Intermingled neural connections apparent in the brain make us wonder what controls the traffic of propagating activity in the brain to secure signal transmission without harmful crosstalk. Here, we reveal that inhibitory input but not excitatory input works as a particularly useful traffic controller because it controls the degree of synchrony of population firing of neurons as well as controlling the size of the population firing bidirectionally. Our dynamical system analysis reveals that the synchrony enhancement depends crucially on the nonlinear membrane potential dynamics and a hidden slow dynamical variable. Our electrophysiological study with rodent slice preparations show that the phenomenon happens in real neurons. Furthermore, our analysis with the Fokker-Planck equations demonstrates the phenomenon in a semianalytical manner.