# Comparative Analysis Report of Social Networks: 5G Conspiracy vs. Non-Conspiracy

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**Date:** November 19, 2025

## 1. Introduction

This report presents a detailed comparative analysis of two distinct social networks: a network related to the **"5G Conspiracy"** and a **"Non-Conspiracy"** network. The analysis is based exclusively on the quantitative metrics calculated by the Gephi software and the qualitative visual inspection of the network structures, as presented in the provided screenshots. The goal is to understand the differences in interaction patterns and structural cohesion between communities discussing controversial content and those discussing general topics.

## 2. Methodology

The analysis relies on the direct output of the Gephi software for both networks. The following key metrics, visible in the Gephi statistics panel, form the basis of the quantitative comparison: Graph Density, Connected Components, Average Clustering Coefficient, Network Diameter, Average Path Length, and Modularity.

### Quantitative Analysis Summary (Based on Gephi Output)

The following table summarizes the main structural metrics calculated by Gephi for both networks:

| Metric | 5G Conspiracy Graph | Non-Conspiracy Graph |
|---|---|---|
| **Graph Density** | 0.005 | 0.038 |
| **Connected Components** | 62 | 8 |
| **Avg. Clustering Coefficient** | 0.012 | 0.271 |
| **Network Diameter** | 4 | 7 |

| | | |
|---|---|---|
| **Avg. Path Length** | 1.764 | 2.981 |
| **Modularity** | 0.685 | 0.396 |

# 3. Comparative Analysis and Visual Interpretation

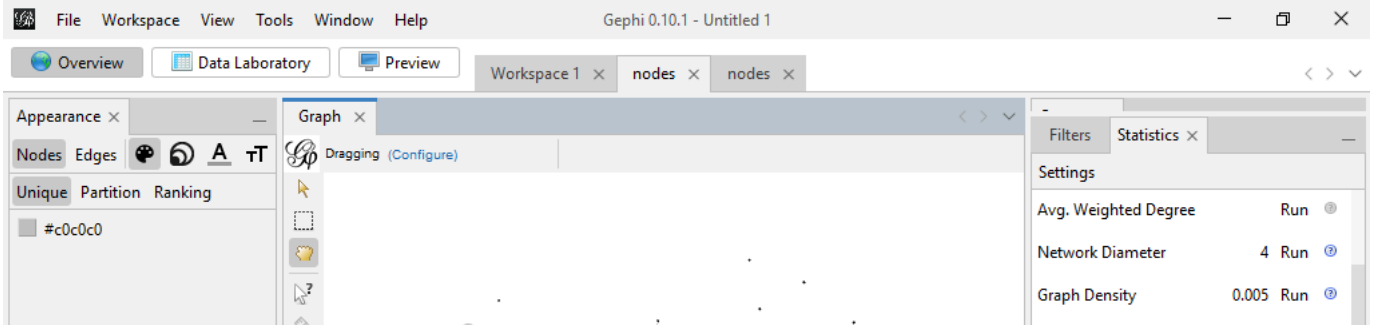
The comparison reveals stark structural differences, indicating fundamentally different interaction dynamics within the two communities.

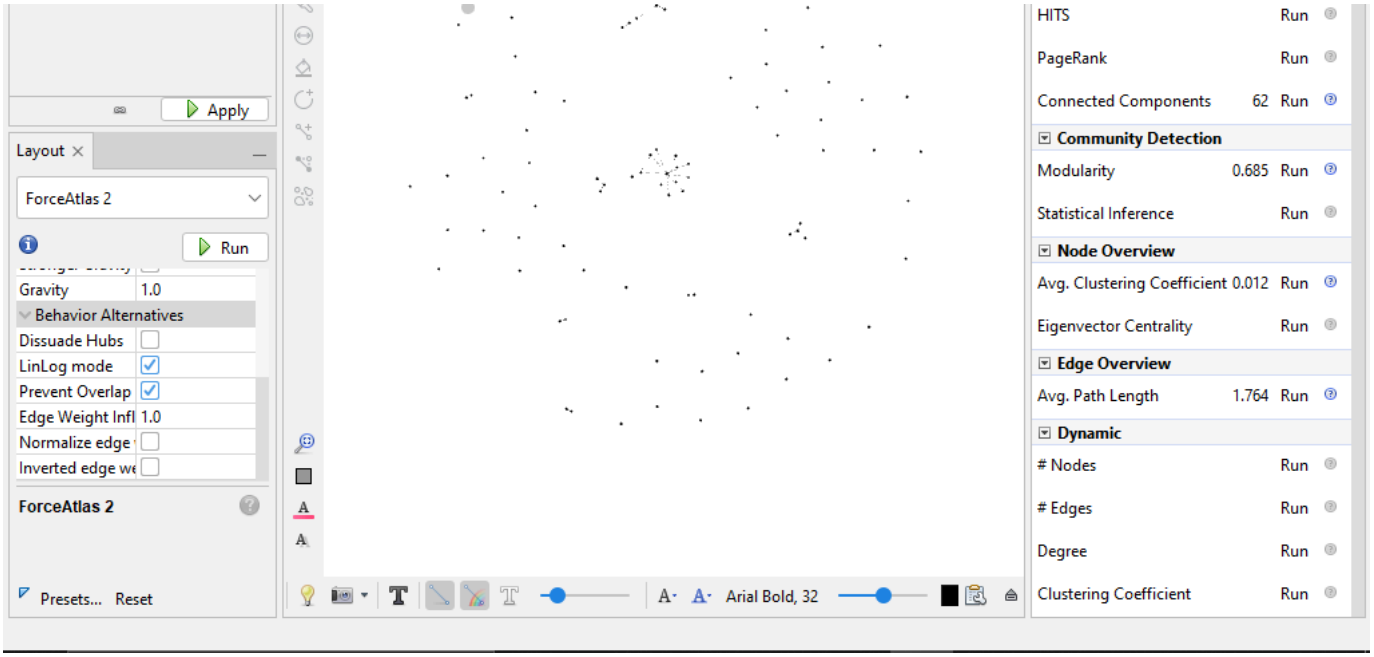
## 3.1. 5G Conspiracy Graph: Fragmentation and Isolation

The quantitative metrics for the 5G Conspiracy Graph point to a highly fragmented and sparse network, a finding strongly supported by the visual representation (Figure 1).

- **Visual Structure (Figure 1):** The graph appears as a collection of scattered, mostly isolated nodes with very few visible connections. This visual sparsity immediately confirms the low level of interaction.
- **Fragmentation:** The network is highly fragmented, evidenced by **62 Connected Components**. This means the network is broken into many small, disconnected groups, indicating a lack of a single, large, cohesive community.
- **Low Density and Cohesion:** The **Graph Density** is extremely low (0.005), confirming the visual sparsity. The **Average Clustering Coefficient** (0.012) is near zero, suggesting that interactions are primarily dyadic (between two individuals) and do not form closed, tightly-knit groups (triangles).
- **Small World Properties:** The **Network Diameter** (4) and **Avg. Path Length** (1.764) are low, but this is misleading in a highly fragmented graph. Since the graph is mostly disconnected, these metrics are calculated only on the largest connected component, which is very small, artificially lowering the path length.
- **High Modularity:** The **Modularity** is high (0.685), which indicates that the few existing connections are concentrated within a small number of distinct, isolated clusters, reinforcing the fragmented nature.

**Figure 1: Visual Representation of the 5G Conspiracy Graph (Source: Gephi Screenshot)**



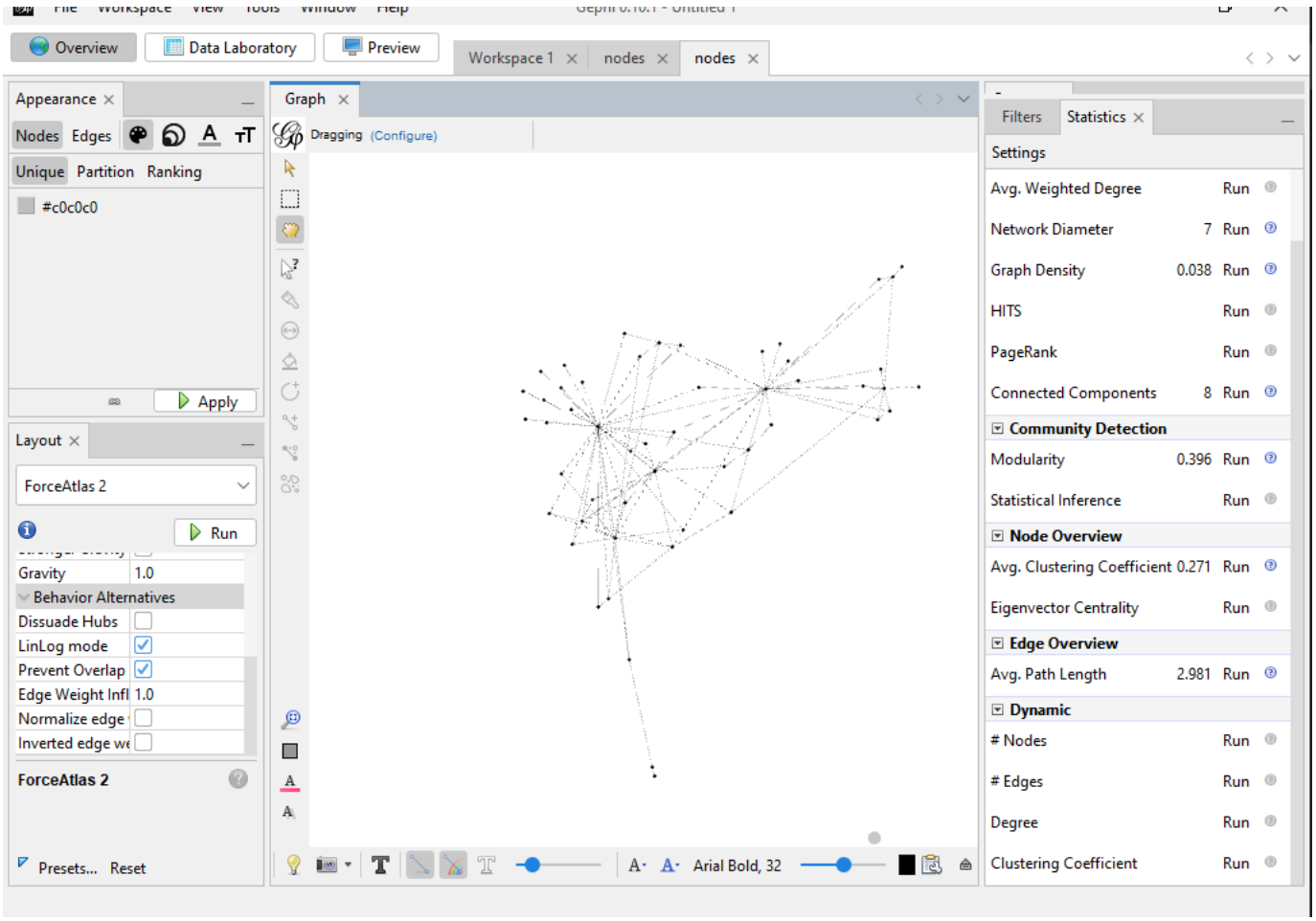



## 3.2. Non-Conspiracy Graph: Cohesion and Centrality

In contrast, the Non-Conspiracy Graph exhibits a much more cohesive and interconnected structure, as shown by both the metrics and the visual representation (Figure 2).

- **Visual Structure (Figure 2):** The graph shows a clear, interconnected core with numerous visible edges forming a dense web. The nodes are clustered together, indicating a higher level of community formation.
- **High Connectivity:** The network is far more connected, evidenced by only **8 Connected Components**. This indicates that the vast majority of nodes belong to a single, large, interconnected community.
- **Higher Density and Cohesion:** The **Graph Density** (0.038) is significantly higher than the conspiracy graph, confirming the visual density. The **Average Clustering Coefficient** (0.271) is much higher, confirming the visual observation of strong local clusters. This suggests that the community is tightly knit, and information is likely to be shared and reinforced within these local groups.
- **Small World Properties:** The **Network Diameter** (7) and **Avg. Path Length** (2.981) are higher than the conspiracy graph, which is expected for a larger, more complex, and truly connected network. The relatively short path length compared to the size of the network suggests efficient information flow.
- **Lower Modularity:** The **Modularity** is lower (0.396), which is typical for a well-connected network where communities are less isolated and there are more connections between different clusters.

**Figure 2: Visual Representation of the Non-Conspiracy Graph (Source: Gephi Screenshot)**




# 4. Conclusion

The comparative analysis reveals a fundamental difference in the structural properties of the two networks, which reflects distinct social dynamics:

| Feature | 5G Conspiracy Graph | Non-Conspiracy Graph |
|---|---|---|
| **Overall Structure** | Highly fragmented and sparse | Cohesive and interconnected |
| **Interaction Level** | Very low (low density) | Moderate to high (higher density) |
| **Community Formation** | Weak (near-zero clustering coefficient) | Strong (higher clustering coefficient) |
| **Fragmentation** | High (62 components) | Low (8 components) |
| **Community Isolation** | High (high Modularity) | Low (low Modularity) |

The **5G Conspiracy Graph** represents a community characterized by **isolated interactions and high fragmentation**, lacking a strong, cohesive core. Conversely, the **Non-Conspiracy**

**Graph** represents a **more robust and tightly-knit community** with strong local clusters and clear connectivity, facilitating more efficient and widespread information sharing. These findings are consistent with the hypothesis that fringe or conspiracy communities often exhibit a more decentralized and fragmented structure compared to more mainstream or established communities.