Description	**Inter-NS interval**
Default model, see Table 1 for parameters	954.89 (54.14)
With delays in synaptic transmission	1001.04 (4.56)
With 10% inhibitory cells	1016.30 (69.57)
With 20% inhibitory cells	1455.24 (125.30)
With 30% inhibitory cells	1198.98 (79.84)
Duration of refractory period T_{reset}=1ms	416.60 (27.23)
Duration of refractory period T_{reset}=1ms	500.20 (11.39)
Resting potential V_{rest}=0.5mV	788.81 (47.89)
Resting potential V_{rest}=1.5mV	1397.34 (95.33)
Maximal spike potential V_{spike}=90mV	1026.29 (64.87)
Maximal spike potential V_{spike}=110mV	946.58 (53.68)
Magnitude of synaptic potentiation W_+=5	887.50 (99.87)
Magnitude of synaptic potentiation W_+=15	769.92 (41.71)
Magnitude of synaptic depression W_-=90	970.26 (47.26)
Magnitude of synaptic depression W_-=110	1024.73 (70.20)
Time-course of synaptic potentiation in STDP τ_+=20	1247.01 (133.22)
Time-course of synaptic potentiation in STDP τ_+=40	869.71 (53.33)
Time-course of synaptic depression in STDP τ_-=50	1028.42 (59.49)
Time-course of synaptic depression in STDP τ_-=70	1087.26 (81.47)
Rise in postsynaptic potential τ_{rise}=0.5ms	1272.80 (130.32)
Rise in postsynaptic potential τ_{rise}=1.5ms	378.68 (20.71)
Decay of postsynaptic potential τ_{fall}=2ms	1006.93 (40.53)
Decay of postsynaptic potential τ_{fall}=4ms	1188.13 (81.15)
Spike threshold V_{thresh}=15mV	204.28 (13.46)
Spike threshold V_{thresh}=21mV	191.39 (12.37)
Tonic current I_{tonic}=0.6mV	316.07 (28.28)
Tonic current I_{tonic}=1.6mV	1298.86 (165.36)
Magnitude of postsynaptic potential V_0=3mV	1021.69 (48.50)
Magnitude of postsynaptic potential V_0=5mV	828.64 (43.33)
Reversal potential E=-70mV	1051.11 (73.20)
Reversal potential E=-50mV	1418.05 (179.48)
Magnitude of change in synaptic efficacies η=0.3	580.00 (176.20)
Magnitude of change in synaptic efficacies η=0.7	384.56 (21.68)
Randomly removing 10% of connections	1528.13 (278.17)
Stochastic noise added to membrane potential: range of [0,1]	839.87 (243.28)
Stochastic noise added to membrane potential: range of [0,10]	897.13 (140.02)
Leakage conductance g=0.005pS	89.08 (6.07)
Leakage conductance g=0.05pS	730.00 (390.64)

Supplementary Material, Table 1. Various parametric modifications do not alter the non-periodic nature of network spikes. Values in the table are averaged over inter-NS intervals. Values in parantheses are standard deviations. Each simulation lasted 5 minutes. Bootstrap reshuffling identified NSs (using time-bins of 1ms). Parameter values for the default simulation are found in Table 1 of main text. In the simulation with delays in synaptic transmission, all parameters are collapsed onto their mean, and the only source of heterogeneity among cells arises from delays in synaptic transmission (Izhikevich 2006). In simulations with inhibitory cells, a certain percentage of connections was randomly initialized to a negative value (w_{ij}=-1) and was never modified by STDP.