Definition 1 (Device).

$$Device := (w_0, G_d(N_d, V_d, w_{\mathcal{F}}))$$

where

$$\begin{cases} w_0 = \tau_{decoherence} / \tau_{\text{2-qubit gate time}} \\ w_{\mathcal{F}}(v) = -\log\left(\bar{\mathcal{F}}_{\text{2-qubit gate on edge } v}\right) \end{cases}$$

Definition 2 (Partial Allocation).

$$Partial\ Allocation\ \phi : N \rightharpoonup N_d$$

Definition 3 (Actions and Costs). *Simple actions are*

- *Allocate:* $\phi \mapsto \phi \cup \{(n, n_d)\}$, *cost:* 0
- *Swap:* $\phi \mapsto \phi \circ \sigma_{ab}$, *cost:* $w_{\mathcal{F}}(v) + (n-2)w_0$*?*
- *Apply:* $\phi \mapsto \phi$, *cost:* $w_{\mathcal{F}}(v) + (n-2)w_0$*?*
- *Bridge??*

Plus compound actions with reduced cost

- *Compose: If a swap and an apply are on the same edge, then the cost halves.*
- *Parallelize: If* k *simple actions have no node in common, total cost will be reduced by* $(k-1)nw_0$.

Definition 4. *Applicability of* (n_1, n_2) *is checking that* $(\phi(n_1), \phi(n_2)) \in V_d$

Definition 5.

$$d(n_1, n_2) := d_w(\phi(n_1), \phi(n_2))$$

Definition 6.

$$d(\phi_1, \phi_2) := \textit{minimum cost of reaching 2 from 1 by swaps and allocations}$$

The target is to apply all $T \subseteq N \times N$. We may add some dependencies later.
The algorithm is an A*, with only branching to $t \in T$ applicable...
Best initial allocation is NP-Hard.