We are interested in topologies in which it is possible to route a packet in a fixed number of hops until it arrives at its destination. Given a constant $d$, this paper introduces a new self-stabilizing protocol for the $q$-ary $d$-dimensional de Bruijn graph ($q = \sqrt[d]{n}$) that is able to route any search request in at most $d$ hops w.h.p., while significantly lowering the node degree compared to the clique: We require nodes to have a degree of $\mathcal{O}(\sqrt[d]{n})$, which is asymptotically optimal for a fixed diameter $d$. The protocol keeps the expected amount of edge redirections per node in $\mathcal{O}(\sqrt[d]{n})$, when the number of nodes in the system increases by factor $2^d$. The number of messages that are periodically sent out by nodes is constant.