



# Vitis with 100 Gbps TCP/IP Network Stack Performance Benchmark

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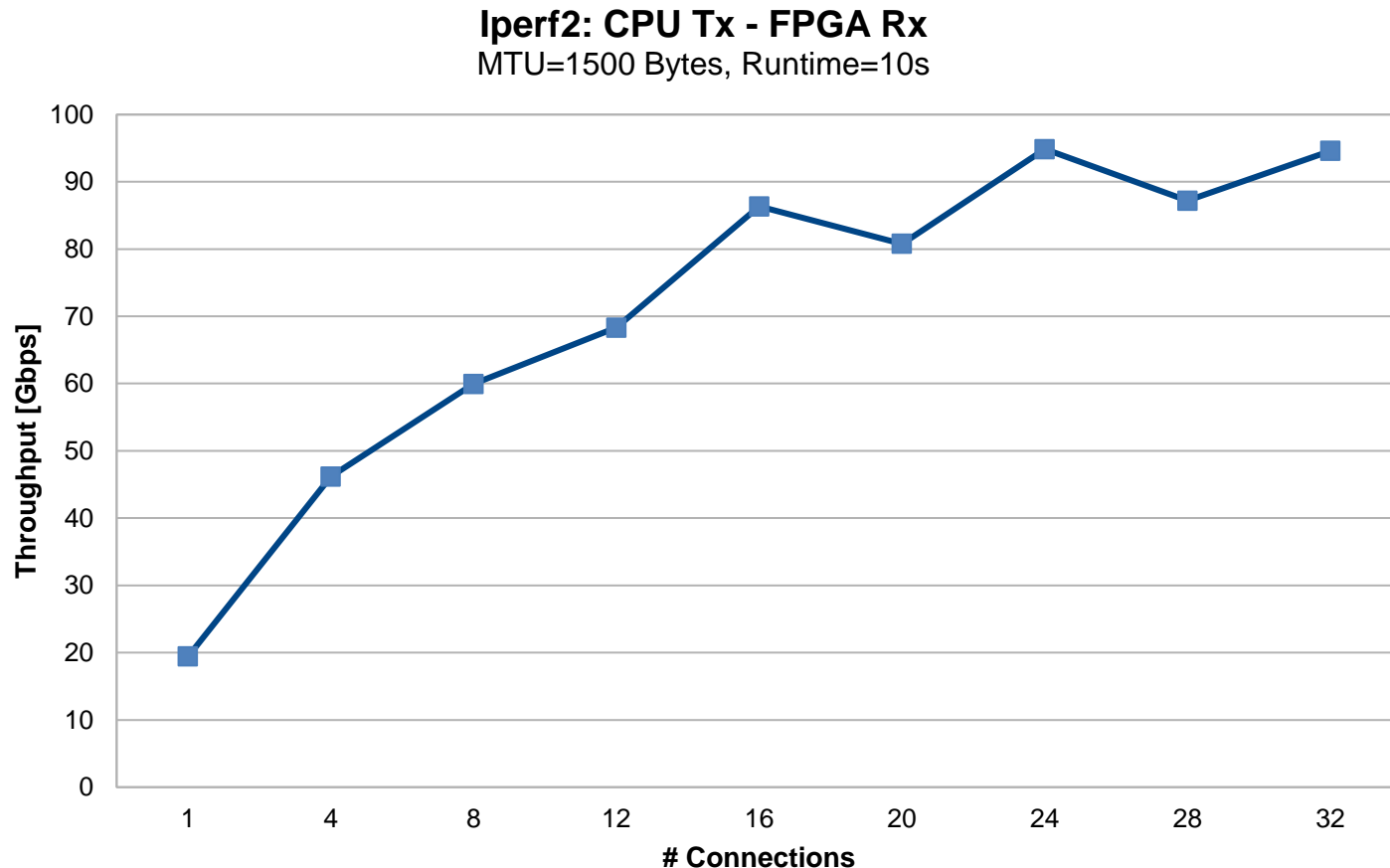
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# Experiment Setup 1

- Single Client Machine – Single Server Machine
  - CPU: Intel Xeon Gold 6234 with 376GB RAM and Mellanox MT27800 Connect-X 5 NIC (100 Gbps)
  - FPGA: Alveo u280
  - Network switch: Cisco Nexus 9336C-FX2 (100 Gbps connections)
- Experiment are run three times and the average is reported

# Performance: CPU Tx - FPGA Rx

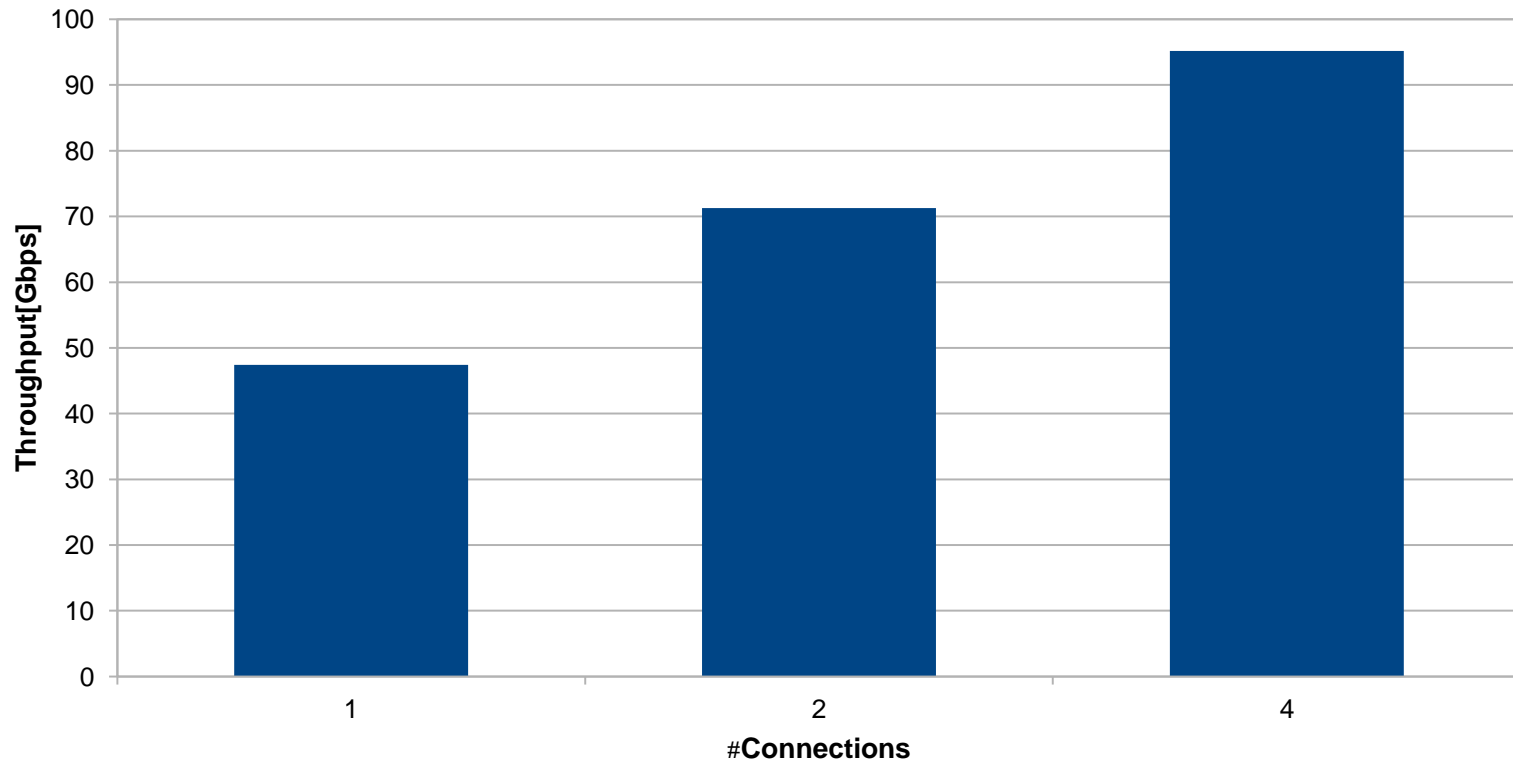
- Iperf2 test: one CPU as client, one FPGA as server
- CPU single connection Tx rate is limited
- 32 concurrent connections to saturate network bandwidth



# Performance: FPGA Tx – CPU Rx

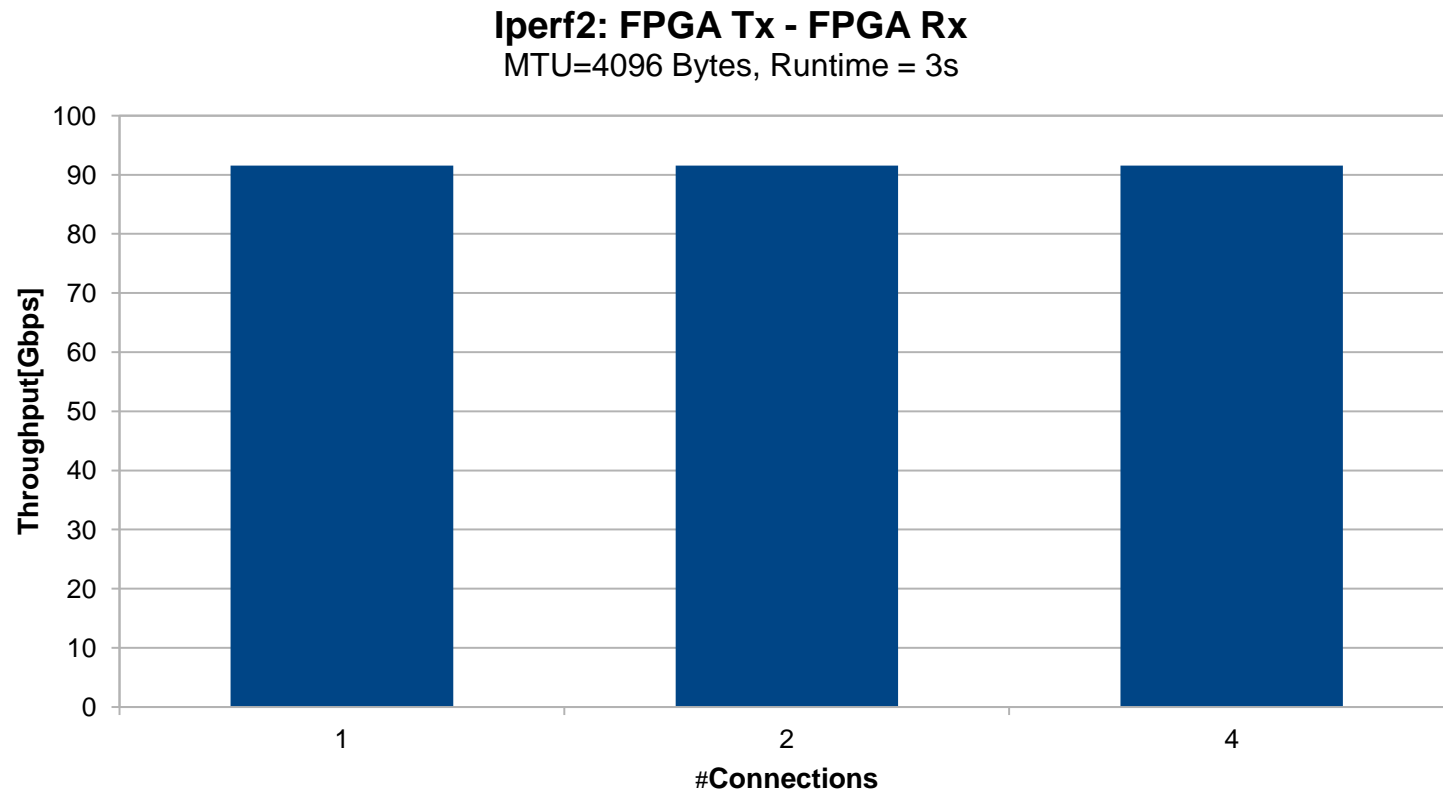
- Iperf2 test: one FPGA as client, one CPU as server
- Large MTU to reduce packet parsing overhead
- 4 concurrent connections to saturate network bandwidth

**Iperf2: FPGA Tx - CPU Rx**  
MTU=4096 Bytes, Runtime = 10s



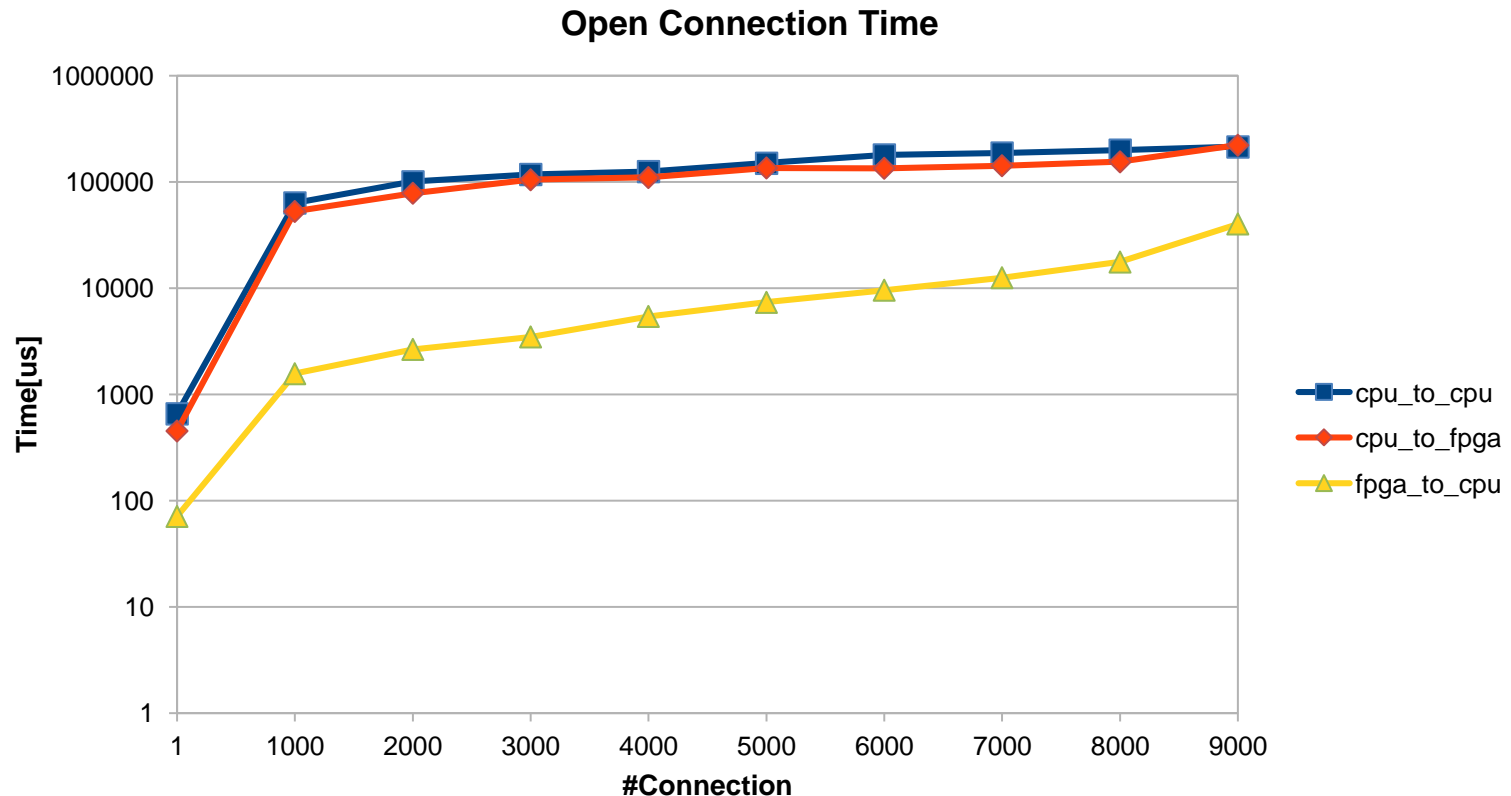
# Performance: FPGA Tx – FPGA Rx

- Iperf2 test: one FPGA as client, another FPGA as server
- Saturate network bandwidth with single connection



# Performance: Open Connection Time

- Open connection time under three configurations:
  - One CPU client to one CPU server
  - One CPU client to one FPGA server
  - One FPGA client to one CPU server
- CPU client application and CPU server application are optimized with multi-threading
- FPGA is 1-2 orders of magnitude faster than CPU to open thousands of connections



# Experiment Setup 2

- Single Client Machine – Multiple Server Machine
  - Client:
    - CPU: Intel Xeon Gold 6234 with 376GB RAM and Mellanox MT27800 Connect-X 5 NIC
    - FPGA: Alveo u280
  - Servers:
    - 10 CPUs: Intel Xeon E5-2620 with an Intel 82599ES 10-Gb SFI/SFP+ network controller
  - Network switch: Cisco Nexus 5596UP switch (10 Gbps connections)
- Experiment are run three times and the average is reported

# Performance: Open Connection Time

- Open connection time under two configurations:
  - One CPU client to ten CPU servers
  - One FPGA client to ten CPU servers
- Total connections are distributed equally to each server
- FPGA client is 2 orders of magnitude faster than CPU client to open thousands of connections

