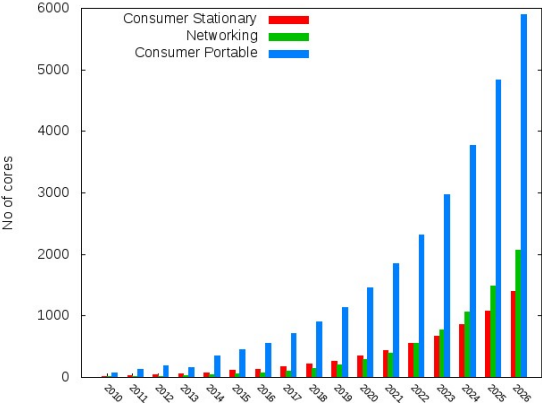# Networks on Chip
2000 - 2017

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19-20 October 2017

Number of Cores on Chip

International Roadmap for Semiconductors 2012 edition

What Does the Future Look Like?

Corollary of Moore's law:
Number of cores will double every 18 months

	'02	'05	'08	'11	'14
Research	16	64	256	1024	4096
Industry	4	16	64	256	1024

1K cores by 2014! Are we ready?

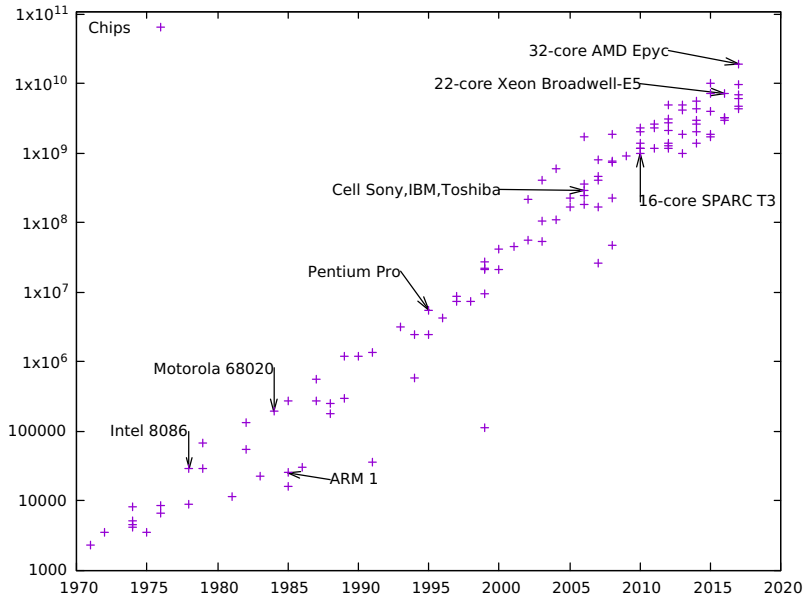Source: Anand Agarwal, NoCS 2009

Vision for the Future

The 'core' is the logic gate of the 21st century
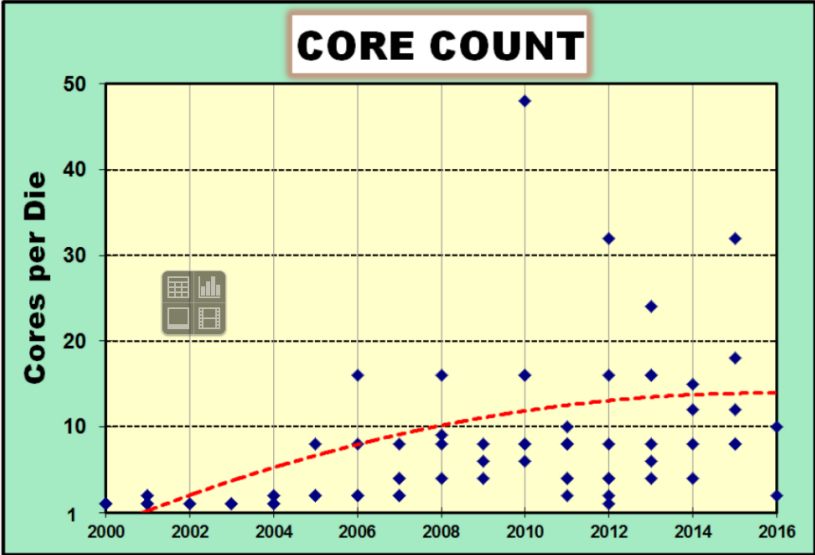

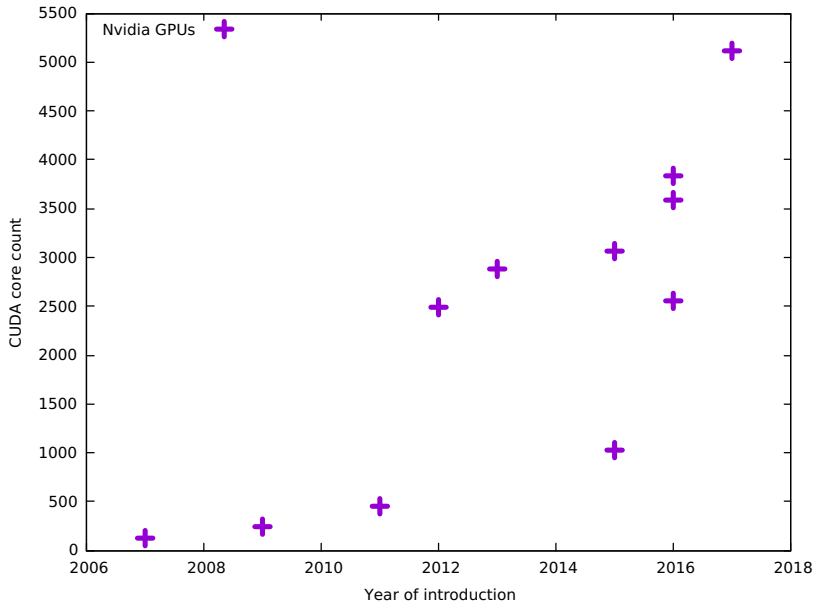Source: Anand Agarwal, NoCS 2009

CPU Development

Data source: en.wikipedia.org/wiki/Transistor_count

Core Count Trends

Source: ISSCC 2016 Technology Trends

GPU Development

Data source: en.wikipedia.org/wiki/Nvidia_Tesla

Nvidia GP104 GPU / Pascal Block Diagram

Conclusion

- Networks are specialized:
  - functionally specialized,
  - specialized topology.
- Their main purpose is to feed cores with data.
- Directions:
  - Memory access networks with multiple cache levels;
  - Networks for stream processors;
  - Networks for deep learning neural networks;
  - Networks for low power, heterogeneous mobile and sensor devices.
- System topics, not NoC topics:
  - Cache coherence
  - Quality of service
  - Fault tolerance
  - Security
  - Power, performance, ...