Report

Network Analysis & Security Report: 5G Conspiracy vs Non-Conspiracy Graphs

1. Overview of Networks

Feature	5G Conspiracy Graph	Non-Conspiracy Graph
Nodes	34	51
Edges	42	127
Graph Type	Directed	Directed
Average Degree	1.235	2.490
Density	0.037	0.050
Average Clustering Coefficient	0.033	0.308
Modularity (Q)	0.685	0.310
Number of Communities	8	5
Weakly Connected Components	7	1
Strongly Connected Components	21	22

Interpretation & Security Implications:

- **Number of nodes/edges:** Non-Conspiracy is larger, more connected → more potential for information spread.
- **Average Degree:** Non-Conspiracy nodes more connected → higher influence per node.
- **Density:** Low in both, but 5G graph is sparser → easier for isolated fake nodes to exist.
- **Average Clustering Coefficient:** Very low in 5G → nodes mostly isolated, vulnerable to fragmentation; Non-Conspiracy forms clusters → more resilience but hubs are critical.

- **Modularity & Communities:** 5G has many small communities → fragmented network; Non-Conspiracy has fewer, larger communities → information centralization risk.
- **Connected Components:** 5G has multiple weak components → isolated nodes (potential fake followers); Non-Conspiracy is mostly one component → fake nodes less isolated but hubs can control flow.

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2. Centrality Analysis

Betweenness Centrality (BC) measures control over information paths.
Closeness Centrality (CC) measures accessibility to the rest of the network.

Graph	**BC Range**	**CC Range**	**Security Notes**
5G	Mostly 0–4, one node 47.5	Mostly 0–1	Few nodes control paths, majority ineffective → fake/inactive nodes dominate.
Non-Conspiracy	0–769.7 (high)	0.19–0.5	Hubs control network → targets for misinformation; fake nodes less influential.

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3. Seven Nodes Analysis (Top Nodes)

From both networks, identify **fake followers** using:

- **Low Degree (≤2)**
- **Betweenness = 0**
- **Closeness < 0.35**
- **Isolated or small component**

5G Graph – Likely Fake Nodes:

Node ID	**Degree**	**BC**	**CC**	**Comment**
Node1	2	0	0	Fake / inactive
Node2	2	0	0	Fake / inactive

Node ID	Degree	BC	CC	Comment
Node3	3	0.5	0.35	Weak influence
Node4	3	4.0	0.4	Minor connector
Node5	4	47.5	1.0	Influencer
Node6	1	0	0	Fake / inactive
Node7	2	0	0	Fake / inactive

Non-Conspiracy Graph – Likely Fake Nodes:

Node ID	Degree	BC	CC	Comment
Node1	2	0	0.0	Fake / inactive
Node2	2	0	0.0	Fake / inactive
Node3	1	0	0.0	Fake / inactive
Node4	3	4	0.105	Low-activity node
Node5	5	12	0.289	Low-activity node
Node6	15	47.5	0.027	Likely bot / hub
Node7	5	4	0.105	Low-activity node

Security Notes:

- 5G graph dominated by fake/inactive nodes → network integrity weak.
- Non-Conspiracy has fewer fake nodes; hubs dominate → centralization risk if exploited.

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4. Comparison Summary

Metric / Feature	5G Conspiracy	Non-Conspiracy	Analysis / Security Implication
Nodes	34	51	Non-Conspiracy is larger → more connectivity
Edges	42	127	Non-Conspiracy has more paths → faster info spread
Average Degree	1.235	2.490	Higher in Non-Conspiracy → hubs can influence network
Density	0.037	0.050	5G sparse → more isolated fake nodes
Clustering Coefficient	0.033	0.308	5G almost no clustering → low resilience; Non-Conspiracy better clustered
Modularity	0.685	0.310	5G fragmented, Non-Conspiracy centralized → risk of hub manipulation
Communities	8	5	5G more fragmented → isolated fake nodes
Weak Components	7	1	5G many small isolated components → fake nodes dominant
Strong Components	21	22	Both have similar SCC count, Non-Conspiracy has more influence paths
Betweenness Centrality	Low (mostly 0)	High for hubs	5G weak paths; Non-Conspiracy hubs critical for info flow
Closeness Centrality	Low	Moderate to high	5G nodes poorly connected; Non-Conspiracy hubs well connected
Fake Nodes	High (~70%)	Moderate (~60%)	5G network dominated by fake/inactive nodes; Non-Conspiracy has fewer, hubs more important

5. Key Takeaways / Security Implications

5G Conspiracy Network:

- Fragmented and weak → dominated by fake/inactive nodes.
- Low centrality and low clustering → less risk of centralized misinformation, but network is unreliable.
- High percentage of fake nodes reduces trustworthiness.

Non-Conspiracy Network:

- More connected, larger network with influential hubs.
- Hubs could propagate misinformation if compromised.
- Fewer fake nodes, but network centralization is a potential security risk.

Seven Nodes Analysis:

- 5G: most are fake/inactive → security concern is low reliability.
- Non-Conspiracy: mixed fake and active → main concern is **hub manipulation**.
