Social Network Analysis Report

Comparison Between a 5G Conspiracy Subgraph and a Non-Conspiracy Twitter Subgraph

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1. Introduction

This report analyzes and compares two Twitter subgraphs from the WICO dataset:
(1) a misinformation community focusing on **5G conspiracy content**, and
(2) a **non-conspiracy** community representing normal user interactions.

The purpose of this analysis is to understand how misinformation networks differ structurally from normal online communities using standard Social Network Analysis (SNA) metrics generated in **Gephi**.

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2. Selected Graphs

5G Conspiracy Graph: 1
Non-Conspiracy Graph: 1i

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3. Network Metrics

3.1 Basic Structure

Metric	5G Conspiracy	Non-Conspiracy
Number of Nodes	89	58
Number of Edges	42	127
Average Degree	0.472	2.19
Graph Density	0.005	0.038
Connected Components	62	8

Average Weighted Degree	0.472	— (not provided)
Average Clustering Coefficient	0.012	0.271

3.2 Modularity & Communities

Metric	5G Conspiracy	Non-Conspiracy
Modularity Q	0.663	0.381

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4. Analysis & Interpretation

4.1 Connectivity and Interaction

The 5G misinformation network is extremely sparse:

- Only **42 edges across 89 nodes**
- Very low **average degree (0.472)**
- Very low **density (0.005)**
- **62 components**, meaning most users are isolated or form tiny disconnected pairs.

In contrast, the non-conspiracy graph shows significantly higher interaction:

- **127 edges among 58 nodes**
- **Average degree = 2.19** (almost 5× higher)
- **Density = 0.038** (7× higher)
- Only **8 connected components**, indicating much stronger overall connectivity.

Conclusion:
→ The non-conspiracy network is *much more cohesive*, while the 5G network is fragmented and disconnected.

4.2 Community Structure (Modularity)

- The 5G graph has **very high modularity (0.663)**
  → Indicates strong separation into isolated echo chambers.

- The non-conspiracy graph has **moderate modularity (0.381)**
  → Communities exist but are more open and less polarized.

Conclusion:
→ Misinformation spreads inside *tight, isolated clusters* rather than across the whole network.

4.3 Clustering & Local Structure

- **5G Clustering Coefficient = 0.012**
  → Almost no triangles, meaning users do not share mutual connections.
  → Indicates weak social cohesion.

- **Non-Conspiracy Clustering = 0.271**
  → A healthy amount of triangle formation ("friend-of-a-friend").
  → Indicates real social relationships and natural community structures.

Conclusion:
→ Normal communities show natural social behavior; misinformation networks do not.

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5. Final Comparative Summary

Aspect	5G Conspiracy	Non-Conspiracy
Connectivity	Extremely low	High
Density	Very low	Moderate
Components	Very fragmented (62)	Much more unified (8)
Modularity	Very high → echo chambers	Moderate → open communities
Clustering	Nearly zero	Strong local cohesion

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6. Conclusion

The analysis shows that misinformation networks (such as 5G conspiracy communities) differ fundamentally from normal Twitter communities.
They are:

- Highly fragmented
- Poorly connected
- Dominated by isolated clusters
- Strongly modular (echo chambers)
- Extremely weak in social cohesion

In contrast, the non-conspiracy network demonstrates:

- Higher interaction rates
- More interconnected users
- Stronger local clustering
- Fewer disconnected components

These characteristics explain why misinformation tends to circulate **within small polarized groups**, while normal information flows more naturally across larger parts of the network.