Collective Communication Optimizations (CCO)

An IETF118 Side Meeting, Prague

14:30-16:00 Thursday, Nov 9, 2023

Kehan Yao (China Mobile), Yizhou Li (Huawei)

Note Well

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- BCP 25 (Working Group processes)
- BCP 25 (Anti-Harassment Procedures)
- BCP 54 (Code of Conduct)
- BCP 78 (Copyright)
- BCP 79 (Patents, Participation)
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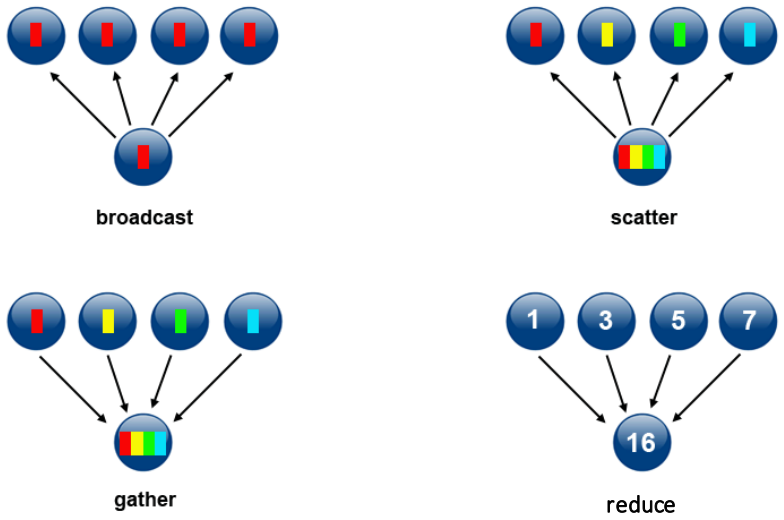
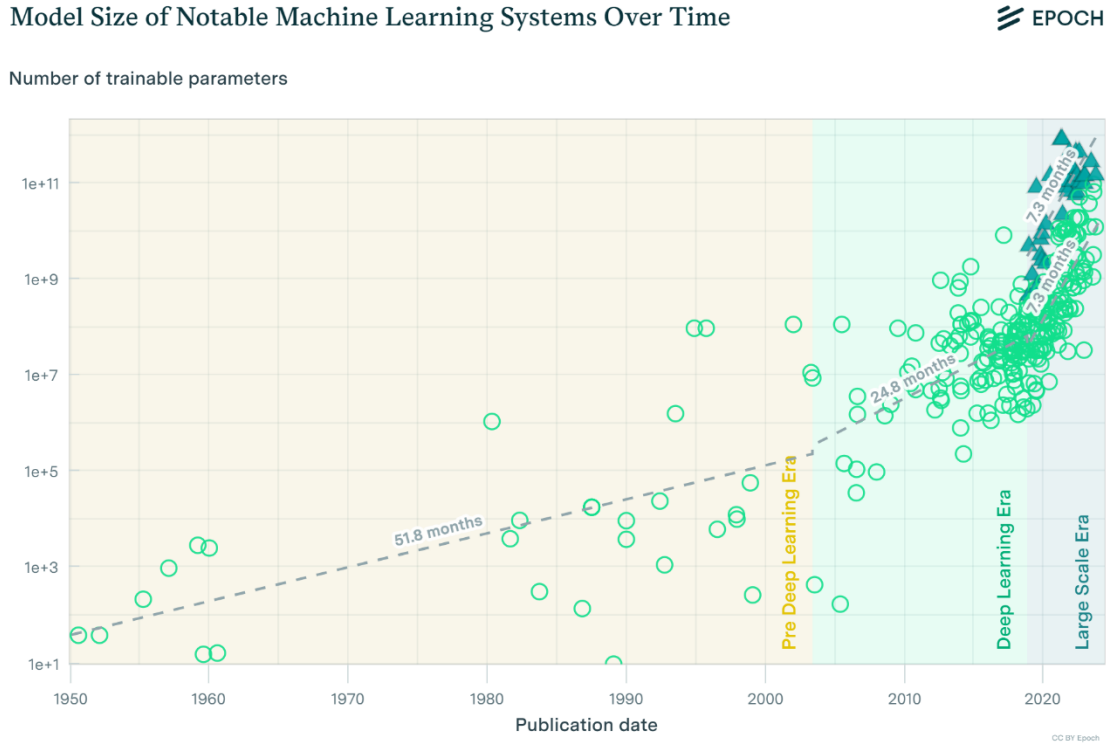
Agenda

1. **Opening** (5 mins)
2. **Use cases, problem space and requirements**
   Kehan Yao (China Mobile) (20 mins)
3. **Challenges in hardware offloading of collective operations**
   Alex Margolin (Hebrew University of Jerusalem)
4. **Signaling In-Network Computing Operations (SINC)**
   David Lou (Huawei) (20 mins)
5. **In Network Compute**
   Surendra Anubolu (Broadcom Inc) (20 mins)
6. **Open Discussions**

Collective communications are essential in the distributed training



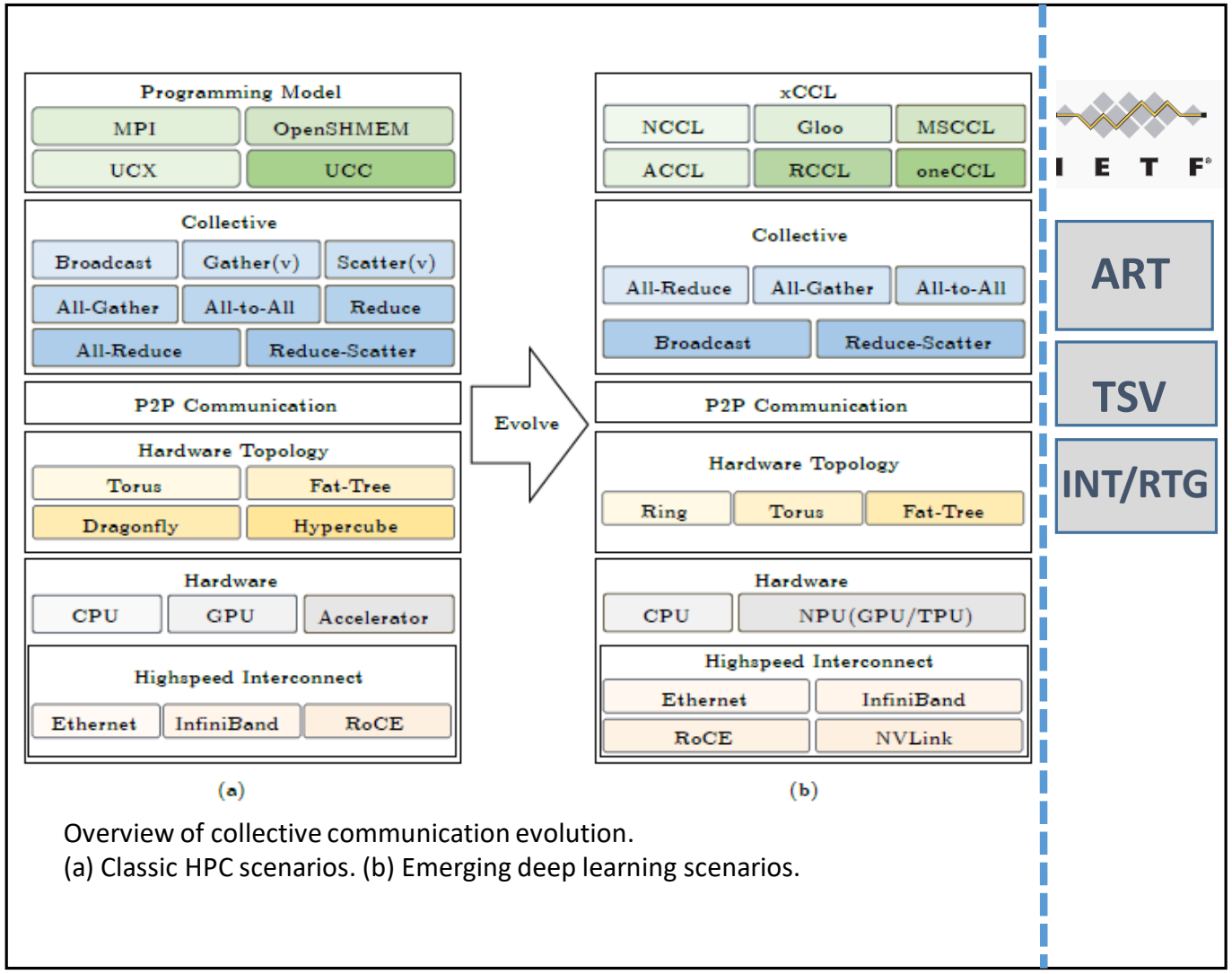
Some collective communications



Increasing model sizes and training data volumes necessitate more efficient communications and training routines

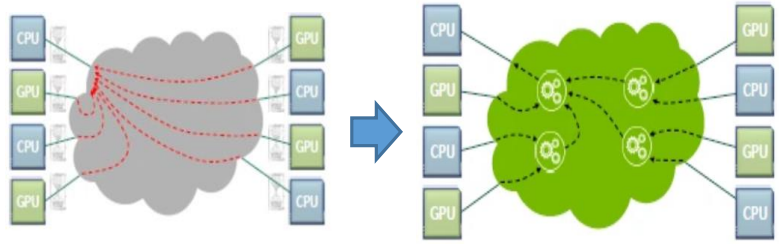
Source: Parameter, Compute and Data Trends in Machine Learning. Published online at epochai.org.

Collective communications are evolving



Overview of collective communication evolution.
(a) Classic HPC scenarios. (b) Emerging deep learning scenarios.

- In-network computing support to save bandwidth and/or reduce latency



- Co-design of software & hardware. Make effective use of powerful hardware to accelerate
- New primitives, communication models, memory access, protocols…
- Optimizations at different layers

xCCL: A survey of industry-led collective communication deep learning.
JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY 38(1): 166−1libraries for 95 Jan. 2023.