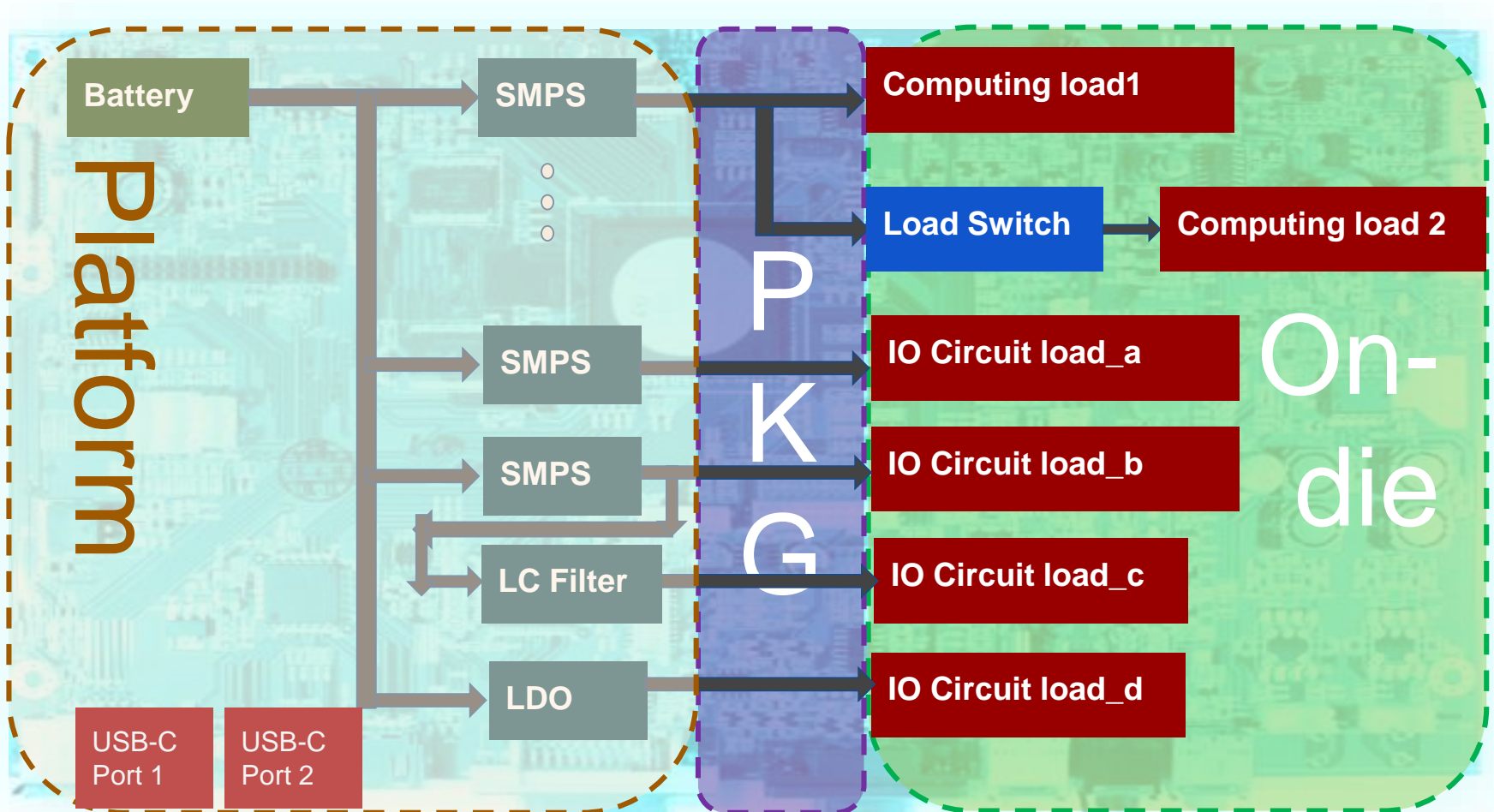
**High-quality and widely supported models for active power components are missing today!**

*SMPS=switching mode power supply

System-Level Power Simulation

Use IBIS format models to do the following simulations:

- System level DC simulations, including IR drop, DCR (1st)

- System power consumption and efficiency (1st)

- AC simulations, i.e. PDN impedance (2nd)

- Transient load response, i.e. transient power noise (2nd)

- Power/thermal co-simulation (3rd)

(Ranking relative to standardization priority)
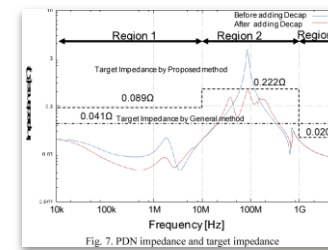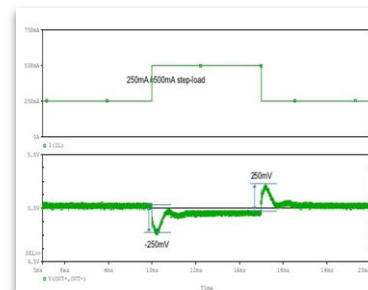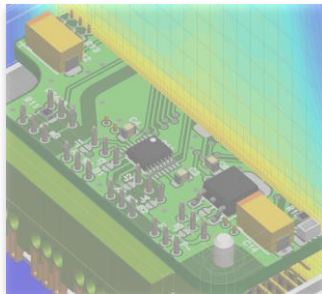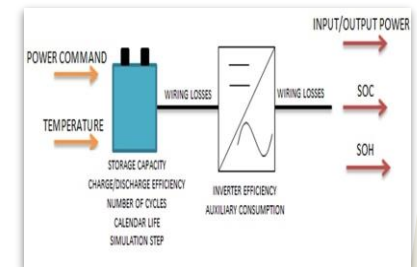
DC and Power Consumption Simulation

Charger	Battery	DC-DC	BRD	PKG	Chip PDN	Die
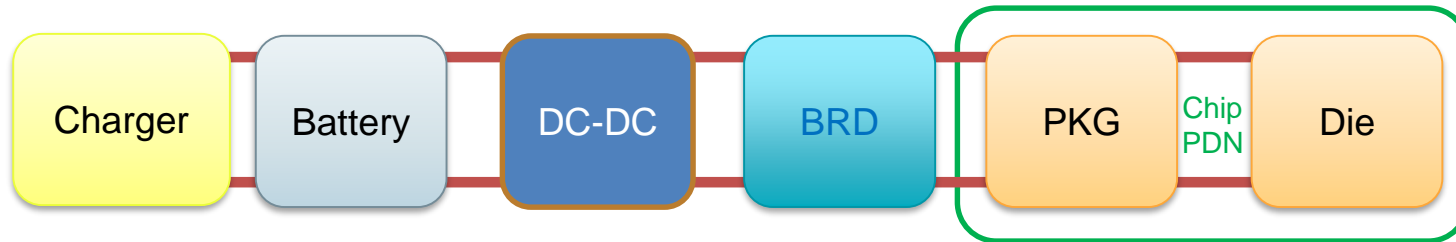
- No good models for charger, battery, DC/DC converters and Die

- BRD can be modeled well with existing EDA tools

- PKG can be modeled with existing PKG EDA tools, but it will be great if it can be included as a part of IC component models from the IC vendors.
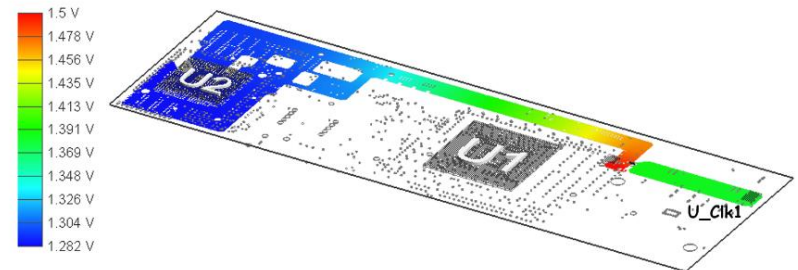
Future Work

- IEEE EMC Society collaboration
- Home for PI Modeling
  - IBIS-centric
    - Existing ATM or new task group?
  - IEEE-centric
    - IBIS provides hooks to import final format and information (as an IBIS-ISS subcircuit)

[Thank You]

IBIS Open Forum:
Web: https://www.ibis.org
Email: ibis-info@freelists.org

We welcome participation
by all IBIS model makers,
EDA tool vendors, IBIS model
users, and interested
parties.