```
Python 3.13.5 | packaged by Anaconda, Inc. | (main, Jun 12 2025, 16:37:03) [MSC v.1929 64 bit (AMD64)]
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IPython 8.30.0 -- An enhanced Interactive Python. Type '?' for help.

In [1]: %runfile C:/Users/somen/Desktop/Project/trialruns_bogus.py --wdir
Loading graph...
Finding articulation points...
Found 1655 articulation points

Trials  |  Avg Frag | Max Frag | Min Frag
--------|-----------|----------|----------
Running 1000 multi-point failure simulations (10 APs each)...
  1000 |    18.03 |       32 |       11
Running 2000 multi-point failure simulations (10 APs each)...
  1000 |    17.92 |       33 |       11
  2000 |    17.94 |       35 |       11
Running 3000 multi-point failure simulations (10 APs each)...
  1000 |    18.03 |       36 |       11
  2000 |    18.03 |       36 |       11
  3000 |    17.94 |       36 |       11
Running 4000 multi-point failure simulations (10 APs each)...
  1000 |    18.19 |       34 |       11
  2000 |    18.12 |       35 |       11
  3000 |    18.07 |       35 |       11
  4000 |    18.04 |       35 |       11
Running 5000 multi-point failure simulations (10 APs each)...
  1000 |    18.04 |       33 |       11
  2000 |    18.11 |       35 |       11
  3000 |    18.13 |       35 |       11
  4000 |    18.09 |       37 |       11
  5000 |    18.04 |       37 |       11
Running 6000 multi-point failure simulations (10 APs each)...
  1000 |    17.97 |       37 |       11
  2000 |    17.98 |       37 |       11
  3000 |    18.05 |       37 |       11
  4000 |    18.04 |       37 |       11
  5000 |    18.04 |       37 |       11
  6000 |    18.02 |       37 |       11
Running 7000 multi-point failure simulations (10 APs each)...
  1000 |    17.98 |       34 |       11
  2000 |    18.11 |       34 |       10
  3000 |    18.09 |       35 |       10
  4000 |    18.11 |       35 |       10
  5000 |    18.10 |       35 |       10
  6000 |    18.11 |       35 |       10
  7000 |    18.11 |       35 |       10
Running 8000 multi-point failure simulations (10 APs each)...
  1000 |    17.89 |       32 |       11
  2000 |    18.03 |       36 |       11
  3000 |    18.05 |       36 |       11
  4000 |    18.09 |       36 |       11
  5000 |    18.10 |       36 |       11
  6000 |    18.07 |       36 |       11
  7000 |    18.05 |       36 |       11
  8000 |    18.05 |       38 |       11
Running 9000 multi-point failure simulations (10 APs each)...
  1000 |    18.19 |       36 |       11
  2000 |    18.25 |       36 |       11
  3000 |    18.20 |       36 |       11
  4000 |    18.21 |       36 |       10
  5000 |    18.22 |       36 |       10
  6000 |    18.19 |       36 |       10
  7000 |    18.17 |       38 |       10
  8000 |    18.15 |       38 |       10
  9000 |    18.14 |       38 |       10
Running 10000 multi-point failure simulations (10 APs each)...
  1000 |    18.16 |       33 |       11
  2000 |    18.09 |       34 |       10
  3000 |    18.04 |       36 |       10
```

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  4000 |    18.04 |       37 |       10
  5000 |    18.04 |       37 |       10
  6000 |    18.05 |       37 |       10
  7000 |    18.04 |       37 |       10
  8000 |    18.07 |       37 |       10
  9000 |    18.07 |       39 |       10
 10000 |    18.05 |       39 |       10
Running 11000 multi-point failure simulations (10 APs each)...
  1000 |    18.23 |       33 |       11
  2000 |    18.09 |       37 |       11
  3000 |    18.06 |       37 |       10
  4000 |    18.05 |       37 |       10
  5000 |    18.06 |       37 |       10
  6000 |    18.09 |       37 |       10
  7000 |    18.05 |       37 |       10
  8000 |    18.06 |       37 |       10
  9000 |    18.07 |       37 |       10
 10000 |    18.07 |       37 |       10
 11000 |    18.08 |       37 |       10
Running 12000 multi-point failure simulations (10 APs each)...
  1000 |    18.06 |       35 |       11
  2000 |    18.02 |       35 |       11
  3000 |    18.02 |       35 |       11
  4000 |    17.97 |       35 |       11
  5000 |    17.99 |       35 |       11
  6000 |    17.98 |       35 |       11
  7000 |    17.98 |       35 |       11
  8000 |    18.00 |       35 |       11
  9000 |    18.00 |       35 |       11
---------------------------------------------------------------------------
KeyboardInterrupt                         Traceback (most recent call last)
File c:\users\somen\desktop\project\trialruns_bogus.py:50
     48 # Run simulations from 1000 to 100000 in steps of 1000
     49 for trial_size in range(1000, 100001, 1000):
---> 50     result = analyze_multi_ap_failure(G, all_aps, trial_size, 10)
     52     # Stop at 100,000
     53     if trial_size >= 100000:

File c:\users\somen\desktop\project\trialruns_bogus.py:16, in analyze_multi_ap_failure(G,
all_articulation_points, num_trials, num_aps_per_trial)
     12 for i in range(num_trials):
     13     # Select unique APs for this trial
     14     aps_to_remove = random.sample(all_articulation_points, num_aps_per_trial)
---> 16     G_copy = G.copy()
     17     G_copy.remove_nodes_from(aps_to_remove)
     18     fragments = nx.number_connected_components(G_copy)

File C:\ProgramData\anaconda3\Lib\site-packages\networkx\classes\graph.py:1663, in Graph.copy(self, as_view)
   1661 G.graph.update(self.graph)
   1662 G.add_nodes_from((n, d.copy()) for n, d in self._node.items())
-> 1663 G.add_edges_from(
   1664     (u, v, datadict.copy())
   1665     for u, nbrs in self._adj.items()
   1666     for v, datadict in nbrs.items()
   1667 )
   1668 return G

File C:\ProgramData\anaconda3\Lib\site-packages\networkx\classes\graph.py:1049, in Graph.add_edges_from(self,
ebunch_to_add, **attr)
   1047     self._adj[v] = self.adjlist_inner_dict_factory()
   1048     self._node[v] = self.node_attr_dict_factory()
-> 1049 datadict = self._adj[u].get(v, self.edge_attr_dict_factory())
   1050 datadict.update(attr)
   1051 datadict.update(dd)

KeyboardInterrupt:

In [2]:
```