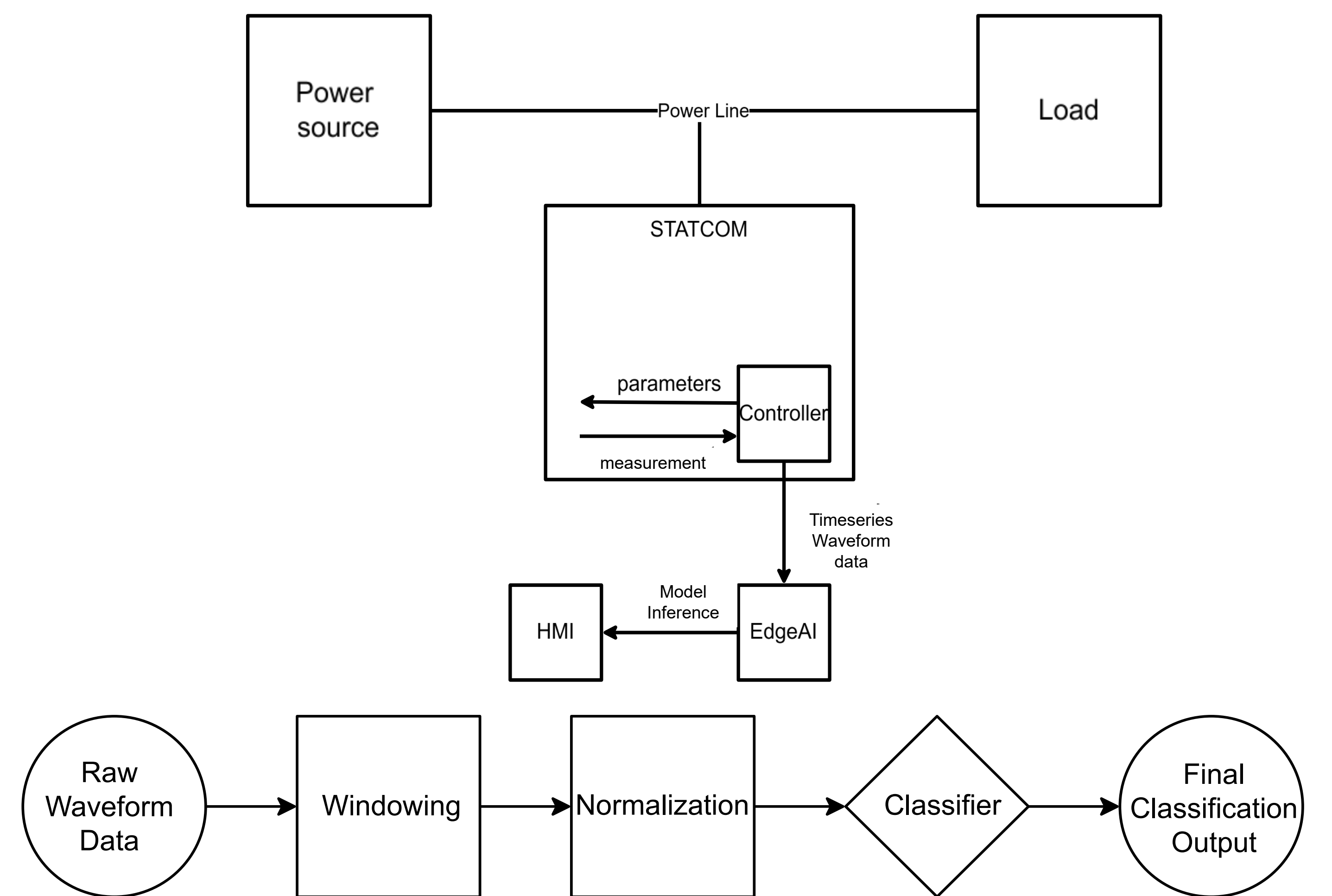


EdgeAI Applications for STATCOM Devices

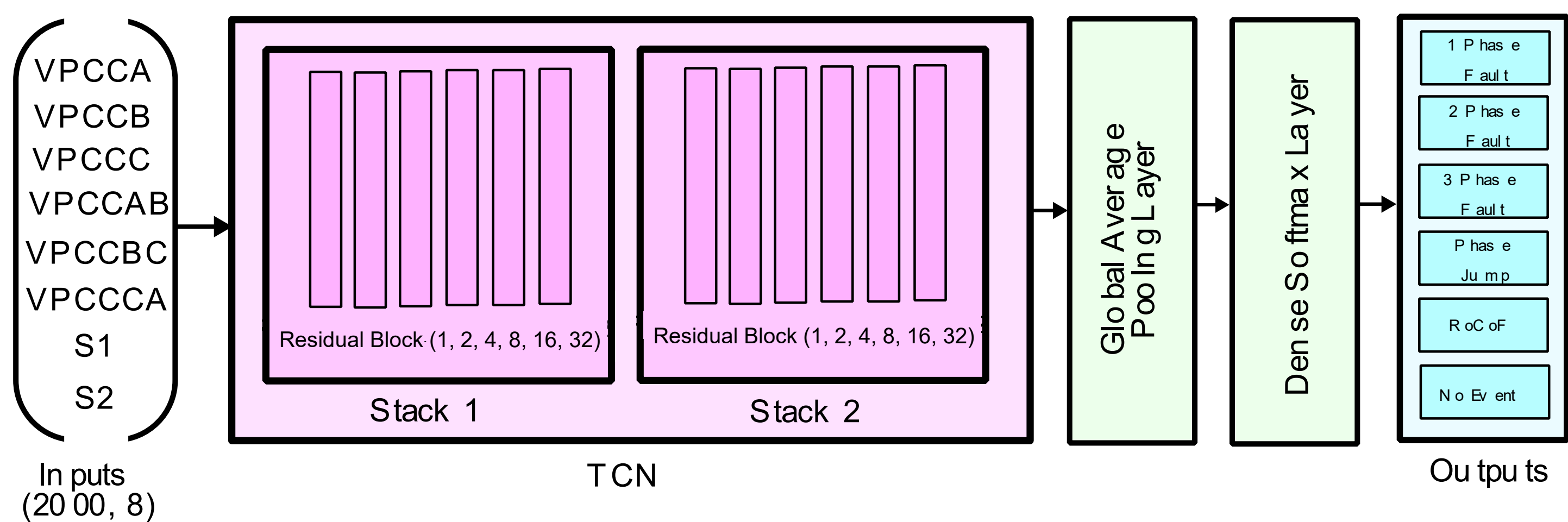
Goals

- G1: Define a use case for EdgeAI in STATCOM, including signals, event types, and performance requirements
- G2: Design a data-processing pipeline for that use case and compare candidate model families with respect to the G1 requirements.
- G3. Implement the chosen design on an EdgeAI SoC and evaluate it experimentally against the G1 requirements using representative data.

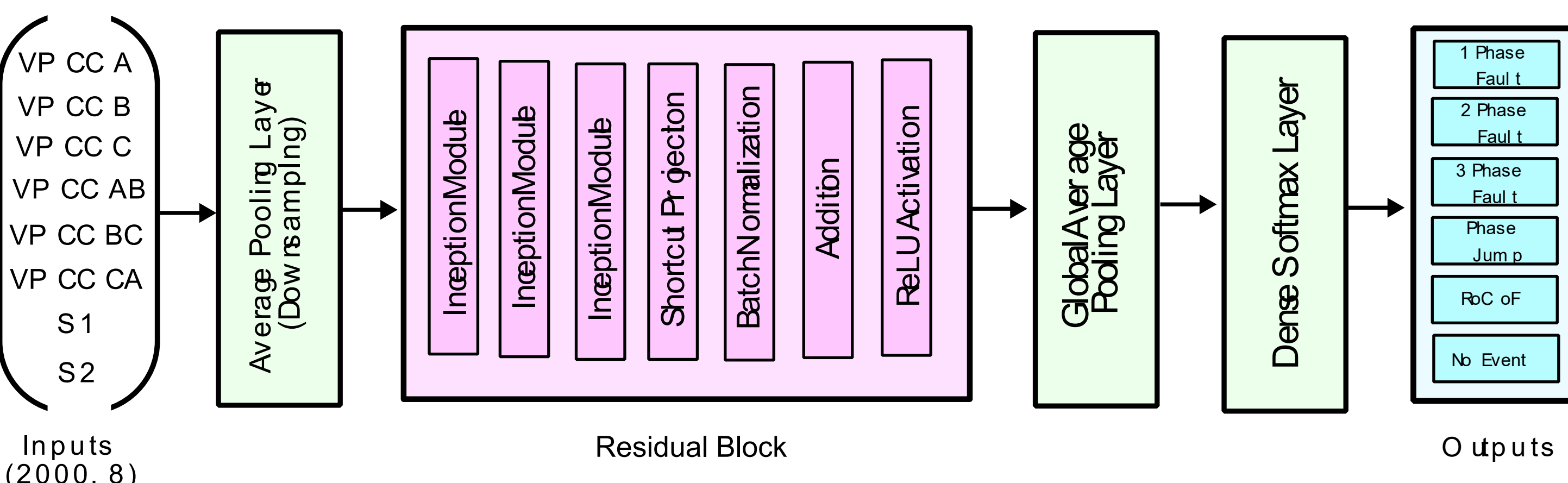
System Design



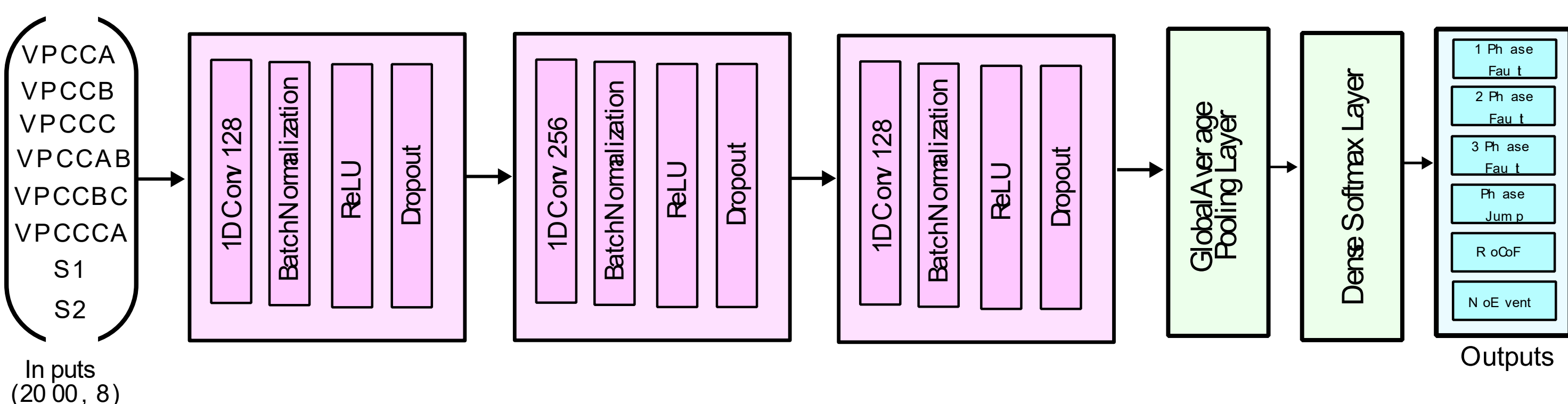
Model Design



Temporal Convolutional Network



InceptionTime



Fully Convolutional Network

Results

Model	Accuracy Before Quantization	Accuracy After Quantization	Accuracy Reduction
TCN	94%	60%	36.17%
InceptionTime	96%	90%	6.45%
FCN	94%	94%	0.00%

Model	Average CPU Latency (ms)	Average NPU Latency (ms)	Latency Improvement
TCN	13.79	13.26	3.84%
InceptionTime	5.45	0.58	89.36%
FCN	7.68	4.53	41.02%

- TCN neither quantizes well nor accelerates on the NPU well
- InceptionTime demonstrates quantization resilience and excellent latency improvement on the NPU
- FCN has the highest resilience to quantization and demonstrates a moderate latency improvement on the NPU
- InceptionTime shows the most potential for real-time implementation