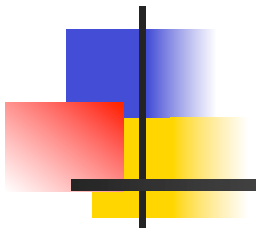


NoCs: Past, Present and Future

Giovanni De Micheli

EPFL

NoCs: Connecting people

SPIN: a Scalable, Packet Switched, On-chip Micro-network

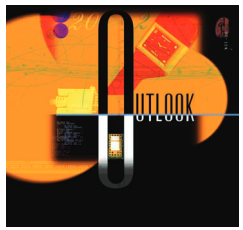
Adrijean Adriahantenaina (UPMC/LIP6)
Hervé Charlery (UPMC/LIP6)

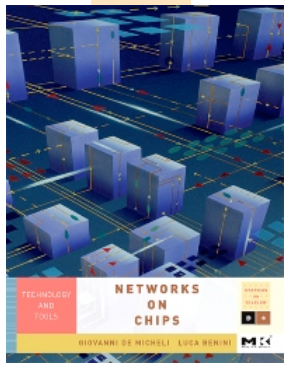
Route Packets, Not Wires: On-Chip Interconnection Networks

William J. Dally and Brian Towles
Computer Systems Laboratory
Stanford University
Stanford, CA 94305

SOC DESIGNS

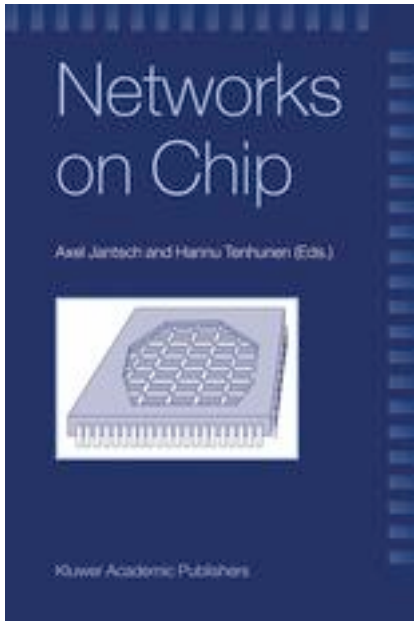
Networks on Chips: A New SoC Paradigm

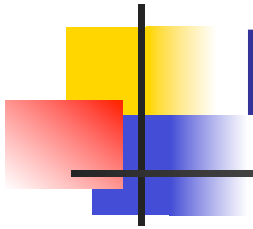




ÆthereaI Network on Chip: Concepts, Architectures, and Implementations

Kees Goossens, John Dielissen, and Andrei Rădulescu
Philips Research Laboratories

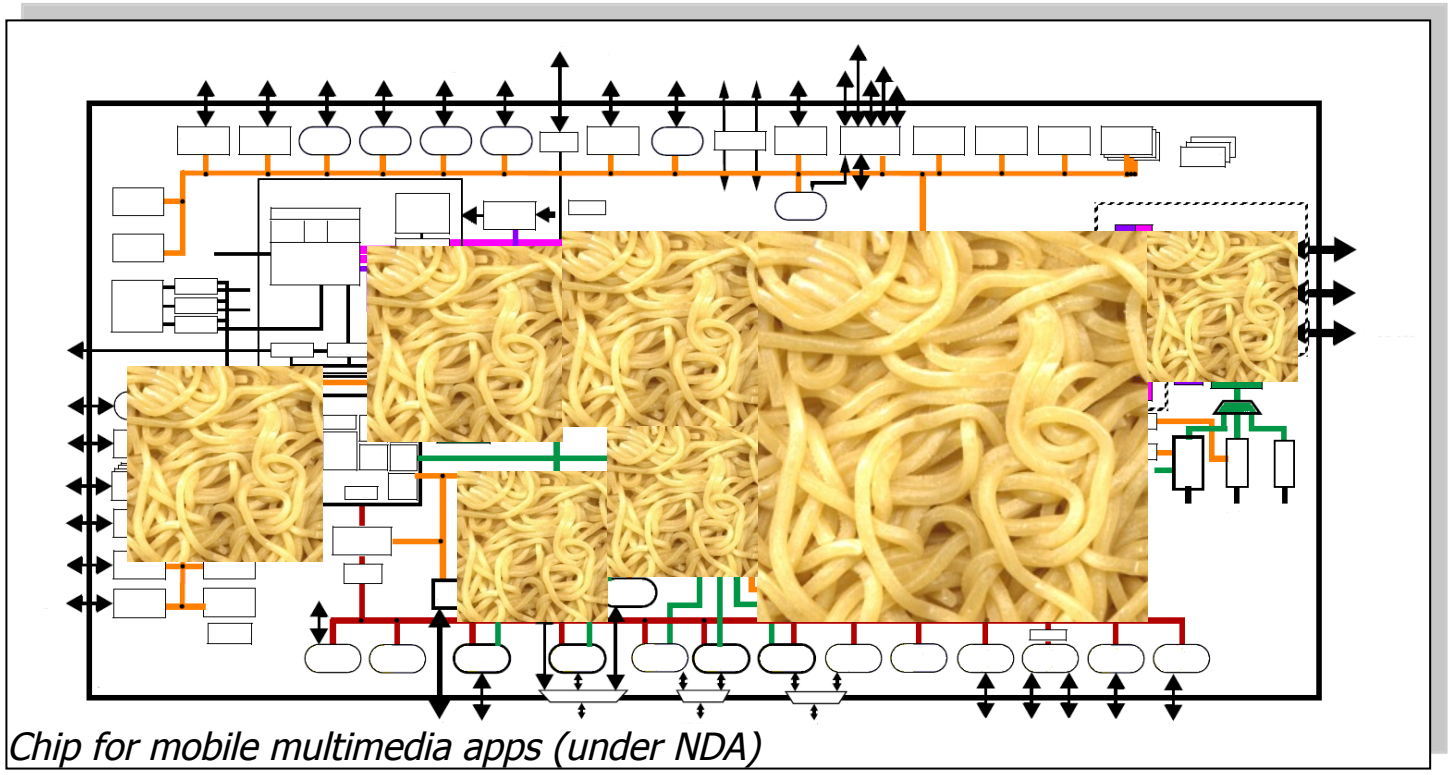




NoCs: Connecting design

- Connecting scientific communities
  - Multiprocessor Design, Communication, EDA
- Connecting technologies
  - Silicon, optical, RF
- *Providing hardware scalability through raising design abstraction level*

The Rise of Networks-on-Chip

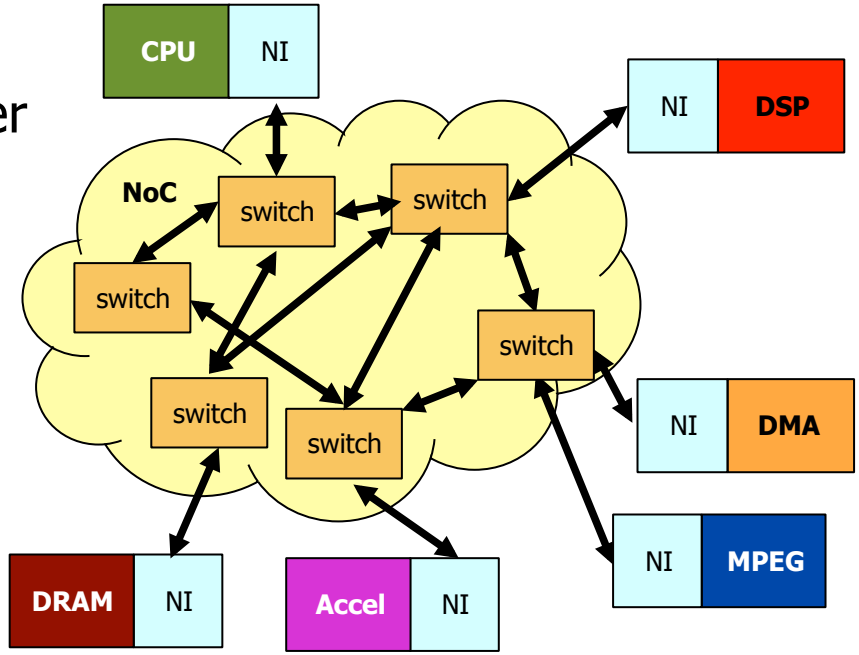


Chip for mobile multimedia apps (under NDA)

The Network-on-Chip Paradigm

The "power of NoCs":

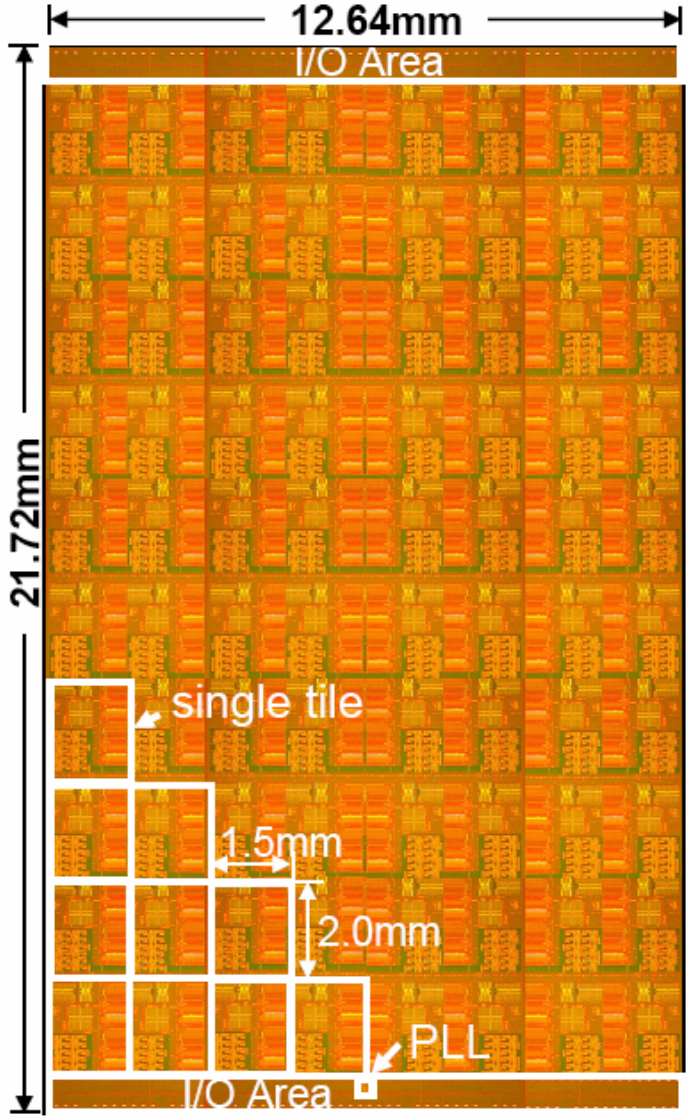
- Clean separation at session layer
  - Cores issue end-to-end transactions
  - Network deals with transport, network, link, physical
- Modularity at HW level: only 2 building blocks
  - Network interface
  - Switch (router)
- Physical design aware (floorplan global routing)



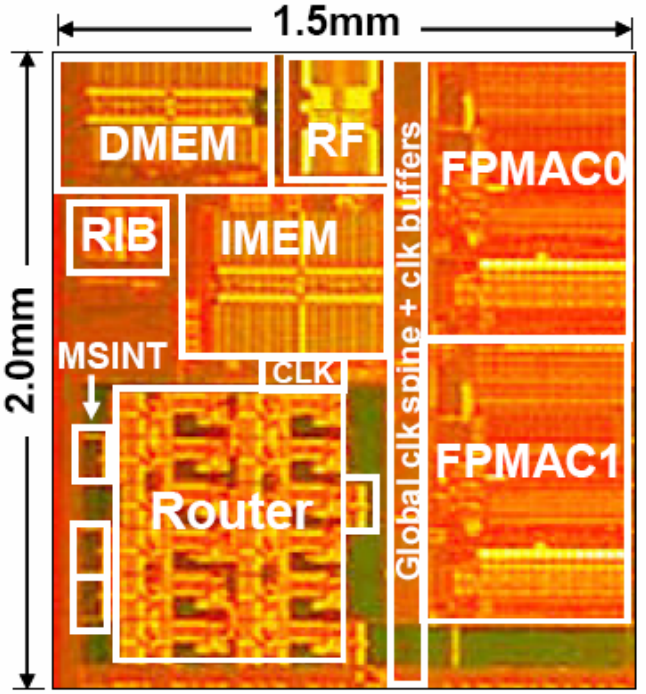
Scalability is supported from the ground up!

NoCs: Past and Present

Enabling multiprocessing

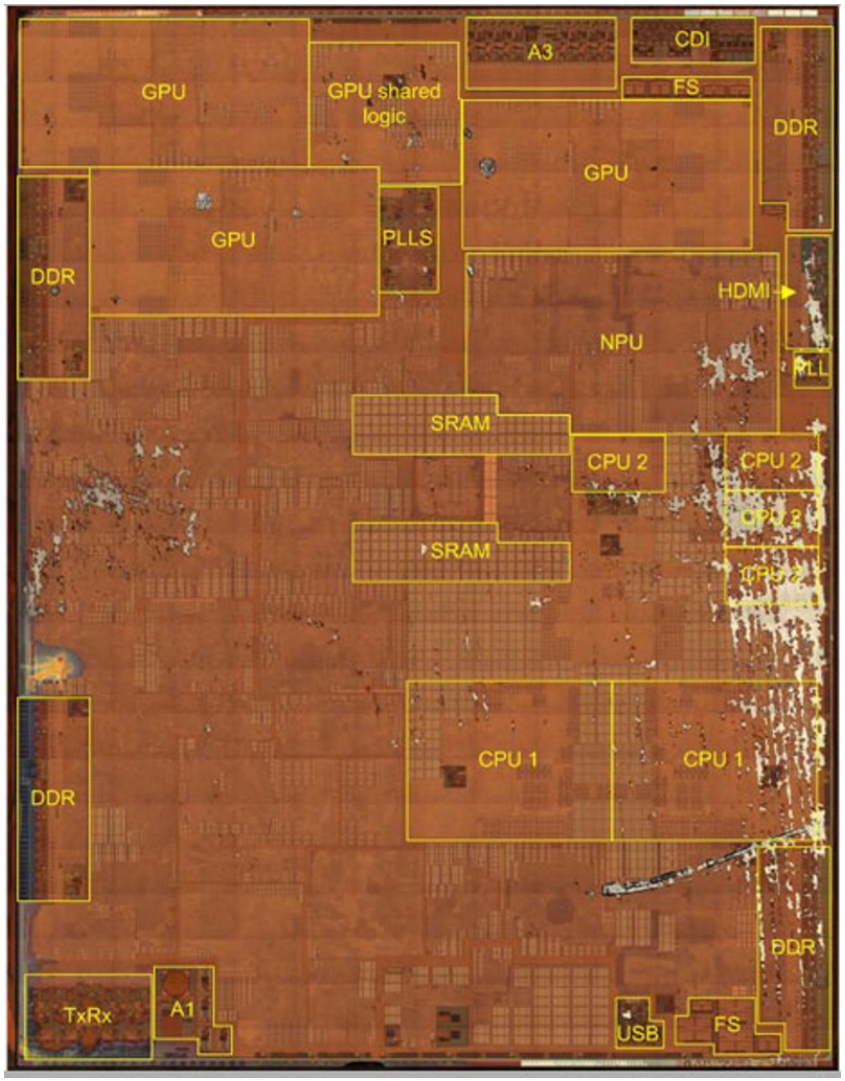


Vangal et al. ISSCC 2007



Technology	65nm CMOS Process
Interconnect	1 poly, 8 metal (Cu)
Transistors	100 Million
Die Area	275 mm^2
Tile Area	3 mm^2
Package	1248 pin LGA, 14 layers, 343 signal pins

Enabling multiprocessing

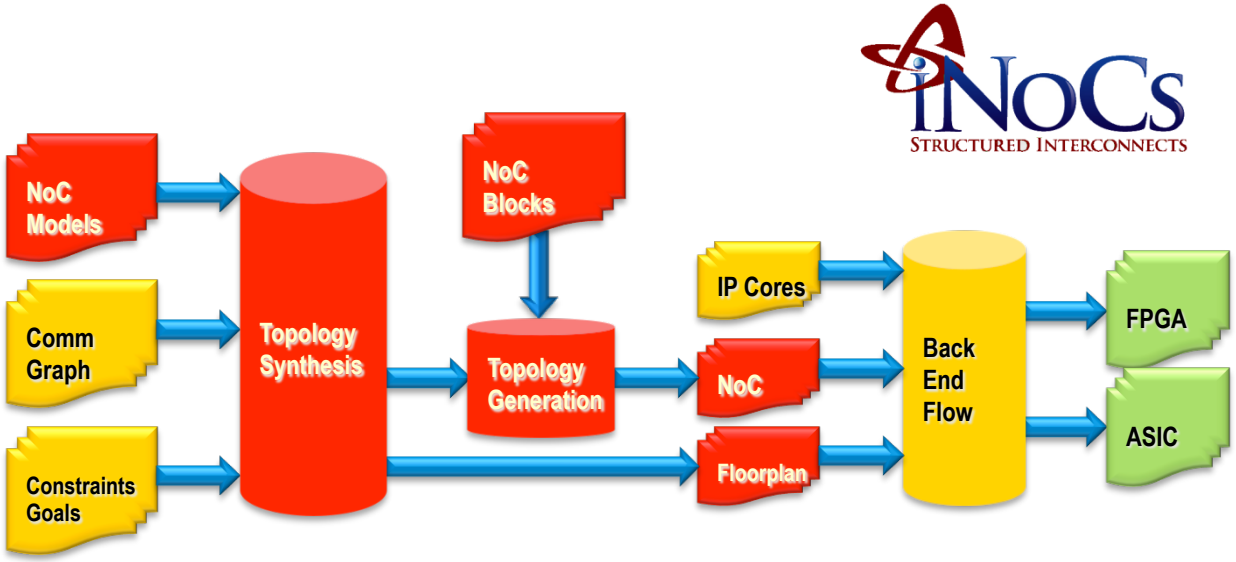


Apple A11 SoC

Technology	10nm CMOS Process TSMC
Processor	ARM v8A 6-core
Transistors	4.3 Billion
Die Area	88 mm^2
Application	mobile
Package	Package on Package With 2GB of memory

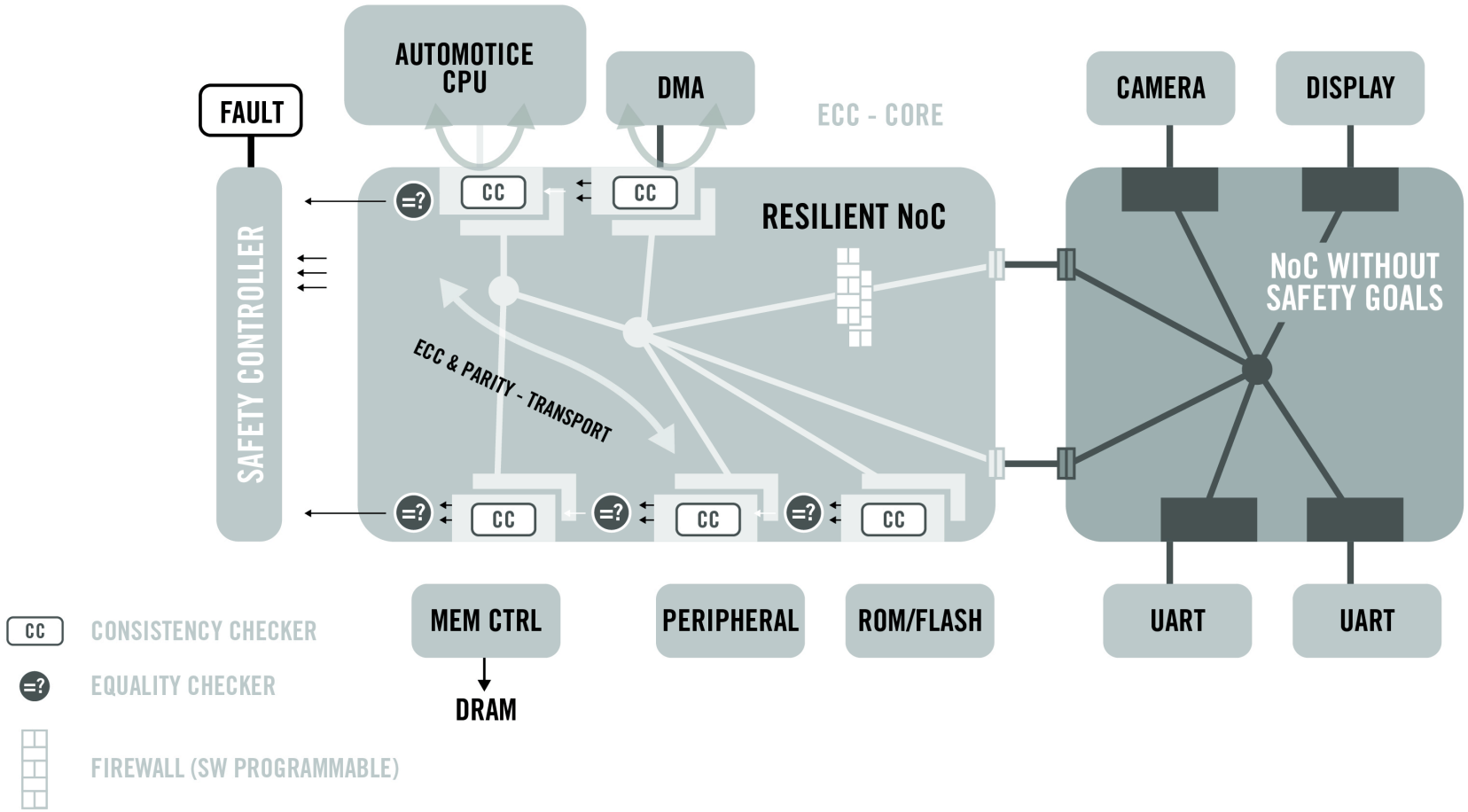
NoCs: Enabled by EDA

- From academic startups



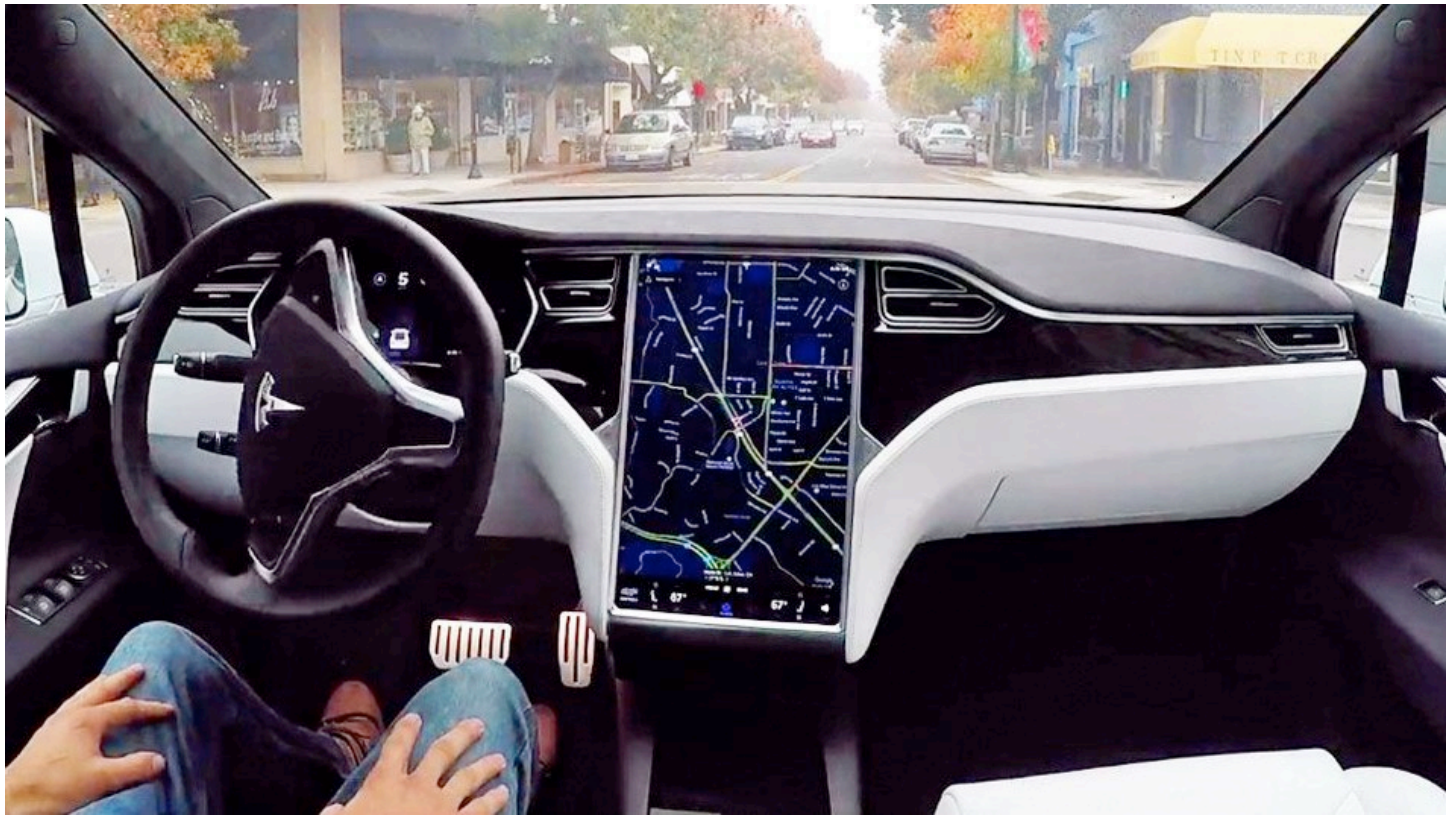
NoCs: Enabled by EDA

- To market leaders: Arteris



The Future

- Almost all telephones and cars have a NoC




NOC INSIDE