



U.S. DEPARTMENT
of ENERGY

EIC Computing Infrastructure Modeling

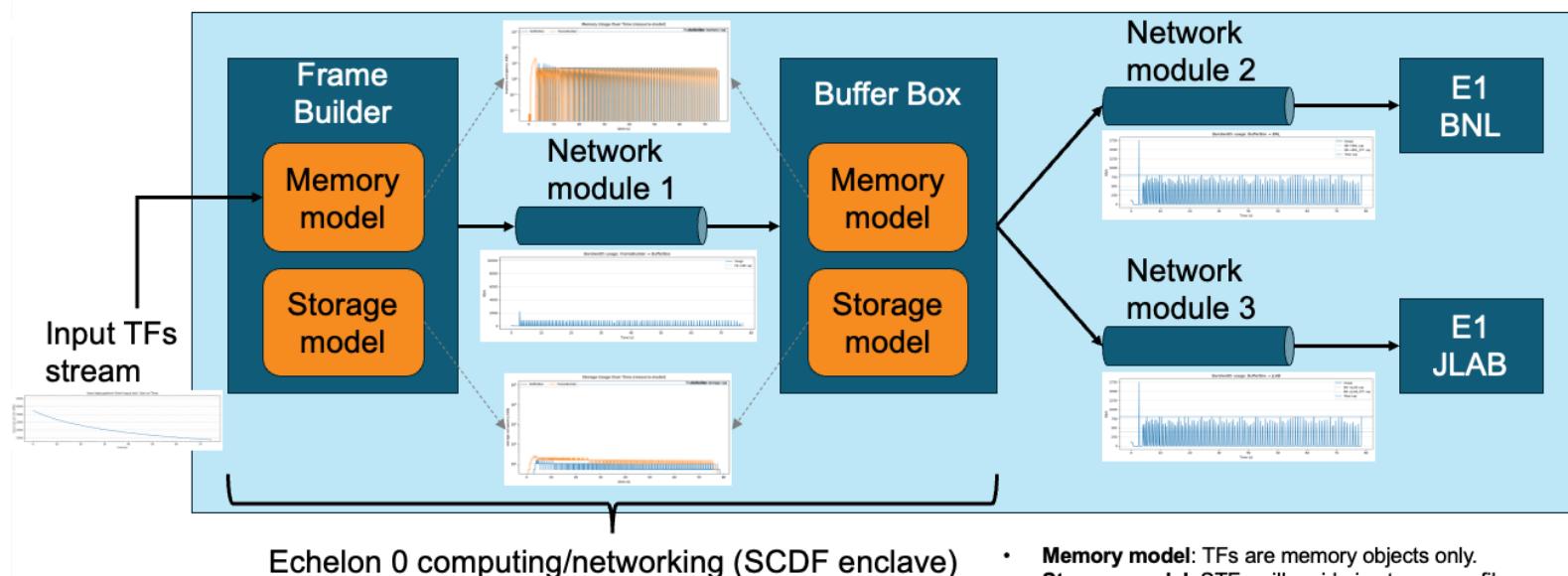
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Current Status of Modeling

- Developed a high-level E0/1 computing infrastructure simulator
 - Based on current networking/buffer estimations/requirements
 - Configurable/parameterized timing simulation



- **Memory model:** TFs are memory objects only.
- **Storage model:** STFs will reside in storage as files.
- **Network modules:** We give different parameters for different network modules.

2026 Plan: Streaming modeling

- Towards streaming modeling
 - Extend the modeling capabilities to include both streaming and file transfers.
 - Streaming modeling objectives
 - Feedback loop optimization
 - System configuration design to with set performance ranges
 - Streaming/file transfer ratio modeling
 - Evaluate resource placement and scheduling impact for important use case scenarios that involve streaming.
- Validation plan
 - Using surrogate data on available testbeds

2026 Plan: E1/E2 Use Case Scenarios

- Inclusion of computing workload modeling
 - Tunable workload characterization based on type (e.g. reconstruction/simulation) and complexity of algorithms, analysis goals
- Include Echelon 2 and inter-site network into the model
- Understand potential computing characteristics, and provide guidance for the requirements discussion for E1/2
- Workload distribution modeling among E1/2 sites: study and optimization
- Validation plan
 - Use data from WLCG (ATLAS infra.) (or OSG) as surrogate
 - Validate on surrogate, predict for EIC

Status of Computing Model

- Understanding computing use cases from WLCG
 - Focused computing types: simulation, reconstruction
- Computing model construction
 - Task execution time = $\text{func}(\text{compute}, \text{input size}, \text{cpu core}, \dots)$ as one of the possible ideal targets.
 - Leverage LLM to analysis performance impact from source code.

Analysis on WLCG workload (prod)

