From Spaghetti wires to Noc

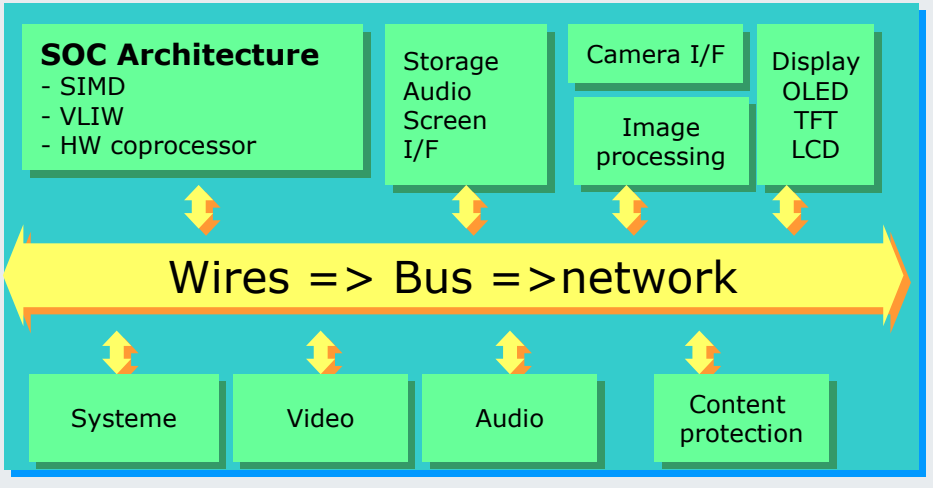
Marcello Coppola

MPSOC05

STMicroelectronics

On-chip communication Infrastructure

The on-chip communication Infrastructure is a fundamental tool for composing large, complex SoC

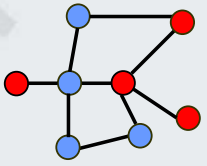


DVD

Digital TV

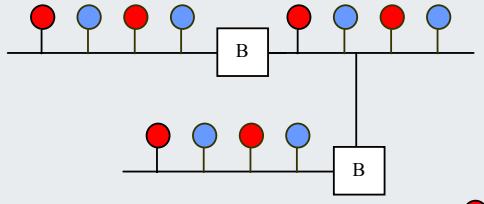
Set-Top Box

On chip communication: Evolution

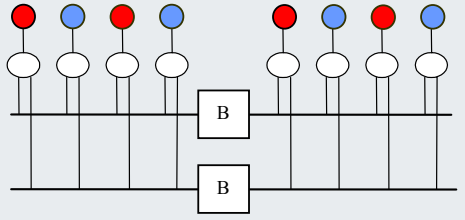


Custom

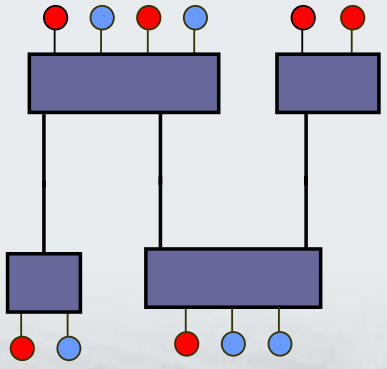
Bus



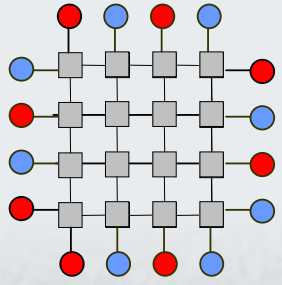
Bridged Bus



Multi Layer Bus



Pipelined Crossbar



NoC

NoC definition

A flexible and scalable packet-based on-chip micro-network

designed according to a layered methodology

Methodology view: **NoC is a communication-centric platform**

Architecture view: **NoC is a packet-based micro-network**

- Convergence of multiple disciplines:

  (On-chip communication, Parallel computing, Networking)

NoC must be a TRADE-OFF synthesis

Industry Solutions

- Multi Layer bus
  - AMBA
  - AXI
  - CORECONNECT
  - STBUS
  - ……

- Pipelined Crossbar
  - Arteris
  - …..

- NoC
  - Athereal
  - CrossBow Technologies
  - STNOC
  - …..

On-Chip Communication: An Analogy

- Large cities (*e.g.*, Los Angeles), circa 2000: Reducing commute time by 15 min => $15b economic impact
- Large chips (SoCs), circa 2010: On-chip communication will dominate performance, power efficiency

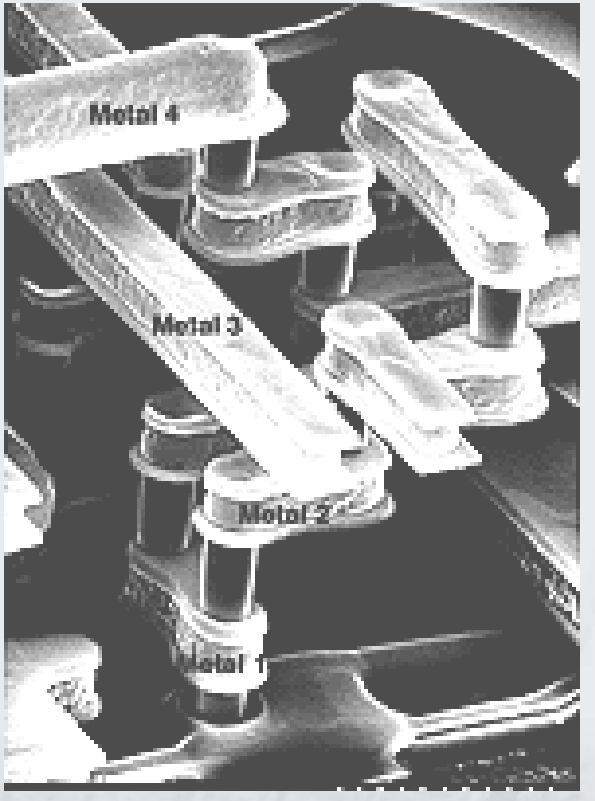
Source M. Laiolo NEC

Micro Trends

DSM and global wires

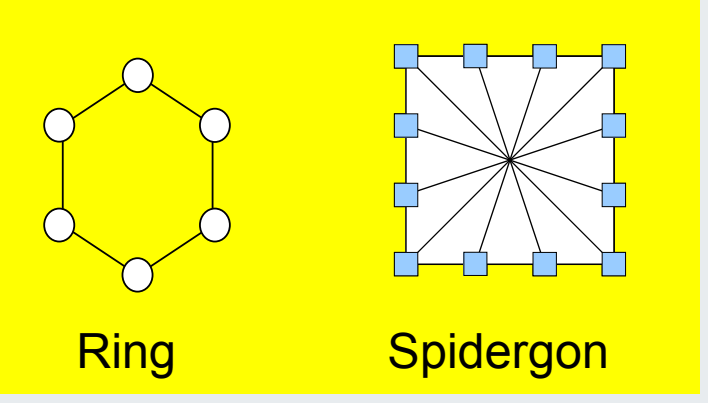
- Global wire delay
  - Global wire delay increases
  - Multiple clock latency
  - Synchronization issue
- Power dissipation
  - For interconnection do not scale
- Signal integrity

Interconnect is rapidly dominating the delay, power, and area of ICs



From Digital Integrated Circuits – J.M. Rabay

STNoC



STNoC topology range (degree 2-3)

- **STNoC**, the ST Network on Chip
- **Solve** today SoC integration issues
- **Anticipate** next complex architectures integration challenge
- **Leverage** on ST key technology and methodology

Draining the Swamp

If you can escape from the Spaghetti interconnection Jungle, you can get a long-term commitment in ***Platform Reuse and Time to Market***

STNoC challenge

bring NoC innovative technology to silicon in the near future

Thanks for listening!

To get in touch:

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